

**THE UNITED KINGDOM'S
FOURTH NATIONAL REPORT
ON
COMPLIANCE WITH THE
OBLIGATIONS OF THE JOINT
CONVENTION ON THE SAFETY OF
SPENT FUEL MANAGEMENT AND
ON THE SAFETY OF RADIOACTIVE
WASTE MANAGEMENT**

September 2011

Contributors to the United Kingdom's National Report

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Food Standards Agency

GE Healthcare

Health Protection Agency

Home Office

Magnox Ltd

National Nuclear Laboratory

Northern Ireland Environment Agency

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Research Sites Restoration Ltd

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Springfields Fuels Ltd

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Foreword

This report has been prepared by the United Kingdom (UK) to meet the requirement of Article 32 of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (the Joint Convention). It considers each of the Joint Convention's obligations and explains how the UK addresses them.

The report covers spent fuel management and radioactive waste management facilities as defined in Article 2 of the Joint Convention. For the purposes of this report, the UK has included spent fuel reprocessing as part of the spent fuel management. The safety of other UK nuclear facilities that fall outside the scope of the Joint Convention are also regulated to the same standards, so as to ensure that they are operated in a manner that maintains a high level of safety.

Within the UK's nuclear safety, radiation protection and environmental frameworks, there have been no significant corrective actions necessary to comply with the Joint Convention. The UK's nuclear safety licensing, radiation protection and environmental authorisation regime, together with the high priority given to safety by the UK nuclear operators, has proved to be effective in a period of great change. Furthermore, the periodic safety review requirements of the UK nuclear site licences have meant that for many years the UK has been monitoring and continuously improving the safety of its nuclear installations. Additionally, the environment agencies carry out periodic reviews of all disposal authorisations for nuclear sites to drive improvements in environmental performance. All of these activities will continue in the future to drive further improvements.

However the UK is not complacent. Safety, radiation protection and environmental challenges remain, especially in dealing with the ageing of facilities and legacy issues, and the requirement under UK law to strive for further improvement guards against such complacency. In line with these ongoing efforts, following the unprecedented events in Japan in March 2011, the Secretary of State for the Department of Energy and Climate Change asked Her Majesty's Chief Inspector of Nuclear Installations to provide a report to the Government on the implications for the UK nuclear industry of the events at the Fukushima Dai-ichi power station and to identify lessons. An interim report was published in May 2011 which focused on the UK's nuclear power plants, and the final report is expected to be published by the autumn of 2011.

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Section A

1 - Introduction

Structure of the report

A.1.1. This report explains how the nuclear installations in the United Kingdom (UK) achieve the high safety, radiation protection and environmental standards required by the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (the Joint Convention). Each Article of the Joint Convention is addressed separately in the main text of this, the UK's fourth, report. This report does not consider matters related to the safety or environmental standards of those nuclear installations that have previously been addressed by the UK's submissions for the review meetings of the Convention on Nuclear Safety, or which are outside the scope of either of these Conventions. Section C sets out the scope of the report.

A.1.2. For the purpose of this report, the term 'the Government' means the UK Government and the devolved administrations, unless stated otherwise.

A.1.3. The report summarises the UK's approach to the safety of spent fuel management (including reprocessing) and the safety of radioactive waste management, with particular emphasis on developments since the previous report. The report addresses the UK's obligations arising from the Joint Convention as shown in the Table of Contents, ordered as proposed by the "Guidelines regarding the form and structure of national reports"^[1].

A.1.4. There are a number of developments in the UK that potentially affect the way that compliance with the Joint Convention is demonstrated. The date of 30 April 2011 was adopted as the cut-off date for reporting new issues: developments subsequent to this date will be addressed in the UK presentation to the Joint Convention Review Meeting in May 2012. The exception to this is the inclusion of the key conclusions from Her Majesty's (HM) Chief Inspector of Nuclear Installation's interim report following the accident at the nuclear plant in Fukushima Dai-ichi, Japan.

Basis of the report

A.1.5. In addition to the Joint Convention itself and its associated guidelines, a number of information sources have been used to inform the structure and development of this report. These include:

- (a) 'The Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management Third Review Meeting of Contracting Parties', May 2009, Report of the President of the Review Meeting' JC/RM.3/03.
- (b) The Rapporteur's report for the United Kingdom, Country Group 4, based on the presentation in May 2009 to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.
- (c) The questions raised by other Contracting Parties on the UK's last Report in 2009, and the answers provided.

- (d) The International Atomic Energy Agency (IAEA) Technical Meeting on the 'Use of IAEA Safety Standards in the Preparation of National Reports for the Joint Convention Review Meetings', May 2011

A.1.6. All of these documents have been assessed and suggestions for improvements in the UK report have been implemented in the text where applicable.

A.1.7. In the main report, in those instances where compliance with the Joint Convention has substantially changed since the third UK report (i.e. in a way that has implications for the Joint Convention obligations) this will be noted at the beginning of the relevant Article.

A.1.8. As in previous UK reports, lists of facilities, inventories, other data and references to further information are provided in Annexes (Section L) at the end of the report. References to sources of the information used are identified thus: ^[XX] and listed at the end of this report.

A.1.9. The IAEA Standards used in the preparation of this report are as follows:

- GSR Part 1: Government Legal and Regulatory Framework for safety – General Requirements.
- GSR Part 5: Predisposal Management of Radioactive Waste – General requirements.
- WS-R-1: Near Surface Disposal of Radioactive Waste – Requirements.
- WS-R-4: Geological Disposal of Radioactive Waste – Safety Requirements.
- WS-R-5: Decommissioning of facilities using Radioactive Material – Safety Requirements.

Note, however, that the UK report to the Joint Convention does not address the issues raised by the IAEA Requirements documents on a point for point basis.

2 - General Overview and Summary of Significant Developments since the last Report

Nuclear Policy in the United Kingdom

A.2.1. Nuclear policy in the UK is addressed under several topic areas, from general issues to the specifics (e.g. radioactive discharges strategy and energy policy). At the general level, it is a UK Government policy objective that nuclear power generation should form part of the low-carbon energy mix and that the population, society and the natural environment should be protected from harmful levels of radioactivity through adequate and appropriate national measures, whether deriving from European Union (EU) directives and regulations, international agreements or from domestic legislative initiatives.

A.2.2. Specific policies for radioactive waste management, radioactive waste discharges, long-term management of high activity radioactive waste, management of low-level radioactive waste, and decommissioning are addressed in Section B, under Article 32.1(iii).

A.2.3. Following the unprecedented events in Japan in March 2011, the Secretary of State for the Department of Energy and Climate Change (DECC) asked HM Chief Inspector of Nuclear Installations to provide a report to the Government on the implications of the situation and lessons to be learned for the UK nuclear industry. The report will be prepared in close co-operation with the international nuclear community including the IAEA and Japan, and other international regulators. An interim report by HM Chief Inspector of Nuclear Installations was published in May 2011^[2], with the final, full report expected by autumn 2011.

A.2.4. The key conclusions of the interim report can be summarised as follows:

- There is no reason for curtailing the operation of UK operating sites, although the founding principle of continuous improvement will continue to be applied.
- The UK industry reacted and responded to the events in Japan both responsibly and appropriately.
- There are no weaknesses in the UK nuclear licensing regime or the safety assessment principles that underpin it. Additionally the Government's intention to create the Office for Nuclear Regulation (ONR), currently an Agency of the Health and Safety Executive (HSE), in statute will further enhance confidence in the UK's regulatory regime.
- The regulatory body does not see a need to alter the UK siting strategy in relation to new build sites and does not believe that flooding risks would prevent construction at the potential development sites.
- There is no reason to depart from a multi-plant site concept.
- There is no evidence to suggest that the presence of mixed oxide fuel in Fukushima Dai-ichi Reactor 3 significantly contributed to the health impact of the accident.

A.2.5. The interim report also included 26 recommendations identifying areas that ONR considers should be reviewed in order to determine whether there are any

further reasonably practicable improvements that can be made to enhance the safety of the UK nuclear industry. The main conclusions of the interim report are provided in more detail in Sections K.2 to K.5.

Policy Developments in the United Kingdom

New nuclear power plant in the UK

A.2.6. The UK Government's view is that nuclear power is low-carbon, affordable, dependable, safe and capable of increasing diversity of energy supply, and that it should continue to form part of the UK's energy mix, with new nuclear power stations generating electricity from around 2018. This policy applies to England and Wales only, although decisions on new nuclear power stations in Wales are not devolved to the Welsh Government but are taken by the Secretary of State for DECC. The Welsh Government considers that the high level of interest in exploiting the huge potential for renewable energy reduces the need for other, more hazardous, forms of low carbon energy and obviates the need for new nuclear power stations in Wales. The devolved Scottish Government does not support any new nuclear power stations in Scotland.

A.2.7. It will be for energy companies to fund, develop and build new nuclear power stations in the UK, including meeting the full costs of decommissioning and their full share of waste management and disposal costs. However, the Government has a strategic role in removing unnecessary obstacles to the development of new nuclear power stations and in particular, delivering on the following four facilitative actions:

- Regulatory Justification decisions on two new nuclear reactor designs, Westinghouse's AP1000 and Areva's EPR. The decisions were approved by the UK Parliament in November 2010 and have been given effect by two Statutory Instruments: The Justification Decision (Generation of Electricity by the AP1000 Nuclear Reactor) Regulations 2010, and The Justification Decision (Generation of Electricity by the EPR Nuclear Reactor) Regulations 2010^[3];
- Securing Parliamentary ratification of a draft Nuclear National Policy Statement (NPS)^[4]. The draft Nuclear NPS includes a list of potentially suitable sites as well as setting out the Government's preliminary conclusion that it is satisfied that effective arrangements will exist to manage and dispose of the waste that will be produced by new nuclear power stations in England and Wales;
- Ensuring that the regulators (ONR and the Environment Agency) have the ability to maintain the level of resource needed to deliver a meaningful end to the Generic Design Assessment (GDA) of the new nuclear reactor designs. It had been intended that this would be in June 2011, but as HM Chief Inspector's interim and final reports on the implications for the UK of the Fukushima incident could affect the conclusions of the GDA, this date will be delayed to enable account to be taken of relevant recommendations;
- Finalising arrangements to ensure that new nuclear operators set aside sufficient money from the outset to pay for waste and decommissioning.

A.2.8. The UK Government consulted^[5] between December 2010 and March 2011 on fundamental reforms to the electricity market to ensure that the UK can meet its

climate goals and have a secure, affordable supply of electricity in the long term and the responses are currently being assessed.

Regulating new build

A.2.9. The UK's approach to regulating new build nuclear power plants, including GDA, is set out in detail in the UK's Fifth National Report on Compliance with the Convention on Nuclear Safety (CNS)^[6] (the 'fifth UK CNS report') obligations published in September 2010. The main points on the licensing strategy and the GDA process are summarised in this section below.

A.2.10. Licensing of nuclear installations for new nuclear power reactors in England and Wales will follow the standard legal and regulatory processes described in the fifth UK CNS report under Article 7, and detailed in the document 'The licensing of nuclear installations'^[7] published in March 2007.

A.2.11. The document 'The licensing of nuclear installations', which is currently being updated along with other guidance, addresses the law, the regulatory regime, and the nuclear licensing and de-licensing processes. It provides basic regulatory information and links to other reference documents that potential licensees need to be aware of.

A.2.12. The GDA process consists of four 'steps', with the assessment becoming increasingly detailed at each stage. Technical reports are produced after each step, which provide an indication of how the assessment is progressing and highlighting potential issues that will need to be resolved during the following step. The four steps are:

- Step 1: Design and safety case submission, involving putting the formal agreements in place to carry out the assessment (August - September 2007)
- Step 2: Fundamental Safety Overview of the reactor design safety case, consisting of a short review of the acceptability of the safety aspects of the proposed reactor design (September 2007 - March 2008)
- Step 3: Overall design safety review, involving a more in-depth safety assessment of the case submitted (June 2008 - November 2009)
- Step 4: Detailed assessment leading to potential acceptance of the adequacy of the safety features of the design, examining all relevant aspects of the submission, including relevant inspection of an applicant's procedures and records and some verification analysis (November 2009 – to an end date, originally June 2011, but which has now been delayed to allow proper consideration of the implications of the Fukushima accident).

A.2.13. Following the commissioning of HM Chief Inspector's report on lessons to be learned from the Fukushima Dai-ichi accident, the parties involved in the GDA process (regulators and industry) agreed to extend the timetable of GDA in order to consider the final findings of the report. A seven stage plan was agreed and published in the regulators' Quarterly Progress Report in May 2011^[8].

Planning reform

A.2.14. In the UK, obtaining planning permission for major infrastructure projects has often been a somewhat bureaucratic and slow process. In the early 1980s the planning process for UK's last nuclear power plant, Sizewell B, took over three years.

A.2.15. To streamline the planning process for major infrastructure projects in England and Wales, the need for fundamental reform of the planning system was identified by the Government, and the process was commenced with the introduction of the Planning Act 2008^[9], which provides for a more efficient, transparent and accessible planning system. The current UK Government, which took office in May 2010, supports this reform, although it has announced its intention to make some changes to introduce greater democratic accountability. Whereas the Planning Act 2008 provided for development consent for nationally significant infrastructure to be administered by a new independent body, the Infrastructure Planning Commission (IPC), the UK Government announced in 2010 that this un-elected body would be abolished. A new body, the Major Infrastructure Planning Unit, will be established within the Planning Inspectorate, an agency of the Department of Communities and Local Government, to hear examinations, but decisions will be taken by Ministers. These changes require legislation and therefore in the interim the IPC will continue to operate as the Planning Act 2008 provides. It should be noted that this new planning process applies to major infrastructure projects, and is not confined only to nuclear power plants (NPPs): it is entirely separate from the nuclear licensing process.

A.2.16. The draft Energy National Policy Statements^[4] will provide a basis for decisions on applications for development consent for all major energy infrastructure projects. The two that are relevant to the development of new NPPs are:

- the Overarching Energy NPS, that sets out the UK Government's energy policy. It explains the need for new energy infrastructure and how the impacts of energy infrastructure development in general should be assessed; and
- the Nuclear NPS, that contains supplementary information specific to nuclear installations. The list of potentially suitable sites for the deployment of new nuclear power stations was an output of the Government's Strategic Siting Assessment (SSA) process^[10]. The details of the SSA criteria and process are addressed in the fifth UK CNS report.

Managing radioactive waste safely

A.2.17. In October 2006 the Government accepted the recommendation from the Committee on Radioactive Waste Management's (CoRWM) that the best available approach for the long-term management of higher activity radioactive waste is geological disposal, preceded by safe and secure interim storage.

A.2.18. In June 2008, following public consultation, the UK Government and devolved administrations for Wales and Northern Ireland published a White Paper, 'Managing Radioactive Waste Safely: A Framework for Implementing Geological Disposal'^[11]. This sets out a staged framework for implementing geological disposal based on voluntarism and partnership with local communities.

A.2.19. The Managing Radioactive Waste Safely (MRWS) 2008 White Paper^[11] set out a staged process for implementing geological disposal with the first stage being an invitation issued for expressions of interest from communities to open up without commitment discussions with Government. Following the White Paper, the Welsh

Government reserved its position on the policy of geological disposal, however it confirmed that it would continue to play a full part in the MRWS programme in order to ensure that the interests of Wales were taken into account. The Scottish Government decided to opt out of the MRWS programme saying it did not support disposal of higher-activity wastes in a geological repository.

A.2.20. The UK Government has set up the Geological Disposal Implementation Board chaired by a Minister to provide oversight of the MRWS programme as well as enabling stakeholders to provide input to, or to observe, the programme. The UK Government has also developed a high-level indicative timeline for the programme^[12], setting out indicative timescales and milestones leading to the estimated first consignment of waste to a geological disposal facility in 2040.

Scottish Government higher-activity radioactive waste policy

A.2.21. The Scottish Government published its policy on higher-activity radioactive waste in January 2011^[13] that the long-term management of higher-activity waste (HAW) should be in near-surface facilities. Facilities should be located as near as possible to the site where the waste is produced, and developers will need to demonstrate how the facilities will be monitored and how waste packages, or waste, could be retrieved. All long-term waste management options will be subject to robust regulatory requirements.

A.2.22. However, the Scottish Government continues to support the CoRWM recommendations for a robust programme of interim storage for higher-activity wastes and an ongoing programme of research and development and continues to endorse the UK-wide low-level waste policy (LLW) published in March 2007^[14].

Dounreay radioactive waste substitution policy

A.2.23. The Scottish and UK Governments consulted on a proposed policy of radioactive waste substitution for the radioactive waste arising from historic fuel reprocessing contracts with overseas customers at Dounreay. Radioactive waste substitution means that, instead of returning to customers the radioactive waste arising from their reprocessing contracts, a radiologically equivalent amount of radioactive waste will be returned instead. This radioactive waste could be from another facility within the Nuclear Decommissioning Authority's (NDA's) estate. The consultation ended in March 2011 and the responses are currently being assessed.

UK integrated waste strategy and plan

A.2.24. The NDA has responsibilities for the effective management of radioactive waste within its UK-wide estate. Government has also made NDA responsible for developing and implementing a UK-wide strategy for nuclear industry LLW and for implementing geological disposal of HAW, which extends its responsibility outside its own estate in these areas.

A.2.25. The achievement of risk reduction by waste retrieval and immobilisation is NDA's chief priority. However, it also has wider responsibilities to secure optimum waste management practice in terms of safety, environmental protection, security and value for money.

A.2.26. In 2009 NDA published the report 'Integrated Waste Management Overview 2009'^[15] that sets out its strategy for management of radioactive waste. This report indicates that NDA will take a coherent estate-wide and UK-wide approach to NDA operations and that it intends that its integrated waste strategy (IWS) will achieve that

aim and complement the integrated waste strategies that are produced on a site-by-site basis.

A.2.27. The production of the report, together with other waste strategy work, addressed a commitment made in NDA's 2006 published 'Strategy to develop a UK IWS'^[16]. The position set out in this overview document was further developed and refined in the Integrated Waste Management theme section of NDA's 2011 Strategy^[17].

Bulk quantities

A.2.28. Section 1 of the Nuclear Installations Act 1965 (NIA65)^[18] and the Nuclear Installations Regulations 1971^[19] refer to the term 'bulk quantities' in relation to both the storage and disposal of radioactive matter. A clearer definition of this term is being developed to clarify the regulatory position relating to radioactive waste storage facilities and to address future expectations regarding the licensing of the proposed Geological Disposal Facility.

A.2.29. In relation to storage activities, ONR has proposed the following definition for 'bulk quantities' of radioactive waste:

"A quantity of radioactive material exceeding one hundred times the levels set out in Schedule 2 of the Radiation (Emergency Preparedness and Public Information) Regulations 2001 (REPPIR). Where multiple isotopes are present the formula provided in REPPIR Schedule 2 applies".

ONR believes this definition to provide a proportionate and transparent approach to regulating the storage of radioactive matter and plans to begin a public consultation in the summer of 2011.

Revised low-level waste management policy and new strategy for the management of solid low-level waste

A.2.30. The 'UK Strategy for the Management of Solid Low-Level Radioactive Waste from the Nuclear Industry' (the LLW Strategy)^[20] was prepared for the UK Government and devolved administrations by NDA in response to the 2007 'Policy for the Long-Term Management of Solid Low-Level Radioactive Waste in the United Kingdom'^[14].

A.2.31. Publication of the final strategy followed a consultation, which ran from June to November in 2009, on the draft strategy and its accompanying Strategic Environmental Assessment. Responses were received from a wide range of parties, including regulators, Local Authorities from across the UK, supply chain companies and other interested groups.

A.2.32. The strategy targets better application of the waste management hierarchy to reduce the amount of solid low-level radioactive waste generated and reduce reliance on disposal. The objective is to ensure continued capability and capacity for the safe, secure and environmentally responsible management and disposal of LLW in the UK.

A.2.33. The strategy sets out the preference for managing LLW more effectively at higher levels of the hierarchy, which will mean a move away from the past focus on disposal. Where the preference for higher levels of the waste hierarchy cannot be met and disposal is necessary, it must be optimised to minimise the overall impact of LLW management on people and the environment. The principles outlined in the

strategy are being actively employed by waste producers across the UK and the benefits of applying the waste hierarchy are being realised.

A.2.34. The LLW Strategy requires that managing LLW should not be separated from managing other radioactive wastes and non-radioactive wastes (controlled wastes) and implementation requires an integrated waste management approach. The NDA will continue to provide strategic leadership with regard to the strategy's implementation.

Committee on Radioactive Waste Management

A.2.35. The Committee on Radioactive Waste Management (CoRWM) was reconstituted in 2007 to provide independent scrutiny and advice to Government Ministers on the long-term management, including storage and disposal, of radioactive waste. The Chair and twelve members of CoRWM were reappointed for a second term of office by sponsor Ministers from DECC and the devolved administrations. Its 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.

A.2.36. The Committee undertakes a three-year rolling programme of work and the proposed programme for 2011-2014 is available on CoRWM's website (see Annex L.10).

A.2.37. During 2009 CoRWM published three reports^[21,22,23], to which the Government has responded^[24,25,26], on:

- interim storage of higher-activity wastes;
- Geological disposal of higher-activity radioactive wastes; and
- National research and development for interim storage and geological disposal of higher-activity radioactive wastes and nuclear materials.

International Framework for Nuclear Energy Cooperation

A.2.38. In June 2010 the Global Nuclear Energy Partnership was replaced by the International Framework for Nuclear Energy Cooperation (IFNEC)^[27]. Its objectives are the promotion of safe, responsible nuclear development while reducing volumes of waste and the risk of nuclear proliferation. The UK is continuing to play a positive role to ensure that IFNEC considers the whole fuel cycle, including radioactive waste management and decommissioning. It provides both practical support and knowledge/experience to the two IFNEC working groups on infrastructure development and reliable nuclear fuel services. In particular, it shares the chairing of the infrastructure development working group and leads the radioactive waste management subgroup.

UK strategy for radioactive discharges

A.2.39. In July 2009, the Government and devolved administrations published the revised 'UK Strategy for Radioactive Discharges' (the 2009 Discharge Strategy)^[28]. The revised Strategy builds on and widens the scope of the 2002 Discharge Strategy, bringing all information on radioactive discharges into one place. The 2009 Discharge Strategy covers the period up to 2030, includes aerial as well as liquid discharges from operational and decommissioning activities and includes both the nuclear and non-nuclear sectors. The progressive reduction of discharge targets and

of actual discharges is a central tenet of the way in which radioactive discharges are controlled, and has been a feature of UK policy since 1993.

A.2.40. Also in July 2009, the Government issued statutory guidance to the Environment Agency concerning the regulation of radioactive discharges into the environment^[29]. The Scottish Government had already issued, in May 2008, similar statutory guidance^[30] to the Scottish Environment Protection Agency (SEPA). Further information is given in Sections B.20 to B.22.

Standardised reporting of radioactive discharges

A.2.41. In May 2010, SEPA and the Environment Agency published joint guidance on “Standardised Reporting of Radioactive Discharges from Nuclear Sites”^[31]. The guidance is designed to support practicable implementation in the UK of parts of the European Commission (EC) Recommendation (2004/2/Euratom)^[32] on standardised information on radioactive airborne and liquid discharges into the environment from nuclear power reactors and reprocessing plants in normal operation. The guidance is not mandatory, but the environment agencies expect it to be followed in the following situations:

- New facilities or new discharge reporting systems.
- Where there is a net benefit (e.g. costs to implement a new discharge reporting system are less than cost savings from introducing new assessment methods).
- Where the costs are not significant or are broadly similar to the benefits.

A.2.42. The guidance provides a consistent regulatory approach for reporting of discharges from these types of nuclear sites and ensures that discharges from different nuclear sites can be compared. It sets out good practice for nuclear operators on how they should assess discharges for reporting to the environment agencies. The guidance will lead to more realistic assessments of discharges and doses; which will provide a better evaluation of compliance with the 2009 Discharge Strategy^[28] changes.

Shipment of radioactive waste and spent fuel

A.2.43. The Transfrontier Shipment of Radioactive Waste and Spent Fuel Regulations 2008^[33] came into force in December 2008 and revoke and replace the Transfrontier Shipment of Radioactive Waste Regulations 1993^[34]. The Regulations apply across the UK and extend the scope of regulation to cover shipments of spent nuclear fuel that are sent for reprocessing (the recovery of reusable uranium and plutonium), in addition to shipments of radioactive waste. The Regulations are administered in the UK by the Environment Agency in England and Wales, SEPA in Scotland, and the Northern Ireland Environment Agency (NIEA) in Northern Ireland.

A.2.44. The Regulations implement Council Directive 2006/117/Euratom^[35] on the supervision and control of shipments of radioactive waste and spent fuel and continue to implement Council Directive 96/29/Euratom^[36] laying down basic standards for the health of workers and the general public against the dangers arising from ionising radiation. One of the objectives of Council Directive 2006/117/Euratom is to bring shipments of spent fuel for reprocessing within the scope of the Euratom control regime to ensure consistency with the Joint Convention. Further information is in Section I of this report.

European Council Directive on Nuclear Safety

A.2.45. The European Council Directive 2009/71/Euratom^[37] of 25 June 2009 (the 'Nuclear Safety Directive') establishing a Community framework for the nuclear safety of nuclear installations was adopted in July 2009 by publication in the Official Journal. The Nuclear Safety Directive is intended to establish a Community framework to maintain and promote the continuous improvement of nuclear safety and its regulation, and to ensure that Member States provide appropriate national arrangements for high levels of safety to protect workers and the general public. Spent nuclear fuel storage facilities and storage facilities for radioactive waste that are on the same site and are directly related to nuclear installations fall within the scope of the Directive. The UK will transpose the Directive by July 2011.

Proposed European Council Directive (EURATOM) on the Management of Spent Fuel and Radioactive Waste

A.2.46. The European Commission published its proposal for a Council Directive on the management of spent nuclear fuel and radioactive waste in November 2010^[38]. The proposal follows on from the Nuclear Safety Directive^[37]. The Scope and Content of the proposal are currently being negotiated by Member States of the European Union. The draft Directive, once agreed by Member States, will be transposed into domestic legislation two years after the date of publication in the Official Journal.

A.2.47. The aim of the draft Directive is to establish a Community framework for ensuring the responsible and safe management of spent nuclear fuel and radioactive waste arising from both the nuclear and non-nuclear sectors. It will apply to all stages of spent nuclear fuel management and all stages of radioactive waste management, from generation up to disposal, and will cover spent fuel and radioactive waste storage and disposal facilities, including those located on and directly related to nuclear installations. The draft Directive is based on the principles and requirements laid down by the Joint Convention and intends to make some of them legally binding and enforceable under EU law. The UK has a robust legal and regulatory regime in place and is in a strong position to implement the requirements of the proposed Directive.

Environmental Permitting Regulations

A.2.48. In April 2010, the Environmental Permitting (England and Wales) Regulations 2010 (EPR10)^[39] came into force. EPR10 replaces the Radioactive Substances Act 1993 (RSA93)^[40] in England and Wales and is implemented by the Environment Agency. RSA93 remains in force in Scotland and Northern Ireland and is implemented by SEPA and the Northern Ireland Environment Agency respectively.

A.2.49. EPR10 does not change the nature or scope of radioactive substances regulation in England and Wales. One important change was that authorisations and registrations granted under RSA93 automatically became "environmental permits" – no action was required by operators. There were also some procedural changes relating to, for example, application forms, inter-site transfers of radioactive waste, and transfer and surrender of environmental permits.

A.2.50. EPR10 provide a power for the Environment Agency to implement staged regulation of geological disposal facilities. Under staged regulation, a developer would require an environmental permit to start intrusive site investigation, such as

borehole drilling, at a candidate site for a geological disposal facility. This power is not available under RSA93.

A.2.51. Radioactive substances regulation is a UK-wide regime. The Environment Agency is working with SEPA and NIEA to ensure a consistent approach is maintained across the UK.

Implementation of the Groundwater Daughter Directive 2006

A.2.52. European Council Directive 2006/118/EC on the protection of groundwater against pollution and deterioration (the Groundwater Daughter Directive)^[41] requires Member States or their competent authorities to determine which substances should be determined as hazardous on the basis of their toxicity, persistence and capacity to bio-accumulate – i.e. positive determination rather than removal from a pre-determined list. Due to their nature, it is considered that all radioactive substances are to be regarded as hazardous substances for the purposes of the Directive.

A.2.53. The requirements on discharges of radioactive substances under the Groundwater Daughter Directive are implemented through EPR10 in England and Wales and through RSA93 in Scotland and Northern Ireland. EPR10 and RSA93 require the UK environment agencies to take all the necessary measures to prevent direct or indirect discharges of hazardous substances to groundwater. For a discharge to be construed as direct, there will have been an input to groundwater with no percolation through the soil or ground or other natural or artificial barrier. This includes, for example, an engineered barrier or geological barrier in the case of solid waste disposal facilities. An indirect input to groundwater is one where the input to groundwater occurs via percolation (seepage) through the soil or subsoil, including through the unsaturated zone of the aquifer in which the groundwater occurs or through a natural or engineered barrier.

A.2.54. A clear objective of the Groundwater Daughter Directive is to prevent the input of all hazardous substances into groundwater. Interpretation of 'prevent' is important in this context and is interpreted having regard to the Common Implementation Strategy guidance issued by the European Commission^[42]. This recognises that, whilst the aim is to avoid the introduction of hazardous substances into groundwater, it may not be technically feasible to stop all inputs of hazardous substances. There must also be consideration of whether the input is environmentally significant. An environmentally insignificant input into groundwater would be one that could not have any effect on:

- (i) any of the receptors noted in Water Framework^[43] /Groundwater Daughter Directive definition of pollution;
- (ii) the chemical status of a groundwater body; or
- (iii) could give rise to a significant and sustained rising trend in the concentrations of pollutants in groundwater.

A.2.55. For radioactive substances, in addition to environmental significance, consideration also needs to be given to the significance of any input in respect of the radiation doses which might be received by people and non-human species. Radiation doses may arise due, for example, to plausible future abstractions of drinking water and to natural processes involving the return of groundwater to the other environmental media. When considering which measures are "reasonable" to prevent inputs of radioactive substances to groundwater, the radiation protection principle of optimisation also needs to be observed. It is also necessary to manage

radiological risks to non-human species together with any non-radiological hazards associated with radioactive waste.

A.2.56. For disposals of any solid wastes, absolute and indefinite containment of pollutants within a disposal facility will not be achievable. At some point after a disposal facility has closed, there will eventually be some inputs into groundwater. These facilities should be designed such that the long term inputs of hazardous substances to groundwater will be insignificant from an environmental and human health perspective.

Budgetary effects on nuclear decommissioning

A.2.57. The budgetary settlement for the NDA, as set out in Appendix 5 of its Business Plan 2011-2014^[44], recognises the importance of tackling the UK's nuclear legacy waste. Funding for tackling this waste (made up of both grant and commercial income) is being maintained at around £3 billion a year. This will enable the NDA to maintain progress on decommissioning, with the main focus being on maintaining safety and processing the high hazard materials into a passively safe form. From financial years 2011/12 to 2013/14, NDA's commercial income is projected to decline, while the expenditure required to tackle the legacy is fixed or rising. Direct Government funding has increased from £1.1 billion in 2005/06 to £1.7 billion in 2010. This will rise to more than £2 billion a year from 2011/12 to 2014/15.

Remediation

A.2.58. In March 2011 the UK Government and the Scottish Ministers approved the NDA 2011 Strategy (more detailed information on the Strategy is provided in Sections A.2.85 to A.2.90). The approval of the Strategy follows an extensive period of engagement with stakeholders during 2009 and 2010, including a formal consultation exercise undertaken between September and November 2010. It is a statutory document which sets the direction for delivering the nuclear clean-up programme. Hazard reduction is a top priority for the NDA and resources are focused on the most challenging facilities at Sellafield. The work on managing the nuclear legacy, including NDA's performance and delivery, is Ministerially led. The Minister is supported in these activities by the Shareholder Executive and regularly meets with NDA and the independent regulators to monitor delivery of the Strategy and the associated targets for decommissioning identified in the NDA Business Plan (see also Sections A.2.87 to A.2.90). The Shareholder Executive was set up in September 2003 to work with shareholder Departments in Government to improve fundamentally the Government's capabilities and performance as a shareholder, especially in relation to Government-owned assets, such as the NDA estate.

Other developments in radioactive waste management

A.2.59. The latest issue of the three yearly UK Radioactive Waste Inventory (UKRWI 2010)^[45], with a stock date of 1 April 2010, was published in March 2011. Information can be found on the NDA website (see Annex L.10 of this report).

A.2.60. In February 2009, the environment agencies published revised Guidance on Requirements for Authorisation of Near-surface Disposal Facilities^[46] which applies across the UK, and separate Guidance for Authorisation of Geological Disposal Facilities^[47], which applies in England, Wales and Northern Ireland. These guidance documents apply only to disposal of solid radioactive waste.

A.2.61. SEPA did not sponsor the guidance for geological disposal because the Scottish Government policy is that the long-term management of higher-activity

radioactive waste should be in near-surface facilities and these facilities should be located as near to the site where the waste is produced as possible. Developers will need to demonstrate how the facilities will be monitored and how waste packages, or waste, could be retrieved. All long-term waste management options will be subject to robust regulatory requirements.

A.2.62. A review of the 18 Exemption Orders^[48] made under RSA93/EPR10 has been completed and will culminate in the introduction of new legislation that will amend the definition of radioactive material and waste in RSA93/EPR10. Also, there will be a single new exemption order to replace the current 18 Exemption Orders, whilst at the same time maintaining appropriate protection of human health and the environment. The review is expected to be implemented in legislation that will come into force throughout the UK by October 2011.

Transport regulation changes

A.2.63. Since the third UK Joint Convention report, the legislation applicable for rail and road transport of radioactive material has been updated in 2009 and 2011. The European Parliament and Council Directive on the inland transport of dangerous goods was transposed into UK legislation in 2009 by The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009^[49]. These remain valid with additional amending regulations which will come into force on 1 July 2011. Further details are in Section E.39

Organisational Developments

Creation of the Department of Energy and Climate Change

A.2.64. The Department of Energy and Climate Change (DECC) was established in October 2008, bringing together responsibility in Government for energy and climate change for the first time. Its creation reflected the growing importance of these issues and the close links between them. DECC's priorities are to tackle climate change, ensure energy security, and maximise the benefits of the transition to a low-carbon economy. Achieving these goals in the short, medium and long term, and doing so in a way that is acceptable to the public, is a major challenge. The responsibility for the regulatory framework on radioactive substances, formally the responsibility of the Department of Environment, Food and Rural Affairs (Defra), now falls within DECC's remit.

A.2.65. DECC's Office for Nuclear Development is responsible for taking forward the Department's objectives for the safe management of spent fuel and radioactive waste that were formerly the responsibility of Defra and the Department for Business, Enterprise and Regulatory Reform.

A.2.66. The Office for Nuclear Development has a key mission to facilitate new nuclear investment in the UK and specifically to:

- enable operators to build and operator new nuclear power stations in the UK from the earliest possible date and to enable the new nuclear power stations to make a full and safe contribution to the country's energy needs;
- ensure that the UK is an appropriate place for companies to invest in new nuclear power with unnecessary obstacles removed; and
- maximise the ability of UK firms to take advantage of the UK and worldwide nuclear programme.

Creation of the Office for Nuclear Regulation

A.2.67. In the Nuclear White Paper (January 2008)^[50], the UK Government announced it would be working with the regulators of the nuclear industry to explore ways of enhancing further the transparency and efficiency of the regulatory regime, without diminishing its effectiveness, in dealing with the challenges of new nuclear power stations. Dr Stone, an advisor to Government Ministers, was appointed to carry out the review of the current nuclear regulatory environment to ensure that it is in line with the Government's ambition to make the UK a world leader in the safe, efficient use of nuclear energy, including a highly efficient and effective regulatory system.

A.2.68. In undertaking this review, Dr Stone discussed with a range of people the issues confronting the then HSE's Nuclear Directorate (ND). These discussions included representatives of the nuclear industry, Government Departments, and the regulator itself.

A.2.69. The review focused on ND, and paid particular attention to their ability to undertake work relating to new nuclear build, the most immediate aspect of which was the process of GDA. Dr Stone's final report (the Stone Report) was delivered to the UK Government, and a summary of the findings was published in January 2009^[51]. The complete report was later published in December 2009^[52], and a more detailed discussion of its content was given in the fifth UK CNS Report^[6].

A.2.70. In February 2011 the UK Government announced its intention to bring forward legislation to create a new independent nuclear regulator, the Office for Nuclear Regulation (ONR). ONR, which was formed on 1 April 2011 as an Agency of HSE, will function as a sector-specific regulator of the nuclear industry. It has taken on the relevant functions previously carried out by HSE and the Department for Transport's Radioactive Materials Transport Team (DfT-RMT), which is responsible for the transport of radioactive, material by road, rail or inland waterway, thereby bringing together civil nuclear and radioactive transport safety and security regulation into one place. ONR will retain the best of current practice while creating a modern regulator based on the principles of transparency, accountability, proportionality and consistency. The establishment of ONR will allow improvements in:

- Independence;
- Flexibility; and
- Accountability/Transparency.

A.2.71. As an interim measure and until the legislation can be enacted, ONR was established as an Agency of the wider HSE on 1 April 2011, signalling the Government's commitment to securing an appropriately resourced and responsive regulator for the future challenges of the nuclear industry. ONR has its own interim Board consisting of both non-executive and executive members.

A.2.72. When the legislation comes into force (expected to be in April 2013) and the ONR becomes a separate statutory body, it will formally be responsible in law for delivering its regulatory functions.

A.2.73. These changes will not affect the current regulatory requirements or standards with which industry must comply, and the vast majority of the costs of the regulator will continue to be recovered in charges from operators in the nuclear industry rather than being publically funded. Additional organisational costs will be met almost entirely by the nuclear industry.

Nuclear Liabilities Financing Assurance Board

A.2.74. The Nuclear Liabilities Financing Assurance Board (NLFAB) is an advisory non-departmental public body, set up in 2008, to advise the Secretary of State for DECC on the financial arrangements that operators of new nuclear power stations submit for approval. NLFAB provides independent scrutiny and advice on the suitability of the Funding Decommissioning Programmes put in place by operators for decommissioning and waste management and disposal of their nuclear waste. In addition to advising on the approval of the Funding Decommissioning Programme, the Board also advises the Secretary of State on the regular reviews and ongoing scrutiny of the funding arrangements.

A.2.75. The NLFAB is designed to be independent and transparent in its advice and be able to provide an appropriate level of scrutiny of the funding arrangements in the funded Decommissioning Programme for a new nuclear site. It currently consists of a broad range of experts from relevant fields such as current or former fund managers, pension trustees, actuaries and nuclear specialists - necessary to effectively scrutinise complex financial arrangements and to provide the Secretary of State with the independent advice which needs to be considered before any Funded Decommissioning Programmes for a new nuclear power station can be approved.

Geological Disposal Implementation Board

A.2.76. The Geological Disposal Implementation Board was set up by the UK Government to provide senior level oversight of the implementation of the geological disposal programme. The Board is chaired by the Minister of Energy for DECC and meets two to three times per year and provides increased visibility of the programme. It aims to facilitate dialogue in order to:

- advise Government on the successful implementation of geological disposal for higher activity radioactive wastes;
- foster better shared understanding of the issues involved as the programme develops and moves forwards;
- ensure DECC is aware of the views of key stakeholders on the geological disposal implementation programme; and
- bring challenge and hold DECC to account for delivery of its programme of work set out in the Managing Radioactive Waste Safely White Paper 2008, and now reported on annually to Parliament.

A.2.77. During 2010, the UK Government published an indicative timeline for implementation. This describes the key steps since the programme was launched, as well as setting out indicative timescales and milestones in the programme of work leading to the estimated first consignment of waste to a geological disposal facility in 2040. The timeline is based on planning assumptions^[12] used by NDA and is initially indicative, given that the approach to siting a facility is based on voluntarism and a preferred site has yet to be identified. DECC has been keen to explore the scope for acceleration of this and wider optimisation of the facilities design and operation, but the 2040 timescale is broadly consistent with programmes in a range of other countries. The exact timing of the process, especially at the early stages, is in part driven by discussions with local communities and their willingness to move forward at each stage of the process. However as technical assessments, site investigations, facility design and construction will take several decades, taking the time to get the community engagement process well-established from the outset, and starting to

address local concerns, is considered to be well worth the effort, given that it will have little effect on the overall timetable.

Nuclear Decommissioning Authority

A.2.78. The Nuclear Decommissioning Authority (NDA) is a non-departmental public body, set up in April 2005 under the Energy Act 2004^[53] to provide a UK-wide strategic focus on decommissioning and cleaning-up nuclear sites. Its mission is to deliver a world-class programme of safe, cost-effective and environmentally responsible decommissioning of the UK's civil nuclear legacy in an open and transparent manner and with due regard to the socio-economic impacts on communities.

A.2.79. The nuclear legacy inherited by NDA includes:

- the nuclear sites and facilities which were developed in the 1940s, 1950s and 1960s to support the Government's research programmes, and the wastes, materials and spent fuels produced by those programmes;
- the Magnox fleet of nuclear power stations built in the 1960s and 1970s; and
- plant and facilities at Sellafield used for the reprocessing of Magnox and oxide-based fuels, and all associated wastes and materials.

A.2.80. Responsibility for funding and strategic direction of the decommissioning of all these sites lies with NDA. NDA contracts with each Site Licence Company (SLC), the operators of the sites within its portfolio, to carry out decommissioning work. The Management and Operation contracts that NDA has with the SLCs require the delivery of decommissioning work in accordance with site Lifetime Plans. The SLCs are the enduring legal entities which are subject to regulation by ONR, the environment agencies, and DfT. NDA is competing the ownership of these SLCs as a way of bringing in new strategic approaches and innovation to decommissioning.

A.2.81. In 2007, the Government updated its policy on low-level waste management and gave responsibility to NDA for developing and maintaining a national strategy for the handling of solid low-level nuclear waste. The NDA published the 'UK Strategy for the Management of Solid LLW by the Nuclear Industry'^[20] in autumn 2010. The strategy, subject to consultation with stakeholders in 2009, targets better application of the waste hierarchy to reduce the amount of solid low-level radioactive waste generated and reduce reliance on disposal.

A.2.82. In its response to CoRWM's recommendations in October 2006, the Government also decided that responsibility for implementing geological disposal of higher-activity radioactive waste should fall to NDA.

A.2.83. NDA's Radioactive Waste Management Directorate (RWMD) is now responsible for developing the programme for geological disposal of higher-activity waste, a role it took over from Nirex, the previous expert body on the long-term management of some higher-activity radioactive waste.

A.2.84. In line with the MRWS White Paper 2008, RWMD is being developed into the delivery organisation for geological disposal, with an initial intention to create a wholly-owned subsidiary of NDA as a prospective 'site licensee company', and is currently operating under voluntary regulatory scrutiny.

NDA Strategy and Business Plan

A.2.85. The Energy Act 2004 requires NDA to review and publish its Strategy at least every five years. The strategy sets out the long-term objectives and strategic direction which focuses on ensuring the efficient decommissioning and clean-up of the UK civil public sector nuclear legacy sites, while encouraging high standards in health, safety, security and environmental performance. An Environmental and Sustainability Report was part of the Strategic Environmental Assessment undertaken to inform the draft Strategy. This document highlights the content of the Strategy, describes the assessment process, and identifies the findings and recommendations arising from the assessment.

A.2.86. NDA's second strategy was consulted on between September 2010 and November 2010 and involved members of the public, nuclear regulators, employees within the SLCs, trade unions, local authorities, Site Stakeholder Groups, Non-Governmental Organisations and other organisations or public bodies. The review, including the consultation responses, confirmed that much of their original strategy remained relevant and it has since been given Ministerial approval. However, the background against which NDA operates has changed significantly since it was established. UK Government policy on nuclear energy has changed and a new nuclear programme is beginning to be progressed in England and Wales. Much of the UK's knowledge relating to spent fuel management and reprocessing, waste management and decommissioning lies within the NDA estate and it is important this expertise is made available to the UK's broader nuclear programme.

A.2.87. The NDA Business Plan 2011– 2014^[44] was approved by the Secretary of State for DECC and the Scottish Ministers and published in March 2011. The Business Plan supplements the NDA Strategy II also published in March 2011. It sets out NDA's key objectives and plans for delivering their priorities over the next three years, in line with the funding settlement announced in October 2010.

A.2.88. The principal themes for 2011– 2014 are grouped together with their objectives under six key priorities that address NDA's mission:

- Spent Fuels - defines the safe, secure and cost-effective lifecycle management approach to the diverse range of spent nuclear fuels for which NDA has responsibility, including Magnox, oxide and exotic spent fuels;
- Nuclear Materials - defines the safe, secure and cost-effective lifecycle management approach to dealing with the inventory of uranium and plutonium currently stored on some of the sites;
- Integrated Waste Management - considers how NDA manages all forms of waste arising from operating and decommissioning its sites, including waste retrieved from legacy facilities, in a manner that protects people and the environment, now and in the future. This is being undertaken in ways that comply with UK Government and Scottish Government policies and provide value for money. It also ties in the wider work of the Radioactive Waste Management Directorate on implementing geological disposal;
- Site restoration - restore designated sites and release them for other uses; and

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- Business Optimisation - looks at how NDA maximises commercial income, using its assets and capabilities to reduce the net cost of decommissioning and clean-up to the taxpayer.

A.2.89. Secondary priorities are to:

- Provide socio-economic support and development; and
- Deliver skills, research and development and supply-chain development.

A.2.90. Critical enablers, which support the overall delivery of NDA's mission, apply across the other strategic themes and enable their delivery. One important topic theme is Health, Safety, Security, Safeguards, Environment and Quality, which has the objective to reduce the inherent health, safety, security, safeguards and environmental risks associated with the nuclear legacy, and encourage high standards in operational health, safety, security, safeguards, environmental and quality performance.

National Nuclear Archive

A.2.91. NDA remains committed to building the UK's National Nuclear Archive in Caithness, Scotland. NDA has a statutory obligation to manage public records, keeping them safe and making them more accessible to the public and the nuclear community. The National Nuclear Archive will manage between 20 and 30 million mostly digital, paper and photographic records, primarily relating to the UK's civil nuclear industry since the 1940s. The programme is currently at a stage where it is reassessing a number of options including preferred delivery mechanism (lease vs. buy), clarity with respect to the financial justification and value for money test, as well as submitting applications for third party funding. It is anticipated that construction will commence in 2012 or 2013.

National Nuclear Laboratory

A.2.92. In April 2009 a contract for the Management of the National Nuclear Laboratory (NNL) was awarded to a consortium comprising Serco, Battelle and the University of Manchester. At the same time, the shares of the National Nuclear Laboratory were transferred from British Nuclear Fuels plc. to DECC. A Shareholder Executive will exercise shareholder responsibilities on behalf of DECC. The role of the contractor is to provide strategic vision and management to NNL and to develop it as a stand-alone business. The contract is for an initial three-year period, with options to extend by up to two years.

A.2.93. NNL provides services covering the complete nuclear fuel cycle from fuel manufacture and power generation, through to reprocessing, waste treatment and disposal and including defence, new nuclear build and security, supported by a range of links with international research organisations, academia and other national laboratories. It has facilities at Sellafield, Springfields, Windscale and Workington.

A.2.94. The objectives that DECC set out when NNL was established did not include a specific Research and Development (R&D) remit. In relation to the future development of nuclear energy, the Government is looking to commercial nuclear operators to deploy existing technology and expects therefore that further R&D will not be necessary in the near term. NNL has an R&D strategy through which it covers key research areas important for the organisation's growth and provides a focus for skills maintenance, which is a DECC objective.

URENCO Chemplants Ltd

A.2.95. In April 2007, URENCO Chemplants Ltd (UCP) was established as a subsidiary to URENCO Ltd, an independent, international energy and technology group operating enrichment plants in the United Kingdom, the Netherlands, Germany and in New Mexico, USA.

A.2.96. Depleted Uranium Hexafluoride (UF_6), known as 'tails', arises as a by-product of the enrichment process. The UF_6 tails produced by URENCO in Europe, have previously been managed in three main ways, being:

- stored on the site where they are produced, in internationally approved Type 48 steel transport cylinders;
- exported to Russia to be enriched under a contract with a Russian company, Techsnabexport (Tenex). The enriched product (either Equivalent Natural Uranium or Enriched Uranium Product) is returned to the production site, and the very depleted Uranium tails remain in Russia for use in the down blending of Russian Uranium stocks; and/or
- exported to France under a contract with Areva NC (a small quantity only) to be deconverted to Uranium Oxide (U_3O_8) and Hydrofluoric Acid (HF) co-product.

A.2.97. Due to a number of future uncertainties and a need to continue operating the enrichment sites for the foreseeable future, URENCO Ltd decided to develop its own facility for managing its tails and UCP was established to do this. UCP will operate a Tails Deconversion Plant, which will be used to deconvert Uranium Hexafluoride to Uranium Oxide (U_3O_8). This plant will require supporting facilities to provide decontamination and maintenance of components, washing of Type 48 transport cylinders and removal or recovery of uranium from effluent streams. Together, these facilities comprise the UCP Tails Management Facility, which will consist of a:

- Tails deconversion (defluorination) plant.
- UF_6 cylinder handling and storage facility
- UF_6 cylinder wash facility
- Decontamination and maintenance facility
- Residues recovery facility
- Effluent Treatment Plant
- Uranium Oxide (U_3O_8) store

A.2.98. Land allocated for Tails Management Facility is currently undergoing preliminary enabling works and is located on the existing URENCO Nuclear Licensed Site at Capenhurst, near Chester in the North West of the UK.

A.2.99. During 2009/2010, the then HSE-ND issued Licence Instruments for construction to commence on the majority of these plant facilities, with assessment of the remaining facilities planned to be completed during 2011. In June 2010, the

Environment Agency granted an Environmental Permit for Radioactive Substances Activity to UCP, as operator of the Tails Management Facility, which is anticipated to make minor discharges and disposals of radioactive waste. However, there will be no overall increase in discharge limits on the Capenhurst site.

Licensee restructuring

A.2.100. Competition is central to NDA's strategy as part of its statutory duty under the Energy Act 2004, to secure value for money while promoting competition and best practice. Private sector expertise has been introduced through competition of the management and leadership of the sites to Parent Body Organisations (PBOs) in order to enhance performance, introduce innovation and deliver greater value for money.

A.2.101. The competitions do not affect the status of the Site Licence Companies as the enduring legal entities which hold the nuclear site licences.

A.2.102. In April 2008, the contract to manage and operate LLW Repository Ltd was awarded to UK Nuclear Waste Management Ltd, a consortium of URS Washington Division, Studsvik, Areva and Serco Assurance.

A.2.103. In November 2008, the contract to operate and manage Sellafield Ltd was awarded to Nuclear Management Partners Ltd, a consortium of URS Washington Division, AMEC and AREVA NC.

A.2.104. In order to retain the Capenhurst site as a viable commercial site, NDA and URENCO Ltd have agreed a Heads of Terms document covering the potential transfer of all of NDA's Capenhurst assets to URENCO UK Ltd, including the management of the infrastructure associated with the former Gaseous Diffusion Plant, now decommissioned.

A.2.105. This follows a recent, smaller transaction of land from NDA to URENCO during 2009, which required land to be de-designated from the Energy Act 2004 to allow URENCO to use it for the development of new facilities.

A.2.106. The transfer of assets and any subsequent reorganisation of the nuclear licences is planned to be completed during 2011/12.

A.2.107. UKAEA Ltd was established in April 2008 and became the PBO of Dounreay Site Restoration Ltd (DSRL), the company that holds the site licence and discharge authorisation for the Dounreay site. The licences and discharge authorisations for the Harwell and Winfrith sites transferred to Research Sites Restoration Ltd in February 2009. UKAEA Ltd was later acquired by Babcock International Group in October 2009. Babcock is currently the PBO for Research Sites Restoration Ltd and DSRL. The role of PBO for Dounreay Site Restoration Ltd. is currently being competed, and a preferred PBO is expected to be announced in early 2012.

A.2.108. In 2008 Magnox Electric Limited separated into two SLCs; Magnox North Limited with the sites of Chapelcross, Hunterston A, Oldbury, Trawsfynydd and Wylfa; and Magnox South Limited with the sites of Berkeley, Bradwell, Dungeness A, Hinkley Point A and Sizewell A. Subsequently, in January 2011 the sites in Magnox South Limited were relicensed back to Magnox North Limited and the company was renamed Magnox Limited. This recombination of the sites and associated support provides for a greater organisational resilience and potential benefits from economies of scale.

A.2.109. A single competition for all of the Magnox sites plus Harwell and Winfrith is anticipated to be completed by 2014.

A.2.110. As part of the long-term management strategy, NDA has recognised that the Springfields Nuclear Licensed Site has a commercial imperative to continue to provide fuel for the UK's Advanced Gas-cooled Reactor (AGR) reactor fleet, as well as contracts with overseas customers for other fuels and intermediates. This does not fit easily with NDA's decommissioning objectives and therefore the management of Springfields Site has been transitioned from a former short-term Maintenance and Operations contract with a Management Company to a long-term lease. The remaining NDA residues and decommissioning liabilities on the Springfields Site are enshrined in commercial contracts with the leaseholder to ensure delivery. The leaseholder is empowered to manage the Site in accordance with its business objectives, including further development and expansion subject to additional liabilities provision being put in place.

A.2.111. EDF Energy purchased British Energy Group plc in January 2009. Consequently, British Energy was delisted from the London Stock Exchange in February 2009 and became a subsidiary company of EDF Energy UK Ltd., which is a wholly-owned subsidiary of Electricité de France SA. Within British Energy Group there is one nuclear operating company, British Energy Generation Ltd. (BEGL). BEGL is the nuclear licensee for Sizewell B, Dungeness B, Hinkley Point B, Heysham 1, Heysham 2, Hartlepool, Hunterston B and Torness. EDF Energy is establishing a new company to become a nuclear licensee for the planned new nuclear power plant at Hinkley Point C.

Safety and Environmental Developments

Joint Guidance on the management of higher-activity radioactive wastes

A.2.112. The nuclear safety regulators published revised joint guidance on radioactive waste management in February 2010^[54]. The guidance applies to nuclear licensed sites and consists of an overview with four technical guidance modules covering (1) the regulatory process; (2) radioactive waste management cases; (3) waste minimisation, characterisation and segregation; and (4) managing information and records relating to radioactive waste. In addition, two modules covering (a) conditioning and disposability, and (b) storage of radioactive waste, have been issued for trial use by operators and regulators before being finalised.

A.2.113. The main aims of the guidance are to:

- provide a comprehensive source of information that can be used by nuclear site licensees and the regulators' staff, and referred to by other stakeholders; and
- advise licensees on how to obtain regulatory acceptance of their proposals for radioactive waste management.

A.2.114. This guidance should assist licensees by providing:

- a clear and transparent regulatory process involving early dialogue between the nuclear industry, the regulators, NDA and other stakeholders;
- much greater business certainty at a time when the nuclear industry is committing significant resources to radioactive waste management;

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- a clear, auditable document trail of the basis for current regulatory decisions.

The joint guidance complements ONR's existing guidance to inspectors on nuclear safety cases and radioactive waste management^[55, 56].

Nuclear sector plan and report

A.2.115. In July 2009, the Environment Agency published an updated Nuclear Sector Plan^[57] following discussions with the nuclear industry. The plan was updated to reflect future priorities and changes since publication of the first plan in November 2005. The updated sector plan sets out the main environmental issues facing the nuclear industry over the next few years and the ways in which the nuclear industry and the Environment Agency can work together to address them. It encourages nuclear operators to be responsible for environmental issues and to improve their environmental performance. It also commits the Environment Agency to improve how it regulates nuclear sites. Performance against the objectives and indicators set out in the Nuclear Sector Plan is reported annually.

Nuclear Sector Plan 2009 performance report

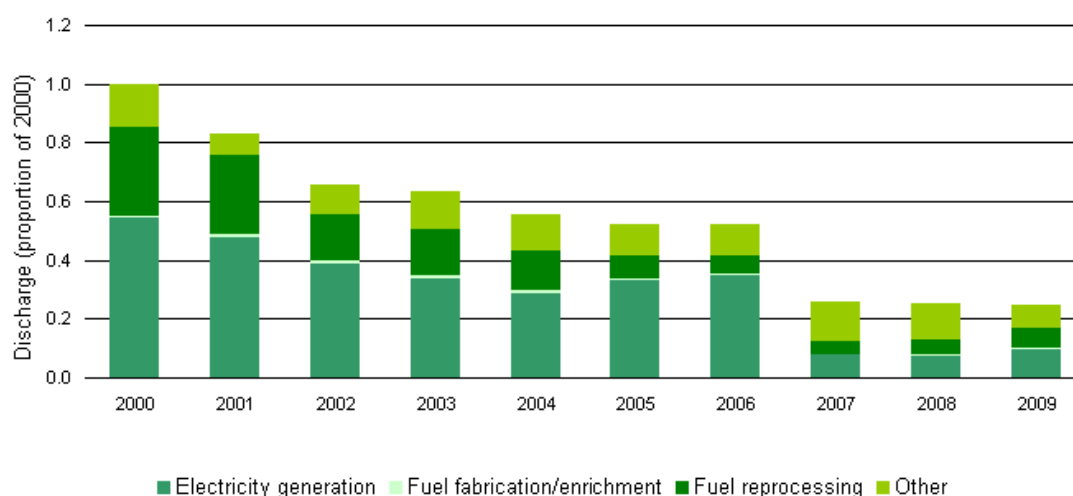
A.2.116. The most recent annual performance report supporting the Nuclear Sector Plan was published in December 2010^[58]. The report describes the environmental performance of the nuclear industry in England and Wales during 2009. It measures performance against the objectives and performance indicators set out in the revised Nuclear Sector Plan, published in July 2009. Overall, the environmental performance of the industry during 2009 was good, with improvements made in a number of areas. The table below provides a summary of how the nuclear industry performed against its eight main environmental objectives during the year, and since 2005 when reporting started. More detailed information on two objectives "Minimise discharges to air and water" and "Minimise and manage solid waste" is provided below.

Minimise discharges to air and water

A.2.117. The total radioactive discharges to air from the nuclear industry continue to fall. The overall trend in discharges since 2000 has shown a significant reduction in discharges to air. A step-change reduction in discharges took place in 2007 which reflected the planned shut-down of Magnox power stations at Dungeness A and Sizewell A. More recently the downward trend has continued primarily because some commercial operations within the medical and bioscience sector in the UK have stopped.

Figure A.1 - Total assessed radioactive discharges to air

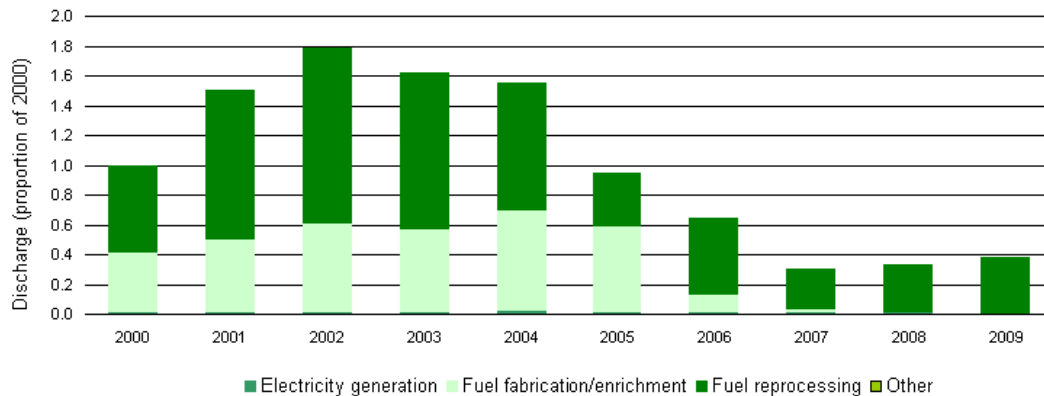


*Discharge of each radioactive substance weighted by dose impact

Notes: i) this bar chart assumes that all discharges are released into the same environment. The total discharge of each radionuclide from each sub-sector is multiplied by a specific "dose per unit release" factor which takes into account the different toxicities of different radionuclides and the likely concentration in the environment. The total is then compared to the 2000 total to show the trend in this indicator over time. The bar chart is therefore comparative and does not have any units, also it does not equate to actual impact. ii) the "other" category includes the medical and bioscience, defence, research and waste management sub-sectors.

A.2.118. Radioactive discharges to water remain low and on target to meet the commitments set out in the UK Strategy for Radioactive Discharges^[28]. This is a major success story for the UK nuclear sector which, over the last 30 years, has achieved significant reductions in its discharges to water. The Strategy set further targets for 2030. However, a key event that will contribute significantly to ensuring the UK Strategy targets are achieved will be the completion of the Magnox Operating Plan (MOP)^[59] which defines the key deliverables of the whole Magnox fuel cycle covering fuel manufacture, electricity generation, fuelling and de-fuelling of reactors, and reprocessing of spent fuel. The MOP will remain a focus of considerable work within the nuclear industry for some while yet.

Figure A.2 - Trends in radioactive discharges to water



*Discharge of each radioactive substance weighted by dose impact

Notes: i) this bar chart assumes that all discharges are released into the same environment. The total discharge of each radionuclide from each sub-sector is multiplied by a specific "dose per unit release" factor which takes into account the different toxicities of different radionuclides and the likely concentration in the environment. The total is then compared to the 2000 total to show the trend in this indicator over time. The bar chart is therefore comparative and does not have any units: also it does not equate to actual impact. ii) the "other" category includes the medical and bioscience, defence, research and waste management sub-sectors.

A.2.119. Small increases in certain discharges have occurred largely as a result of an increase in fuel reprocessing which reflects progress being made in the management of spent nuclear fuels. This is a key activity that will enable the de-fuelling, and subsequent decommissioning and clean-up of legacy Magnox sites. Discharges also increased slightly because two power stations came back into use after maintenance outages.

Minimise and manage solid waste

A.2.120. During 2009, the nuclear industry generated 19,070m³ of low level waste and managed to avoid sending 67% of this to the Low-Level Waste Repository (LLWR) through, for example, recycling and use of alternative disposal routes. This is a significant achievement, helping to ensure that the limited capacity within the national repository is available for that waste which requires the level of protection it offers.

A.2.121. The LLWR is engineered specifically to provide suitable containment for low-level radioactive waste which is at the upper end of the activity limit set out in the March 2007 Policy. Historically almost all of the low-level waste in the UK would have been disposed to the repository. However, alternative disposal routes are available for some types of these wastes, e.g. landfill, incineration, and recycling facilities for some metallic wastes. The LLWR has only a limited capacity. To protect the remaining capacity of the repository, the nuclear industry is not only continuing to minimise the amount of waste it produces, but also seeking to make best use of the alternative suitable routes that exist for lower-activity low-level waste. The industry is also being encouraged to increase the amount of low-level waste that is recycled or reused.

A.2.122. An area of waste management that needs further improvement is the conditioning and packaging of 'legacy intermediate-level waste' within the nuclear industry. These are high-hazard wastes that, while safely managed at the sites, are not yet in a final form which can safely be disposed. Volumes of 'raw' intermediate-

level wastes are increasing as sites undergo decommissioning, and further progress is being made to condition and package these – most notably, significant progress has been made at the Winfrith site.

A.2.123. However, the overall rate of progress within the industry has remained stable, and has not advanced or improved significantly over the last five years. Since 2005 the proportion of the total volume of intermediate level waste that has been conditioned and packaged remains at under 25%. This reflects the lack of real progress in addressing the large volumes of legacy wastes stored at Sellafield. It is not an easy issue to tackle but progress in this area is still needed to minimise the safety and environmental risk at nuclear sites. The nuclear industry, ONR and the Environment Agency are keen to accelerate the rate of conditioning and packaging of these wastes and this will continue to be an important focus for future work.

3 - Safety and Environmental Issues at UK Nuclear Installations

A.3.1. The UK has no nuclear installations where significant corrective actions were necessary to comply with the requirements of the Joint Convention. This is a reflection of the effectiveness of the UK's nuclear safety licensing and environmental permitting regime, the high priority given to safety and environmental protection by the UK nuclear operators and the safety culture in the industry. Furthermore, the periodic safety review requirements of the UK nuclear site licences have meant that for many years the UK has been monitoring and improving the safety of its nuclear installations.

A.3.2. The UK environment agencies also carry out periodic reviews on all environmental permits and authorisations for radioactive waste disposal from nuclear sites. The Environment Agency carries out such a review annually for England and Wales. The Environment Agency's performance report for 2009^[58] showed that in a number of key areas the environmental performance of the nuclear sector continues to be good in relation to other industry sectors. The sector is using fewer resources, greenhouse gas emissions are small, and discharges of pollutants to the environment are generally falling or remaining the same. There have been no incidents at nuclear sites that have had major or significant impacts on the environment.

A.3.3. Since 2004, SEPA has required that all holders of RSA93 authorisations report their annual mass discharges, or annual total releases, of radioactive substances to the Scottish Pollutant Release Inventory. In Scotland, there have been no incidents at nuclear sites that have had major or significant impacts on the environment and there were no serious pollution incidents or serious breaches of permits.

A.3.4. Periodic reviews of nuclear safety and environmental performance at nuclear sites will continue in the future to drive further improvement.

Progress in decommissioning

A.3.5. Since the third Joint Convention review meeting, NDA has improved the knowledge of the UK nuclear legacy such that the complexities of the NDA estate are now better understood and in much more detail. The estate has now been completely restructured and this has allowed NDA, through managed competitions, to bring in international private sector expertise. In terms of decommissioning and clean-up activities, the primary focus has been on retrieving and packaging hazardous radioactive material; putting in place management arrangements for low-, intermediate- and high-level radioactive waste; safe storage of nuclear materials; demolishing redundant facilities and environmental restoration of land. Good progress has been made in all these areas such as:

- on reducing the Highly-Active Liquor (HAL) stock at Sellafield and progress on vital projects to improve highly-active liquor evaporative capacity;
- the opening of the Sellafield Product and Residue Store;
- hazard reduction achievements including the clean-up of approximately 95% of radioactive sludge arising from Sellafield's flocculation plant that was being stored in ageing concrete tanks. This sludge has now been transferred to a modern high integrity tank in preparation for final treatment

and encapsulation, thereby reducing one of the primary environmental hazards associated with Sellafield;

- defuelling progress for the Magnox reactor fleet, which is more than 94% complete;
- the LLWR is now offering a range of recycling, compacting and disposal services implementing the UK Strategy for the Management of Solid LLW from the Nuclear Industry^[20], published by NDA in August 2010. The strategy reflects Government policy and ensures the best use of resources to minimise the amount of waste generated while managing arisings safely, cost-effectively and in an environmentally acceptable manner;
- a new vault has been opened at the LLWR to increase the capacity for LLW disposal;
- at Dounreay the destruction of the sodium-potassium coolant, the largest single hazard left over from the fast reactor research programme; and
- completion of a seven-year project to clean up a highly contaminated area of Dounreay's uranium conversion plant.

A.3.6. Progress is also being achieved in the development of a deep geological facility for the permanent disposal of higher-activity radioactive waste from England and Wales. The Government has taken the lead in finding suitable locations by seeking volunteer communities to open a dialogue on what it might mean for their area. Also an important technical milestone on the path towards implementation of the Geological Disposal Facility (GDF) has been completed with publication of a suite of documents, the Disposal Systems Safety Case, outlining the multi-barrier safety and security steps that will be taken to safeguard the public, the workforce and the environment.

A.3.7. Successful decommissioning programmes have already seen the decontamination and demolition of facilities right across the estate. The highlights of this progress are described in more detail in the sections below as well as the challenges that the industry has seen realised in the same timeframe.

Spent Fuel Management Issues

Reactors currently within the Joint Convention

A.3.8. There are no changes in the status of reactors for the purposes of the Convention on Nuclear Safety since the third UK Joint Convention report.

Progress

Reactors de-fuelling

Calder Hall (Four Magnox Reactors)

A.3.9. Calder Hall ceased generating electricity in March 2003. Since then modifications have been made to its fuel routes that are necessary to begin de-fuelling the reactors. Owing to throughput problems at the reprocessing plant at Sellafield, the start of de-fuelling has been progressing slowly. There are approximately 10,000 fuel elements in each of the four reactors.

Chapelcross (Four Magnox Reactors)

A.3.10. The decision to permanently cease generation at Chapelcross took effect in June 2004. Significant modifications to the fuel route have been carried out on all four reactors and de-fuelling commenced in 2008. To date, 12,000 out of 380,075 elements have been shipped to Sellafield.

Dungeness A (Two Magnox Reactors)

A.3.11. Dungeness A operated at power for 40 years and ceased generation in December 2006. A Post-Operation and De-fuelling Safety Case was developed between 2004 and 2006 to supersede the operational safety case at the end of generation. A further Periodic Safety Review (PSR) was completed in March 2006 to justify plant safety post-generation. A major refurbishment of the fuel route was completed approximately five years ago and further modifications have been undertaken to support de-fuelling. Bulk de-fuelling is on-going, but at a reduced rate owing to reprocessing issues at Sellafield. As of March 2011 the reactors are 51% de-fuelled.

Sizewell A (Two Magnox Reactors)

A.3.12. Sizewell A operated at power for 40 years and ceased generation in December 2006. A Post-Operation and De-fuelling Safety Case was developed between 2004 and 2006 to supersede the operational safety case at the end of generation. In addition, a PSR was completed in March 2006 to justify plant safety post-generation. Refurbishment of the fuel route has been completed to support de-fuelling. As of March 2011 the reactors are approximately 25% de-fuelled.

Review on plutonium and uranium disposition

A.3.13. NDA has reviewed the plutonium and uranium strategy themes as part of its overall strategy review (NDA 2011)^[17]. The current strategy is to ensure the safe and secure management of these materials while continuing to provide best value for the UK taxpayer.

A.3.14. NDA has previously published the Nuclear Materials Macro-Economic Study^[60], which is still consistent with its strategy. This study provided NDA with a wide-ranging analysis of the possible futures for the UK's stocks of uranium and plutonium materials. The study laid out different potential futures and set out their financial, socio-economic and environmental impacts. The three management strategy options for the next 300 years are to:

- treat the used fuel as waste, put it in a form suitable for geologic disposal and proceed with this as soon as possible.
- store the used fuel for the long-term, on the assumption it may have a value at some point up to 300 years in the future.
- reprocess the fuel now for recycle. This would see uranium stocks put back into enrichment and fuel fabrication, and plutonium used as an input to mixed-oxide fuel (MOX).

A.3.15. However, all the options involve a number of assumptions which mean that few firm conclusions can be made at this time. In particular, the option to reprocess and recycle would require a 20-year life extension (to 2032) for the Thermal Oxide

Reprocessing Plant (Thorp) at Sellafield, that the Sellafield MOX plant be refurbished to greatly increase output, and that the UK would continue to use nuclear power at a capacity of 12GWe (roughly equivalent to historical levels).

A.3.16. NDA will use these findings to inform its ongoing discussion with the Government on whether any of its stocks of uranium and plutonium should be regarded as waste in the future.

Spent fuel strategy update

A.3.17. NDA has reviewed the spent fuel strategy theme as part of its overall strategy review (NDA 2011)^[17]. The spent fuel strategy is to secure and subsequently implement the most appropriate management approach for Magnox and oxide fuels and, where possible, take advantage of these approaches to also manage exotic fuels. For oxide fuels, NDA strategy is to complete Light Water Reactor (LWR) and AGR reprocessing contracts as soon as reasonably practicable and cease reprocessing at Thorp. For Magnox fuel, the strategy is reprocess all spent Magnox fuel in line with the MOP^[59]. NDA has carried out assessments of the full life-cycle implications of spent fuel management. These assessments are being used to inform NDA's approach to spent fuel management, and include assessments of the risks and opportunities associated with three broad scenarios: disposal, storage or use. The work being carried out by NDA will ultimately give rise to a range of recommended policy options to be presented to Government. These policy recommendations will take into account the life-cycle financial, safety, security and environmental assessment of the range of options available for spent fuel management.

AGR fuel storage issues at Sellafield update

A.3.18. Based on Sellafield Ltd's Integrated Strategy, AGR fuel will be wet stored until a disposal route is available, for those stocks where the fuel is deemed uneconomic to reprocess. Should a disposal facility not become available, a contingency option of fuel drying and dry storage is being evaluated. The licensee proposes to consolidate wet storage of AGR fuel into a single pond at Sellafield, subject to regulatory review.

A.3.19. This position may be modified, depending on the outcome of NDA review of the UK-wide spent fuel management strategy when it is completed.

EDF Energy pressurised water reactor fuel management

A.3.20. Spent pressurised water reactor (PWR) fuel arises from the existing Sizewell B PWR power station in the southeast of England. The fuel, once discharged from the reactor core, is stored at Sizewell B in a water-cooled storage pond ('wet store'). The station has capacity in the storage ponds to store fuel which arises up to 2015. A planning consent process and public consultation was initiated in 2009 for an Independent Spent Fuel Storage Installation (ISFSI) – a dry cask store to accommodate all spent fuel arising from the site, including that already in the wet store. It is planned that the dry storage facility will be constructed by 2015. All spent fuel will then be progressively switched to dry storage by 2045. Thereafter, the store will operate in a passive mode until fuel is retrieved, beginning in 2080, and transported over a 20-year period to the GDF (see Sections L.1.19 to L.1.22).

Dounreay fuel management plans

A.3.21. DSRL baseline strategy continues to be storage in appropriately licensed onsite shielded stores. Dounreay's Lifetime Plan^[61] contains a timeline for the design, build and operation of a new spent fuel store within the next seven years, either in a dry vault or in shielded casks. In addition, DSRL staff are participating in inter-SLC discussions on a co-location strategy for spent fuel within the NDA estate.

Plutonium disposition consultation

A.3.22. In February 2011, the UK Government published, for public scrutiny and consultation, its proposed approach to the long-term management of civil plutonium. This proposed approach recognises that, in view of the non-proliferation and security concerns in relation to plutonium, the Government has a duty to develop a long-term vision for its future handling. The UK's current policy is for long-term storage in safe and secure purpose-built facilities, pending a final decision on the best management solution. The UK Government's preliminary view is that the best prospect of delivering a long-term solution for plutonium management is through reusing the plutonium to make MOX fuel. This preliminary view will be conditional in that it will have to be tested to show that it is affordable, deliverable and offers value for money, taking into account safety and security requirements, before the UK Government will be in a position to take a final view.

Sellafield Product and Residue Store inactive and active commissioning

A.3.23. The Sellafield Product and Residue Store inactive safety commissioning was successfully completed in February 2011 with the receipt of a licence instrument to start active commissioning. Active commissioning work is in progress with transfers of both Magnox and Thorp materials successfully tested.

Challenges

Update on Magnox Operating Plan and Oxide Operating Plan to manage overall safety of the fuel cycle

A.3.24. Sellafield Ltd and the Magnox sites coordinate the national movement of Magnox fuel and its reprocessing through the MOP. MOP8 rev2^[59] shows Magnox reprocessing being completed in March 2017.

A.3.25. Whilst the objectives laid down in MOP remain valid, the latest programme nevertheless is challenging due the ageing facilities approaching the end of their design lives. Experience with the need to repair failed connecting pipework and a small increase in the amount of material to be reprocessed, means that meeting the schedule will require improved performance in both fuel delivery and reprocessing rates. Plans are being implemented to bring these improvements about.

A.3.26. Whilst the MOP was and is managing and mitigating risks, it must be recognised that there will remain the potential for an event or issue to significantly interrupt spent fuel transport or reprocessing, and delay completion further.

A.3.27. Sellafield Ltd and the existing EDF Energy nuclear power stations coordinate the national movement of AGR fuel and its reprocessing through a joint plan known as the Oxide Operating Plan. The current version of the plan shows AGR reprocessing continuing until 2018.

A.3.28. The cumulative effect of several losses of throughput at the Thorp reprocessing and supporting facilities has led to delays in the completion of reprocessing. The latest estimate for completing reprocessing against existing contracts is significantly later than originally planned, although this relies on the continued successful operation of the reprocessing infrastructure. As the supporting infrastructure nears the end of its life, the completion of Thorp reprocessing may be later than had been planned. The optimal time to cease reprocessing will be assessed in the near future and will be influenced by a number of factors including the condition of our reprocessing infrastructure and the availability of the options for safe long-term spent fuel management, storage and disposal.

Radioactive Waste Management Issues

Progress

Integrated Waste Strategies

A.3.29. The UK regulators look to promote adoption of the waste management hierarchy and best waste management practices through the development of Integrated Waste Strategies (IWSs). This has additionally been required for Sellafield through its environmental permit, which states:

"The Operator shall develop and maintain an Integrated Waste Strategy (IWS), supported by waste strategies covering waste management and disposals to land, water and air, to enable it to implement and manage its current and future operational, decommissioning and restoration activities so as to deliver optimised performance taking account of environmental, safety and other relevant factors."

A.3.30. It is further specified that:

"The Integrated Waste Strategy should be developed and maintained according to the specification and guidance^[16,62] developed by the regulators and NDA. Supporting strategies covering waste management and disposals to land, water and air shall be developed and maintained. The strategies shall be supported by the development of environmental protection principles, appropriate standards, management arrangements and key performance indicators."

A.3.31. NDA has included a contractual requirement for its sites to prepare IWSs that accord with these requirements. These must be submitted to NDA and regulators for scrutiny as part of the sites' lifetime plan submissions. The operator should also consider the existing conditions and limits set out in the Environmental Permit under EPR10 in England and Wales, or in Scotland, under RSA93 and other environmental legislation. The operator should thus identify and substantiate any changes to the existing conditions and limits that may be appropriate, including where the headroom between actual discharges and authorised limits is either too restrictive or excessive.

A.3.32. The initial (baseline) batch of IWSs, except for Sellafield, was submitted to NDA and regulators in March 2006. The first (baseline) version of the IWS was submitted by Sellafield in June 2006. The Sellafield strategy continues to be developed and refined – a second issue was submitted in June 2007, and yearly updates have followed.

A.3.33. Following the transfer of the management and operation of Windscale to Sellafield Ltd in 2008, the IWSs for these two adjacent nuclear licensed sites are now combined.

A.3.34. Integrated Waste Strategies continue to play an important role in setting the guiding framework for the prevention, minimisation and management of effluents and solid wastes generated by both operation and decommissioning. The analyses and forecasts of effluent and solid waste arisings included in the IWSs provide increasingly useful input into wider strategies and plans, and to the regulatory permitting process.

Highly-active evaporators and storage tanks

A.3.35. Current arisings of Highly-Active (HA) raffinate are being vitrified as they arise, whilst observing the appropriate blending constraints, but a backlog of HAL remains. This is being worked off in accordance with the HAL stock curve set by the nuclear safety regulatory specification in 2007.

A.3.36. ONR is currently making two important revisions to the definition of the HAL Stocks Specification:

- First of all, the current volumetric limit is being replaced by an equivalent limit in safety terms based on the mass of Uranium in the unprocessed fuel from which the HAL was derived. This new form of limit better reflects the true hazard posed by the HAL and is an improvement in terms of safety over the present form of limit.
- In addition, ONR has revised the long-term steady-state limits to enable reprocessing and vitrification to continue at optimum rates, therefore minimising the accumulation of spent fuel in ponds and enabling the conversion of HAL into a safe passive vitrified form suitable for long-term storage.

A.3.37. A new evaporator is under construction with a planned operational date in 2014. A project to build a new facility for Highly-Active Storage Tanks (HASTs) has been approved and is now at the design stage. This will provide new facilities, though much smaller than the existing facility due to the reductions in the volume of HA liquors in buffer storage before vitrification. It will also provide additional flexibility for future decommissioning activities. A final decision on whether to commit to new HASTs will be determined on a number of factors including the condition of the existing tanks and future demands. Controls are in place to ensure that HAL arisings do not exceed the capacity of the site to manage them.

Regulatory team audit of Sellafield solid waste

A.3.38. In 2010 and 2011, joint nuclear safety and environment regulatory team inspections were carried out on facilities for management of solid wastes. The inspections undertaken were:

- Plutonium-Contaminated Material (PCM)
- Low-Level Waste (LLW)
- Intermediate-Level Waste (ILW); and
- overall solid waste strategy

These inspections formed part of a regulatory intervention programme on solid waste management and storage. There were no compliance issues but there were a number of areas for improvement. The regulators are reviewing the evidence

submitted to address and close out the recommendations of the previous joint solid waste inspection in 2006.

Regulatory team audit of Sellafield gaseous waste

A.3.39. Key concerns from the 2007 team inspection of gaseous radioactive waste, seen in some areas, were the lack of implementation of standards, plant care and maintenance and laboratory quality assurance.

A.3.40. The Environment Agency required Sellafield Ltd to develop a programme to address all the recommendations and potential compliance issues detailed in the report.

A.3.41. The Environment Agency undertook a follow-up review of gaseous waste management at Sellafield in 2009. The review included an inspection of gaseous waste management at the Magnox reprocessing plant and related plant. Overall, arrangements appeared to be well developed, supported by comprehensive and up-to-date site standards and formal processes. Sellafield Ltd also has an in-house ventilation technical support group and support from external organisations. The review identified several areas where improvements could be made and the Environment Agency is currently agreeing final close out of this inspection with Sellafield Ltd. Some residual issues will be followed up through routine regulation.

Regulatory inspection of Sellafield active ventilation systems

A.3.42. The Environment Agency undertook an inspection of the operation and maintenance of Sellafield's active ventilation system condensate drainage arrangements in 2010. The aim of this inspection was to assess Sellafield Ltd's compliance with an Enforcement Notice issued by the Environment Agency in July 2009 which required improvements in the management of these systems. The Environment Agency concluded that improvements had been delivered in many areas but further work is required to complete Sellafield Ltd's implementation of its proposals following on from the Enforcement Notice.

Regulatory team audit of Sellafield liquid effluent

A.3.43. Environment Agency and HSE regulators carried out a joint team inspection of liquid effluent systems in June 2009. The inspection involved observers from the Radiological Protection Institute of Ireland. The inspection met its objectives and provided a good overview of aqueous waste management at Sellafield; good practice was observed in some areas.

A.3.44. The regulators concluded that Sellafield Ltd's compliance with the conditions of the RSA93 authorisation had improved significantly since the previous major team inspection on this topic in 2005. In particular, improvements were noted with respect to the demonstration and application of the Best Available Techniques (BAT) for the minimisation of radioactive discharges (for further discussion on BAT – see Sections B.21 and B.22). However, the inspection highlighted a number of areas in which Sellafield Ltd should take action to demonstrate continued application of BAT. For example, improvements were required in the manner in which solids and particulates in some aqueous waste streams are prevented or minimised, and/or removed prior to final discharge to sea. The regulators continue to work with Sellafield Ltd in addressing the findings of the inspection.

Sellafield – European Commission Article 35 verification visit

A.3.45. The Environment Agency supported an EC Article 35 Euratom Treaty verification visit to Sellafield in August 2010. The EC inspectors confirmed that the majority of recommendations associated with the on-site scope of the previous verification visit (2004) had been completed, and action was being taken on those that had not. Another Article 35 visit is planned for August 2011.

Commencement of export of high-level vitrified waste

A.3.46. In 2010 the UK carried out the first shipments of high-level vitrified waste to Sellafield Ltd's overseas reprocessing customers. The first shipments were to Rokkasho, Japan and to COVRA in the Netherlands. The overall return shipments programme will last about 10 years. All shipments were carried out under the Shipments Directive (see Section I).

Progress with isolating potential leak paths in the first generation Magnox storage pond

A.3.47. Work is underway to isolate potential leak paths in the first generation Magnox storage pond structure. The teams have had to deal with working in a radiologically challenging environment and demonstrate that the repairs and isolations can be implemented safely, without making the situation worse. A range of techniques have been developed and tested in off-site test rigs to deal with weaknesses in pipes and cracks in the concrete. Some pipes have now been successfully sealed and plans to clean and repair a crack in the concrete of one of the bays are well advanced; an independent review of the proposals has been completed and the As Low As Reasonably Practicable (ALARP) safety case is being finalised prior to approval and implementation this year. The full programme of work is planned to be completed in 2016.

New highly-active liquor evaporator

A.3.48. The existing evaporators within the Highly-Active Liquor Evaporation and Storage (HALES) plant have operated very successfully to support the reprocessing activities on site but are moving towards the end of their operational life. To support currently-known reprocessing and decommissioning activities, new evaporative capacity is being provided adjacent to the existing facilities. The project is currently in the build phase. Construction work on the Evaporator is well advanced with a service date in 2014. The construction is taking place adjacent to active facilities and innovative techniques have been used to deal with the challenges including self-erecting cranes and climbing shuttering platforms. The plant is of modular construction and is being fabricated off the site. Delivery of the modules to Sellafield will start this year following completion of the building shell.

Progress in transfers from the floc tanks

A.3.49. Work is in progress to transfer radioactive floc to more robust containment prior to treatment. Last year saw the successful re-suspension and transfer of 600m³ of floc, achieving the target for that year. The third out of six tanks will be worked on in 2011 as part of a programme of work that is planned to be completed by 2021.

Completion of WAGR reactor core and pressure vessel removal

A.3.50. In February 2010 the Windscale Advanced Gas-cooled Reactor (WAGR) decommissioning project achieved a major milestone with completion of the size reduction, packaging and encapsulation of the lower hemisphere of the reactor pressure vessel. This completed removal of the reactor core and pressure vessel achieving the original project intent of demonstrating the feasibility of decommissioning nuclear power generating reactors shortly after shutdown. All intermediate-level waste generated is encapsulated within WAGR boxes in accordance with Letters of Compliance from RWMD and stored within the WAGR Box Store. Low-level wastes have been packaged and consigned to the LLWR. The project is now clearing the remaining Reactor Vault structures prior to encapsulation of final miscellaneous ILW and clean down of asbestos residues resulting from the removal of insulation as part of the pressure vessel removal.

Magnox Encapsulation Plant drums update

A.3.51. During 2010, Sellafield Ltd carried out a total of 28 detailed inspections of encapsulated drums containing Magnox swarf, bringing the total number of drum inspections to 56. The results of the most recent inspections are similar to those of previous inspections with approximately 20% of drums showing features most likely to have been caused by expansive corrosion of pieces of bulk uranium within the encapsulated waste form. Most features are very minor however two of the drums have developed pronounced protrusions. None of the drums exhibit features which are considered to threaten the integrity of the waste container. Work is in progress to identify and develop a means of accurately measuring drum dimensions and the topography of surface features, to assess the extent of the strain induced in the stainless steel drum by the formation of pronounced protrusions, and to identify potential remediation techniques should these be required in the future. Further drum inspections are programmed to be carried out during the next two years.

Removal of a top duct from Calder Hall

A.3.52. One of the largest cranes in Europe, with a 1,200 tonne lifting capacity, was used to remove two large sections from the Calder Hall heat exchangers in another significant hazard reduction step for the site. The top ducts, weighing around 48 tonnes each, posed a potential hazard because of their size and weight as well as their contamination levels. Four of the 16 top ducts have now been removed. The ducts will be processed through Sellafield's Metals Recycling Facility as part of a six-year project that will give environmental benefit and save significant sums in waste reduction and disposal costs. The ducts, which comprise a straight and an elbow shaped section, are approximately 6m in length and around 1.5m in diameter.

Dounreay waste substitution

A.3.53. DSRL staff participated in the joint DECC/Scottish Government consultation on waste substitution. This consultation is now closed and is going through due process.

Dounreay cementation plant

A.3.54. In April 2008, DSRL was formed as a separate legal entity in accordance with the Nuclear Transfer Scheme arrangements set out in the Energy Act 2004. DSRL is now the SLC which operates under contract to NDA and is responsible for the decommissioning and clean-up of the Dounreay site.

A.3.55. Following the clean-up of an incident described in the third UK Joint Convention report, the plant restarted routine operations in April 2008 and has since processed some 302m³ of radioactive liquors to end of March 2011. There has been no indication of a recurrence of previous problems which led to the original incident.

Review of interim storage

A.3.56. NDA has completed an UK-wide review of higher-activity waste storage on behalf of Government which was published in March 2009^[63]. This includes storage regimes for solid ILW and for High-Level Waste (HLW). The review involved significant input from individual sites and the nuclear safety, environmental, security and transport regulators. The review concluded that NDA's priority is to deal with high hazard, high environmental risk facilities (the majority of which are at Sellafield and Dounreay) ensuring that the wastes are removed from ageing facilities at the earliest safe opportunity. The other main conclusions are that, in principle, the '100 years or more' interim storage objective may be attainable, and that a new storage strategy will only be implemented if the Geological Disposal Facility is not available beyond 2100, with the exception of higher-activity wastes stored in Scotland. Part of the review concerned with storage optimisation concluded that the main focus of investigating storage opportunities for NDA packaged ILW should be southern Magnox and RSRL (Harwell and Winfrith) sites, and NDA has no intention of pursuing a radically-altered waste storage regime such as a single very large low maintenance UK facility.

A.3.57. Coincident with the NDA review, CoRWM published its own independent scrutiny report on interim storage in March 2009. In response to its own and CoRWM reviews, NDA launched an Interim Storage project, which was made up of SLCs and other waste owners, to "address key issues such as waste package performance, store longevity, monitoring and inspection regimes, and store maintenance and refurbishment". The project published draft industry guidance on interim storage in April 2011 with a view to publishing the final guidance later in the year^[64].

Low-level waste capacity challenges

Calder Landfill Extension Segregated Area

A.3.58. The Calder Landfill Extension Segregated Area is an engineered landfill on site at Sellafield used to dispose of high-volume very-low-level radioactive waste - mainly soil and rubble from demolition and construction projects with a small amount of organic waste. Sellafield Ltd is permitted to use a limited section of the landfill, which should provide capacity for another two years. Sellafield Ltd has submitted a further application to dispose of waste along the side walls (Phase 2), which will more than double the available space. The Environment Agency is considering whether to grant an environmental permit for Phase 2 to proceed.

Clifton Marsh Disposal Facility

A.3.59. The environmental permits held by Springfields Fuels Ltd (at Springfields) and Sellafield Ltd and Urenco UK Ltd (at Capenhurst) allow those operators to dispose of LLW at the Clifton Marsh landfill site near Preston, Lancashire. The operational "Phase 4" has planning consent for land filling operations to continue until the end of 2015, though there is sufficient capacity for land filling beyond that date. The Clifton Marsh site also receives non-radioactive household and industrial waste from the Preston area for disposal under the conditions of an environmental permit.

In volume terms, radioactive waste is estimated to account for 10-20% of the total disposal of all wastes at the Clifton Marsh site.

A.3.60. The operator has applied for a radioactive substances activity environmental permit for the site. The Environment Agency is considering this application. If granted, that would allow the receipt of LLW from a wider range of consigning sites. The operator may also seek to extend disposals at the site until 2020, which would require land-use planning permission.

Dounreay low-level waste disposal facility

A.3.61. The on-site facility for the authorised disposal of solid radioactive waste at Dounreay was closed in 2005. All solid radioactive waste is now being stored on the site. In 2009 DSRL received planning permission from Highland Council for a new solid low-level waste near-surface disposal facility, outside the current Dounreay nuclear site boundary. The facility is planned to comprise a number of separate vaults for the disposal of LLW and Very-Low-Level Waste (VLLW) from the Dounreay site. Subject to regulatory and other consents, construction is scheduled to begin in autumn 2011. The Phase 1 vault construction contract was let to the preferred bidder at the end of February 2011. The new LLW facility is programmed to receive grouted waste containers in 2014.

A.3.62. In November 2010, SEPA received an updated application under RSA93 from DSRL for an authorisation to dispose of solid low-level radioactive waste in the proposed new disposal facilities. This application is supported by an Environmental Safety Case, along with other documents. SEPA is currently undertaking a determination process which involves reviewing and assessing the application against all applicable legislation, regulation, policy and guidance.

A.3.63. As the proposed facilities are not on a nuclear licensed site, there is no requirement under RSA93 for SEPA to undertake public consultation on the application: however, in line with its policy of open and transparent regulation, SEPA always made clear that engagement and consultation would take place. SEPA has already consulted the HSE, the Food Standards Agency and the Scottish Government. Following feedback from the Dounreay Stakeholder Group meeting in March 2009, SEPA has taken account of the views expressed and will now be using a style of consultation in which the public and other interested parties are given the opportunity to comment on the draft authorisation that SEPA is considering issuing in response to the application. This is expected to take place starting in October 2011.

Berkeley safestores

A.3.64. Magnox has moved the reactors at Berkeley into a period of 'safestore'. To support this strategy, the licensee produced a safety case which highlights all the potential hazards including flooding, seismic, fire, aircraft impact, degradation etc. This is supported by an intent to conduct appropriate inspections of the structure and internals to provide continued reassurance. Repairs will be conducted based on the results of the periodic inspections to maintain compliance with the safety case for the remaining operational lifetime of the 'Safestores', which is approximately 100 years.

A.3.65. Prior to 'safestore', Magnox removed the majority of the asbestos and loose contamination from the primary circuit (excluding the main vessel), stripped out the boilers and removed the gas ducts back to the bio-shield. All the additional penetrations were capped adjacent to the bio-shield. Sections of contaminated pipework were sealed and stored within the reactor basement. The roof has been lowered and the external structure of the weather envelope improved. The nuclear

inventory is contained within the two main vessels and has three barriers to the environment (the vessel, the bio-shield and the weather envelope). Ventilation has been provided to the old boiler houses in order to minimise the build-up of any condensation within the 'Safestores'. Any water ingress will be routed to the boiler house basement and pumped out as required, with arrangements in place to ensure the system is reliable.

A.3.66. The vessels themselves have sufficient thickness to withstand corrosion at the most pessimistic rates and barriers have been installed to prevent flora and fauna penetrating the vessels.

Graphite pathfinder project

A.3.67. In 2010 a feasibility study was initiated to investigate opportunities for near-surface disposal of graphite wastes arising from the Magnox reactor fleet. The study, being undertaken by Magnox Ltd, was initiated and is being funded by NDA, which owns the Magnox Sites and is the strategic authority responsible for decommissioning the UK's public sector civil nuclear sites. The work includes consideration of a practical example looking at operational graphite wastes from the Hunterston A site. The study is a response to the 2007 recommendation by CoRWM that the Government should look at options for the near-surface disposal of short-lived ILW arising from reactor decommissioning. It also recognises the recently-updated Scottish Government policy on higher-activity wastes which indicates that long-term management of such wastes should be in near-surface near-site facilities. NDA is considering the outputs of this work and will take it forward in its strategic decision-making.

Sellafield beach monitoring

A.3.68. The Environment Agency requires Sellafield Ltd to monitor local beaches for small radioactive objects and particles. Beach monitoring for particles at Sellafield has been carried out since the 1980s. Following successful trials using vehicle-mounted radiation detection equipment in November 2006 and February 2007, Sellafield Ltd began routine large area beach monitoring in May 2007.

A.3.69. Up to the end of December 2010, 1175 solid items, either comprised of, or contaminated with radioactive substances, had been detected and removed from West Cumbrian beaches. These are categorised into pebbles and stones (items 2mm or more in size) and particles (items less than 2mm in size); and into alpha-rich (contaminated mainly with americium-241) and beta-rich (contaminated mainly with caesium-137). High find-rate areas remain limited to Sellafield north beach areas, with the vast majority of finds located on the stretch of beach extending 3 km north from the Sellafield site. Results to date indicate that find rates for both beta-rich pebbles/stones and beta-rich particles are reducing. Find rates for alpha-rich particles were also seen to fall between 2006 and 2009, but have increased since August 2009, coincident with the introduction of an improved detection system with greater sensitivity for this type of material. Further monitoring is required to determine whether the actual numbers of alpha-rich particles present on the beaches is also in decline.

A.3.70. The Environment Agency sought advice from the Health Protection Agency (HPA) about the health implications for the public, and commissioned HPA to carry out a detailed assessment of risks. HPA's report on 'Health Risks from Radioactive Objects on Beaches in the Vicinity of the Sellafield Site'^[65] was published in April 2011. Data gathered to date indicates that risks are very low and HPA's previous

advice that no special precautionary actions are required to limit access to or use of the beaches remains valid.

A.3.71. Work undertaken by Sellafield Ltd to better understand the sources and pathways of alpha-rich particles entering the environment, indicates that this material is from Sellafield operations from over 25 years ago; and that there are no ongoing discharges of this type.

A.3.72. Sellafield Ltd will continue to monitor the beaches using the latest improved detection system. Monitoring will concentrate on areas with the highest find rates and on those beaches frequented most by members of the public. In 2010, Sellafield Ltd commissioned preliminary work to inform the requirements for monitoring of the seabed. This has included deployment of equipment to gather data on underwater currents to help understand conditions in relation to offshore particle transport and dispersion. A technical specification is being developed that will establish the scope for a suitable offshore monitoring programme.

A.3.73. Further information is available on the Sellafield Ltd and Environment Agency websites (see Annex L.10).

Dounreay beach monitoring

A.3.74. Monitoring of a number of publicly-accessible beaches near Dounreay continues to detect the presence of fragments of irradiated nuclear fuel. An investigation into the implications of these occurrences was undertaken by the Dounreay Particles Advisory Group. In May 2009, the Dounreay Particles Advisory Group was reconstituted as the Particles Retrieval Advisory Group. Its main objective is to provide expert scientific advice to SEPA on:

- a) the effectiveness of the offshore particle retrieval operation;
- b) whether the Dounreay Particles Advisory Group's predications of particle numbers offshore and on local beaches remain valid; and
- c) the criteria and possible end-points for the recovery operation in the Dounreay local environment.

Details of both of these Advisory Groups can be found on the SEPA website (see Annex L.10).

A.3.75. DSRL continues to support a monitoring regime of local beaches to identify and remove any fragments of irradiated nuclear fuel. Since 2008, DSRL has carried out monitoring of the seabed off the Dounreay foreshore in an attempt to identify and recover these irradiated nuclear fuel fragments before they are mobilised onto the local beaches. The programme intends to cover some 60 hectares of the seabed; to date some 33% has been completed. Data from the monitoring and recovery programme is submitted to the Dounreay Particles Advisory Group and to Dounreay's Site regulators.

Contaminated land

A.3.76. Defra has consulted on proposals for revising the Statutory Guidance on Contaminated Land, including the separation of guidance for radioactive and non-radioactive contamination into separate documents. No substantive changes are planned for the rules on radioactivity. The consultation closed in March 2011 and it is planned to issue new Statutory Guidance in November 2011.

HASS update – sealed source removal programme

A.3.77. The UK implemented the European Council Directive on the control of high-activity sealed radioactive sources and orphan sources through the High-Activity Sealed Radioactive Sources and Orphan Sources Regulations 2005^[66] (HASS Regulations) and as Directions from the relevant Secretaries of State to the environment agencies. In England and Wales, the provisions of the HASS Regulations were incorporated into EPR10 in April 2010; this did not involve any change in the scope or nature of the regulatory regime.

A.3.78. The Environment Agency has completed the Government-funded Surplus Source Disposal Programme. The programme has been a major success in arranging safe management, recycling and disposal of a legacy of over 11,000 disused radioactive sources throughout the UK.

Challenges

Sellafield waste vitrification plant trap door event

A.3.79. Work has been completed following an event with a trap door which provides shielding on one of the lines in the Sellafield Waste Vitrification Plant. Engineering solutions have been developed and substantiated via a robust safety case. Permission to start modifications has been granted and implementation is well underway. Operations are planned to restart later in 2011 subject to the granting of further permission from ONR.

Sellafield HALES disruption of cooling water

A.3.80. There was an event when cooling water supplies were disrupted to the HALES plant. The plant operator's response maintained the plant within safety operating envelope defined in the safety case. Two Improvement Notices were issued which have now been completed and the Notices closed out.

Sellafield Life Time Plan 2010

A.3.81. The plan formulated in the summer of 2009, the Life Time Plan (LTP) 2010, was the most extensive planning exercise for a number of years. It was an evolution of earlier plans and set out to establish a mature base-line position, following changes in the management arrangements and management team at Sellafield. LTP 2010 was intended to be the realistic datum against which to measure future progress. The new Sellafield Executive Team set a greater focus on clean-up, remediation and high risk/hazard reduction. LTP 2010 was based on previous strategies, but the planning process involved more independent challenge, and input at the start to ensure that the result was robust and based on demonstrated performance and known technological solutions (rather than aspirational assumptions). The output showed an increase in some programme durations over previous plans, but these were considered to be a more realistic assessment of the future. The most recent planning round has generated LTP 2011 and this has factored-in acceleration plans and ambitions, and shows a marked improvement across the board.

Licence Instrument Specification for pile fuel storage pond and first generation Magnox storage pond

A.3.82. NII issued a Licence Instrument (LI) Specification in August 2000 for work covering radioactive sludges in the Pile Fuel Storage Pond and the First Generation Magnox Storage Pond. The LI used the then existing Sellafield Ltd plans to specify dates for the completion of certain activities; however subsequent events have revealed the original Sellafield Ltd plans to be over-optimistic. A combination of significant technical challenges, programme constraints and delivery issues revealed that there was more work involved than originally envisaged and completion by the dates set was not possible. Nevertheless, focus and resource to complete the work specified has been maintained, particularly in relation to the refurbishment of existing facilities and construction of new sludge storage facilities. This includes significant risk reduction activities and progress toward inventory retrievals:

- Installation of impact protection for the lines in the South Active Drain Trench and of frost and impact protection of the vulnerable Redundant Effluent Sludge Pipework System lines, reducing the risk of significant release of activity due to primary containment failure;
- Elimination of the risk of pond siphoning through the isolation of lines to an adjacent sludge settling pond;
- Development and installation of improved Redundant Effluent Sludge Pipework System emergency pumping systems to enable robust recovery should pond containment be breached and leakage occur;
- Development, design, manufacture and construction of the equipment and facilities needed to enable retrieval of the sludge in facilities, e.g. new skip-handler mast stand and tooling;
- Gantry rail refurbishment (>70% complete);
- Skip-handler refurbishment;
- Retrievals tooling development and construction;
- Sludge Packaging Plant 1 construction well-advanced; and
- Accessible waste removal (e.g. old pond tooling) and asset improvements (e.g. level instrument refurbishment).

Deferral of Windscale Pile 1 decommissioning

A.3.83. The regulatory bodies agreed to a proposal to defer the decommissioning work planned for the Pile 1 reactor to allow available resources to be focussed on high hazard reduction at Sellafield. This deferral was possible due to the work done by the piles project in preparation for decommissioning, which showed that the risks historically associated with Pile 1 (criticality, hydride fire, graphite dust explosion) were not credible in its current quiescent state.

Sellafield - Antimony-125 releases to air

A.3.84. In 2009, there was a gradual increase in the level of antimony-125 (Sb-125) discharged to air from Sellafield due to an increase in the reprocessing of spent

Magnox fuel with higher burn-up. Sellafield Ltd suspended its Magnox reprocessing operations in April 2009 to avoid breaching the permitted discharge limit for Sb-125. However, the suspension of reprocessing, and the prolonged storage of Magnox fuel in storage ponds, carries the risk of enhanced corrosion of fuel and increased discharges to sea. In addition, any delays in reprocessing increase the likelihood of not having completed the reprocessing of spent Magnox fuel remaining in wet storage by the time the existing reprocessing facility comes to the end of its operational life, around 2017.

A.3.85. In June 2009, the Environment Agency advised Sellafield Ltd that it agreed to the resumption of Magnox reprocessing operations as this represented the Best Practicable Environmental Option (BPEO), but in the knowledge that a breach of the site limit for Sb-125 (a radionuclide with a very low radiological impact) discharges to air could occur – even with Sellafield Ltd applying Best Practicable Means (BPM) to reduce its emissions. Sellafield Ltd had previously applied to the Environment Agency for an increase in the discharge limit for Sb-125 to account for the forecast increase in discharge. Reprocessing operations resumed in June 2009, and the permitted limit was exceeded later that summer. In 2009, the total aerial discharge of Sb-125 was 11GBq compared to a limit of 6.9GBq. The Environment Agency advised Sellafield Ltd of the breach of site limit for aerial discharges of Sb-125 and required improvements in the accountancy techniques for this radionuclide.

A.3.86. In April 2010, the Environment Agency increased the permitted limit for Sb-125 to 30GBq per year because it was satisfied that Sellafield Ltd was using the Best Available Techniques to control its emissions, and because the resulting radiological impact was small. This followed a positive European Commission opinion under Euratom Article 37 on the proposed change to the operation of the Fuel Handling Plant (where spent fuel is managed prior to its reprocessing).

A.3.87. Sb-125 is one of the radionuclides for which limits are established in the environmental permit. At the time the limit for Sb-125 was changed, the Environment Agency reduced the site limits for gaseous waste discharges of ruthenium-106 and iodine-131 and for aqueous waste discharges of zirconium/niobium-95, ruthenium-106, neptunium-237 and curium-234+244. No increases were requested by Sellafield Ltd to the limits for other radionuclides discharged to air or as aqueous waste.

Sellafield – low-level waste wrongly consigned

A.3.88. In April 2010, Sellafield Ltd incorrectly consigned and disposed of a small volume of Low-Level Waste from the Sellafield Site to the Waste Recycling Group's Lillyhall Landfill Site, Workington, Cumbria. The waste packages were recovered and returned to the Sellafield site. The Environment Agency has been carrying out an investigation into this incident in coordination with the nuclear safety and transport regulators.

Ductile cast iron containers

A.3.89. Magnox has proposed the use of ductile cast iron containers to provide interim on-site storage and eventual disposal of higher-level radioactive wastes. At present, the regulators (ONR, DfT, SEPA and the Environment Agency) do not have sufficient information to assess fully the disposability of these containers to enable regulatory agreement to be given to the totality of the strategy change requested by Magnox. The regulators are working with Magnox to develop a way forward, but there are too many uncertainties in terms of evidence to support permissioning the

strategy change at this time. This evidence must support any claims regarding disposability, which is still a key issue.

A.3.90. A programme of work has been agreed with the licensees to supply the necessary evidence that supports the proposal. This programme has been linked to Magnox proposals regarding regulatory schedule milestones and deferral reviews, and proposed deployment of equipment as part of the business plan.

Bradwell – prosecution for unauthorised discharge of liquid waste

A.3.91. In February 2009, the Environment Agency prosecuted Magnox Electric for unauthorised disposal of radioactive wastes from its premises at Bradwell Nuclear Power Station. Magnox Electric was found guilty of three charges of disposing of radioactive waste not in accordance with its authorisation over a 14 year period. The company also pleaded guilty to failing to maintain the plant - a below-ground sump used to collect radioactive wash water. The sump was originally a brick-lined pit, intended as an inspection chamber, but was modified to hold waste water before treatment in the site's effluent plant. The sump had no impermeable lining and clay pipes leading from it had been poorly sealed. The problem was identified in 2004 when Magnox staff noticed that the liquid level was falling. The sump served a decontamination bay used for washing down equipment that had been in contact with radioactive material. The water was slightly radioactive due to the presence of caesium and tritium. No radioactive material left the site and there was no risk to employees or the public. Magnox Electric was fined £250,000 with costs of £150,000.

4 - Rapporteur's Feedback and President's Report from the Third Joint Convention Review Meeting

A.4.1. At the third review meeting, the country group rapporteur summarised the planned measures to improve safety identified during the UK presentation. Where appropriate, progress on these matters has been addressed within this report. Key issues, as identified by the rapporteur, are summarised below.

Finalisation and application of REPs (RS Regulation environmental principles)

- *In April 2010, the Environment Agency published the latest version of the document, "Radioactive Substances Regulation – Environmental Principles, Regulatory Guidance Series, No RSR 1"^[67]. This is one of the regulatory guidance documents supporting the implementation of EPR10 in England and Wales. They provide the underlying basis for the technical assessments and judgements that Environment Agency staff make when regulating radioactive substances and inform permitting and compliance decisions. The REPs are discussed in Sections K.17 and K.18, and EPR10 is discussed in Sections A.2.48 to A.2.51.*
- *The fundamental protection objective and the principles contained in the environment agencies' 'Guidance on Requirement for Authorisation' (GRA) for radioactive waste disposal facilities are consistent with the Environment Agency's REPs. The guidance on radioactive waste disposal facilities is discussed in Section GH, from GH.60 onwards.*

RW Disposal Regulation Initiatives based on "risk" and "hazard"

- *In March 2009, NDA published a UK-wide review of higher activity waste storage (see Section A.3.56). This concluded that "... the priority is to deal with high hazard, high environmental risk facilities.....at the earliest safe opportunity".*
- *This principle has been adopted in the UK for all types of radioactive waste, and is evident in various Sections of the UK Report.*
- *The environment agencies' GRA includes a risk guidance level that applies to radioactive waste disposal facilities after the period of authorisation. This is discussed in Sections GH.65 and GH.66.*

Implement Institutional Changes to facilitate improvements (how changes have facilitated improvements)

- *Sections A.2.64 to A.2.94 describe a number of "Institutional Changes" since the last report under the heading "Organisational Developments" which are designed to facilitate improvements in the way the UK deals with, inter alia, matters under the Joint Convention, including spent fuel and radioactive waste.*
- *These include the creation of the Office for Nuclear Regulation and the Geological Disposal Implementation Board. There have also been a number of changes in licensee structures and in the companies charged with the management of many of the nuclear sites now being decommissioned (see Sections A.2.100 to A.2.111).*

- *The effect of these changes is described in the subsequent Sections of the UK Report.*

Progress in decommissioning with focus on high hazard plants

- *The status of decommissioning is presented under Article 32.2 (v) in the Tables which follow Section L.2.96.*
- *The two sites containing most of the high hazard plants are Sellafield and Dounreay, and the Table provides details of the current state of decommissioning at these sites and at other sites that fall within the scope of the Joint Convention.*

Implementation of discharge strategy (including non-nuclear sector) to ensure the reduction of discharge limits and actual discharges

- *In July 2009, the UK published its revised “UK Strategy for Radioactive Discharges”^[28]. The revised Strategy covers the period up to 2030 and includes both the nuclear and non-nuclear sectors. The Strategy is discussed in Sections A.2.39 and A.2.40, B.20 and B.21, and K.9 to K.14.*
- *The progressive reduction of discharge limits and of actual discharges has been a feature of UK policy since 1993. The practical effect of this policy is illustrated in the charts for discharges to air and to water which are shown in Sections A.2.117 to A.2.119.*

Work towards provision of a disposal facility for Higher Activity Waste

Monitoring and maintaining of multiple barriers concept.

- *In 2010, the Government published an indicative timetable for implementation of a geological disposal facility (GDF), with the first consignment of waste expected to be around 2040 (see Section A.2.77).*
- *The NDA has been charged as the implementing body for the GDF, and has restructured its Radioactive Waste Management Division (RWMD) accordingly.*
- *The search for a possible location for the GDF is now under way, based on the principle of voluntarism by local communities.*
- *In December 2010, NDA published a collection of documents that comprise the “Generic Disposal Systems Safety Case”^[68]. These include a description of the multiple barrier design concept and the arrangements planned for monitoring any effects in the environment.*

A.4.2 The President of the review meeting identified four specific topics of mutual interest to Contracting Parties. The table below indicates where these topics are dealt with in this, the UK's fourth Report.

President's Report
<p>Definition and implementation of a comprehensive national plan for the management of spent fuel and radioactive waste</p> <ul style="list-style-type: none"> • <i>UK policy for spent fuel management options is that it is a matter for the commercial judgment of the owners of the spent fuel, subject to meeting the necessary regulatory requirements (see Section B.3).</i> • <i>The January 2008 White Paper "Meeting the Energy Challenge"^[50] states that it would be feasible to co-dispose of spent fuel along with other legacy wastes.</i> • <i>In June 2008, the Government published a further White Paper "Managing Radioactive Waste Safely; A Framework for Implementing Geological Disposal"^[11]. The task of implementing the GDF was given to NDA.</i> • <i>The NDA is the owner of much of the spent fuel that is still in storage, and that which will arise during remaining reactor lifetimes. In its 2011 Strategy^[17], NDA sets out options for reprocessing or disposing of various proportions of this spent fuel, and future arisings, in the GDF.</i> <p>Management of VLLW and implementation of clearance thresholds</p> <ul style="list-style-type: none"> • <i>The policy on VLLW was updated by the LLW Policy issued in March 2007^[14]. Low Volume VLLW can be safely disposed of to unspecified destinations and High Volume VLLW to specified landfill sites. Controls on disposal of High Volume VLLW, after removal from the premises at which it originates, will be necessary in a manner specified by the environmental regulators (see Section B.59).</i> <p>Establishment of national agencies in charge of the management of spent fuel and radioactive waste</p> <ul style="list-style-type: none"> • <i>NDA was set up under the Energy Act 2004^[53] (see Sections A.2.24 and A.2.78).</i> • <i>NDA has responsibilities for the effective management of radioactive waste within its UK-wide estate. Government has also made NDA responsible for developing and implementing a UK-wide strategy for nuclear industry LLW and for implementing geological disposal of higher-activity waste (HAW), which extends its responsibility outside its own estate in these areas. These higher-activity wastes include spent fuel.</i> <p>Management of graphite waste</p> <ul style="list-style-type: none"> • <i>In 2010, a feasibility study, the Graphite Pathfinder Project, was initiated to investigate the opportunities for near-surface disposal of graphite wastes. This is funded by NDA and will look at the applicability of this approach to graphite wastes from the operation of the Magnox fleet (see Section A.3.67).</i>

A.4.3. In his Summary Report, the President of the third review meeting identified six specific topics of mutual interest to Contracting Parties that should be included in the reports of Contracting Parties to the next review meeting. The table below indicates where these topics are dealt with in this, the UK's fourth Report.

Summary Report
<p>Development of a comprehensive regulatory framework</p> <ul style="list-style-type: none"> • See Articles 19 and 20, Section E of this report.
<p>The effective independence of the regulatory body</p> <ul style="list-style-type: none"> • See Article 20.2, Section E.154 to E.157.
<p>Implementation of the strategies with visible milestones</p> <ul style="list-style-type: none"> • See Section A.2.85 to A.2.90. • The Government has assigned the responsibility for the development of waste management and decommissioning strategies to the NDA. The latest strategy can be found in the document "NDA Strategy, April 2011"^[17]. A summary of the current milestones for each of the NDA's sites can be found in Appendix C of the NDA Strategy.
<p>Funding to secure waste management</p> <ul style="list-style-type: none"> • See Section A.2.57. • A summary of the estimated costs of the NDA's decommissioning activities can be found in Appendix D of the NDA Strategy.
<p>Education and recruitment of competent staff and employees</p> <ul style="list-style-type: none"> • Training is referred to at many points in the report. • See Sections F.10 to F.26 for details of licensee training. • See Sections L.7.10 to L.7.16 for details of ONR training. • See Sections L.7.30 to L.7.32 for details of Environment Agency training. • See Sections L.7.47 to L.7.49 for details of SEPA training.
<p>Geological repositories for HLW</p> <ul style="list-style-type: none"> • The programme for implementing a geological repository or geological disposal facility (GDF) is referred to at many points in the report. See Sections A.2.17 to A.2.20, A.2.76 and A.2.77, B.3 to B.5, B.23 to B.29, B.80 to B.85, GH.54 to GH.57, K.15 and K.16. • The January 2008 White Paper "Meeting the Energy Challenge"^[50] states that it would be feasible to co-dispose of spent fuel along with other legacy wastes. • In June 2008, the Government published a further White Paper "Managing Radioactive Waste Safely; A Framework for Implementing Geological Disposal"^[11]. The task of implementing the GDF was given to the NDA.

Section B - Policies and Practices

Article 32 - Reporting

1. In accordance with the provisions of Article 30, each Contracting Party shall submit a national report to each review meeting of Contracting Parties. This report shall address the measures taken to implement each of the obligations of the Convention. For each Contracting Party the report shall also address its:

- (i) spent fuel management policy;
- (ii) spent fuel management practices;
- (iii) radioactive waste management policy;
- (iv) radioactive waste management practices;
- (v) criteria used to define and categorise radioactive waste.

B.1. Under this Article, compliance with the Joint Convention is demonstrated in ways that have not substantially changed since the third UK report (i.e. in a way that has implications for the Joint Convention obligations).

B.2. Annex L.9 lists the Sections of this report that explain how the UK meets each of its obligations under the Joint Convention. A brief summary of policy and practices in spent fuel and radioactive waste management, together with an explanation of the criteria used to define and categorise radioactive waste is given below.

Article 32.1(i) - Spent Fuel Management Policy

B.3. The Government's spent fuel management policy on the question of whether to reprocess (and if so when) or to seek alternative spent fuel management options is that it is a matter for the commercial judgment of the owners of the spent fuel, subject to meeting the necessary regulatory requirements. The Government also accepts that spent fuel should not be categorised as waste while the option of reprocessing the fuel remains open and a future use for the fuel can be foreseen. The 2008 White Paper, 'Meeting the energy challenge'^[50] states that any new nuclear power stations that might be built in the UK should proceed on the basis that spent fuel will not be reprocessed and that plans for, and financing of, waste management should proceed on this basis.

B.4. The Energy White Paper sets out the Government's conclusions in relation to the management of radioactive waste produced by new nuclear power stations as follows:

"Having reviewed the arguments and evidence put forward, the Government believes that it is technically possible to dispose of new higher-activity radioactive waste in a geological disposal facility and that this would be a viable solution and the right approach for managing waste from any new nuclear power stations. The Government considers that it would be technically possible and desirable to dispose of both new and legacy waste in the same geological disposal facilities and that this should be explored through the Managing Radioactive Waste Safely programme. The Government considers that waste can and should be stored in safe and secure interim storage facilities until a geological facility becomes available".

B.5. 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 NDA as part of the GDA process support this view and they 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. This conclusion is supported by the similarity of the wastes to those expected to arise from the existing pressurised water reactor at Sizewell B. NDA has concluded that given a disposal site with suitable characteristics, the wastes and spent fuel from the potential reactor designs are expected to be disposable.

Article 32.1(ii) - Spent Fuel Management Practices

B.6. Spent fuel management practices are summarised below. A fuller description is at Annex L.1.

B.7. Spent Magnox fuel is initially stored in either water-filled ponds or, in the case of Wylfa power station in North Wales in a dry store, to allow for the radioactive decay of short-lived isotopes (minimum 90 days) before being dispatched to the nuclear licensed site at Sellafield in the northwest of England for reprocessing.

B.8. Spent AGR fuel is first held under water in containers for at least 100 days at the power station, before being transported by rail to Sellafield using specially designed flasks. EDF Energy has contracts with Sellafield Ltd for reprocessing 5,000te of its AGR fuel. Spent fuel in excess of this contracted quantity will be stored pending a decision on its long-term management. The 2010 UKRWI reports 5,500te of spent AGR fuel will be reprocessed and some 3,100te will go for interim storage.

B.9. Spent PWR fuel arises from the existing Sizewell B power station, in the southeast of England. The fuel discharged from the reactor core is stored on site in a water-cooled storage pond ('wet store'). The station has capacity to store fuel in the storage ponds for up to 20 years of operation (i.e. up to 2015). For accounting purposes, Sizewell B has a lifetime of 40 years and an assumed closure date of 2035. To meet the shortfall in storage capacity, EDF's current plan is that an ISFSI should be constructed at Sizewell to accommodate all spent fuel arising from the site, including that already in the wet store. The ISFSI would continue to store the spent fuel for many decades after the station is decommissioned, pending final disposal in an off-site facility. The estimated total spent fuel arising from 40 years operation at Sizewell B is 1,049 tonnes Uranium.

B.10. The ISFSI Dry Store strategy for Sizewell B is to store spent PWR fuel assemblies in metal flasks within a building. The metal flasks will maintain an inert gas atmosphere for the storage of the spent fuel assemblies. The system is designed to be passive with heat dissipated through the external surface of the flask. Cooling of the building is achieved by natural convection.

B.11. A planning consent process and public consultation was initiated in 2009, the plan being that a dry storage facility will have been constructed by 2015. The intention is to switch all spent fuel progressively to dry storage by 2045. Thereafter, the store would operate in a passive mode until fuel is retrieved and disposed of to the national GDF, beginning in 2080 (see Sections L.1.7 and L.1.19 to L.1.22).

B.12. Other fuels including the fuel from UKAEA's various research and demonstration reactors are stored on sites at Dounreay, Harwell and Sellafield, pending decisions on a long-term fuel management route.

Article 32.1(iii) - Radioactive Waste Management Policy

B.13. The following is a summary of the key points of the policy.

General radioactive waste management policy

B.14. The policy is based on the same basic principles as apply more generally to environmental policy, and in particular on that of sustainable development. More specifically, radioactive wastes are managed and disposed of in ways which protect the public, workforce and the environment.

B.15. Within this approach, the Government maintains and continues to develop a policy and regulatory framework which ensures that:

- radioactive wastes are not unnecessarily created in accordance with the waste hierarchy;
- wastes created are safely and appropriately managed and treated; and
- they are then safely disposed of at appropriate times and in appropriate ways.

B.16. Within that framework, the producers and owners of radioactive waste are responsible for developing their own waste management strategies, ensuring that:

- they do not create waste management problems which cannot be resolved using current techniques, or techniques which could be derived from current lines of development;
- where it is practical and cost-effective to do so, they characterise and segregate waste on the basis of physical and chemical properties, and store it in accordance with the principles of passive safety; and
- they undertake strategic planning, including the development of programmes for the disposal of waste accumulated at nuclear sites within an appropriate timescale and for the decommissioning of redundant plant and facilities.

B.17. The producers and owners of radioactive waste are responsible for bearing the cost of managing and disposing of the waste.

B.18. Policy for the management of Low-level Radioactive Waste is now laid down in 'Policy for the Long Term Management of Solid Low level Radioactive Waste in the United Kingdom'^[14]. This was issued to address the shortfall in LLW disposal capacity arising as a result of decommissioning of the UK's nuclear facilities. It also introduces a risk-based approach to the use of range of appropriate disposal options.

B.19. Policy for the long term management of higher activity waste is set out in Section B.23 to B.28.

Policy on radioactive waste discharges

B.20. In July 2009, the UK Government and devolved administrations published the revised UK Strategy for Radioactive Discharges^[28] which covers the period up to 2030. The revised UK Strategy builds on and widens the scope of the 2002 Strategy, bringing all information on radioactive discharges into one place. The Strategy applies to both the nuclear and non-nuclear sectors and includes aerial as well as liquid discharges from operational and decommissioning activities. It sets out the progress made on reducing discharges and emissions to the environment; it describes, at the sectoral level, the outcomes which are expected to be achieved and by when, and sets a strategic framework for addressing radioactive discharges over the next 20 years. The progressive reduction of discharges is a central tenet of the way in which radioactive discharges are controlled. The UK Government interprets "progressive reduction" as a clear reduction over a number of years or a statistically significant difference between one period of years and a subsequent period to indicate a reduction. This does not mean year-on-year reductions, but it allows for normal plant fluctuation and variations in nuclear reactor operation and reprocessing.

B.21. In the UK, the policy on the regulation of radioactive waste discharges and disposals requires optimisation through application of BAT in England and Wales or application of BPM in Scotland and Northern Ireland. Application of BAT replaced use of BPEO and BPM in England and Wales under Statutory Guidance from the UK Government to the Environment Agency^[29]. BAT is considered broadly equivalent to BPM. Application of BAT is considered more consistent with environment protection regimes in other countries and with the terminology used for environmental regulation of major non-nuclear industries.

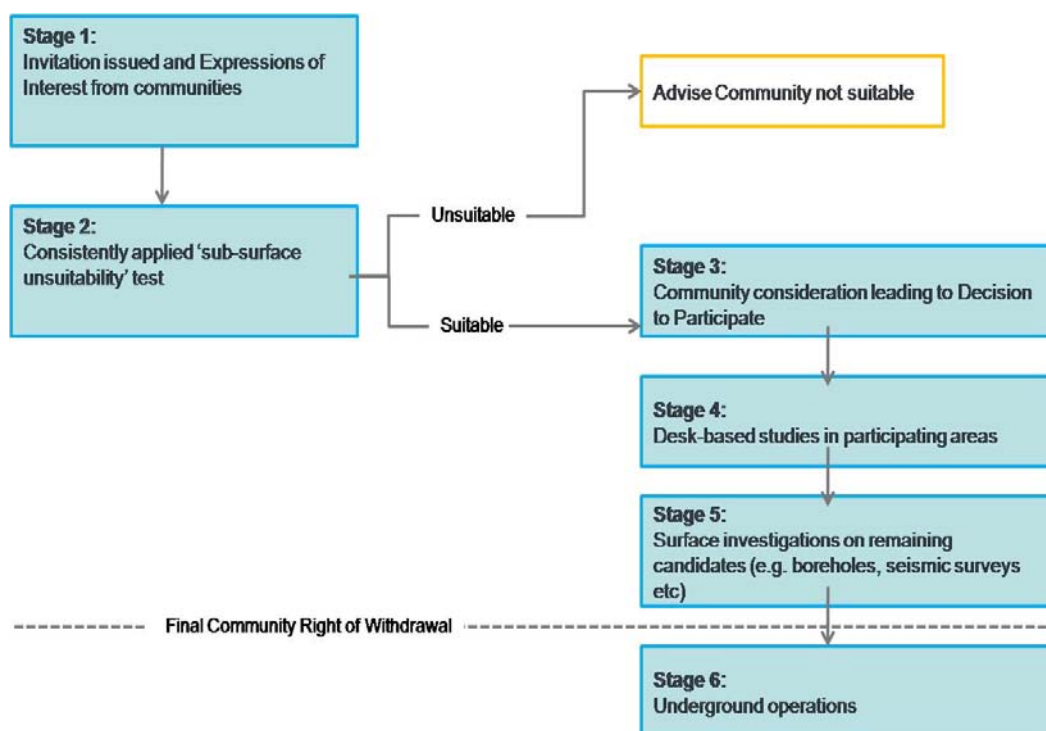
B.22. The Environment Agency has published guidance that sets out the principles and framework for undertaking studies on optimisation and the identification of BAT^[69]. SEPA has recently issued similar guidance on BPM and its role in ensuring that ionising radiation exposures to members of the public are ALARA^[70].

Implementing the policy for the long-term management of higher-activity radioactive waste

B.23. As described in Section A.2.18 – A.2.20, the MRWS White Paper sets out a step-by-step process for implementing geological disposal in England and Wales based on voluntarism and partnership with local communities.

B.24. So far, three local authorities have 'expressed an interest'. Copeland Borough Council, Allerdale Borough Council and Cumbria County Council, all in the north-west of England, have set up a partnership of local interests – the West Cumbria Partnership – to make recommendations to the three Councils on whether or not they should participate in the geological siting process, without commitment to eventually hosting a facility.

Figure B.1 – Process for implementing geological disposal



B.25. The next step, following a community coming forward, is for the British Geological Survey to apply initial sub-surface screening criteria for the area under consideration. This screening will not identify sites that could definitely host a facility but will rule out areas that are unsuitable to host a facility for geological reasons.

B.26. The British Geological Survey has undertaken initial sub-surface screening for the Copeland and Allerdale areas of west Cumbria and a report was published in October 2010^[71]. The initial screening results do not present any reason why West Cumbria could not participate in the site selection process for a GDF. It will be for the West Cumbria MRWS Partnership to continue its local engagement to inform its recommendations to the local authorities.

B.27. Initial sub-surface screening does not consider any non-geological factors and does not show where a facility would eventually be located. If a community decides to participate further in the siting process then increasingly detailed assessments applying more localised geological and other criteria will be made. All of the stages in the site selection process are shown in the figure above.

B.28. The option for other communities to express an interest will be left open for the foreseeable future and the UK Government hopes that the interest shown in West Cumbria will be the first of a number of approaches to Government to discuss the siting process for a GDF.

B.29. As set out in Sections A.2.21 to A.2.22, the Scottish Government Policy, published in January 2011, is that the long-term management of higher activity waste should be in near-surface facilities. Facilities should be located as near as possible to the site where the waste is produced, and developers will need to demonstrate

how the facilities will be monitored and how waste packages, or waste, could be retrieved. All long-term waste management options will be subject to robust regulatory requirements. The Scottish Government will be developing a Strategy to implement the Policy.

Policy for the management of low-level radioactive waste

B.30. A new UK policy for managing solid LLW was published by the Government in March 2007^[14]. The new policy statement outlines the priorities for managing low-level radioactive waste responsibly and safely, by:

- allowing greater flexibility in managing the wide range of LLW that already exists and will arise in the future;
- maintaining a focus on safety, with arrangements supported by the independent regulators;
- seeking to first minimise the amount of LLW created before looking at disposal options, through avoiding generation, minimising the amount of radioactive substances used, recycling and reuse;
- the publication of the *UK Strategy for the Management of Solid Low-Level Radioactive Waste from the Nuclear Industry* in August 2010 by NDA^[20]. This Strategy aims to provide a framework within which management decisions can be taken flexibly to ensure safe, environmentally acceptable and cost effective management solutions. The Strategy conserves capacity at the national LLW Repository in West Cumbria and facilitates significant savings in NDA's liabilities. The strategy is considered to be flexible enough to accommodate the potential LLW arising from new nuclear power stations;
- The UK Government is currently developing a *Strategy for the Management of Solid Low-Level Radioactive Waste from the Non-nuclear Industry in the UK*. This Strategy covers the majority of sectors making up the non-nuclear industry and will include general information applicable to the whole of the non-nuclear industry. A consultation on the Strategy was completed in March 2011 and the results are awaited. A second phase of consultation will be conducted separately on the specific needs of those organisations which produce wastes containing naturally-occurring radioactive materials (NORM). The consultation will take into account arrangements for NORM disposal in the UK following the decision by SEPA to refuse granting an authorisation under RSA93 for the Scotoil facility, located near Aberdeen, to discharge NORM wastes directly to the sea. Also the nature of NORM wastes is very different to those of the rest of the non-nuclear industry, hence the UK Government is considering NORM waste management arrangements separately; and
- emphasising the need to involve communities and the wider public in developing and delivering LLW management plans.

B.31. The methods for managing and disposing of LLW in the long term already exist in the UK. However the review of managing LLW dealt with a number of new issues, including:

- the decommissioning and clean-up programme by those sites for which the NDA is responsible, which will greatly increase the amount of LLW generated over the coming decades;

- the very limited long-term capacity at the national LLW disposal facility near Drigg to deal with this waste;
- the diminishing availability of other routes for dealing with LLW; and
- the increasing difficulty of finding small-scale treatment and disposal routes for the least radioactive wastes, which are very important for the non-nuclear sectors.

Policy on decommissioning

B.32. The Government's policy on decommissioning is set out in The Energy Act 2004^[53] which obliges NDA to review and publish a Strategy at least every five years. The UK Government and Scottish Ministers approved the latest Strategy in March 2011^[17]. NDA's core object is to ensure that the historic civil public sector nuclear legacy sites are decommissioned safely, securely, cost effectively and in ways that protect the environment. NDA delivers its objective through others, primarily SLCs, which are licensed to operate NDA's nuclear sites. Key points of this policy are noted below.

Objectives of decommissioning

B.33. The objective of decommissioning is to remove progressively the hazard that the facility poses. Decommissioning operations should be carried out as soon as reasonably practicable, taking all relevant factors into account.

Decommissioning strategies

B.34. Each operator produces and maintains decommissioning strategies and plans for its sites. The strategies and plans should take into account the views of stakeholders (including relevant local authorities, public and stakeholder groups). The strategies should take into account all relevant factors, assessing and presenting them in a transparent way, underpinned by objective information and arguments. These include:

- a) ensuring worker and public safety;
- b) maintaining site security;
- c) minimising waste generation and providing for effective and safe management of wastes which are created;
- d) minimising environmental impacts including reusing or recycling materials whenever possible;
- e) maintaining adequate site stewardship;
- f) using resources effectively, efficiently and economically;
- g) providing adequate funding;
- h) maintaining access to an adequate and relevant skills and knowledge base;
- i) using existing best practice wherever possible;
- j) conducting R&D to develop necessary skills or best practice; and

-
- k) consulting appropriate public and stakeholder groups on the options considered and the contents of the strategy.

B.35. The future use of the site, once decommissioning operations are completed, is a significant factor in determining decommissioning operations. The objective is to get the best solution overall taking into account the needs of the environment, and the safety of workers and the local community.

B.36. Strategies harness the general benefits of radioactive decay while the problems to which it may give rise in certain areas are avoided. They seek to avoid the creation of radioactive wastes in forms that may reduce the number of options for safe and effective long-term waste management.

B.37. Where short-term increases in discharges of some radionuclides are unavoidable, the relevant environment agency must be satisfied that they represent the optimal result from appropriate option studies and reflect the application of BAT or BPM principles to ensure public doses are As Low As Reasonably Achievable (ALARA).

B.38. Operators review their strategies periodically, and when changes in circumstances, including relevant Government policies, make this necessary.

B.39. The operators of sites for which NDA is responsible are also required through their contracts with NDA to produce plans covering the whole lifecycle of these sites, including their decommissioning. These plans are reviewed regularly and summaries of the current plans can be found on the NDA website (see Annex L.10).

Funding of decommissioning operations

B.40. The UK Government expects all nuclear operators to take the steps necessary to ensure that their decommissioning work is adequately funded.

Regulation

B.41. The nuclear regulators (ONR and environment agencies) ensure that regulation is proportionate to the level of the risk to safety or the environment posed by the site.

Access to skills and development and spread of best practice

B.42. Operators maintain a knowledge base, records and skills as necessary for their decommissioning operations and management of associated wastes. In addition, NDA has obligations under the Energy Act 2004 to ensure suitable skills and technologies are available to support its decommissioning programme and to encourage the use of best practice.

B.43. NDA is fulfilling its skills obligation through its People Strategy, published in April 2011 as part of its overall strategy document^[17]. The strategy includes NDA taking a proactive approach to ensure that SLC Resource and Skills Strategies are aligned to the delivery of the NDA mission. NDA is implementing its strategy by investing significantly in defining skills demands, building infrastructure, developing appropriate qualifications and provision. Additionally, it encourages recruitment into the industry and the use of world-class benchmarks to compare performance against that of other industries. To date, initiatives are being developed and implemented with partners and stakeholders. Examples include: Nuclear Skills Passport, Standard Resource Code definitions, Site Licence Company Skills Strategies, the Dalton

Cumbria Facility, the National Skills Academy for Nuclear and its delivery centres, a National Graduate Scheme and Community Apprenticeships in the supply chain.

Designing new nuclear facilities to take account of decommissioning

B.44. Any new facility should be designed and built so as to minimise decommissioning and the associated production of radioactive waste (see ONR website for the guidance on assessing adequacy in these areas) and costs, as part of the nuclear safety and environmental regulatory processes.

Waste and decommissioning financing arrangements for new nuclear power stations

B.45. In December 2010, DECC published its revised Funded Decommissioning Programme (FDP) Guidance for New Nuclear Power Stations^[72]. The consultation follows the publication in February 2008 of initial draft FDP guidance on what an approvable FDP should contain. Since 2008 there have been some significant developments with regard to the framework that the UK Government is putting in place concerning the financing of decommissioning and waste management and waste disposal. Also, over this period, the prospective nuclear operators have been developing their approach to the FDP as their development plans have progressed.

B.46. The finalised guidance is will be published in 2011 and will assist operators in understanding their obligations under the Energy Act 2008^[73]. The Act requires operators of new nuclear power stations to have an FDP approved by the Secretary of State for Energy and Climate Change in place before construction of a new power station begins and to comply with this FDP thereafter.

B.47. The Decommissioning and Waste Management Plan part of the Guidance will assist operators in setting out and costing the steps involved in decommissioning a new nuclear power station and managing and disposing of hazardous waste and spent fuel in a way which the Secretary of State for DECC may approve.

B.48. The Funding Arrangements Plan part of the Guidance will assist operators in setting out acceptable financing proposals to meet the costs identified. It will set out information on the factors by which the Government would expect to assess the funding proposals submitted by operators as part of an FDP for approval under the provisions in the Energy Act 2008.

B.49. The independent Nuclear Liabilities Financing Assurance Board will provide impartial scrutiny and advice to the Secretary of State on the suitability of the FDP programme submitted by operators of a new nuclear power stations.

B.50. Under the Energy Act 2008 the Secretary of State for DECC has put in place regulations relating to the financing of decommissioning and waste handling. The Nuclear Decommissioning and Waste Handling (Finance and Fees) Regulations 2011^[74], which came into force in April 2011, include: provision relating to the setting of fees for approving an FDP; reporting and information requirements, and disapplication of the modification regime set out in the Energy Act 2008 in certain instances. The regulations are complemented by The Nuclear Decommissioning and Waste Handling (Designated Technical Matters) Order 2010^[75] which specifies certain matters as designated technical matters, in addition to those provided in the Energy Act 2008, so that there is a clear understanding of the extent of the designated technical matters. The Order came into effect in November 2010.

B.51. Alongside the consultation on the revised FDP guidance, the UK Government also published a consultation on an updated Waste Transfer Pricing Methodology for

the disposal of higher-activity waste from new nuclear power stations. This consultation follows the publication of the Consultation on a Methodology to Determine a Fixed Unit Price for Waste Disposal and Updated Cost Estimates for Nuclear Decommissioning, Waste Management and Waste Disposal in March 2010.

B.52. The consultation document sets out:

- the Government response to the March 2010 consultation;
- the key changes that have been made as a result of that consultation; and
- an updated methodology for further consultation.

B.53. The finalised approach on the issues covered by the consultation will be issued in 2011.

Article 32.1(iv) - Radioactive Waste Management Practices

B.54. Radioactive waste management practices have not changed substantially since the last report. The following is a short summary of practices. Further information, including the definitions and categorisations of radioactive waste in the UK, is presented in Annex L.2.

B.55. In 2010 the UK carried out the first shipments of high-level vitrified waste to Sellafield Ltd's overseas reprocessing customers. The first shipments were to Rokkasho, Japan and to COVRA in the Netherlands. The programme will last about 10 years. All shipments were carried out under the Shipments Directive^[35] (see Section I).

B.56. For LLW, it is intended to develop a new disposal facility at Dounreay. SEPA has a range of responsibilities in relation to the proposed LLW facilities at Dounreay. These responsibilities cover the pre-planning, planning, construction, operational and post-closure phases and involve a range of regulatory regimes including:

- Radioactive Substances Act 1993 (RSA93);
- Water Environment (Controlled Activities) (Scotland) Regulations 2005 (known as the Controlled Activities Regulations, or CAR)^[76];
- Pollution Prevention and Control (Scotland) Regulations 2000^[77];
- Waste Management Licensing Regulations 1994^[78]; and
- Environmental Protection Act 1990 (EPA90).

B.57. SEPA intends to avoid, as far as possible, dual regulation of the facilities and will regulate primarily under the RSA93 regime where appropriate. In addition to RSA93 requirements, SEPA intends to further protect the environment by applying conditions to any RSA93 authorisation comparable with those applied under other regimes to controlled or hazardous wastes.

B.58. DSRL has submitted an Environmental Safety Case to SEPA to underpin its plans to dispose LLW at a facility located near, but off, the main Dounreay nuclear licensed site (see Sections A.3.61 to A.3.63). SEPA will assess the Environmental Safety Case using the environment agencies' guidance 'Near-Surface Disposal Facilities on Land for Solid Radioactive Wastes: Guidance on Requirements for Authorisation' (GRA)^[46]. The GRA is not a prescriptive document; it contains

principles and requirements that a developer needs to demonstrate to have taken into account when developing the environmental safety case for a LLW disposal facility. The GRA reflects Government policy on long-term management of LLW.

Very-low-level waste

B.59. Very-low-level waste (VLLW) covers wastes with very low concentrations of radioactivity. This category of waste was updated by the LLW Policy issued in March 2007. Low volume VLLW can be safely disposed of to unspecified destinations and high volume VLLW to specified landfill sites. Controls on disposal of high volume VLLW, after removal from the premises at which it originates, will be necessary in a manner specified by the environmental regulators. In general, storage is not necessary.

Low-level waste

B.60. Solid low-level waste (LLW) includes metals, soil, building rubble and organic materials, which arise principally as lightly-contaminated miscellaneous scrap. Most LLW is currently disposed of at the LLWR, where waste is grouted into metal containers prior to emplacement within a concrete vault. Where suitable, waste is subject to high force compaction before placement into these metal containers. Other means are also undertaken to ensure that the waste is in the most suitable form for disposal to the LLWR. The LLWR is used by non-nuclear users, such as hospitals and universities, for the disposal of their radioactive wastes, as well as for the disposal of LLW generated on nuclear sites.

B.61. The LLWR is a nuclear licensed site, under NIA65. This provides a rigorous, robust and transparent regulatory regime to secure safety and public confidence prior to closure. ONR is the regulatory body for this regime. The Environment Agency regulates any discharges from the site during its operation and requires an environmental safety case that demonstrates the required standard of environmental safety is achieved during operation of the LLWR and after its closure.

B.62. In 2002 the operator of the LLWR submitted a Post-closure Safety Case and an Operational Environmental Safety Case for continued operation of the site. In accordance with Government Policy, the Environment Agency periodically reviews authorisations for radioactive waste disposal. To inform the Environment Agency review of the LLWR authorisation, an assessment of the Post-closure Safety Case and Operational Environmental Safety Case for the repository was undertaken, and findings of the assessment were published in 2005^[79].

B.63. The Environment Agency concluded that the 2002 safety case failed to make an adequate or robust argument for continued disposals of LLW. This failure was due to estimated doses and risks from existing disposals exceeding current regulatory targets, the possibility of destruction of the LLWR by coastal erosion in as little as 500 years, and insufficient optimisation and risk management to demonstrate impacts were ALARA.

B.64. In May 2006, the Environment Agency issued an authorisation under RSA93 that only allowed disposal to the existing vault. The operator will need to present further information on optimising the performance of the LLWR before disposals to any further vaults are permitted. The authorisation also included several improvement conditions. In April 2010, the authorisation automatically became an environmental permit when EPR10 came into force; there was no change to the limits or conditions and the existing improvement requirements continue to apply. The

Environment Agency will review the environmental permit when the operator has reported on these improvements.

B.65. One of the improvements requires a environmental safety case, updated in full, to be submitted by May 2011. The Environment Agency will undertake a full review of this environmental safety case to inform the review of the LLWR's environmental permit; this is expected to be complete around 2013. At that time, a decision will be taken on whether further disposals can be permitted.

B.66. EPR10 places a duty on the Environment Agency to conduct periodic reviews of environmental permits. The Environment Agency carries out such periodic reviews annually on all environmental permits for disposals from nuclear sites. A periodic review may lead to proposals to change an environmental permit for radioactive waste disposal. In the case of the LLWR, the annual reviews have not resulted in any substantive change to the environmental permit or the preceding authorisation.

Storage prior to treatment - new ways of working at the low-level waste repository

B.67. The *UK Strategy for the Management of Solid Low-Level Radioactive Waste from the Nuclear Industry* has been prepared for the Government by the NDA in response to the UK policy on the management of solid low-level radioactive waste. The aim is to provide a high level framework within which LLW management decisions can be taken flexibly to ensure safe, environmentally acceptable and cost-effective management solutions.

B.68. Central to the strategy is the implementation of the waste hierarchy in the management of LLW, which will support the provision of continued capability and capacity for managing LLW in the UK. Three strategic themes have guided the development of this strategy:

- Application of the waste hierarchy.
- Best use of existing LLW management assets.
- Need for new fit-for-purpose waste management routes.

B.69. The strategy advocates the application of the waste hierarchy, with a preference for managing LLW at higher levels, where practicable (i.e. waste prevention, reuse, recycling). This approach will facilitate continued waste management, hazard reduction and decommissioning operations. Using a broader number of options for managing LLW rather than focusing on disposal will lead to continued capability and capacity for the safe, secure and environmentally responsible management, treatment and disposal of LLW in the UK.

B.70. The UK's only management route for certain LLW, and the only facility in the UK that can accept a wide range of LLW from numerous waste producers, is the LLWR. The UK will generate significantly more LLW than the potential disposal capacity at LLWR, which means there is a need for alternative ways to manage LLW, including treatment and where necessary, the use of alternative disposal routes. These new or improved alternatives to LLW disposal, either performed at or co-ordinated by LLWR include:

- Metallic waste treatment;
- Combustible waste treatment;

- Supercompaction;
- VLLW disposal; and
- Improved packaging processes.

B.71. Since 1959, most of the UK's solid LLW has been transported to the near-surface disposal facility, the LLWR in Cumbria. Between 1959 and 1995 about 800,000m³ of waste was disposed in a series of clay-lined trenches and covered with soil. Since 1988 most waste has been placed in large metal containers, similar to shipping containers. These are then filled with cement and placed in engineered concrete vaults. At 1 April 2010, the containers occupied 176,000m³ of vault space. Consignments to the LLWR over the past 10 years have totalled 100,000m³.

B.72. The 2010 UKRWI indicates that at 1 April 2010 the volume of LLW was about 66,000m³, of which about 14,900m³ is waste that has already been conditioned and is in Vaults 8 and 9 at the LLWR. The larger volumes of the remaining LLW are at Chapelcross (20,000m³), Dounreay (9,360m³) and Sellafield (6,310m³). At Dounreay LLW is being stored pending the planned opening of a new disposal facility at the site in 2014. At Chapelcross, Sellafield and other sites, most LLW was in temporary storage awaiting consignment to the LLWR. Other wastes are being held for characterisation, processing and/or repackaging, before being consigned to the LLWR. A small fraction of LLW, about 200m³, was unsuitable for consignment to the LLWR or disposal to landfill because the wastes do not meet current acceptance criteria. These wastes are managed in much the same way as ILW.

B.73. About 33,600m³ of LLW previously disposed of at Dounreay is planned for recovery, repackaging and disposal into the third and final phase of the new Low-Level Waste Facility being developed near the Dounreay site in Caithness.

New ways of managing low-level waste – metals recycling

B.74. In conjunction with the LLWR and other nuclear licensed sites, the new Studsvik Metal Recycling Facility (MRF), in Lillyhall, West Cumbria, is used to deliver management of metallic LLW against the waste Hierarchy by use of techniques like size reduction and shot blasting to reduce the volume of waste and recover valuable metals. The site processed/recycled around 900 tonnes of metallic waste in 2010.

Intermediate-level waste

B.75. Intermediate-level waste (ILW) currently arises from the reprocessing of spent fuel, operations and maintenance of radioactive plant and decommissioning. Additionally an inventory of legacy waste dating back to the 1950s is stored, pending retrieval and conditioning into a disposable form. The major components of current arisings of ILW are metals and organic materials, with smaller quantities of cement, graphite, glass and ceramics. As more facilities enter the decommissioning phase, the quantities of metal, concrete and graphite will increase. Until a long-term management solution is available, ILW will be conditioned into a passively-safe form and stored in interim stores, potentially for several decades. The current approach to interim storage of ILW has been to build facilities at each site where it has arisen. Sellafield holds the single largest inventory of ILW.

B.76. Prior to interim storage, ILW is generally conditioned to produce stable waste packages, which are suitable for long-term storage, in passively-safe forms. This is intended to secure long-term safety without the need for complex safety systems (administrative and engineered) to ensure adequate safety, and to avoid the costs

and radiological doses involved in repackaging. Waste conditioning is carried out, as far as practicable, in such a way as to anticipate the requirements for future long-term management. Current arisings from reprocessing of spent fuel are conditioned in near real-time, prior to interim storage.

B.77. The 2010 UKRWI indicates that there were 94,300m³ of ILW in storage, of which 24,500m³ had been treated to achieve passive safety by forming stable packages for long-term management (compared with 92,500m³ and 21,000m³ respectively in 2007; and 82,500m³ and 16,400m³ respectively in 2004). This waste is stored and conditioned on sites licensed under NIA65.

Letter of Compliance

B.78. Regulatory guidance for the management of higher-activity radioactive wastes requires that the licensee produces a Radioactive Waste Management Case addressing the longer-term safety and environmental issues associated with the wastes. The Radioactive Waste Management Case must also provide a reasoned judgement on whether the conditioned wastes will meet the anticipated requirements for acceptance from a potential disposal site operator.

B.79. The guidance recognises NDA's RWMD as the appropriate body to advise licensees on the packaging and conditioning of higher-activity wastes. This is provided through the Letter of Compliance assessment process. In undertaking this assessment, RWMD will assess waste packaging proposals against safety, environmental and security assessments for the transportation and geological disposal of the wastes, and provide an assessment of disposability to the licensee which can be used in support of the Radioactive Waste Management Case. In cases where the proposed waste package is compliant with geological disposal packaging standards and safety cases, this will be signified by the issue of a Letter of Compliance. The Letter of Compliance is a part of the nuclear site licensee's safety case submitted under licence conditions to ONR, which seek advice from the relevant environment agency.

High-level waste

B.80. High-level waste (HLW) is heat-generating waste that has accumulated since the early 1950s at Sellafield as the liquid nitric acid-based waste by-product from the reprocessing of spent nuclear fuel. It has been concentrated and stored in cooled tanks waiting to be encapsulated in glass (i.e. vitrified) to make it passively safe. The liquid glass is then poured into robust stainless steel containers in which it solidifies before being stored in environmentally controlled, safe and secure conditions pending either its return to the country of origin, or the availability of long-term management arrangements in the UK. Current Government policy is that the UK's vitrified HLW should be stored for at least 50 years to allow the heat to decline as a result of radioactive decay, so as to make long-term management less complex.

B.81. The 2010 UKRWI indicates that there are 1,620m³ of HLW in the UK in storage, of which 850m³ is in liquid form and 766m³ is vitrified (compared to 1,730m³ in stock in April 2007 of which 1,090m³ was in the liquid form and 648m³ vitrified). All of the previous HLW inventory at Dounreay has now decayed to an extent that has allowed it to be reclassified as ILW. This waste is stored and conditioned on sites licensed under NIA65.

Development of an higher-activity waste management strategy

B.82. CoRWM, an independent committee set up by the government to advise it on the management of radioactive waste, considered a broad range of options for the long-term management of HAW and in 2006 recommended geological disposal supported by safe and secure waste storage arrangements and a programme of underpinning research. The Scottish Government published its Policy Statement and Post-Adoption Strategic Environmental Assessment Statement for higher-activity radioactive waste in January 2011. The policy is for the long-term storage and, if appropriate, disposal of higher-activity radioactive waste in near-surface facilities.

B.83. The Government made NDA responsible for implementing geological disposal for HAW - as set out in the White Paper, Managing Radioactive Waste Safely: a framework for implementing geological disposal. The waste destined for the GDF arises from a number of waste producers across the UK.

B.84. NDA's overarching strategy is to convert the HAW inventory into a form that can be safely and securely stored for many decades. At the appropriate time, the stored waste in England and Wales will be transported to and disposed of in the GDF. Stored waste in Scotland will be managed in line with Scottish Government Policy for higher activity radioactive waste. Overseas-owned HLW products will be returned to foreign customers under existing contracts in accordance with Government policy. The first shipment was returned in early 2010. Further returns are scheduled over the next few years.

B.85. Development of the GDF is an important part of the strategy for managing HAW in England and Wales. The availability of a GDF is significant for decommissioning schedules, although the plans for safe and secure interim storage are capable of accommodating changes to the delivery timescale of the GDF. Alternative options for some HAW, such as near surface disposal for reactor decommissioning wastes, are also being considered.

Article 32.1(v) - Criteria Used to Define and Categorise Radioactive Waste

Definition of radioactive waste

B.86. Definitions of radioactive waste in UK legislation are specific to the purposes of that legislation. In general, they are in accordance with the definition of radioactive waste in the Joint Convention. The definitions are given in more detail in Annex L.2.

Categorisation of radioactive waste

B.87. In the UK, radioactive waste is classified under a number of broad categories, defined in detail in Annex L.2, according to its heat-generating capacity and activity content.

Section C

Article 3 – Scope of Application

1. This Convention shall apply to the safety of spent fuel management when the spent fuel results from the operation of civilian nuclear reactors. Spent fuel held at reprocessing facilities, as part of a reprocessing activity, is not covered in the scope of this Convention unless the Contracting Party declares reprocessing to be part of spent fuel management.
2. This Convention shall also apply to the safety of radioactive waste management when the radioactive waste results from civilian applications. However, this Convention shall not apply to waste that contains only naturally occurring radioactive materials and that does not originate from the nuclear fuel cycle, unless it constitutes a disused sealed source or it is declared as radioactive waste for the purposes of this Convention by the Contracting Party.
3. This Convention shall not apply to the safety of management of spent fuel or radioactive waste within military or defence programmes, unless declared as spent fuel or radioactive waste for the purposes of this Convention by the Contracting Party. However, this Convention shall apply to the safety of management of spent fuel and radioactive waste from military or defence programmes if and when such materials are transferred permanently to and managed within exclusively civilian programmes.
4. This Convention shall also apply to discharges as provided for in Articles 4, 7, 11, 14, 24 and 26.

C.1. Under this Article, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the third UK report (i.e. in a way that has implications for the Joint Convention obligations).

C.2. In September 1997, during the diplomatic conference to adopt the Joint Convention, the UK supported a declaration with France and Japan, on a voluntary basis, to report on reprocessing as a spent fuel management activity under the terms of the Joint Convention. France, Japan and the UK invited all other countries that carry out reprocessing to do the same.

C.3. Taking into account that declaration, this report addresses the Government's approach to:

- a) the safety of spent fuel management when the spent fuel results from the operation of civilian nuclear reactors, including spent fuel held at reprocessing facilities as part of a reprocessing activity;
- b) the safety of radioactive waste management when the radioactive waste results from civilian applications, but not waste that contains only naturally-occurring radioactive materials and that does not originate from the nuclear fuel cycle, unless it constitutes a disused sealed source; and
- c) discharges as provided for in Articles 4, 7, 11, 14, 24 and 26 of the Joint Convention.

C.4. This report does not address the safety of management of spent fuel or radioactive waste within military or defence programmes, except when such

materials are transferred permanently to and managed within exclusively civilian programmes, as identified in Article 3(3) of the Joint Convention.

Section D - Inventories and Lists

Article 32, paragraph 2

This report shall also include:

- a list of the spent fuel management facilities subject to this Convention, their location, main purpose and essential features;
- an inventory of spent fuel that is subject to this Convention and that is being held in storage and of that which has been disposed of. This inventory shall contain a description of the material and, if available, give information on its mass and its total activity;
- a list of the radioactive waste management facilities subject to this Convention, their location, main purpose and essential features;
- an inventory of radioactive waste that is subject to this Convention that:
 - is being held in storage at radioactive waste management and nuclear fuel cycle facilities;
 - has been disposed of; or
 - has resulted from past practices.
- This inventory shall contain a description of the material and other appropriate information available, such as volume or mass, activity and specific radionuclides;
- a list of nuclear facilities in the process of being decommissioned and the status of decommissioning activities at those facilities.

D.1. Under this Article, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the third UK report (i.e. in a way that has implications for the Joint Convention obligations).

D.2. Inventories and lists required by Article 32.2 for the UK are in the following parts of this report:

- a) Spent Fuel Management Facilities: see Annex L.1.
- b) Inventory of Spent Fuel: see Section L.1.36, no spent fuel has been disposed of in the UK.
- c) Radioactive Waste Management Facilities: see Annex L.2.
- d) Inventory of Radioactive Waste. Tables in Section L.2.97 summarise the inventory of radioactive waste held in storage and disposed of in the UK. The full inventory is published every three years, with the latest version being the 2010 UKRWI, published in 2011.
- e) Nuclear facilities in the process of being decommissioned, see Section A.3 and Section L.2.98 together with subsequent tables. This includes nuclear power stations that have been de-fuelled (and hence no longer fall within the scope of the Convention on Nuclear Safety), as well as spent fuel and radioactive waste management facilities being decommissioned. Further information on the decommissioning of sites for which NDA is responsible is available on the NDA website (see Annex L.10).

D.3. Although not within the scope of the Joint Convention, the UK also holds considerable quantities of uranic materials as the result of reprocessing or enrichment operations. These are not waste materials since they can potentially be reused in the nuclear fuel cycle. They are generally in the form of uranium oxide (held in drums) or uranium hexafluoride (known as hex tails, held in internationally-approved transport containers). The quantities involved are published in the UKRWI.

Section E - Legislative and Regulatory System

Article 18 – Implementing Measures

Each Contracting Party shall take, within the framework of its national law, the legislative, regulatory and administrative measures and other steps necessary for implementing its obligations under this Convention.

E.1. Under this Article, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the third UK report (i.e. in a way that has implications for the Joint Convention obligations).

E.2. The prime legislation covering the safety of workers and the general public at nuclear licensed sites is the Health and Safety at Work etc. Act 1974 (HSWA74)^[80] and its associated statutory provisions. One such statutory provision is the Nuclear Installations Act 1965 (as amended) (NIA65)^[18], which is the specific legislation covering nuclear safety and radioactive waste management on nuclear sites. The disposal of radioactive waste and discharge of radioactive material in airborne and liquid discharges from any facility, including nuclear licensed sites, is regulated under powers derived from the Environmental Permitting (England and Wales) Regulations 2010 in England and Wales^[39] and from RSA93^[40] in Scotland and Northern Ireland.

E.3. The Energy Act 2004^[53] established NDA, which took over the responsibility for decommissioning and clean up of the 19 designated civil nuclear legacy sites. NDA has civil contracts with each of the Site Licence Companies with which it has contracted to fulfil its requirements to operate and eventually decommission and clean up the designated civil nuclear legacy sites. Creation of NDA did not change the regulatory framework described above and ONR and the environment agencies continue to regulate nuclear licensed sites. However the Energy Act 2004 introduced two key amendments to RSA93. The first was to enable a streamlined approach for the Environment Agency and SEPA to transfer radioactive substances authorisations. These transfers are needed primarily for the restructuring of the UK civil nuclear industry in advance of NDA's competition of contracts for the sites. The second amendment introduced the requirement for the Environment Agency and SEPA to undertake periodic reviews of the limitations and conditions of an authorisation. These amendments have been carried forward into EPR10, which provide the Environment Agency with a power to allow transfer and partial transfer of environment permits between operators in both the nuclear and non-nuclear sectors. EPR10 also requires periodic review of environmental permits.

Article 19 - Legislative and Regulatory Framework Governing the Safety of Spent Fuel and Radioactive Waste Management

1. Each Contracting Party shall establish and maintain a legislative and regulatory framework to govern the safety of spent fuel and radioactive waste management.
2. This legislative and regulatory framework shall provide for:
 - the establishment of applicable national safety requirements and regulations for radiation safety;
 - a system of licensing of spent fuel and radioactive waste management activities;
 - a system of prohibition of the operation of a spent fuel or radioactive waste management facility without a licence;
 - a system of appropriate institutional control, regulatory inspection and documentation and reporting;
 - the enforcement of applicable regulations and of the terms of the licences;
 - a clear allocation of responsibilities of the bodies involved in the different steps of spent fuel and of radioactive waste management.
3. When considering whether to regulate radioactive materials as radioactive waste, Contracting Parties shall take due account of the objectives of this Convention.

E.4. Under this Article, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the third UK report (i.e. in a way that has implications for the Joint Convention obligations).

E.5. The following Section describes the UK's nuclear safety legislative and regulatory framework applicable to spent fuel, reprocessing and radioactive waste management facilities as defined by the Joint Convention. Its content has been informed by relevant IAEA requirements. The framework is structured in a generally non-prescriptive way, based largely on requirements that need to be met 'so far as is reasonably practicable' and using concepts such as 'best practicable means'. The UK has a full suite of primary and secondary legislation that meets international legal requirements and expectations.

Article 19.2(i) - National Safety Requirements and Regulations for Radiation Safety

E.6. For this report, the term 'radiation safety' is interpreted to mean nuclear safety, environment protection and radiation protection. As a result, in the UK there are two principal strands to the legislative and regulatory framework relevant to the Joint Convention. The first strand addresses nuclear safety and radiation protection aspects of spent fuel and radioactive waste management derived from the HSWA74 related legislation and regulations, and the second strand addresses environmental protection derived from EPR10, RSA93 and related legislation.

E.7. Other relevant legislation is derived through other legislative routes as follows:

- a) requirements relating to environmental impact assessments are, with some exceptions, implemented through planning legislation (one significant exception relates to decommissioning nuclear power stations, see Sections E.30 and E.31);

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- b) the safety of road, rail and sea transport of spent fuel and radioactive waste comes under the framework enforced by DfT (see Sections E.110 to E.113); and
 - c) transfrontier shipments come under directly applicable European legislation, or European requirements implemented into the UK legislative system under the European Communities Act^[81].

E.8. Much of the legislation is unchanged from the previous report. The following provides a brief summary of each key piece of legislation.

Health and Safety at Work etc. Act 1974

E.9. Under the Health and Safety at Work etc. Act 1974 (HSWA74)^[80], a general duty is placed on all employers (not just nuclear site licensees) to conduct their undertaking in such a way as to ensure, so far as is reasonably practicable, the health and safety at work of their employees and also of persons not in their employment who may be affected by their work activities. Extracts from HSWA74 relevant to the Joint Convention are contained in Annex L.4. An important provision of the HSWA74 is that it permits HSE to develop secondary legislation in the form of regulations.

Nuclear Installations Act 1965, as amended

E.10. Under the Nuclear Installations Act 1965, as amended (NIA65)^[18], no site can be used for the purpose of installing or operating a nuclear installation unless a nuclear site licence is currently in force, granted by the HSE. Only a corporate body, such as a registered company or a public body, can hold a licence and the licence is not transferable. Sections 1, 3 to 6, 22 and 24A of NIA65 are relevant statutory provisions of HSWA74 (i.e. these sections of pre-existing law are subject to HSWA74 arrangements for regulation and enforcement). The parts of each of these sections relevant to the Joint Convention are contained in Annex L.5. The Act allows for conditions in the interests of safety or radioactive waste management to be attached to licences granted under the Act. This power is delegated to HM Chief Inspector of Nuclear Installations.

Environment Act 1995

E.11. The Environment Act 1995 (EA95)^[82] sets the basis for the regulatory framework with respect to environmental protection. It established the Environment Agency and SEPA as regulators together with their funding arrangements. EA95 also provides for the transfer of functions to the Environment Agency and SEPA, including powers and duties in relation to radioactive substances regulation.

Radioactive Substances Act 1993

E.12. The Radioactive Substances Act 1993 (RSA93)^[40] continues to apply in Scotland and Northern Ireland. RSA93 requires prior authorisation to dispose of radioactive waste, including that from nuclear installations. It also requires registration for the keeping and use of radioactive material (other than by nuclear sites licensees) and authorisation for the accumulation of radioactive waste (other than on nuclear licensed sites). RSA93 empowers the appropriate environment agency to attach limits and conditions to any authorisation that it issues. The Energy Act 2004 amended RSA93 to allow nuclear licensed sites to transfer authorisations from one person to another following consultation with statutory consultees. This avoids the need for a new application to be made for authorisation under RSA93, and

also harmonises radioactive substances regulation with other areas of environmental regulation.

E.13. RSA93 (and EPR10 – see below) does not apply to the keeping and use of radioactive materials by nuclear site licensees and accumulation of radioactive waste on nuclear sites. The legal requirements for the keeping and use of radioactive material and authorisation for the accumulation of radioactive waste on a nuclear licensed site are addressed by provisions in the Licence Conditions attached to each nuclear site licence, which are enforced by ONR.

E.14. A review of Exemption Orders under RSA93/EPR10 (including the Substances of Low Activity Exemption Order) is currently being undertaken with the aim of simplifying regulation for those seeking or using an Exemption Order, whilst at the same time maintaining appropriate protection to human health and the environment. The review is expected to be implemented in legislation in October 2011.

Environmental Permitting (England and Wales) Regulations 2010

E.15. The Environmental Permitting (England and Wales) Regulations 2010 (EPR10)^[39] came into force in England and Wales in April 2010. EPR10 replaced RSA93 in England and Wales but did not introduce any major changes in scope or nature of radioactive substances regulation except provision of a new power to allow staged regulation of geological disposal facilities.

E.16. EPR10 requires prior authorisation, in the form of an environmental permit, to dispose of radioactive waste, including that from nuclear installations. It also requires an operator to hold an environmental permit for the keeping and use of radioactive material (other than by nuclear sites licensees) and for the accumulation of radioactive waste (other than on nuclear licensed sites). EPR10 empowers the Environment Agency to attach limits and conditions to any environment permit that it issues. It also provides powers to the Environment Agency to enable transfer and partial transfer of permits between operators. Under EPR10, the developer of a geological disposal facility would require an environmental permit before starting intrusive site investigation, such as drilling boreholes, at any candidate site.

E.17. Environmental permitting is an initiative aimed at modernising regulation and bringing common systems and processes across regulatory regimes. EPR10 incorporates radioactive substances regulation along with several other conventional regulatory regimes such as those for solid waste disposal and discharges to water and groundwater. EPR10 provides industry, regulators and others with a single permitting and compliance system.

Environmental Protection Act 1990

E.18. Part IIA of the Environmental Protection Act 1990 (EPA90)^[83] set up a system for the regulation of contaminated land in England, Wales and Scotland. The regime provides a framework for identifying and remediation of contaminated land. Part IIA defines contaminated land as land that poses unacceptable risks through its current use.

E.19. In 2006 in England and Wales, and 2007 in Scotland, the Part IIA regime was extended to apply to land contaminated with radioactivity resulting from uses of radioactive materials. It only applies in circumstances where the radioactivity is the result of a past practice or work activity, or the after-effects of a radiological emergency. This includes substances containing artificial radionuclides or processed

natural radionuclides. Radioactivity originating from nuclear sites was excluded from these regulations. However, the liability for any harm that such radioactivity might cause was already covered by NIA65.

Nuclear Installations Regulations 1971

E.20. The Nuclear Installations Regulations 1971^[19] identify those spent fuel and radioactive waste management installations for which a nuclear site licence is required. These are: “Installations designed or adapted for:

- the processing of irradiated nuclear fuel other than processing carried out solely for the purpose of chemical or isotopic assay or metallographic investigation of such nuclear fuel; and
- the storage of irradiated nuclear fuel, or bulk quantities of any other radioactive matter which has been produced or irradiated in the course of the production or use of nuclear fuel, other than storage incidental to carriage or incidental to the purposes of chemical or isotopic assay or metallographic investigation of such nuclear fuel.”

Ionising Radiations Regulations 1999

E.21. The nuclear site licensing regime is complemented by the Ionising Radiations Regulations 1999 (IRR99)^[84] that provide for the protection of all workers and members of the public, whether on licensed sites or elsewhere, from ionising radiations. IRR99 implement aspects of the Basic Safety Standards (BSS) Directive^[85] which established basic safety standards, including the setting of radiation dose limits for employees and members of the public for all activities involving ionising radiation. IRR99 also implement Council Directive 90/641/Euratom^[86] on the operational protection of outside workers exposed to the risk of ionising radiation during their activities in controlled areas. Outside workers are persons undertaking activities in radiation controlled areas designated by an employer other than their own. Further information on the application of IRR99 can be found under Article 24 in Sections F.62 to F.80.

Justification of Practices Involving Ionising Radiation Regulations 2004

E.22. In August 2004, the Justification of Practices Involving Ionising Radiation Regulations 2004^[87] came into force. These regulations provide for the justification of new classes or types of practice and the review of existing classes or types of practice where there is new and important evidence regarding their consequences or effectiveness.

Radiation (Emergency Preparedness and Public Information) Regulations 2001

E.23. The Radiation (Emergency Preparedness and Public Information) Regulations 2001 (REPPPIR)^[88] implemented in Great Britain the Articles on intervention in cases of radiation emergency in the BSS Directive. It also partly implements Council Directive 89/618/Euratom^[89] on informing the general public about health protection measures to be applied and steps to be taken in the event of an emergency. A radiation emergency is defined as a reasonably foreseeable event that is likely to result in any member of the public receiving an effective dose of 5mSv during the year immediately following the emergency.

High Activity Sealed Sources and Orphan Sources Regulations 2005

E.24. The High Activity Sealed Sources and Orphan Sources Regulations 2005 (HASS Regulations)^[66] implement EC Directive 2003/122/Euratom^[90]. They established a regulatory system for the authorisation of practices involving high-activity sealed sources. Under the Regulations, before issuing such an authorisation, the relevant competent authority must ensure that adequate arrangements exist for the safe management of sources, including when they become disused sources. These latter arrangements may provide for the transfer of disused sources to the supplier or to a recognised storage facility. In addition, financial provision must have been made to cover the cost of managing disused sources safely, including the eventuality of the holder becoming insolvent or going out of business.

E.25. In England and Wales, the Environment Agency is the competent authority and the HASS Regulations have been incorporated into EPR10; this did not involve any change in the nature or scope of the regulations other than requiring an operator to hold an environmental permit as the form of authorisation. The HASS Regulations remain in force in Scotland and Northern Ireland where SEPA and NIEA respectively remain the competent authorities.

Management of Health and Safety at Work Regulations 1999

E.26. The Management of Health and Safety at Work Regulations 1999 (MHSW99)^[91] are relevant, as they include requirements on employers, and hence nuclear site licensees, to:

- (i) make assessments of the health and safety risks of their activities;
- (ii) make, give effect to and record the appropriate health and safety arrangements;
- (iii) ensure that their employees are provided with appropriate health surveillance;
- (iv) appoint an adequate number of competent persons to assist them in complying with health and safety legislation;
- (v) establish and give effect to procedures to be followed in the event of serious or imminent danger arising;
- (vi) provide employees with information concerning the:-
 - (a) risks to their health and safety;
 - (b) preventive and protective measures;
 - (c) procedures necessary in the event of serious or imminent danger; and
 - (d) persons nominated to implement evacuation procedures;
- (vii) co-operate with other employers to enable statutory health and safety obligations to be met, including the provision of health and safety information; and
- (viii) ensure that employees, taking into account their capabilities, have adequate health and safety training which is repeated periodically as appropriate.

E.27. MHSW99 are very wide-ranging. Where their requirements overlap with other health and safety regulations, compliance with the more specific regulations, such as NIA65, is normally sufficient for compliance with MHSW99.

Health and Safety (Fees) Regulations

E.28. The Health and Safety (Fees) Regulations are updated annually (the latest being for 2010^[92]) and provide for the charging of fees for all ONR work in relation to the assessment of a proposal for any new nuclear installation. This includes all matters relating to the installation's construction, commissioning, operation and decommissioning, which are to be assessed by ONR prior to any application for a nuclear site licence under NIA65 that may be made based upon the particular design proposal that has been assessed.

Radioactive Contaminated Land Regulations

E.29. The Radioactive Contaminated Land (Modification of Enactments) (England) (Amendment) Regulations 2007^[93] modified EPA90 in England so that it applies to radioactivity originating from nuclear sites. Similar modifications apply in Wales and Scotland^[94,95]. Parallel regulations apply in Northern Ireland^[96].

Nuclear Reactors (Environmental Impact Assessment for Decommissioning) Regulations

E.30. The Nuclear Reactors (Environmental Impact Assessment for Decommissioning) Regulations 2006 (EIADR06)^[97] implement the requirement for an environmental impact assessment for decommissioning nuclear power stations and nuclear reactors arising from Council Directive 85/337/EEC^[98] (as amended by Council Directives 97/11/EC^[99], 2003/35/EC^[100] and 2009/31/EC^[101]) on the assessment of the effects of certain public and private projects on the environment.

E.31. Before decommissioning or dismantling of a nuclear power station or nuclear reactor can take place, a licensee must apply to ONR for consent, undertake an Environmental Impact Assessment (EIA) and provide an environmental statement. The information to be included in an environmental statement is referred to and specified in Schedule 1 to the regulations. Similarly, the licensee must assess the environmental impact of changes or extensions to an on-going decommissioning project and may have to conduct an EIA where there is potential for the change or extension to cause a significant adverse effect on the environment. A list of consents issued is given in the fifth UK CNS report^[6].

Other Relevant Legislative Frameworks

Planning / Environmental Assessment Regulation

E.32. The Planning Act 2008 was introduced to provide a more efficient, transparent and accessible planning system for nationally significant infrastructure projects in the transport, energy, water and waste sectors in England and Wales. Key aspects of the Act include the establishment of a series of National Policy Statements to provide the planning framework for decisions, and a new decision making body, the Infrastructure Planning Commission (IPC), to consider and decide on nationally significant infrastructure project applications.

E.33. In June 2010 the UK Government announced its intention to amend the Planning Act 2008 and abolish the IPC. In its place, the Government envisages that a Major Infrastructure Planning Unit (MIPU) will be established within the Planning

Inspectorate. Once established, the MIPU would hear examinations for development consent and would then make a recommendation to the Secretary of State, who would take the decision. The Government intends that National Policy Statements would continue to provide the policy framework for decisions under these new arrangements. These proposed reforms require primary legislation. Until such time as the Planning Act 2008 is amended, the IPC will continue as set out in that Act.

E.34. The Nuclear NPS, taken together with the Overarching National Policy Statement for Energy^[4], will form the primary basis for decisions taken on individual development consent applications for the construction of new nuclear power stations and associated waste facilities in England and Wales.

E.35. Among other things, the Nuclear NPS and the Overarching National Policy Statement for Energy provides the planning policy for the IPC on issues such as the need for new nuclear power and the assessment of environmental impacts that may result from the construction, operation and decommissioning of new nuclear power stations. It also lists the sites that have been deemed to be potentially suitable for the deployment of new nuclear power stations by the end of 2025.

E.36. All proposals for projects that are subject to the European Environmental Impact Assessment Directive^[98], including new nuclear power stations, must be accompanied by an Environmental Statement from the applicant describing the aspects of the environment likely to be significantly affected by the project. The IPC will make its decisions following consultation with the Environment Agency and other regulatory bodies.

E.37. In Scotland planning applications are determined by the relevant local authority under the Town and Country Planning (Scotland) Act 1997^[102] and the provisions of the Planning etc. (Scotland) Act 2006^[103].

E.38. In some instances, following notification or directly, an application for planning permission may be “called in” by Scottish Ministers for review. This usually reflects the fact that the development is seen as having national importance. The planning authority may suggest the “call in”. Where an application for planning permission is “called in”, the provisions in The Town and Country Planning (Appeals) (Scotland) Regulations 2008 described in Circular 6/2009^[104] apply. A Reporter from the Scottish Government’s Directorate for Planning and Environmental Appeals will provide a recommendation before a decision is taken by the Scottish Ministers.

Radioactive Materials Transport

E.39. The UK’s regulatory framework for the transport of radioactive material reflects international codes, treaties and regulations:

- the GB Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009^[49];
- The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment (Amendment) Regulations 2011, currently being consulted upon^[105];
- the Merchant Shipping (Dangerous Goods and Marine Pollutants) Regulations 1997^[106];

- Merchant Shipping Notice No MSN 1820(M), The Carriage of Dangerous Goods and Marine Pollutants in Packaged Form – Amendment 34-08 to the IMDG Code^[107]; and
- the Air Navigation Order 2009^[108], together with the Air Navigation (Dangerous Goods) Regulations 2002^[109], amended in 2009^[110] and Official Record Series 4^[111].

Transfrontier Shipments

E.40. The regulatory framework for the control of transfrontier shipment of spent fuel and radioactive materials and radioactive waste derive from European Union requirements that are either directly applicable European legislation or are implemented in the UK through the European Communities Act 1972^[81].

E.41. Euratom Directive 2006/117/Euratom (“the Shipments Directive”)^[35] provides the regulatory framework for supervision and control of shipments of radioactive waste and spent fuel into, out of, or through the European Community. The Directive was transposed into UK law by the Transfrontier Shipment of Radioactive Waste and Spent Fuel Regulations 2008^[34], which came into force in December 2008. Further information is in Section I. In March 2008, the European Commission published a revised Standard Document used in the process of authorising such shipments^[112].

Nuclear Safety Directive

E.42. The Council Directive on Nuclear Safety 2009/71/Euratom closely reflects the philosophy underpinning the UK’s nuclear regulatory framework. As a result, most of the provisions of the Directive already form part of Great Britain’s current regime of nuclear safety regulation. In particular, Great Britain can rely in part on the NIA65 and the standard set of 36 licence conditions to meet the obligation to transpose several detailed provisions of the Directive. However, following a detailed analysis, a number of small changes to the existing regulatory framework have been needed to ensure the UK has fully complied with its obligations to fully meet the Directive.

Northern Ireland

E.43. There are no nuclear installations in Northern Ireland. It does, however, have its own regulatory framework that mirrors that in the rest of the UK. In addition to RSA93, the relevant statutory provisions for the province include:

- a) the Health and Safety at Work (Northern Ireland) Order 1978^[113];
- b) the Ionising Radiation Regulations (Northern Ireland) 2000^[114];
- c) the Radiation (Emergency Preparedness and Public Information Regulation) (Northern Ireland) 2001^[115];
- d) Radioactive Contaminated Land Regulations (Northern Ireland) 2006^[96];
and
- e) The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment (Northern Ireland) Regulations 2010^[116].

E.44. Additionally, the Department of the Environment, Northern Ireland has made legislation (The Radioactive Substances (Basic Safety Standards) Regulations

(Northern Ireland) 2003)^[117], under powers conferred by the European Communities Act 1972, to meet the obligations imposed by the BSS Directive.

Article 19.2(ii) – Licensing Spent Fuel and Radioactive Waste Management Activities

E.45. Under the meaning of licensing of spent fuel and radioactive waste management activities in the Joint Convention there are four distinct activities in the UK, each of which is considered below:

- a) for certain installations, termed ‘nuclear installations’, a nuclear site licence is granted by HM Chief Inspector of Nuclear Installations. Such a licence is required for all spent fuel storage and reprocessing activities, and the accumulation of bulk quantities of radioactive waste;
- b) for the accumulation of radioactive waste on sites that do not require a nuclear licence, an environmental permit or an authorisation is granted by the environment agencies;
- c) for the disposal of radioactive waste from any site, including the transfer of waste between sites, an environmental permit or an authorisation is granted by the environment agencies; and
- d) for most sites, planning consent will also be required from local planning authorities before a new spent fuel or radioactive waste management activity takes place.

E.46. There has been little change in the fundamental aspects of licensing since the previous report. There follows a short summary of the key points.

Nuclear site licensing

E.47. Under NIA65, no site may be used for the purpose of installing or operating a nuclear installation unless a licence has been granted by HM Chief Inspector of Nuclear Installations. Such sites include those for spent fuel and radioactive waste as prescribed both in NIA65 and in Nuclear Installations Regulations 1971.

E.48. The form and structure of the site licence is the same for all nuclear installations. The licence is granted to the user of the site for the purposes of installing and operating an installation. Schedules attached to it provide a:

- a) brief definition of the site (with reference to a site map) and a description of the licensable aspects of the installation or definition of the processes; and
- b) series of Licence Conditions (LCs).

E.49. Once granted, the nuclear site licence is the principal and immediate method of statutory control over a licensee's operations. LCs define areas of nuclear safety and radioactive waste management to which a licensee should pay attention to ensure safe operation of the site. While some conditions impose specific duties, others require the licensee to devise and implement adequate arrangements in particular areas. The issues covered range from arrangements for ensuring the safety of plant and for controlling operations to management issues such as radioactive waste management and the supervision and training of staff. Breach of a licence condition is an offence under NIA65.

E.50. A schedule of 36 standard conditions is incorporated into all nuclear site licences. The full text of the LCs is given in Annex L.6, with some explanation as to their purpose. In the main, they require the licensee to make and implement adequate arrangements to address the particular issues identified. LC1 makes it

clear that these arrangements must be in writing and LC6 requires the licensee to make records to demonstrate compliance with these arrangements. Each licensee can develop arrangements that best suit its business, whilst demonstrating that safety is being managed adequately. ONR's nuclear inspectors regularly inspect the arrangements and their implementation.

E.51. HM Inspector of Nuclear Installation's powers under a nuclear site licence are outlined in Annex L.3 and described further under Article 19.2(v).

E.52. A significant proportion of ONR's activity involves the permissioning of the licensees' activities. This is done by legal licence instruments (such as Consents and Approvals). Such activities involve the licensee producing a safety case to demonstrate the safety of the proposed activity.

E.53. ONR's nuclear inspectors assess the adequacy of the safety case, they are assisted, as necessary, by external expertise from other agencies etc. When the inspector is satisfied, he or she will produce a written report supporting the reasons why permission should be given to the licensee to proceed. ONR has arrangements in place to ensure that the authorisation of Consents and Approvals are signed and issued at the appropriate management level after internal peer review.

E.54. The licensing regime is described in more detail in Annexes L.5 and L.6 and the publication 'Nuclear Site Licences: Notes for Applicants'^[7].

E.55. The nuclear installation licensing system applies throughout the lifetime of a civil nuclear site including installation, commissioning, operation and decommissioning. Licensees can only be relieved of their responsibility for a site under NIA65 if either: a licence for the site is issued to another body; or ONR is satisfied that there has ceased to be any danger from ionising radiations from anything on the site.

Appeals process

E.56. Nuclear site licensees, like all duty holders under HSWA74, have the right of appeal to an industrial tribunal in respect of Improvement and Prohibition Notices (see Annex L.3). However, Section 44 of HSWA74 precludes the right of nuclear licensees to appeal over licensing decisions made under NIA65. This reflects the nature of the hazard being regulated and the particularly complex technical arguments that underpin most key licensing decisions. A licensee who is dissatisfied with a licensing decision may raise concerns with the site inspector and the relevant management in ONR. Although HM Chief Inspector of Nuclear Installations is the final arbiter of licensing decisions, a licensee may seek a review by ONR, as the governing body, of the process by which a licensing decision had been reached.

E.57. Within UK law, Judicial Review is always possible to challenge regulatory decisions, but this applies only to a review of process and not to the final decision itself.

E.58. In relation to the construction of new installations, applicants who are refused planning permission by a local planning authority, or who are granted permission subject to conditions that they find unacceptable, may appeal to the Secretary of State.

E.59. Additionally, NIA65 Section 4(4) provides for HSE to "...consider any representations by any organisation representing persons having duties upon the site ...with a view to the exercise by HSE in relation to the site of any of its powers under the foregoing provisions of this section." There has been very limited experience of

this provision being exercised and, in the end, it only allows appeal back to HSE on decisions or activities by one of its own Directorates. There is no other provision in NIA65 for the granting of a legal instrument, or for regulatory decisions by ONR to be challenged. This reflects the robust independent nature of the regime.

Nuclear site delicensing

E.60. A published policy statement^[118] that provides a basis for the considerations that need to be made by ONR in order to delicense the whole or part of a nuclear licensed site. The policy statement attempts to achieve broad consistency with current scientific thinking, relevant guidance and other published material (EPR10, RSA93 (and the exemption orders made under it, which also apply under EPR10), Article 5 of the BSS Directive, and the IAEA Safety Guide “Application of the Concepts of Exclusion, Exemption and Clearance”^[119]).

E.61. In ONR's view, requiring a licensee to demonstrate ‘no danger’ cannot mean asking the licensee to demonstrate that the site is ‘completely safe’. Such absolute certainty could never be delivered, no matter how comprehensively a site is cleaned up and monitored. This suggests that after termination of licensable activities on a site, and following rigorous decontamination and clean up, it may be acceptable for there to remain a small radiological hazard, whose further detection and reduction would necessitate a grossly disproportionate effort and cost. ONR will, however, require the licensee to show that any residual radiological hazard will not pose a significant ongoing risk to any person, regardless of any foreseeable uses to which the site, or anything left on the site, may be put.

E.62. On the basis of existing published guidance, ONR considers that an additional risk of death to an individual of one in a million per year, is ‘broadly acceptable’ to society. Applying this to nuclear licensed sites, any residual radioactivity, above the average natural background, which can be satisfactorily demonstrated to pose a risk less than one in a million per year, would be ‘broadly acceptable’. For practical purposes, therefore, ONR will use this criterion to remove the site from regulatory control under NIA65, i.e. allow the site to be delicensed. The environment agencies may however require continued or additional controls to ensure protection of people and the environment from non-radiological hazards arising from a former nuclear licensed site.

Application of very low risk and ‘no danger’ to discharges

E.63. Legislation such as EPR10, RSA93 (and the exemption orders made under it, which also apply under EPR10), and the BSS Directive that set standards for the protection of human health, may be also used to inform decisions on what constitutes ‘no danger’. Under EPR10, the UK Government has issued statutory guidance^[29] to the Environment Agency that states “*Where the prospective dose to the most exposed group of members of the public from discharges from a site at its current discharge limits is below 0.01mSv/year the Environment Agency should not seek to reduce further the discharge limits that are in place, provided that the holder of the authorisation [environmental permit from April 2010] applies and continues to apply BAT.*” In Scotland and Northern Ireland, under RSA93, in line with current policy, regulators do not seek further reductions in discharges where exposures of members of the public are optimised and less than 0.02mSv/yr. For RSA93, it is proposed to implement the lower criterion of 0.01mSv/yr through the Exemption Order Review; this change is planned to come into effect in October 2011.

E.64. Annex 1 of the BSS Directive allows Member States to exempt a practice where appropriate, and without further consideration if doses to members of the

public are of the order of 0.01mSv or less per year. This dose limit broadly equates to the 1 in a million per year 'no danger' criterion. To place the residual risks into a broader context, it should be noted that the average risk of death in the UK from naturally occurring radioactivity is estimated to be around 1 in 10,000 per year as the average background dose in the UK is around 2mSv/yr.

Authorisation of the accumulation of radioactive waste

E.65. Prior authorisation, under EPR10 in England and Wales or under RSA93 in Scotland and Northern Ireland, is required for the keeping and use of radioactive material and for the accumulation of radioactive waste. These requirements do not apply on licensed nuclear sites, where they are met by specific provisions in the Licence Conditions attached to a nuclear site licence, which are enforced by ONR. ONR consults the environmental regulators when setting such conditions. Statutory consultation arrangements apply in Scotland and Northern Ireland under RSA93, but under EPR10 in England and Wales, ONR and the Environment Agency have a non-statutory 'Working Together Agreement' that sets out consultation arrangements.

Radioactive waste disposal

E.66. No person may dispose of radioactive waste except in accordance with an environmental permit under EPR10 or an authorisation under RSA93, or except where the waste is excluded by EPR10 or by RSA93 or by an Exemption Order. Certain categories of activities are specified in exemption orders under RSA93 and are not subject to its requirements, although most of the exemption orders have conditions attached. The Substances of Low Activity Exemption Order^[120] is the main such instrument used by the nuclear industry and allows unconditional exemption from the reporting requirements of EPR10 or RSA93 for waste that complies with the conditions and limits specified in the Exemption Order.

E.67. The regulatory bodies are the Environment Agency (for sites in England and Wales), SEPA (for sites in Scotland) and the Northern Ireland Environment Agency (for the limited radioactive waste disposal that occurs in Northern Ireland from non-nuclear fuel cycle facilities).

E.68. The legislation is long-established: many features of RSA93 originated from the earlier Radioactive Substances Act 1960, with amendments (e.g. public access to information; wider enforcement powers available to the regulator) made by the EPA90 and also under EPR10.

E.69. Environmental permits and authorisations for the disposal of radioactive waste include schedules addressing limitations and conditions, improvement and additional information requirements, and individual disposal routes. Under EPR10, environmental permits do not need to specify destinations at which solid radioactive waste will ultimately be disposed of. Such permits can allow transfer to any destination where the operator holds an environmental permit to accumulate or dispose of the relevant type of solid radioactive waste. The environment agencies can, however, identify specified disposal destinations in environmental permits or authorisations as necessary.

General limitations and conditions

E.70. The environment agencies set conditions that state that operators are required not only to comply with numerical limits on the levels of activity which may be discharged, but also to use BAT under EPR10 (England and Wales) or BPM under RSA93 (Scotland and Northern Ireland) to minimise further the amount of

radioactivity discharged. Operators are required to use BAT or BPM to minimise the volume and activity:

- a) of radioactive waste produced which will require disposal under the environmental permit or authorisation;
- b) of radioactive waste disposed of by discharge to the environment; and
- c) to minimise the volume of radioactive waste disposed of by transfer to other premises.

E.71. These conditions provide the main basis for ensuring that the exposures of members of the public are optimised and accord with the International Commission on Radiological Protection (ICRP) principle of ensuring exposures are ALARA, see ICRP website (Annex L.10). They also encourage a holistic approach to radioactive waste management, exert a downward pressure on discharges, are consistent with the objectives of the UK Strategy for Radioactive Discharges, see Sections A.2.46 and A.2.47, and help to ensure that BAT under EPR10 or BPM under RSA93 is implemented.

E.72. The environment agencies may also set further conditions, including those relating to measurement and assessment of discharges, record keeping and provision of information to the agencies.

E.73. The environment agencies can set limits and conditions that apply exclusively to each individual disposal route. Disposal limits set by the agencies take into account a number of factors, including radiological impact on humans and the environment, safety, operational need, socio-economic and cost implications, legal requirements, Government policy and international commitments.

E.74. The annual limits on discharges of radionuclides to the environment that are included in environmental permits or authorisations are not set at a level corresponding to the boundary between acceptable and unacceptable radiological impact. In particular, they result in estimated doses well below the annual dose limit (1mSv/year), set out in UK legislation, for exposure of members of the public to artificial radiation, excluding medical exposure. Even if discharges from each of the sites were made at 100% of the limits included in environmental permits or authorisations, the radiological impact on the most exposed members of the public would still be within the annual dose limit. This limit setting approach accords with the precautionary principle.

E.75. In setting limits, the environment agencies aim to apply downward pressure on discharges. The expected levels of discharge, and the discharge limits which it is appropriate for the environment agencies to set, are radionuclide and site specific, reflecting the design and operational history of each site.

Improvement and additional information requirements

E.76. An environmental permit or authorisation may include requirements on the operator to carry out a programme of investigations and improvements.

Ministerial powers

E.77. Under EPR10, the Secretaries of State for Energy and Climate Change, and Health, and Welsh Ministers hold joint powers to call in applications for environmental permits for their own determination, in which case a local inquiry may be held. The

Secretaries of State and Welsh Ministers can also issue Directions to the Environment Agency.

E.78. In Scotland, powers under RSA93 are held and administered by the Scottish Ministers. These include powers to direct applications for authorisation to the Scottish Ministers for their determination under Section 24 of RSA93. Also, the Scottish Ministers may cause a local inquiry to be held in relation to the application.

Article 19.2(iii) – Prohibition of Operation without a Licence

E.79. The UK legislative framework prohibits the operation of spent fuel or radioactive waste management facilities without a licence as described in Table E.1 below:

Table E.1 – Provisions for prohibition of the operation of spent fuel or radioactive waste management facilities without a licence.			
Activity	Legislation	Enforcing Authority	Type of licence
The construction, commissioning, operation and decommissioning of any spent fuel or radioactive waste management facility required as a result of nuclear industry activities, including accumulation, and prescribed under NIA65 cannot take place without a nuclear site licence. <i>[The licence provides the powers to shut down any operations in the interests of safety.]</i>	NIA65 ^[18]	ONR	Nuclear Site Licence
The keeping and use of radioactive material (other than on licensed nuclear sites)	EPR10 ^[39] (E & W) RSA93 ^[40] (S & NI)	Environment Agency (E&W) SEPA (S) NIEA (NI)	Permit Registration Registration
Accumulation of radioactive waste (other than on licensed nuclear sites)	EPR10 ^[39] (E & W) RSA93 ^[40] (S & NI)	Environment Agency (E&W) SEPA (S) NIEA (NI)	Permit Registration Registration
Disposal of radioactive waste	EPR10 ^[39] (E & W) RSA93 ^[40] (S & NI)	Environment Agency (E&W) SEPA (S) NIEA (NI)	Permit Registration Registration
Installations for: <ul style="list-style-type: none"> processing of spent fuel or high level radioactive waste; final disposal of spent fuel or radioactive waste, storage of spent fuel or radioactive waste in a different site than the production site. 	T & CP (EIA)(E & W) Regulations ^[121] , Town and Country Planning (Scotland) Act 1997 ^[102] / and provisions of the Planning etc (Scotland) Act 2006 ^[103] EIA(Scotland) Regulations 1999 ^[122] Planning(EIA) Regulations(NI) 1999 ^[123]	Local Planning Authority	Planning Consent (including EIA)
Decommissioning of a nuclear reactor or power station.	EIADR99 ^[97]	ONR	Consent (including EIA)

(E & W) = England and Wales: (S) = Scotland: (NI) = Northern Ireland
EIA = Environmental Impact Assessment, T & CP = Town and Country Planning
EIADR99 = Nuclear Reactors (Environmental Impact Assessment for Decommissioning Regulations 1999^[97] (also amended in 2006)
Note that most of the activities for which a nuclear site licence is required will also be the subject of other regulatory requirements. Such activities will therefore appear on several rows in the Table above.

Article 19.2(iv) - Institutional Control, Regulatory Inspection, and Documentation and Reporting

Institutional control

E.80. Under the requirements of NIA65, the “period of responsibility” of a licensee for a site handling, treating or storing spent fuel or radioactive waste under a nuclear site licence begins with the grant of the licence and ends with whichever of the following dates is the earlier:

- a) the date when ONR gives notice in writing to the licensee that in the opinion of ONR there has ceased to be any danger from ionising radiations from anything on the site; or
- b) the date when a new nuclear site licence is granted either to the same licensee or to some other person.

E.81. In other words, the legislation provides for a continuous period of institutional control of a site, whether it is operated by a single organisation for the whole of its life or by transfer of the responsibility to other organisations, until there is no longer any danger from ionising radiations. Sections F.4 to F.6 deal with responsibilities when there is no ‘operator’.

Regulatory inspection

Office for Nuclear Regulation

E.82. On 1 April 2011, the Office for Nuclear Regulation (ONR) was formed as an Agency of HSE. HSE’s nuclear inspectors became ONR inspectors who continue with their former inspections of all nuclear licensed sites in Great Britain. There is a detailed intervention plan for each site that embraces planned inspections. This ensures that compliance is checked against licence condition requirements at regular intervals as well as targeting all types of regulatory activity to maximise the resulting levels of safety at the site.

E.83. Each major nuclear licensed site has an allocated site inspector. Large multi-plant sites have more than one site inspector, e.g. the Sellafield site. ONR also has specialist nuclear inspectors to carry out more detailed assessment of the licensees’ safety cases and to assist in the delivery of the site intervention plan. Usually, the site inspector will be the point of contact, but for a large modification or a new plant to be built on the site, the site inspector would normally delegate much of the regulatory responsibility to a nominated project inspector. The project inspector co-ordinates the review and assessment of the safety case by ONR’s specialist nuclear inspectors. The site inspector normally leads any investigation of an incident.

E.84. In addition to inspection and assessment work for specific sites, ONR carries out generic work to support and underpin its regulatory activities. This work includes the development of regulatory strategy, the production of standards and guides for inspectors, the development of business management systems and international cooperation programmes.

Environment Agency and Scottish Environment Protection Agency

E.85. The environment agencies' inspectors carry out site inspections and formal reviews of the limits and conditions in environmental permits under EPR10 and in RSA93 authorisations. This ensures operators are complying with the requirements of the relevant authorisations and that these remain appropriate and up to date. Periodic, or regular, reviews are a formal requirement under EPR10 and also under RSA93, as amended by the Energy Act 2004. The Environment Agency has implemented this requirement through annual reviews of environmental permits.

E.86. When required, team inspections or audits may be carried out on a particular plant or to investigate particular aspects. Joint inspections are sometimes carried out with ONR inspectors and other regulators from within the UK and from overseas. Site inspections are also carried out to investigate incidents.

E.87. There are no nuclear installations in Northern Ireland.

Documentation and reporting

E.88. Regulatory requirements for documentation and reporting are contained in:

- a) ONR's standard nuclear site licence conditions, see Annex L.6; and
- b) For the Environment Agency, the standard conditions for radioactive waste disposal from nuclear sites are set out in section 3 of the environmental permit^[124]. SEPA applies similar standard conditions in Schedule 2 of its authorisations for nuclear sites^[125].

Article 19.2(v) - Enforcement of Applicable Regulations and of the Terms of the Licences

E.89. Both safety and environmental law in the UK are based on the concept that duty holders should do all that they reasonably can to minimise human or environmental risks. These concepts are embodied in such terms as ALARP and ALARA. The following provides a brief summary of the practical aspects of enforcement.

Office for Nuclear Regulation

E.90. HSWA74 prescribes those breaches of legislation that constitute offences, and which ONR will enforce. In particular, with respect to the Joint Convention, it is an offence for a duty holder *“to contravene any health and safety regulations . . . or any requirement or prohibition imposed under any such regulations (including any requirement or prohibition to which he is subject by virtue of the terms of or any condition or restriction attached to any licence, approval, exemption or other authority issued, given or granted under the regulations)”*.

E.91. HSWA74 enables HSE to appoint Inspectors and gives them regulatory powers to enforce applicable regulations: these powers are outlined in Annex L.4. The Health and Safety Commission (HSC) published the ‘Enforcement Policy Statement’^[126], implemented by HSE in the ‘Enforcement Management Model’^[127], which explains the purpose and process of health and safety enforcement in UK. ONR will take action, if it considers the law has been broken, that will depend on the circumstances and on the licensee’s safety record, and will be proportionate to the risk. Enforcement action may range from discussion with the operator, through to the use of enforcement notices, or in serious cases to prosecution. ONR has considerable enforcement powers, some originating from HSWA74 and some via conditions attached to nuclear site licences. For example, under HSWA74, ONR inspectors can issue improvement notices, prohibition notices and instigate prosecutions under criminal law. Those powers under the nuclear site licence conditions are described in Annex L.6.

E.92. In England and Wales, ONR inspectors may initiate prosecutions for breach of the relevant provisions (in Scotland, the matter is referred to the Procurator Fiscal for prosecution). In such cases, HSWA74 prescribes the maximum penalties that may be handed down by the court. For example, breach of a nuclear site licence condition may result in imprisonment for up to two years, an unlimited fine, or both.

Environment agencies

E.93. The environment agencies have enforcement powers for the disposal of radioactive wastes on or off a licensed nuclear site. For nuclear licensed sites, the environment agencies may issue either an environmental permit or authorisation if, after consultation, they are satisfied with the applicant’s proposals. Before granting an environmental permit or authorisation, the environment agencies undertake rigorous checks to ensure that either BAT or BPM are in place to protect both human health and the environment and ensure resultant doses are ALARA. UK Government decided that the Environment Agency should ensure that BAT is applied in place of BPM and BPEO in England and Wales^[29]. UK Government believes that BAT will deliver an environmental protection regime in relation to radioactive discharges that is more consistent with similar regimes applied in other countries. BPM continues to apply in Scotland and Northern Ireland.

E.94. Environmental permits and authorisations comprise standard conditions and a set of schedules that set out disposal routes to be used, and set limits on the quantities of waste that may be disposed of within set time periods. The environmental permits or authorisations, granted by the environment agencies, also include a schedule for setting out improvements to be made by the operator, and information to be supplied to the environment agencies within specified time limits.

E.95. When the environment agencies have reasonable cause to believe that the conditions or limits set in an authorisation or environmental permit may have been breached, they have powers under EA95 to investigate. The agencies also have the power under EPA10 in England and Wales to issue Enforcement Notices and Suspension Notices and under RSA93 in Scotland and Northern Ireland to issue Enforcement Notices and Prohibition Notices; the enforcement powers under EPA10 and RSA93 are equivalent. These powers mirror those of ONR inspectors as described in Annex L.4. Decisions on regulatory action, including the issuing of enforcement notices, suspension notices or prohibition notices, are only taken after very careful consideration of the implications. Action will be proportionate and may range from discussion to prosecution (in England and Wales the Environment Agency itself can undertake prosecution, whereas in Scotland SEPA recommends prosecution to the Procurator Fiscal). Variation of the conditions or limits in an environmental permit or an authorisation is another course of action open to the environment agencies.

Food Standards Agency

E.96. The Food Standards Agency is a consultee to the Environment Agency through consultation arrangements made under EPA10 and is a statutory consultee to SEPA for the granting of new or revised authorisations under RSA93. If the Food Standards Agency believed that a current or proposed authorisation would result in an unacceptable risk to consumers, it would request the relevant Health Minister to direct SEPA or the Environment Agency to vary or revoke the environmental permit or authorisation. The Food Standards Agency does not grant authorisations to the operators of nuclear sites.

Northern Ireland

E.97. EA95 does not apply in Northern Ireland. The Chief Radiochemical Inspector of NIEA administers RSA93. Inspectors' enforcement powers are the same as those for the Environment Agency and SEPA.

Enforcement of planning control

E.98. The purpose of the planning enforcement provisions in the Town and Country Planning Act 1990 for England and Wales and the Town and Country planning (Scotland) Act 1997 for Scotland and the provisions of the planning etc (Scotland) Act 2006 is to protect the integrity of the planning system and development control process, by enabling local planning authorities to remedy any harm to amenity or other interest of acknowledged importance which may result from unauthorised development. Whether to take enforcement action and, if so, what action is best suited to the particular circumstances, are matters for the planning authority's discretion. The authority's main enforcement powers are:

- a) to issue an enforcement notice;
- b) to serve a stop notice which can prohibit, almost immediately, any activity to which the accompanying enforcement notice relates; and

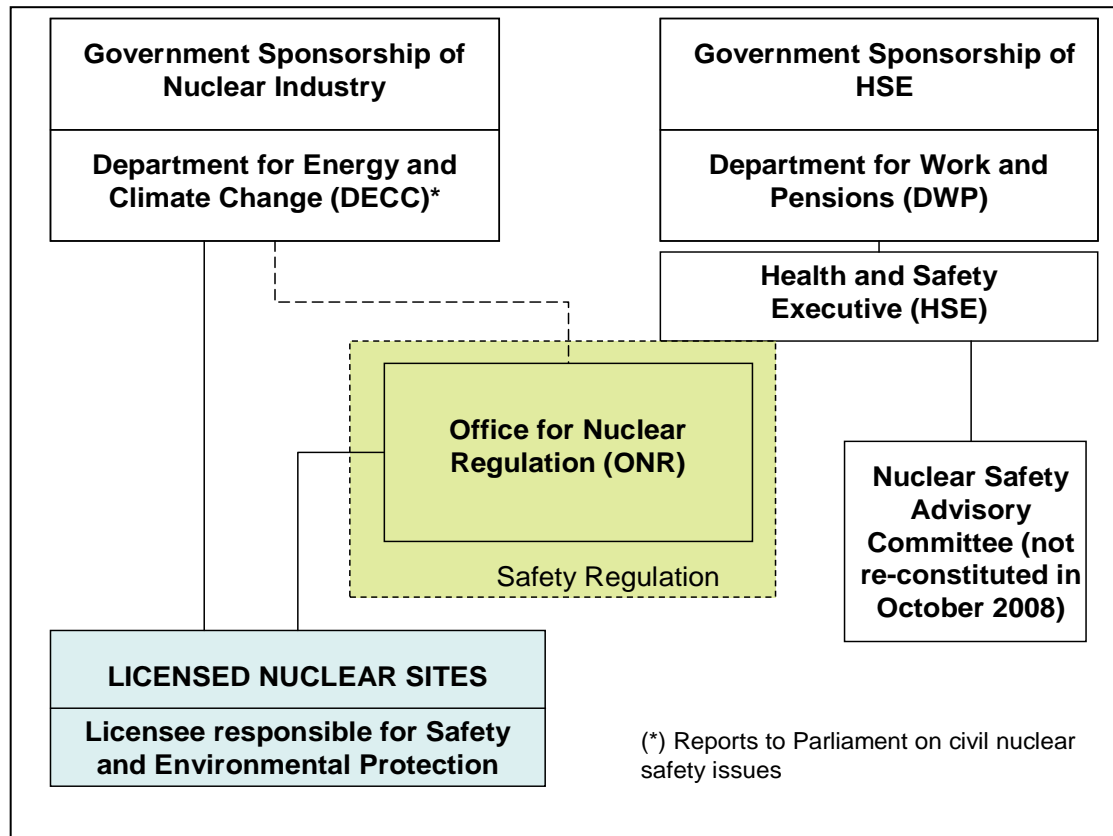
- c) to serve a breach of condition notice if there is a failure to comply with a condition imposed on a grant of planning permission.

E.99. After an enforcement notice has become effective, or at any time after a stop notice has been served, it is a criminal offence not to comply with an enforcement notice's requirements or to contravene the prohibition in a stop notice. In Scotland, the procedures relating to planning enforcement differ slightly and are described in circular 10/2009^[128].

19.2 (vi) - Responsibilities of Bodies Involved in Spent Fuel and Radioactive Waste Management

E.100. The diagrams at Figures E.1 and E.2 illustrate the responsibilities of the various bodies in the UK and how they interact.

Figure E.1 - Responsibilities for the safety of spent fuel, reprocessing and radioactive waste management at nuclear licensed sites

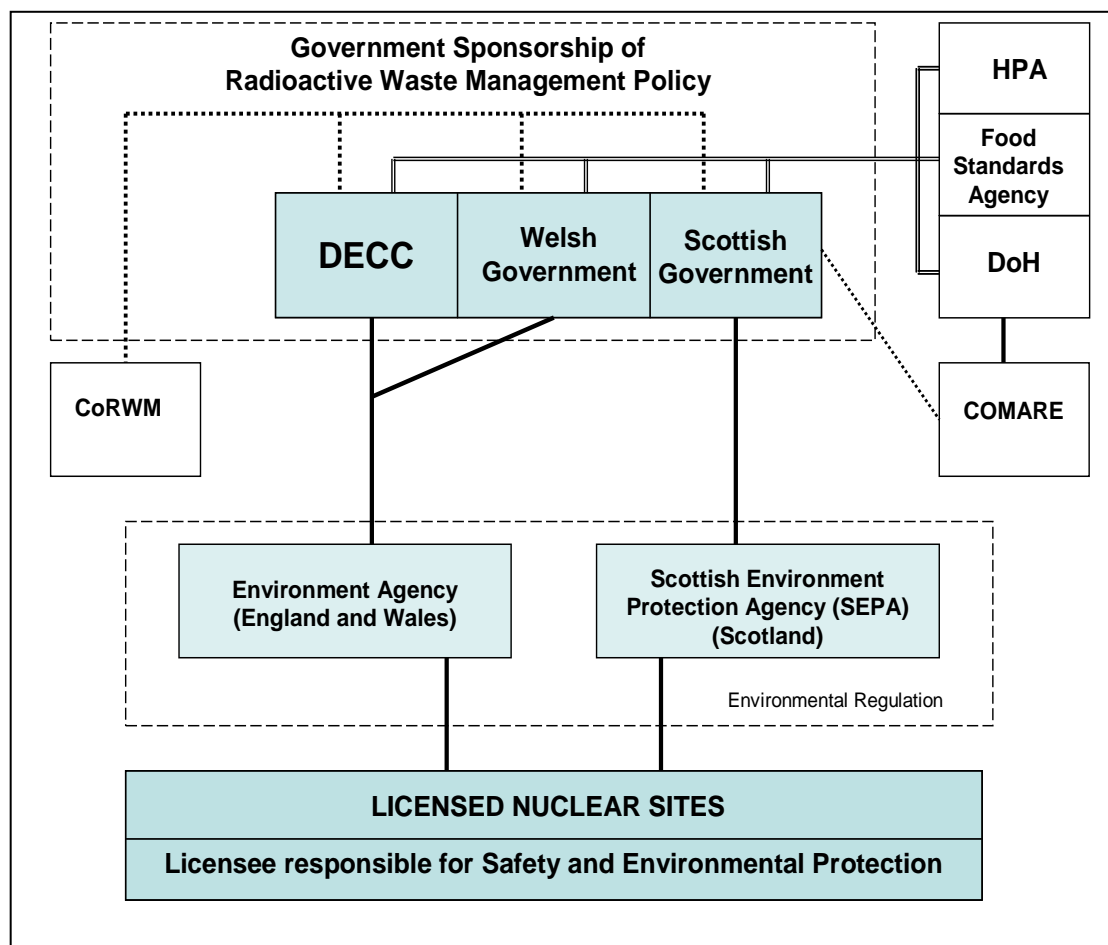


Government responsibilities

E.101. The DECC website (see Annex L.10), sets out in summary the distribution of responsibility and accountability among Ministers, independent bodies and the devolved administrations, including:

- a) safety regulation at civil nuclear sites;
- b) nuclear emergency planning and response to a nuclear emergency or incident;
- c) safe storage, use, discharge and disposal of radioactive materials; and
- d) involvement in international work on nuclear safety.

Figure E.2 - Responsibilities for the environmental effects of spent fuel, reprocessing and radioactive waste management



E.102. Sponsorship of the civil nuclear industry and accountability to Parliament for civil nuclear safety in Great Britain and radioactive waste policy in England rests with the Secretary of State for Energy and Climate Change. Radioactive waste policy is devolved to the Scottish Government, the Welsh Government and the Northern Ireland Government. However, the Secretary of State for DECC remains accountable for the safe management of radioactive wastes kept or stored at licensed nuclear sites in England, Wales and Scotland. The Secretary of State for Work and Pensions is responsible for the sponsorship of HSE and its Agency, ONR, and accountable to Parliament for radiation protection matters as well as general health and safety at work issues throughout Great Britain. The Department of Health and the territorial health departments have general responsibility for public health. The Food Standards Agency is a non-Ministerial Government department with statutory responsibility for the safety of foods, and is a statutory consultee to the Environment Agency and SEPA on discharge authorisations. The Food Standards Agency monitors radioactivity in food and holds the principal responsibility for any radioactivity in food in the UK. The Food Standards Agency would also advise the Government on food safety related environmental effects of radioactivity released to the environment; it is free to publish this advice to ensure its independence.

Responsibilities of operators or employers

Operators/ employers

E.103. Under HSWA74, employers have the prime responsibility for ensuring the safety of their workers and the public from dangers arising from their work.

E.104. In accordance with Government policy, the producers and owners of radioactive waste are responsible for developing their own waste management strategies, ensuring that:

- a) they do not create waste management problems which cannot be resolved using current techniques or techniques which could be derived from current lines of development;
- b) where it is practical and cost-effective to do so, they characterise and segregate waste on the basis of physical and chemical properties and store it in accordance with the principles of passive safety; and
- c) they undertake strategic planning, including development of programmes for the disposal of waste accumulated at nuclear sites within an appropriate timescale and for the decommissioning of redundant plant and facilities.

E.105. The producers and owners of radioactive waste bear the cost of managing and disposing of the waste.

Responsibilities of regulators

Office for Nuclear Regulation

E.106. HSWA74^[80] established two bodies, HSC and HSE, which in 2008 were merged into a new unitary body, bringing together their powers and functions, and retaining the name Health and Safety Executive (HSE). The function of ONR, an Agency of HSE, is to enforce the relevant statutory provisions where it is the enforcing authority. Those parts of NIA65 that concern safety became statutory provisions of HSWA74 in 1974.

E.107. The Nuclear Installations Act 1965 etc. (Repeals and Modifications) Regulations 1974^[129] made HSE the nuclear licensing authority for nuclear sites. This authority is delegated to HM Chief Inspector of Nuclear Installations, who is also the Executive Head of ONR. As a result, under NIA65, no site can be used for the purpose of installing or operating a nuclear installation unless a nuclear site licence is currently in force, granted by ONR.

Environment Agency and Scottish Environment Protection Agency

E.108. The Environment Agency is the principal environmental regulator in England and Wales. The Environment Agency reports to the Secretary of State for Defra for its activities in England and to the Welsh Ministers (in the Welsh Government) for its activities in Wales. SEPA has broadly equivalent responsibilities in Scotland. Their regulatory responsibilities include the authorisation of the disposal of radioactive wastes from nuclear licensed sites.

E.109. EPR10 make the Environment Agency the regulatory body for permitting disposal of radioactive waste from nuclear licensed sites in England and Wales, and RSA93 as amended by EA95 makes SEPA the regulatory body for Scotland. EPR10 implements parts of the BSS Directive in England and Wales. The same parts of the

BSS Directive are implemented in Scotland through a Direction from the Scottish Ministers to SEPA.

Radioactive materials transport

E.110. The Secretary of State for Transport is the competent authority in the UK for regulating the safety of transport of all radioactive material for all modes of transport (land, air and sea transport). The responsibilities for the functions of the competent authority are shared according to their specificity between the Department for Transport's Dangerous Goods Division (DfT-DGD), the Civil Aviation Authority and the Maritime Coastguard Agency. ONR regulates the security aspects of movements of nuclear material, as defined by the Nuclear Industries Security Regulations 2003^[130].

E.111. DfT-DGD must certify that all package designs and associated transport arrangements comply with statutory regulations. DfT-DGD is also responsible for regulating the safety of transport operation. This is complemented by the assessment of emergency planning, investigation of incidents and independent assessment of the radiation and contamination levels of irradiated nuclear fuel flasks.

E.112. The regulatory requirements for the security aspects of transport of nuclear materials stipulate that a carrier must:

- be approved by ONR beforehand;
- satisfy ONR, through the submission of a Transport Security Statement and/or specific Transport Security Plans, that suitably robust measures are in place to ensure the security of nuclear material;
- comply with directions and instructions issued by ONR;
- report specific security matters to ONR; and
- notify ONR in advance of all intended movements of nuclear material.

E.113. In February 2008, the competent authorities for the transport of radioactive material of France and UK (DfT-DGD) signed a bilateral agreement for extending their cooperation to all activities under their responsibility on the transport of radioactive material. The competent authorities of the other Member States of the EU have been invited to join a European Association of Competent Authorities of the EU which provides a forum to exchange information, share best practice and develop guidance material at a European level; there are currently 22 members.

General regulatory responsibilities

E.114. In addition to the responsibilities mentioned above, each of the regulators provides advice on matters within their remit as required, or when requested, to other bodies, government and the public.

E.115. All regulators operate in an open and transparent way within their regulatory remit and Freedom of Information legislation. Each regulator has a website on which information on its work is published, in particular, and where appropriate, including:

- a) any internal guidance on implementing legislation;
- b) reports of inspection or assessment or other regulatory activities; and

- c) specific guidance to operators on complying with legislation.

E.116. UK regulators take an active part in international co-operation and development, contributing to international standards, taking part in meetings of European and world regulators, and negotiating and implementing bilateral information exchange agreements with other national regulators.

E.117. Whereas operators have a duty to carry out environmental and safety assessments, the regulators similarly need to assess the operators' submissions to satisfy themselves that the operators are meeting their obligations.

Responsibilities of other Agencies and bodies

Health Protection Agency

E.118. The Health Protection Agency (HPA) was established on 1 April 2005 under the Health Protection Agency Act 2004^[131] as a non-departmental public body. It replaced the HPA special health authority and the National Radiological Protection Board (NRPB), and its health protection remit includes radiation protection, and protection from chemical hazards.

E.119. The former NRPB role continues as the Radiation Protection Division (RPD) of HPA. Their statutory functions include:

- the advancement of the acquisition of knowledge about protection from radiation risks;
- the provision of information and advice in relation to the protection of the community (or any part of the community) from radiation risks; and
- the provision of advice on the application of the International Commission on Radiological Protection recommendations in the UK.

E.120. HPA is a statutory consultee for the UK Justification Regulations^[87]. HPA's RPD also provides technical services to persons concerned with radiation hazards. It charges for such services, and for providing information and advice.

E.121. The Scottish Government relies on the provision of expert advice from the HPA on a number of devolved issues - chemicals, radiation, poisons and emergency planning.

Responsibilities of Advisory Bodies

Committee on Radioactive Waste Management

E.122. The Committee on Radioactive Waste Management (CoRWM) was reconstituted in 2007 to provide independent scrutiny and advice to Government Ministers on the long-term management, including storage and disposal, of radioactive waste. Its 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. The Committee undertakes a three-year rolling programme of work and the proposed programme for 2011-2014 is available on CoRWM's website (see Annex L.10).

Nuclear Safety Advisory Committee

E.123. HSWA74 Section 13(1)(d) enables HSE to create advisory committees to provide independent advice on any of its functions. Although not a legal requirement, HSE custom and practice has been to constitute advisory committees in relation to activities in the nuclear sector. In October 2008, the mandate of the Nuclear Safety Advisory Committee (NuSAC) expired and its work was terminated. ONR is currently considering the various options available to it for securing any advice it needs in the future, including a reconstituted NuSAC.

Ionising Radiations Health and Safety Forum

E.124. The Ionising Radiations Health and Safety Forum has been established to consider all matters concerning protection against ionising radiations that are relevant to HSE's remit. The Forum consists of a wide cross-section of organisations including representatives from industry and the unions, local authorities, government departments and professional bodies. Its work includes consideration of the standards of protection for workers and others from work activities involving ionising radiations, monitoring the effectiveness of legislation and monitoring developments in technology.

Committee on Medical Aspects of Radiation in the Environment

E.125. The Committee on Medical Aspects of Radiation in the Environment (COMARE) assists and advises the Department of Health and the Scottish Government Health Department on behalf of Scottish Ministers on the health effects of natural and human-made radiation in the environment and assesses the adequacy of the available data and the need for further research. Further information can be found on COMARE's web site (see Annex L.10).

Financial provisions

E.126. In November 2001, the Government announced radical changes to previous arrangements for the clean-up of Britain's publicly-owned nuclear legacy which came fully into effect in April 2005 with the formation of NDA. These arrangements are mostly financed by the taxpayer and subsume all previous financial provisions for decommissioning made by the publicly-owned civil nuclear utilities. Separate arrangements for BEGL's privately-owned nuclear power plants are explained in the fifth UK CNS report^[6]. NDA provides the strategic direction for cleaning up Britain's civil public sector nuclear sites, including the Magnox reactors. For each of NDA's sites, there is a SLC, which employs the operations staff, is the enduring entity which holds the nuclear site licence and discharge authorisation, and is subject to regulation by both ONR and the relevant environment agency. NDA places and manages contracts with the SLCs, and from time-to-time awards new contracts for the ownership of the SLCs to provide improved strategic approaches and innovation to decommissioning. Full details of NDA's work including its strategy, which has been agreed by Government following public consultation, can be found on its website (see Annex L.10).

E.127. NDA has responsibility for commercial and waste management activities on its sites and for the eventual decommissioning of those sites. It is funded partly by Government and partly by revenue derived from commercial activities on its sites. NDA is tasked with ensuring it allocates a significant part of its funding to decommissioning and clean-up, prioritising its spending and ensuring its risks are both managed and mitigated. Further information on the finances of NDA is provided in Sections F.27 to F.39.

Article 19.3 - Consideration of whether to Regulate Radioactive Materials as Radioactive Waste

E.128. As stated in Sections B.13 to B.19, the UK adopts a position in line with the definition of radioactive waste in the Joint Convention, i.e. "*radioactive waste means radioactive material in gaseous, liquid or solid form for which no further use is foreseen by the Contracting Party or by a natural or legal person whose decision is accepted by the Contracting Party, and which is controlled as radioactive waste by a regulatory body under the legislative and regulatory framework of the Contracting Party*".

E.129. Assessment of waste management options includes not only materials currently classified as waste, but also takes into consideration the consequences of providing for other materials which may have to be managed as waste in the future, such as some separated plutonium and uranium, as well as certain quantities of spent nuclear fuel.

E.130. The UK Government has consulted on the possible options for the future management of UK-owned civil plutonium stock and is considering the responses. More generally, the Government urges the owners of all radioactive materials in the UK, on a voluntary basis, to put in hand procedures now that would allow them to identify those materials that may become uneconomic to reuse. NDA is the owner of UK-owned plutonium on its designated sites, and has consulted on management options for this material as part of the development of its first strategy.

Article 20 – Regulatory Body

1. Each Contracting Party shall establish or designate a regulatory body entrusted with the implementation of the legislative and regulatory framework referred to in Article 19, and provided with adequate authority, competence and financial and human resources to fulfil its assigned responsibilities.
2. Each Contracting Party, in accordance with its legislative and regulatory framework, shall take the appropriate steps to ensure the effective independence of the regulatory functions from other functions where organizations are involved in both spent fuel or radioactive waste management and in their regulation.

E.131. Under this Article, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the third UK report (i.e. in a way that has implications for the Joint Convention obligations).

Article 20.1 - Regulatory Body

E.132. In the UK, the regulatory bodies entrusted with implementing the framework described in Article 19 are identified below.

Organisation of the regulatory body

E.133. The legal framework of the regulatory body was introduced under Article 19. Further details of the regulatory structure and operation are provided below and at Annex L.7.

Office for Nuclear Regulation

E.134. HSE was established under HSWA74 with the duty to enforce the relevant statutory provisions where it is the enforcing authority. HSWA74 empowers HSE to appoint inspectors, to allow it to carry out its duties. Inspectors have a range of powers including powers of entry, powers to investigate and, in England and Wales, to prosecute. Until 1 April 2011, the responsibility for regulating the nuclear industry was delegated by HSE to its Nuclear Directorate (ND) which incorporated HM Nuclear Installations Inspectorate (NII).

E.135. Since 1 April 2011, the Office for Nuclear Regulation (ONR), an Agency of HSE, is responsible for enforcing legislation on health and safety at work, in relation to nuclear installations, for the operation of the nuclear site licensing regime including the day-to-day regulation of the nuclear industry. ONR also encompasses the work previously carried out by the Office for Civil Nuclear Security (OCNS) and the UK Safeguards Office.

E.136. Licensing powers are delegated to HM Chief Inspector of Nuclear Installations, who is also the Executive Head of ONR, giving the power to issue, add conditions to, and revoke nuclear site licences.

E.137. The Government has stated its intention to bring forward legislation to put ONR on a statutory basis, outside HSE, to regulate the nuclear industry. The new statutory corporation will continue to be known as the Office for Nuclear Regulation (ONR) and will take on the relevant statutory functions currently carried out by the

Health and Safety Executive and the Department for Transport in relation to nuclear installations.

E.138. ONR will then be a new fully independent regulator, formally responsible in law for delivering its regulatory functions. The creation of ONR will consolidate civil nuclear and radioactive transport safety and security regulation in one place.

E.139. This proposed change will not affect the current regulatory requirements or standards with which industry must comply, and the vast majority of the costs of the regulator will continue to be recovered from charges on the operators in the nuclear industry rather than funded by the public purse.

E.140. HM Chief Inspector of Nuclear Installations will continue to have direct lines of access, on nuclear safety matters, to Ministers for the Department of Energy and Climate Change and for the Ministry of Defence, reflecting their respective responsibilities to Parliament on civil and military nuclear safety.

Office for Nuclear Regulation - regulatory management system

E.141. ONR operates in accordance with a Business Management System (BMS) to provide an integrated approach to system management, thereby ensuring that the system adds value to internal processes, and clarifies the responsibilities of its staff. The BMS has been designed to document appropriate policies, management controls and process controls in a manner that augments the experience, training and professional judgment of all staff. This is reflected in the systems Key Business Activity areas. The system is a living one, being regularly updated as experience of its use is gathered and fed back to improve systems where shortfalls are found.

E.142. Within the BMS, procedures and guides of ONR's key processes (key business activities) are documented in a consistent manner. The activity-based approach ensures that the documentation adapts easily to accommodate re-organisations or changes in organisational focus. The system includes a means for continuous improvement. Audit, review and use of specified monitoring tools (e.g. the European Foundation for Quality Management Excellence Model), ensures that the focus on processes maximises the efficiency and effectiveness of efforts towards meeting ONR's aspirations.

Office for Nuclear Regulation - principles, regulations and guides

E.143. The regulatory approach to nuclear safety in the UK is based on a nuclear site licensing regime (see Annexes L.3 – L.6). Hence, most of the requirements for nuclear safety are imposed by means of Conditions attached to the nuclear site licence. As a result, ONR does not specifically set out its requirements for nuclear safety in the form of regulations. However, some issues arising from European Council and Euratom Directives have been addressed by the implementing UK regulations.

E.144. The Safety Assessment Principles (SAPs)^[132] form a framework used by its inspectors as a reference for technical judgments on the adequacy of licensees' safety cases. The SAPs will continue to be used by ONR to assist it in applying a consistent and uniform approach to its assessment process. In carrying out an assessment, ONR's nuclear inspectors judge the extent to which the safety submission shows that the design of the plant is in conformity with the relevant SAPs, noting that not all of the principles are applicable to every licensed site. Some of the SAPs incorporate specific statutory limits. Apart from these, the SAPs should be met, so far as is reasonably practicable, which is a requirement of the HSWA74. There can, therefore, only be a rigid interpretation of those principles that reflect

statutory limits. The SAPs were revised in 2006 and are described in more detail in Annex L.8.

E.145. Technical Assessment Guides (TAGs) are used as guidance for ONR's specialist inspectors on the interpretation and application of the SAPs. There is also guidance for inspectors in the form of Technical Inspection Guides (TIGs). These set out the principles underlining the enforcement of licence condition compliance. The TAGs provide guidance in particular technical areas, and they are used at the discretion of inspectors. Copies of TAGs and TIGs are available on the ONR website^[133] (see Annex L.10).

Environment Agency and Scottish Environment Protection Agency

E.146. The Environment Agency is the principal environmental regulator in England and Wales. SEPA has the equivalent responsibilities in Scotland. Their regulatory responsibilities include the authorisation of the disposal of radioactive wastes from nuclear licensed sites. There are no nuclear installations in Northern Ireland to which the Joint Convention applies. The Northern Ireland Environment Agency regulates radioactive sources and radioactive waste at non-nuclear sites.

Regulatory responsibilities

E.147. ONR, the Environment Agency and SEPA work closely with one another to ensure the effective co-ordination of their respective regulatory activities at nuclear installations. They have agreed Memoranda of Understanding (MoUs) whose objective is to facilitate the minimisation of the overall detriment due to radioactive waste management on licensed sites, from generation to disposal. Under NIA65, ONR consults the Environment Agency or SEPA before:

- granting a nuclear site licence; or
- varying a nuclear site licence if the variation relates to or affects the creation, accumulation or disposal of radioactive waste.

E.148. Similarly the Environment Agency or SEPA consult ONR under EPR10 or RSA93 respectively on proposed (new or varied) environmental permits or authorisations for disposals of radioactive waste including discharges to the environment.

E.149. In addition to their own routine inspection activities on nuclear licensed sites, the Environment Agency and SEPA carry out planned joint inspections with ONR and co-operate in investigations of incidents where appropriate.

Authority, Competence, Financial and Human Resources

E.150. The mandate, structure, financial and human resources, and inspectors' qualifications and training of each of the organisations comprising the UK 'regulatory body' are described in Annex L.7.

Responsibilities of other agencies and bodies

E.151. The responsibilities and functions of the Health Protection Agency are described in Sections E.118 to E.121.

E.152. Further information on the nuclear regulators is at Annex L.7, which includes: mandates and duties; structure; and resources.

E.153. Figure E.1 illustrates the responsibilities of the various bodies relevant to nuclear safety in the UK and how they interact.

Article 20.2 - Regulatory body independence

E.154. ONR's independence as a regulator is ensured, as an Agency of HSE, under HSWA74, where HSE is given direct responsibility for the enforcement of the nuclear safety regulatory system. Similarly, the environment agencies are made responsible to provide the environmental protection regulatory system under EPR10 in England and Wales and RSA93 in Scotland and Northern Ireland.

E.155. There are also governmental mechanisms in place to maintain the independence of the regulatory bodies. ONR is sponsored by the Department for Work and Pensions, which has no role in promoting nuclear technology or responsibilities for facilities or activities. However, the Secretary of State for Energy and Climate Change is answerable to Parliament for nuclear safety in Great Britain. In this respect, ONR can provide factual information to this Minister on matters of nuclear safety regulation, but this Minister is not responsible for ONR's nuclear regulatory actions.

E.156. The Environment Agency is sponsored by Defra and the Welsh Government. On radioactive waste matters, it works closely with DECC's Nuclear and Radioactive Waste Section, the Department of Health (DoH) and Welsh Government.

E.157. SEPA is sponsored by the Scottish Government. On radioactive waste matters, it works closely with the Environmental Quality Division of the Scottish Government, DECC and the DoH.

E.158. DECC has a number of policy roles in respect of the nuclear industry. These include responsibility for energy policy generally (including the role of nuclear power), prescribing the activities that should be subject to the nuclear licensing regime, nuclear emergency planning, nuclear security and safeguards, international treaties, the Joint Convention and the Convention on Nuclear Safety, and the international nuclear liability regime. It is also responsible for those parts of the UK civil nuclear industry still owned by the Government.

E.159. In carrying out its responsibilities, DECC will, when appropriate, seek technical factual information on safety-related matters from ONR, and advice on environmental issues from the environment agencies through Defra.

E.160. Working agreements exist between the regulators and the Food Standards Agency. In addition, the Food Standards Agency acts as consultee to the Environment Agency through arrangements agreed under EPR10 and as statutory consultee to SEPA under RSA93. Regular liaison meetings take place between the Environment Agency, SEPA and the Food Standards Agency. On radioactive waste matters, the Food Standards Agency also works closely with the Welsh Government.

Section F - Other General Safety Provisions

Article 21 – Responsibility of the Licence Holder

1. Each Contracting Party shall ensure that prime responsibility for the safety of spent fuel or radioactive waste management rests with the holder of the relevant licence and shall take the appropriate steps to ensure that each such licence holder meets its responsibility.
2. If there is no such licence holder or other responsible party, the responsibility rests with the Contracting Party which has jurisdiction over the spent fuel or over the radioactive waste.

F.1. Under this Article, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the third UK report (i.e. in a way that has implications for the Joint Convention obligations).

Article 21.1 - Prime Responsibility for Safety

F.2. A fundamental principle of the UK regulatory system is that responsibility for health and safety lies with those who own, manage or work in industrial and commercial undertakings.

F.3. Although ownership of many sites in the UK has transferred to NDA, the prime responsibility for safety remains with the site licensee.

Article 21.2 - Contracting Party Responsibility if there is no Licence Holder or Other Responsible Party

F.4. The Government will take the steps necessary to ensure that spent fuel and radioactive wastes are managed in a safe manner. In particular, if adequate facilities are not available for the safe disposal or accumulation of radioactive waste, under EPR10 the Secretary of State in England and Welsh Ministers in Wales have the power to provide such facilities, or may arrange for their provision by such persons as they may think fit. Similar powers are available to the Scottish Ministers under RSA93 for sites located in Scotland.

F.5. If there is radioactive waste on any premises, and the appropriate environment agency is satisfied that the waste ought to be disposed of, but that it is unlikely that the waste will be lawfully disposed of, the agencies have power to dispose of that radioactive waste as they may think fit.

F.6. For radioactive waste held on a site where activities are not prescribed under NIA65, the employer is responsible for the safety of its operations under HSWA74 to ensure the protection of its workers and the public.

Article 22 – Human and Financial Resources

Each Contracting Party shall take the appropriate steps to ensure that:

- (i) qualified staff are available as needed for safety-related activities during the operating lifetime of a spent fuel and a radioactive waste management facility;
- (ii) adequate financial resources are available to support the safety of facilities for spent fuel and radioactive waste management during their operating lifetime and for decommissioning;
- (iii) financial provision is made which will enable the appropriate institutional controls and monitoring arrangements to be continued for the period deemed necessary following the closure of a disposal facility.

F.7. Under this Article, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the third UK report (i.e. in a way that has implications for the Joint Convention obligations).

Article 22(i) - Availability of Qualified Staff

F.8. In order to comply with regulatory requirements, a licensee must demonstrate to ONR's satisfaction that it has:

- lines of authority leading to adequate control of the activities, whether these are carried out by the licensee's own staff or by contractors;
- adequate staff resources;
- precise definition and documentation of duties;
- integration of health and safety responsibilities into job functions;
- appropriately trained experienced staff ensuring adequate in-house expertise; and
- the provision of, or access to, a high level of health and safety expertise used in an active manner for the peer review of the safety case, audit and review.

This demonstration is achieved by the preparation of adequate arrangements to satisfy the requirements of the relevant licence conditions.

F.9. The licensee is also required, under LC36 (see Annex L.6) to have arrangements for the control of any change to its organisational structure or resources that might affect safety.

Management of human resources for safety related activities

Regulatory background

F.10. HSW74 places responsibility for safety on the plant operator. This responsibility includes the competence and training of staff with safety-related roles. Specific requirements are included in MHSW99, in particular Regulation 13 on Capabilities and Training.

F.11. In addition, several licence conditions set goals on training and the management of human resources (see Annex L.6). LC10 requires the licensee to make and implement adequate arrangements for suitable training of all those on site who have responsibility for any operations which may affect safety. LC12 requires the licensee to make and implement adequate arrangements to ensure that only suitably qualified and experienced persons perform duties that may affect safety. This includes the appointment of duly authorised persons to control and supervise specific safety related operation.

F.12. The licensees' arrangements made under other licence conditions such as plant modification procedures (LC22), emergency arrangements (LC11) and the control of organisational change (LC36) also require that the licensee should address human resource and training issues.

F.13. ONR's role is to monitor the adequacy of, and compliance with, the arrangements made under the licence conditions. Under normal circumstances, ONR does not have any specific role in the selection, training and authorisation of staff to perform safety related duties. It does, however, have powers to intervene if, in its opinion, any person is unfit to perform the duties of a duly authorized person.

F.14. Training and human resource issues are addressed by nuclear inspectors when they are reviewing safety documentation against the SAPs^[132]. The SAPs give inspectors guidance on whether the legal requirement of the licence conditions are being met, in particular that provisions are made for training staff who will have responsibility for the safety of the plant. These include a management system for training on the site, analysis of jobs and tasks, development of training methods, assessment of trainees, revision training as required, and regular evaluation of training. Thus, licensees have in place a systematic approach to training and assessment of personnel with safety roles. Analysis of tasks provides an input to the specification of personnel training. Emphasis is placed on training that enables staff to implement accident management strategies, utilising appropriate instrumentation and items of plant that are qualified for operation in severe accident environments.

Licensees' training programmes

Qualification, experience and training

F.15. For all tasks undertaken on site, licensees' and contractors' staff receive training to make them aware of the safety hazards on the site, and in the use of preventive and protective measures established to reduce risks to health and safety. For each post or role with a responsibility for safety, licensees ensure that the duties, responsibilities and competencies are identified and that the training needs of an individual are met.

F.16. The assessed competence of an individual to undertake a specific task is achieved by a combination of:

- knowledge, academic and practical qualifications, assessed training and experience of the person;
- the instructions and information provided to the person; and
- the degree of control and supervision exercised in carrying out the task.

Training requirements are then identified, depending on the needs of the job and the assessed competence of the individual. Procedures for assessing competence prior

to undertaking a safety-related job are part of the arrangements made under LC10. Although the responsibility for evaluating an individual's suitability for a specific job rests with the licensee, ONR will, as part of its inspection programme, inspect the adequacy and implementation of the licensees' training programmes.

F.17. LC12 requires that any posts on site that may affect operational safety, or that implement any actions connected with the site licence conditions, must be performed only by suitably qualified and experienced persons. Where such actions need to be controlled or supervised, this must be done by Duly Authorised Persons appointed by the licensee. ONR inspectors will again inspect the adequacy and implementation of this process, and have powers under the Site Licence to require the licensee to ensure that no person continues to act as a Duly Authorised Person if it is considered that they are unfit to do so.

Training of external personnel

F.18. When licensees use contractors for safety related work, they must satisfy themselves that the contractors' staff have the appropriate qualifications and training to undertake the tasks safely. The training of contractors' staff so that they comply with Site Safety Rules is part of the contractual agreements for such work. A good example of best practice being shared across the UK nuclear industry is the recently developed and introduced Basic Common Induction Standard from Cogent^[134]. Cogent is the Sector Skills Council for the nuclear industry and is leading on a number of initiatives to standardise qualifications, training and experience. Part of this approach is the Basic Common Induction Standard which, when fully implemented across the industry, will provide the necessary knowledge to ensure staff can access and move around licensed nuclear sites safely and securely.

F.19. When safety analysis work and/or inspection work is contracted to organisations external to the licensee (e.g. non-destructive testing and examination), ONR advocates the 'intelligent customer' approach. This means that the licensee should have sufficient in-house expertise to manage (and if necessary, challenge) the work of contractors.

F.20. In the UK, licensees are responsible for ensuring the safety on the licensed site, and are required under LC17 to have quality management arrangements for all matters that might affect safety. Licensees are therefore responsible for ensuring, amongst other things, that their contractors are suitable for the work that they do. ONR has guidance for its inspectors on judging whether licensees and contractors meet their safety responsibilities, and this guidance is available to licensees. It does not specifically prescribe the qualification, quality systems or performance of contractors, but it does carry out inspections of the licensees' quality assurance arrangements. For critical components, such inspections may also involve examination of the quality assurance arrangements of suppliers or contractors. However it is always the licensees' responsibility to ensure that these arrangements are adequate.

Periodic review

F.21. The performance of each of the licensee's employees is assessed regularly by their line managers as part of the performance management processes. This requires periodic formal performance reviews which are recorded. These reviews will identify any corrective or development actions. Although the performance review process itself is not a requirement of LC10, these actions will then be fed into the overall training plan for sites as required by LC10.

Training programme development

F.22. The training programmes take into account changes to plant configuration, plant modifications and the corrective action needed to respond to incidents on site and on other sites. Plant modification proposals, made under the arrangements under LC22, identify where instructions and procedures need to be changed and the associated training needs. For large modifications that need stage Consents to be granted, evidence of satisfactory retraining may be a requirement prior to a Consent being granted to bring the modified plant into routine service.

Operational experience feedback to improve training

F.23. LC7 requires the licensee to develop adequate arrangements for the notification, investigation and reporting of incidents on site. The outcomes of these investigations are reported to ONR. These reports ensure that any training deficiencies are identified and that the licensee takes the necessary corrective action.

F.24. The adequacy of all training courses is kept under review and takes account of feedback from trainees and their line managers. The training arrangements are the subject of internal audits by the licensee's staff and also routine and team inspections by NII inspectors.

Competence of instructors

F.25. Training instructors comprise staff of proven competence and experience who are employed in the work area in which they provide training, as well as full-time instructors normally based at a training centre. Instructors are given training on how to present training materials to best effect. Arrangements are in place for line managers to assess the performance of instructors, and feedback is also provided by the staff receiving instruction.

National Programme

National Skills Academy for Nuclear

F.26. Government is working closely with Cogent, the National Skills Academy for Nuclear (NSA Nuclear)^[135], and the industry to ensure that the UK has a clear, jointly shared understanding of the key skills priorities for the nuclear sector, and how skills demand can be met. NSA Nuclear was set up in January 2008 specifically to develop the capacity and capability of the UK nuclear workforce. By working with existing training providers across the UK, it intends to provide 1,200 apprenticeships and 150 foundation degrees within the sector. NSA Nuclear is also developing a Nuclear Skills Passport which will provide all employees and contractors in the nuclear sector with a physical record of their industry-specific training and qualifications, assisting both employers and employees.

Article 22(ii) - Financial resources

F.27. Financial resources to support the safety of a spent fuel, reprocessing or radioactive waste management facility are treated by the licensees as part of the installation's normal operating costs, the principal elements of which comprise:

- a) maintaining and enhancing safety;
- b) treatment of irradiated fuel and operational radioactive waste;

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- c) materials and services (the cost of engineering, including contractors, and consumable spares for maintaining the facilities and other miscellaneous charges such as insurance);
 - d) staff costs (salaries and pension provisions); and
 - e) depreciation (representing the proportion of the fixed assets written off in relation to the accounting life).

F.28. The operators' internal financial control processes determine the necessary authority required before commitments are made to expenditure on safety. These processes examine the impact on the operators' financial accounts of any proposal for improvement work, using discounted cash flow and cost-benefit analyses. Such analyses take into account both the immediate costs of carrying out the improvements and future income.

F.29. Special financial provision is made for the particular liabilities relating to the reprocessing and storage of spent fuel, the storage and disposal of nuclear waste and the nuclear installation's decommissioning costs.

F.30. The site licensee remains responsible for the safety of sites. However, where sites are owned by NDA, under the site licensee's contract with NDA, the costs outlined above will normally be recoverable costs which may be charged to the NDA, provided they are incurred in compliance with the contract and NDA's Programme Control Procedures (see NDA website, Annex L.10, for more information). The funding of NDA is described below.

F.31. Before ONR grants a nuclear site licence, it seeks assurance from DECC on the issue of liability, but does not have any review responsibilities.

Financing radioactive waste management

F.32. The audited accounts of the UK's operators of spent fuel, reprocessing and radioactive waste management facilities (see websites at Annex L.10) include details of waste management costs and of the provisions made in order to meet them. However, there is no currently-available disposal route for ILW or HLW in the UK. The costs of storing these wastes comprise:

- costs actually incurred during the operational phase; and
- liabilities associated with the management of ILW and HLW during the decommissioning phase prior to their ultimate disposal.

F.33. The cost of managing radioactive waste during the operational phase is an operational cost spread across the materials, services and staff costs in the reported accounts. The materials and services costs in the accounts include costs associated with disposals of low-level radioactive waste, where the operator of the facility sets a price that reflects all operational and liability cost considerations. All disposals of radioactive waste, including those to the environment, are undertaken in accordance with regulatory authorisations. The regulators, the Environment Agency or SEPA, recover costs in granting, monitoring and enforcing the authorisations or permits from the operators.

F.34. NDA requires operators to prepare plans for their sites, known as Lifetime Plans (LTPs), covering commercial activities as well as decommissioning and clean-up. These plans set out a description of each component of the plan for each site, the time-phasing of when the component will be carried out and a forecast of the

likely costs of delivering that component in each year on an undiscounted basis at current price levels.

F.35. Although the plans are extremely detailed, there is significant inherent uncertainty in the future cost estimates that underpin the nuclear provisions. There are still some specific uncertainties that need to be addressed, such as:

- site end-states;
- material to be retrieved from legacy ponds and silos;
- contaminated land quantities and treatments required;
- programming of work and risks arising from programme inter-dependencies;
- timing of final decommissioning of Magnox stations; and
- disposition plans for wastes – HLW, ILW, and LLW – and spent fuels.

F.36. NDA's future cost estimates are calculated as the sum of the LTP base estimates for all NDA sites, including an allowance for some specific project contingencies and risks, an additional estimate for risks managed by NDA rather than by site contractors, and an allowance for the disposition of waste and nuclear materials. The audited accounts of NDA, available on their website (see Annex L.10), includes more detailed information.

Financing decommissioning programmes

F.37. NDA has responsibility for contracting the operation of commercial and waste management operations on designated sites and for the eventual decommissioning of those sites. The current estimate for the cost of the decommissioning and clean-up programme for these sites is around £45.1 billion (discounted) and the programme is likely to take up to 120 years to complete. NDA is exploring ways in which the cost can be reduced and the timescales shortened, whilst still maintaining safety, security and environmental standards.

F.38. NDA is funded directly from central Government, through its sponsoring Department, DECC.

F.39. As part of the Government's 2010 Spending Review, NDA received a budget in the region of £3 billion a year, some of which depends on the level of receipts from commercial activities such as electricity generation, fuel fabrication and spent fuel management. Revenue from commercial operations will make up approximately 40% of NDA's total budget although this proportion will reduce over time as currently operational facilities move into the decommissioning phase.

Financing disposal of high-activity sealed sources

F.40. The HASS Regulations^[66] strengthened the financial controls relating to the management and disposal of disused high-activity sealed sources. Financial provision, or an acceptable alternative (for example, return to supplier), must be made to meet the costs of disposal of any high-activity source to be acquired. Government has provided guidance for the UK regulators on the acceptable arrangements that source holders can make to meet the requirements for such financial provision. In England and Wales, the provisions of the HASS Regulations have subsequently been incorporated into EPR10; this did not involve any change in the scope or nature of the regulatory regime.

Article 23 – Quality Assurance

Each Contracting Party shall take the necessary steps to ensure that appropriate quality assurance programmes concerning the safety of spent fuel and radioactive waste management are established and implemented.

F.41. Under this Article, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the third UK report (i.e. in a way that has implications for the Joint Convention obligations).

F.42. This article has been addressed by considering the Quality Assurance (QA) issues arising from the IAEA's Requirements document GS-R-3 on "The Management System for Facilities and Activities." GS-R-3 has replaced IAEA 50-C/SG-Q in part. A further IAEA document "Application of the Management System for Nuclear Facilities" will supplement GS-R-3 to ensure that all elements of IAEA 50-C/SG-Q are addressed. This suite of documents, including a guide document for GS-R-3, includes quality assurance as part of an overall Management System which is described primarily in GS-R-3 under six basic headings, which have been used to structure the following text. The introduction heading of GS-R-3 is not included. The following paragraphs identify how UK organisations are meeting the new IAEA Requirements documents.

F.43. The SAPs (see Annex L.8) broadly reflect the new IAEA requirements. The SAPs recognise the importance of leadership and management for safety and expect quality management systems to be an integral part of this.

Management system

Establish management system

F.44. Licensees' management systems (including QA programmes) are developed as part of their arrangements to meet LC17, 'Quality Assurance' (see Annex L.6). They meet the requirements of national and international quality management Codes and Standards. In addition to including all the relevant elements of those documents, the management system is also the vehicle by which all other arrangements required to be made under the nuclear site licence are identified, referenced and controlled. Furthermore, any significant changes to the licensees' organisational structures or resources are controlled by arrangements made to meet the requirements of LC36, 'Control of Organisational Change'. Licensees are currently considering the implications of any requirements identified in GS-R-3 and the related documents that are not currently covered by IAEA 50-C/SG-Q.

F.45. Collectively, these arrangements provide a description of organisational structures and detail the arrangements for such things as the control of documentation; the provision of control and supervision; the establishment and maintenance of competency; the management, control and verification of work; and the audit and review of performance. The development of integrated management systems by licensees supports the requirement to consider collectively safety requirements as part of a total business perspective.

Graded application

F.46. Graded application of QA is used by the licensees so that there is a hierarchy of controls applied to activities, depending on the safety significance and the related hazards of the plant on which the activity is to be carried out. This approach ensures that appropriate levels of supervision, inspection, monitoring, documentation, training and audit and surveillance are applied, according to the safety significance of the plant, and the potential for error leading to the possibility of severe consequences associated with ill-conceived or improperly-executed activities or with equipment failures. Licensees use a well-established process that allocates a QA grade to an activity. This grade relates to the control measures to be applied to the activity to ensure that it is carried out in accordance with the specification requirements, and that proper records are maintained. The process is also applied to contractors carrying out work on licensed sites where an element of control will be exercised by the licensee, and which, for the highest QA grades, may also require the involvement of an independent third-party inspection body.

Management responsibility

Commitment and resources

F.47. Licensees use a number of processes to support continual improvement of the management system. In addition to established arrangements for self and independent audit and operational experience feedback, licensees periodically review their management systems to ensure that these are providing and delivering business objectives which include the achievement of nuclear safety. These reviews use a wide range of information, including that from the audits and reviews referred to above, and also from the analysis of incident and event data, industry feedback and interactions with the regulators. The output from such reviews is used to improve future arrangements, plans and objectives, and may also lead to organisational restructuring. This approach is compatible with Safety Assessment Principle MS1 on leadership, in showing commitment to safety and system improvement.

Goals, strategies, plans and objectives

F.48. LC17 requires the licensee to make and implement adequate quality assurance arrangements in respect of all matters that may affect safety. Licensees develop business plans for the various stages in the plant life cycle, e.g. design, construction and operation. Quality Assurance arrangements are part of these business plans and are one of the mechanisms used to ensure the implementation of the plans. The licensee identifies where the achievement of business plans requires the input of other organisations. The licensee retains responsibility for the achievement and effectiveness of the plans. Licensees develop policy statements and implement strategies to achieve these policies. There is an increasing use of an integrated approach to business management, and licensees are conscious of the interactions between environmental, safety, security and quality issues. There are frequent and structured reviews of safety performance against specified performance indicators. Implicit in this process is the monitoring and correction process employed by licensees where performance indicators identify such action to be required.

Management responsibility

F.49. Licensees' management systems are authorised for use by senior management and are mandatory on all employees. Processes are implemented to

inform senior management of the suitability, adequacy of, and level of compliance with the management system. Licensees clearly identify in related documents the key responsibilities of managers and others who carry out the work. Responsibilities and processes are identified for monitoring, audit and review to ensure that management processes and work performance are effective. These activities are integrated such that the specification, execution, supervision and monitoring of the work are properly resourced and carried out.

F.50. All licensees have established procurement arrangements. An integral part of these arrangements is the evaluation and selection of suppliers and contractors, including the suitability of contractors to comply with the requirements of the licensees' management systems, or to provide adequate arrangements themselves that provide equivalent levels of control.

Resource management

F.51. The allocation of resources is not a requirement specifically placed on the licensee through LC17, except to the extent that licensees' arrangements for safety related activities cannot be considered to be adequate if the resources needed to undertake those activities are clearly inadequate. LC36 was introduced some ten years ago specifically to guard against any downward drift in the licensees' resources as a consequence of ill-considered cost cutting. However, the activities required to establish, implement, assess and continually improve the management system are a fundamental part of the licensees' arrangements. In addition to all personnel having some responsibility for the delivery of the management system and its components, dedicated personnel are responsible for the assessment, review and collation of management information to support continual improvement.

Process implementation

F.52. Licensees' management systems are developed as part of their arrangements to meet licence conditions. In addition, they are designed to meet the requirements of national and international quality management Codes and Standards. On this basis, licensees have to implement suitable and adequate processes to meet all these requirements, and to instigate assessment and review arrangements to ensure these processes remain fit for purpose and are subject to continual improvement. The management system is also the vehicle by which all other arrangements required to be made under the nuclear site licence are identified, referenced and controlled. Licensees are currently considering the application of any elements identified in GS-R-3 and the related documents that are currently not covered by IAEA 50-C/SG-Q. Fundamental aspects of the licensees' arrangements (e.g. modifications, design control and safety case development) are unlikely to change as a result of this process.

Generic processes

F.53. IAEA GS-R-3, Sections 5.11 to 5.28, identifies a number of generic processes to be developed in the management system. These are control of documents; control of products; control of records; purchasing; communications; and Management of Organisational Change.

F.54. Licensees' arrangements, as a matter of course, cover these processes, which are basic elements of any management system. In addition, because of the nuclear licensing arrangements within the UK, these are supplemented by the processes required under the licence conditions, including LC17 and LC36.

Measurement, assessment and improvement

Independent assessment

F.55. The term 'independent' in 'independent assessment' distinguishes between the audit and review carried out by those involved in the work being assessed, and that which is carried out by personnel that have no involvement in the work under review. This is achieved in a number of ways, including the use of audit and review personnel from a different part of a licensee's organisation, a different site, from corporate resources, or from another organisation under contract to the licensee.

Management system review

F.56. Licensees carry out management system reviews to ensure the continuing effectiveness of their arrangements and to provide a basis for continued improvement. There are a number of processes that contribute to these reviews including auditing, which is a fundamental element in licensees' management systems, incident and accident analyses, operational failures, deficiencies and non-conformances and procedural non compliance. With respect to auditing, there is a strong element of defence-in-depth in the audit and review process. Licensees employ layers of audit and review in self-audit, task independent audit and review and independent audit and review, some of the latter being carried out by third party organisations. In addition to these levels of audit and review, ONR carries out, as part of its regulatory activities, audits and inspections of the licensees' arrangements.

F.57. When licensees carry out periodic (usually annually) reviews of the effectiveness of the quality management system, information from a number of sources is taken into consideration. This includes the results of all assessments, including independent assessments. On a more frequent basis, management is made aware of the output of all audits and assessments. This information is used as the basis for corrective action and/or as an initiator for process improvement.

Non-conformances

F.58. Items, services and processes that do not meet requirements are identified by the licensees through a number of processes including, receipt and in-process inspections, contract reviews, supervision, monitoring and audit activities, all of which are required to be carried out as part of the management system. The level of reporting of a non-conformance depends on its nature, its potential effect on nuclear safety, its cost and its affect on the licensee's programme. Defective items and services can result in the supplier being barred from supplying in the future by being removed from the approved suppliers list. Close-out of non-conformances identified through audit and review processes are reported to management, and if no corrective action is taken within a prescribed time-scale, the report is escalated to senior management for appropriate action. The details of non-conformances are entered, with other data such as incidents and accidents, onto databases where the data is analysed and developing trends identified.

F.59. One of the main reasons the analysis described above is carried out by the licensees is in order to identify any underlying causes. Licensees do this as part of the process of ensuring that the non-conformance will not recur. Underlying causes (such as inadequate supervision, lack of training or incorrect documentation) have been identified and corrective action taken. Learning from errors and mistakes, as part of an operational experience programme, is an essential part of a well developed management system and is a requirement of the nuclear site licence.

Opportunities for improvement

F.60. Licensees use a number of processes to support continual improvement of the management system. Once the need for improvement is identified, it is planned to ensure that it is properly resourced. Depending on the scale of the improvement, it may be included in the business plan or a specific improvement plan so that its progress is monitored to completion. This approach is compatible with Safety Assessment Principle MS1 on leadership, in showing commitment to safety and system improvement.

F.61. Licensees consider the identification of opportunities for improvement as an ongoing responsibility and activity. External influences such as changes to standards or legislation, as well as social and business pressures, all provide the motivation to update business plans and therefore management systems.

Article 24 – Operational Radiation Protection

- 1. Each Contracting Party shall take the appropriate steps to ensure that during the operating lifetime of a spent fuel or radioactive waste management facility:**
 - (i) the radiation exposure of the workers and the public caused by the facility shall be kept as low as reasonably achievable, economic and social factors being taken into account;**
 - (ii) no individual shall be exposed, in normal situations, to radiation doses which exceed national prescriptions for dose limitation which have due regard to internationally endorsed standards on radiation protection; and**
 - (iii) measures are taken to prevent unplanned and uncontrolled releases of radioactive materials into the environment.**
- 2. Each Contracting Party shall take appropriate steps to ensure that discharges shall be limited:**
 - (i) to keep exposure to radiation as low as reasonably achievable, economic and social factors being taken into account; and**
 - (ii) so that no individual shall be exposed, in normal situations, to radiation doses which exceed national prescriptions for dose limitation which have due regard to internationally endorsed standards on radiation protection.**
- 3. Each Contracting Party shall take appropriate steps to ensure that during the operating lifetime of a regulated nuclear facility, in the event that an unplanned or uncontrolled release of radioactive materials into the environment occurs, appropriate corrective measures are implemented to control the release and mitigate its effects.**

F.62. Under this Article, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the third UK report (i.e. in a way that has implications for the Joint Convention obligations).

F.63. The UK's safety requirements and regulations for radiation safety are described in Section E, Article 19.2. Nothing has fundamentally changed in the way radiation exposure and radioactive discharges are limited. This section comments on trends since the previous report.

F.64. The widely-used ICRP concept of ALARA, as applied to radiation doses, is equivalent to ALARP which has legal precedent in the UK's safety regulation. The duty to take action to reduce risks, (the ALARP principle) is fundamental to all UK health and safety legislation and for ionising radiations; Regulation 8 of IRR99 applies in particular.

F.65. Application of ALARA in relation to the discharge and disposal of radioactive waste is required under EPR10 and under the Radioactive Substances (Basic Safety Standards) (Scotland) Direction 2000^[136], which implement the BSS Directive. EPR10 incorporates the provisions formerly under the Radioactive Substances (Basic Safety Standards) (England and Wales) Direction 2000^[137].

F.66. The principle requires any operator to follow relevant good practice. Where relevant good practice in particular cases is not clearly established, the operator has to assess the significance of the risks (both their extent and likelihood) to determine what action needs to be taken. Some irreducible risks may be so serious that they cannot be permitted. At the other extreme, some risks may be so trivial that it is not worth spending more to reduce them. In general, risk-reducing measures should be weighed against the associated costs (in time, trouble and money). The operator

must take the measures unless the costs of taking particular actions are clearly excessive compared with the benefit of the risk reduction.

F.67. The Approved Code of Practice^[138] supporting IRR99 gives practical guidance on the most appropriate methods of complying with the regulatory requirements. Advice has also been published on establishing management procedures to restrict exposure^[139].

Investigations

F.68. If an employee has a recorded whole-body dose greater than 15mSv (or a lower level established by the employer) for the year, the employer must carry out an investigation (under IRR99 Regulation 8). The purpose of this investigation is to establish whether or not sufficient is being done to restrict exposure so far as is reasonably practicable.

F.69. IRR99 Regulation 25 requires HSE to be informed if an exposure in excess of a dose limit occurs or is suspected, whether this arises from a single incident or through an accumulated dose. The employer undertaking work with ionising radiation must carry out a thorough investigation.

Dose monitoring and record keeping

F.70. If an employee is likely to receive a radiation dose greater than three-tenths of a relevant dose limit in a year (6mSv in the case of whole-body exposure), the employer has to designate that employee as a classified person. The employer then has to arrange for any significant doses (internal or external) received by that person to be assessed by a dosimetry service approved by HSE for the measurement and assessment of doses for the relevant type of radiation. HSE also approves dosimetry services to co-ordinate individual doses received and to produce and maintain dose records for classified persons.

F.71. To help the employer assess the effectiveness of the dose control measures, dosimetry services provide a written summary of the doses recorded for each classified employee at least once every three months. By the end of March each year, the dosimetry services must also send HSE summaries of all recorded doses relating to classified persons for the previous year.

F.72. For nuclear licensed sites LC18 requires licensees to monitor the average effective dose equivalent and notify ONR if this figure exceeds the level specified by HSE (currently 5mSv) for any specified class of persons. The classes of persons enable differentiation between the dose received by employees and contractors, and by classified and non-classified persons.

Central Index of Dose Information

F.73. In January 1987, HSE established a computerised Central Index of Dose Information in order to receive and process the annual dose summaries. All dose summaries and personal data provided to HSE are treated as confidential.

F.74. The Central Index of Dose Information generates statistical information from the dose summaries. Detailed information relating to annual dose statistics has been published for each year from 1986 to date (see ONR website, Annex L.10).

Article 24.1(i) - ALARA and ALARP

F.75. The dose uptake (collective and individual mean) for individuals involved in nuclear fuel reprocessing and radioactive waste treatment have remained constant over the last 3 years, but with a marked drop in the number of individual exceeding 6mSv per year. This is an indication of the continued application of the ALARA/ALARP principle within the industry. Within the nuclear decommissioning sector, the significant increases in the annual collective dose and individual dose uptake are indicative of the increased pace of decommissioning of legacy plants in the UK. This is a particularly challenging area of work and the regulator is encouraging the industry to develop innovative techniques to keep doses ALARP. Table F.1 below shows this over the period from 2000 to 2009 for workers undertaking fuel reprocessing, waste treatment and the decommissioning of nuclear facilities.

F.76. Information on individuals is collated by many employers to help them understand which activities are giving the highest radiation doses. This is confidential information and thus not publicly available. However, summary information is publicly available and employers have achieved considerable dose reductions over the past twenty years.

Regulatory activities

F.77. The provisions of IRR99, for both workers and members of the public, at spent fuel, reprocessing and radioactive waste management facilities, are enforced through inspection by ONR's nuclear inspectors. The environment agencies exercise regulatory control over exposures to the public resulting from authorised discharges of radioactive materials into the environment. They enforce the conditions attached to environmental permits or authorisations for radioactive waste disposal issued under EPR10 and RSA93 respectively (see Sections F.86 to F.95).

Licensing requirements

F.78. For nuclear licensed sites, in addition to the application of IRR99, the regulation of radiological hazards is also achieved through the licensing regime. As previously described, the licensing of spent fuel, reprocessing and radioactive waste management facilities ensures that the safety of the public and workers from the effects of ionising radiation, is assessed during design, construction, commissioning, operation and decommissioning.

F.79. The adequacy of the licensees' safety cases is assessed by ONR against the guidance of the SAPs. The principles relating to radiological protection ensure that each licensee continuously strives to keep all radiation exposures ALARP.

Co-operation between regulatory bodies

F.80. The joint responsibility for regulating doses to the public requires close cooperation between ONR and the environment agencies. Memoranda of Understanding are in place to ensure that regulatory activities are consistent, coordinated and comprehensive (see ONR website, Annex L.10).

Table F.1 – Dose information for Classified Persons

Nuclear Fuel Reprocessing										
Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Total Classified Workers	4028	3380	3841	3869	3977	3555	3518	2849	2858	2771
Collective Dose (Man-mSv)	2958	2638	2791	2641	2561	2476	2918	2201	2027	1896
Mean dose, (mSv)	0.7	0.8	0.7	0.7	0.6	0.7	0.8	0.8	0.7	0.7
Classified persons with dose >6mSv										
Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
6.1 to 10mSv	37	31	31	15	17	9	5	1	3	0
10.1 to 15mSv	1	2	3	0	0	0	0	0	0	0
15.1 to 20mSv	0	0	0	0	0	0	0	0	0	0
>20mSv	0	0	0	0	0	0	0	0	0	0

Radioactive Waste Treatment										
Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Total Classified Workers	318	360	371	364	339	291	249	227	237	252
Collective Dose (Man-mSv)	74	81	77	69	72	60	51	61	46	71
Mean dose (mSv)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.3
Classified persons with dose >6mSv										
Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
6.1 to 10mSv	0	0	0	1	0	0	0	0	0	0
10.1 to 15mSv	0	0	0	0	0	0	0	0	0	0
15.1 to 20mSv	0	0	0	0	0	0	0	0	0	0
>20mSv	0	0	0	0	0	0	0	0	0	0

* Corrected value – Central Index of Dose Information: Summary Statistics for 2003 TABLE A1

Decommissioning										
Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Total Classified Workers	1774	2375	2577	2531	2821	3317	3460	4454	4277	3672
Collective Dose (Man-mSv)	965	2218	2463	2642	2410	3190	4046	2952	3485	2753
Mean dose (mSv)	0.5	0.9	1.0	1.0	0.9	1.0	1.2	0.7	0.8	0.7
Classified persons with dose >6mSv										
6.1 to 10mSv	21	58	43	63	31	64	48	13	122	64
10.1 to 15mSv	1	0	1	1	0	1	58	0	0	0
15.1 to 20mSv	0	0	0	0	0	0	0	0	0	0
>20mSv	0	0	0	0	0	0	0	0	1	0

Article 24.1(ii) - Dose Limitation

F.81. IRR99 lay down dose limits for persons engaged in work with ionising radiation. For adult employees, the dose limit for whole body exposure is currently 20mSv per year.

F.82. In practice, all doses recorded for employees at spent fuel, reprocessing and radioactive waste management facilities are well below dose limits for normal operations. IRR99 also allow for dose limitation for an individual worker in specified circumstances to be based on a dose of 100mSv averaged over a period of five consecutive calendar years, with a maximum of 50mSv in any one year. However, this is acceptable only if the licensee can demonstrate to HSE's satisfaction that an annual limit of 20mSv is impracticable for that person.

F.83. Notwithstanding dose limits, the employer responsible for the work must restrict exposure so far as is reasonably practicable.

F.84. No workers in UK radioactive waste or spent fuel management facilities have exceeded this limit since the previous report.

Article 24.1(iii) - Measures to Prevent Unplanned and Uncontrolled Releases of Radioactive Materials into the Environment

F.85. The nuclear licensing regime in the UK, as applied to spent fuel, reprocessing and radioactive waste management facilities, is designed to ensure that the probability of any unplanned or uncontrolled accidental releases of radioactivity into the environment is very low. This is achieved by the requirement to demonstrate, through a safety case, that the design of any plant has taken into account a full range of fault conditions that could lead to an accidental release of radioactivity. The plant design is required to cater for these faults through the

provision of diverse and redundant safety systems, such that the release of radioactivity meets strict probability criteria.

Article 24.2 - Radioactive Discharges

Discharge Authorisations

F.86. Operators must obtain an environmental permit under EPR10 or an authorisation under RSA93 for discharge of radioactivity to the environment, or disposal by means of burial, incineration or transfer of waste off the site.

Environmental permits and authorisations:

- a) can specify the disposal routes to be used, and place limits and conditions on disposal;
- b) place a requirement to use BAT under EPR10 (England and Wales) or BPM under RSA93 (Scotland and Northern Ireland) to minimise the volume and activity of radioactivity discharged to the environment, and to minimise the radiological effects on the environment and on members of the public;
- c) require sampling and analysis to determine compliance with authorisation conditions, reporting of the quantities of radioactive waste disposed of, any instance of non-compliance with limits; and
- d) may specify improvements in waste management arrangements.

F.87. The limits on radioactive discharges are set on the basis of the 'justified needs' of the practice being conducted by the licensees, i.e. they must make a case that the proposed limits are necessary to allow safe and continued operation of the plant. In setting limits, the environment agencies use monitoring, discharge and plant performance data to ensure that the radiation exposure of the public as a consequence of the discharges would be less than the dose constraints and limits set by the UK Government. These constraints are set out in the EPR10 and the Radioactive Substances (Basic Safety Standards) (Scotland) Direction 2000. These are:

- a) a source constraint of 0.3mSv per annum for an individual facility which can be optimised as an integral whole in terms of radioactive waste disposals;
- b) a site constraint of 0.5mSv per annum for a site comprising more than one source, e.g. where two or more facilities are located together; and
- c) a dose limit of 1.0mSv per annum from all sources of human-made radioactivity, including the effects of past discharges but excluding medical exposures.

In addition to meeting dose limits and constraint, doses to members of the critical group must be kept ALARA.

F.88. Environmental permits under EPR10 for the disposal of radioactive waste are reviewed annually by the Environment Agency. SEPA reviews authorisations under RSA93 when it is considered appropriate to do so, although in practice this is at least once every five years. Environmental permits and authorisations for discharges are placed on public registers where they are open to inspection and discharge limits are published in various documents, for instance in the annual Food Standards Agency, Environment Agency, SEPA and NIEA report on Radioactivity in Food and the Environment (RIFE)^[140]. The regulatory bodies carry out checks on the

actual discharges made, in terms of activity and radionuclide composition, and have powers of enforcement, including prosecution under EPR10 or RSA93 if the terms of an environmental permit or an authorisation are breached.

F.89. It is the Government's view that the unnecessary introduction of radioactivity into the environment is undesirable, even at levels where the doses to both human and non-human species are low and, on the basis of current knowledge, are unlikely to cause harm. The progressive reduction of discharge limits, and of actual discharges, having regard to the application of BAT under EPR10 or BPM under RSA93, is a central tenet of the way in which radioactive discharges should be controlled, and has been a feature of UK policy since 1993.

Regulatory environmental radiological surveillance

F.90. In addition to the requirements placed on operators to monitor environmental radioactivity around their sites, the environment agencies undertake their own independent monitoring programmes. Radioactivity in surface and ground water, radiation dose rates on beaches and public occupancy areas, radioactivity in sediments and environmental material etc. are sampled and analysed. The results of the monitoring are published annually. The Food Standards Agency is responsible for the safety of radiation levels in foods, and undertakes a programme of monitoring to ensure that authorised discharges of radioactivity do not result in unacceptable doses to consumers via their diet. The results of the monitoring programmes are published annually in the Radiation in Food and the Environment (RIFE) reports, the latest version being RIFE 2009^[140]. In Northern Ireland, NIEA also carries out its own independent monitoring programme.

F.91. Environmental permits under EPR10 and authorisations under RSA93 for discharges of radioactivity to the environment not only set numerical limits on such discharges, but also require operators to minimise the activity of waste discharged by applying BAT under EPR10 or BPM under RSA93 and to monitor the levels of discharged radionuclides in the local environment. Independent monitoring, by Food Standards Agency, SEPA and NIEA, over the last three years has confirmed that, in terms of radioactive contamination, terrestrial foodstuffs and seafood produced in and around the UK are safe to eat. In 2009, consumers' exposure to artificially produced radioactivity via the food chain (for aquatic, terrestrial and total dose pathways) remained below the EU annual dose limit to members of the public of 1mSv for all artificial sources of radiation (excluding doses from medical sources). Details can be found in RIFE 2009.

F.92. A compilation of year-on-year discharges of radioactivity from the UK's spent fuel, reprocessing and radioactive waste management facilities, together with information on public radiation exposure is given in the annual RIFE report. Further information can also be found on the individual organisations' websites listed in Annex L.10.

F.93. Many nuclear site licensees also publish, annually, reports of their safety and environmental performance. Further information is available on their websites listed in Annex L.10.

Radiation exposure to other countries

F.94. Radiation exposure to members of the public living adjacent to a nuclear site in the UK must be less than the dose limits laid down in the International Basic Safety Standards for Protection against Ionising Radiation and for the Safety of Radiation Sources^[141], and the BSS Directive. Dose estimates indicate that the radiation exposure to the public in other countries, as a consequence of UK radioactive discharges will be much less than these dose limits.

F.95. The Euratom Treaty^[142] requires compliance with measures to monitor radioactivity in the European environment (Articles 35 and 36) and to prevent radioactive discharges or waste disposal in one Member State country resulting in contamination of the environment of another Member State country (Article 37). In this context, the EC decides whether any plan for the disposal of radioactive waste would result in contamination that is significant from the point of view of health. The UK has submitted data to the EC, in respect of all operations covered under Article 37, since its accession to the Euratom Treaty in January 1973. In every case, the Commission's opinion has been favourable. The UK has also submitted monitoring data to the EC as required under Article 36 of the Treaty.

Article 24.3 - Unplanned or Uncontrolled Releases

F.96. Corrective measures to bring back under control any unplanned releases or uncontrolled releases of radioactivity with the potential to travel outside the boundary of the licensed spent fuel, reprocessing or waste management facility, and mitigate their effect, are dealt with under Article 25 (Emergency Preparedness).

Article 25 – Emergency Preparedness

Each Contracting Party shall ensure that before and during operation of a spent fuel or radioactive waste management facility there are appropriate on-site and, if necessary, off-site emergency plans. Such emergency plans should be tested at an appropriate frequency.

Each Contracting Party shall take the appropriate steps for the preparation and testing of emergency plans for its territory insofar as it is likely to be affected in the event of a radiological emergency at a spent fuel or radioactive waste management facility in the vicinity of its territory.

F.97. Under this Article, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the third UK report (i.e. in a way that has implications for the Joint Convention obligations).

Emergency preparedness for a radiological emergency at a UK nuclear installation

F.98. The precautions taken in the design and construction of nuclear installations in the UK, and the high safety standards in their operation and maintenance, reduce to an extremely low level the risk of accidents that might affect the public. However, all nuclear installation operators prepare, in consultation with local authorities, the police and other bodies, emergency plans for the protection of the public and their workforce, including those for dealing with an accidental release of radioactivity. These are regularly tested in exercises under the supervision of ONR.

F.99. DECC co-ordinates emergency preparedness policy at national level, as the lead Government Department for the UK's arrangements for response to any emergency with off-site effects from a licensed civil nuclear site in England and Wales. In the event of an emergency at a civil nuclear site in Scotland, the lead Government Department responsibility and the main national coordinating role would fall to the Scottish Government. DECC would still be responsible for briefing the Westminster Parliament and the UK's international partners.

F.100. In consequence, due to its role as lead Government Department for the planning and response phase for an off-site nuclear emergency at a civil site in England and Wales, DECC chairs the Nuclear Emergency Planning Liaison Group (NEPLG), which brings together organisations with interests in off-site civil nuclear emergency planning. Members include representatives of the nuclear operators, the regulatory body, the police, fire service, local authority emergency planning officers and Government Departments and agencies that would be involved in the response to an emergency. NEPLG is a forum for discussing common problems, exchanging information and experience and agreeing improvements in planning, procedures and organisation. It has issued Consolidated Guidance^[143] to all organisations that may be involved in planning for a civil nuclear emergency. The guidance describes the underlying arrangements that have been developed for responding to an emergency in the UK over a number of years, and which have been adapted by NEPLG and its constituent organisations. NEPLG also reviews results of Level 2 and 3 emergency exercises to ensure that important lessons learned from those exercises are put into practice (see paragraphs F.115 - F.117 for exercise classification).

F.101. The Nuclear Emergency Arrangements Forum (NEAF) provides operators of nuclear licensed sites and ONR with a best practice discussion forum relating, primarily, to the operators' on-site emergency response planning, but also including the operators' role in connection with the off-site response. NEAF is chaired by ONR. Since ONR attends both NEPLG and NEAF, it is able, as part of its regulatory function for enforcing REPIR^[88], to monitor the overall planning position for both on-site and off-site aspects. The NELPG Local Government Sub-Group provides a forum for local authority planning officers, representatives of industry and other appropriate bodies to discuss emergency planning issues relating to the nuclear industry. ONR attends this forum. As a result of involvement in this and other forums, ONR advises DECC in respect of nuclear emergency preparedness and response.

F.102. The UK aims to ensure it is equipped and prepared to respond to the most unlikely event of an emergency at a civil nuclear site. So, in practical terms, individuals with a role if there is an emergency at a nuclear installation receive briefing and training, mostly through participation in exercises, to ensure they can cope effectively in the event of any nuclear emergency. The police, working in conjunction with other emergency services, expert bodies, and local and national agencies, would coordinate any response effort locally. DECC would co-ordinate the response at national level; it would brief Ministers and the UK's international partners, and be the main source of information at national level to the public and the media. These arrangements are exercised at regular intervals by all the organisations concerned.

F.103. In the event of a nuclear accident overseas, which may have implications for the UK, DECC would be the lead Government Department and would receive initial notification through arrangements established by a series of multi-lateral or bilateral Conventions, or agreements. In addition, the UK's Radiation Incident Monitoring Network (RIMNET) of continuous radiation monitoring stations would automatically raise an alarm if abnormal increases in the levels of radiation were detected at any of the RIMNET monitoring sites. DECC's Technical Coordination Centre in London would be used to collect, collate and disseminate radiation monitoring data from a wide number of sources and would be used as a basis for any necessary public protection measures.

Governmental emergency preparedness

F.104. REPIR^[88] implements in Great Britain the Articles on intervention in cases of radiation emergency in Council Directive 96/29/Euratom^[85]. Council Directive 89/618/Euratom^[89] (known as the Public Information Directive) on informing the general public about health protection measures to be applied and steps to be taken in the event of an emergency are covered in the UK by REPIR and the Carriage of Dangerous Goods and the Use of Transportable Pressure Equipment Regulations 2009^[49] which includes requirements for emergency preparedness during transport. REPIR place on a statutory basis the arrangements whereby a local authority with a nuclear site or sites in its area prepares an off-site emergency plan. Responsibilities for reviewing and testing off-site emergency plans are also covered by REPIR. The preparation and testing of off-site emergency plans is regulated by ONR.

F.105. A condition attached to nuclear site licences, LC11 (see Annex L.6), on emergency arrangements, requires that all licensees have adequate arrangements in place to respond effectively to any incident ranging from a minor on-site event to a significant release of radioactive material with off-site consequences. LC11 requires employees to be properly trained and that the arrangements are exercised. There is also a requirement for licensees to consult with any person not in their employ who

may be required to participate in emergency arrangements. The licensees must submit to ONR for approval such parts of the arrangements as ONR may specify. Once approved, no alteration or amendment can be made to the approved arrangements without a further formal Approval.

Main elements of the on-site plan

Arrangements for preparedness and response

F.106. LC11 requires rehearsal of the arrangements to ensure their effectiveness. This is achieved by the licensee holding training exercises and ONR agreeing to a programme of demonstration emergency exercises that staff from ONR formally observe. ONR can specify that exercises cover all or part of the arrangements. This power would be used if ONR was not satisfied with an aspect of the licensee's performance and the licensee did not agree or volunteer to repeat the exercise.

F.107. ONR's Consent is required to bring nuclear fuel onto a site for the first time. As part of the assurances required prior to granting this Consent, the establishment of appropriate emergency and evacuation arrangements have to be demonstrated, including the approval of an on-site Emergency Plan that is in the public domain and cannot be changed without the approval of ONR. The relevant considerations are that there are sufficient trained personnel and suitable available equipment to deal with the risks from hazards on the site. Similarly, the Consent of ONR may be required at stages specified by ONR relating to key increases in hazard on the site during the active commissioning process, for example in which reactor plant is brought from initial criticality up to its full reactor power rating. At any of these stages, ONR may require a demonstration of enhanced emergency arrangements prior to the granting of Consent to proceed to the next stage. This may be through an examination of the training records for all staff affected, or by means of a demonstration exercise that staff from ONR formally observe. Throughout the life of the nuclear installation, the emergency arrangements are subject to review and, with ONR's Approval as described above, revision as appropriate. As part of the licensee's training arrangements, all staff participate in a regular programme of emergency exercises, which requires each shift at each nuclear site to exercise the arrangements at least once a year.

Preparation and testing of emergency plans

F.108. Whilst REPPiR^[88] and licence conditions both apply on site, the principal on site regulatory tool is arrangements made under LC11 which requires rehearsal of the arrangements to ensure their effectiveness. The principal regulatory tool for the off-site component of the Emergency Plan is REPPiR. REPPiR requires off-site plans to be produced by the local authority in consultation with emergency responders, for those sites where a radiation emergency is considered to be reasonably foreseeable. The responsibilities for reviewing and testing off-site emergency plans are also covered in REPPiR. Where there is the potential for an offsite release of radioactivity that would require implementation of countermeasures, Detailed Emergency Planning Zones (DEPZs) are provided around nuclear installations. The extent of these zones is defined by ONR, based on the most significant release of radioactivity from an accident which can be reasonably foreseen. In the event of an accident being larger than the reasonably foreseeable event, the off-site plan outlines arrangements for extending the response.

F.109. The prime function of the off-site facility (Strategic Coordination Centre or SCC) is to decide on the actions to be taken off-site to protect the public, to ensure that those actions are implemented effectively and to ensure that authoritative

information and advice on these issues is passed to the public (the facility includes media briefing centres). Decisions would generally be made through regular coordinating group meetings. These are usually chaired by the Police, who are responsible for coordinating and implementing decisions to protect the public, and would involve all the principal organisations represented at the facility.

F.110. The declaration of an off-site nuclear emergency at a site is the responsibility of the operator in accordance with previously agreed arrangements. This would be followed immediately by notification of the emergency services and local and national authorities. A cascade notification mechanism is in place thus the Operator can focus on dealing with the nuclear emergency. Each organisation with responsibilities for dealing with the emergency would be represented at the SCC. These would generally include the Operator, the Police, the Local Authority, the Health Authority, the Local Water Company and the Fire and Ambulance services. In addition, Government Departments and Agencies would also be represented. These would include DECC, (or Scottish or Welsh equivalents), HPA-CRCE and ONR.

F.111. The lead Government Department would appoint a senior member of ONR (normally one of ONR's Deputy Chief Inspectors) to act as the Government Technical Advisor (GTA). The role of the GTA is described in NEPLG consolidated guidance, but essentially provides authoritative and independent advice to the Strategic Co-ordinating Group handling the off-site response to the emergency and to the press and broadcast media in the event of a civil nuclear emergency, and to advise the emergency services on actions to protect the public. SEPA, in Scotland, and the Environment Agency, in England and Wales, would also be represented because of their role in radioactive waste disposal and other environment protection roles, as would the Food Standards Agency to issue advice and restrictions (if required) to ensure that food contaminated to unacceptable levels does not enter the food chain.

F.112. Representatives at the SCC would be in communication with their organisations and be responsible for ensuring that adequate information and advice was available, both at the SCC and at the emergency control centres of their respective organisations. The representatives would liaise closely to ensure that a proper assessment was being made of the situation, that appropriate actions were being taken and that the public was being kept informed. The following Figures F.1 to F.3 show the arrangements diagrammatically.

Figure F.1 – Emergency arrangements structure

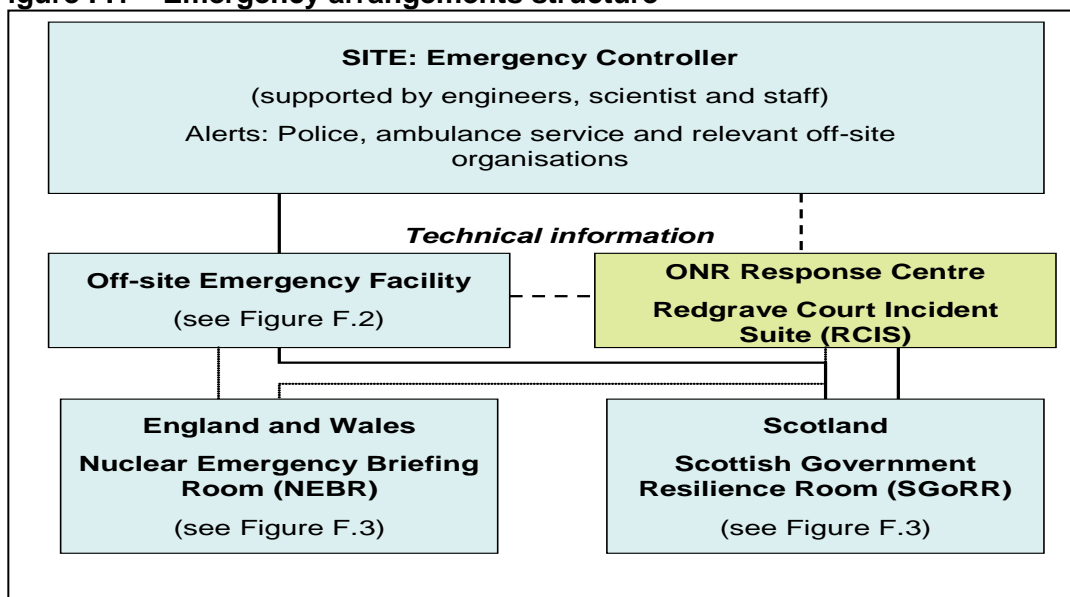


Figure F.2 – Emergency arrangements structure

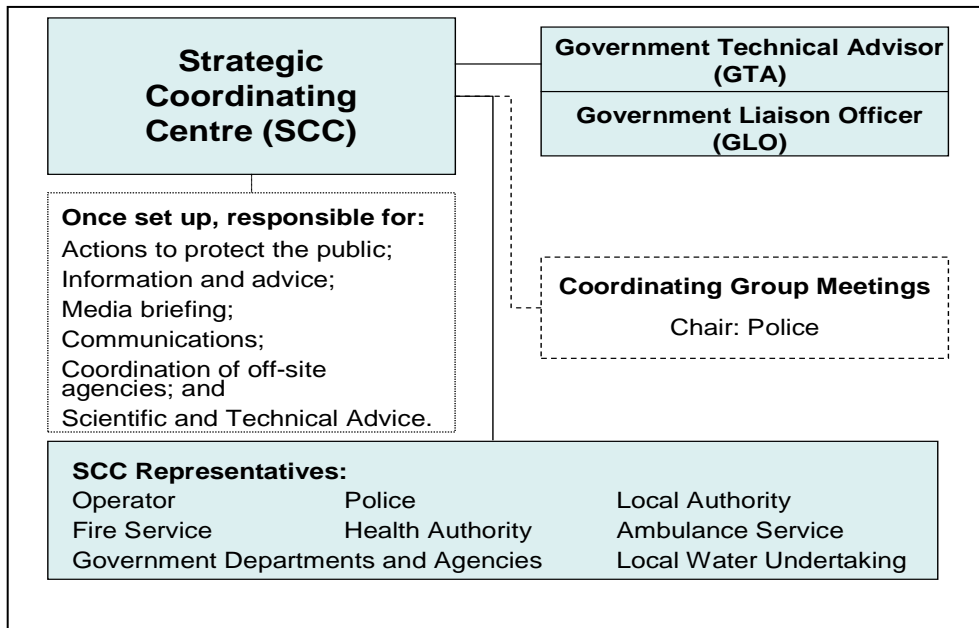
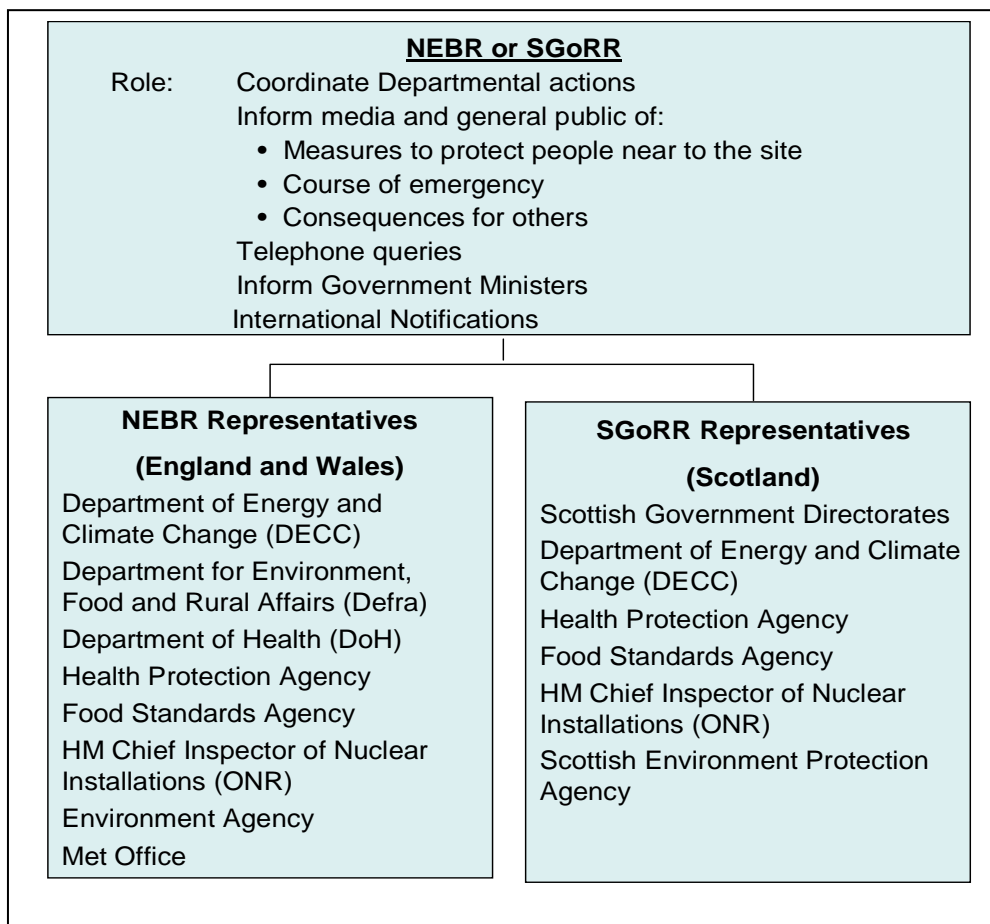


Figure F.3 – Nuclear Emergency Briefing Room and Scottish Government Resilience Room representation



F.113. In the event that the operator believes that there is the potential for, or there has been, a significant off-site release they will declare an off-site nuclear emergency. The off-site plan coordinated by the Local Authority identifies the cascade notification and activation process for setting up the multi-agency response organisation.

F.114. The technical information regarding plant prognosis and radiological assessments by the operator is an important aspect in the response to an emergency. The operator has two roles, to:

- a) monitor the environment on and around the site for radioactivity; and to
- b) provide advice to the off-site organisations, prior to the appointment of the GTA, on any measure that should be taken to protect the public as a consequence of radiological effects, e.g. sheltering, taking of potassium iodate tablets or evacuation.

F.115. Emergency arrangements are tested regularly under three categories known as levels 1, 2 and 3. Level 1 exercises are held at each nuclear installation site once a year and concentrate primarily on the operator's actions on and off the site. ONR will witness and provide feedback on the adequacy of level 1 exercises. In addition, each site has a programme of training and exercises for all staff involved in the emergency scheme and each role has a training profile which defines the type and frequency of training. As a minimum, each shift will take part in a site exercise every year when all the elements of the emergency organisation are practised.

F.116. Level 2 exercises are aimed primarily at demonstrating the adequacy of the arrangements that have been made by the local authority to deal with the off-site aspects of the emergency, particularly the functioning of the SCC where organisations with responsibilities or duties during a nuclear emergency also exercise their functions.

F.117. From the annual programme of level 2 exercises, one is chosen as a level 3 exercise to rehearse not only the functioning of the SCC but also the wider involvement of central government, including the exercising of the various Government Departments and agencies attending the Nuclear Emergency Briefing Room (NEBR) (for England and Wales) in London, or the Scottish Government Resilience Room (SGoRR) in Edinburgh. Aspects of DECC's international liaison arrangements, including the process on notification, are routinely tested during the level 3 exercises. The decision on which exercise should be selected as the level 3 is made jointly between the licensees, the lead Government Departments (DECC or the Scottish Government) and NEPLG, in consultation with ONR.

Public information

F.118. REPPIR^[88] provides a legal basis for the supply of information to members of the public who may be affected by a nuclear emergency. The requirements are placed on the operator and the relevant local authorities. In addition, the various information services of the local agencies involved and of central government, together with the news media, are available to help inform the public of the facts and of the assessments being made of the course of the accident, should one occur.

F.119. REPPIR requires that members of the public within a DEPZ, who could be at risk from a reasonably foreseeable radiation emergency, should receive certain prescribed information. Such information must be distributed in advance of any emergency occurring. Site operators provide this information in a variety of forms,

updated at regular intervals not exceeding three years. The operator also makes the information available to the wider public, usually by providing information on request or by placing copies in public buildings such as libraries and civic centres. Every nuclear installation licensee also has local liaison arrangements that provide links with the public in the vicinity of the site.

Information in the event of an emergency

F.120. REPPIR^[88] requires local authorities to prepare and keep up-to-date arrangements that ensure that members of the public actually affected by a nuclear emergency receive prompt and appropriate information. The operator would also be expected to make a formal announcement as soon as possible after the emergency had been declared. While the agencies involved in responding to the emergency would seek to deal with any queries they received, the main channel of communication with the public outside the immediate vicinity of the affected site would be through the media.

F.121. The duration and extent of an emergency would depend on the scale and nature of the radioactive release. Once the release had been terminated, ground contamination would be checked and the police would advise those who had been evacuated when they could return home. At about this stage, the emergency condition would be officially terminated, but the return to completely normal conditions might take place over a period of time.

F.122. For an emergency at a nuclear installation in the UK, DECC would take the responsibility for notifying other countries and initiate requests for international assistance. Under existing early notification conventions, DECC would inform the European Community, the IAEA, and countries with which the UK has bilateral agreements and arrangements, about the accident and its likely course and effects.

F.123. The UK regularly takes part in emergency exercises with other countries to test emergency arrangements, should there be a nuclear emergency in another country that has the potential to affect the UK.

Measures to enhance emergency preparedness programmes

F.124. The UK has a well-developed programme of site, regional and national exercises of emergency plans. Lessons learned from this programme are reviewed and any actions requiring improvement to emergency facilities, equipment, procedures, training, etc. are identified and completed. NEPLG, together with NEAF, reviews the UK Emergency Exercise Programme to ensure that a balanced programme of exercises takes place covering all types of nuclear facilities. Since some nuclear sites have significant chemical hazards, the implications for this on the nuclear emergency response have been put into the exercise programme.

F.125. Lessons learned from nuclear exercises are handled by the ONR-chaired NEPLG Lessons Learned Sub-Group. The sub-group's work is prompted by actions arising from nuclear exercises. These actions are included in the DECC Action Tracking Paper. ONR produces a draft report which summarises the lessons of level 2 and 3 exercises held during the previous emergency exercise planning year. This report is a statement of the overview of exercises, together with a summary of the overarching issues which need to be considered or resolved by NEPLG. The sub-group submits the draft report to NEPLG for endorsement, comment and further dissemination.

Response to emergencies outside of UK

F.126. DECC is the lead Government Department for coordinating the response to an overseas nuclear emergency. The UK has signed a number of international agreements covering exchange of information in the event of a nuclear emergency. RIMNET is the contact point for inward notifications under these arrangements. The National Response Plan, implemented by DECC with support from other agencies, provides arrangements for dealing with an emergency. This includes DECC maintaining contact arrangements and duty officers that ensure the UK can be notified of an emergency at any time. The RIMNET network comprises 94 gamma dose rate monitors located throughout the UK and provides a secondary alert mechanism in the event of non-notification. RIMNET is the UK's national radiological database. DECC has established procedures including the notification and alert of organisations within the UK with responsibilities for dealing with an overseas nuclear accident. It maintains the NEBR and Technical Co-ordination Centre containing the equipment required for management of the response.

Article 26 - Decommissioning

Each Contracting Party shall take the appropriate steps to ensure the safety of decommissioning of a nuclear facility. Such steps shall ensure that:

- **qualified staff and adequate financial resources are available;**
- **the provisions of Article 24 with respect to operational radiation protection, discharges and unplanned and uncontrolled releases are applied;**
- **the provisions of Article 25 with respect to emergency preparedness are applied; and**
- **records of information important to decommissioning are kept.**

F.127. Under this Article, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the third UK report (i.e. in a way that has implications for the Joint Convention obligations).

F.128. In the UK, decommissioning on a licensed nuclear site is regulated by ONR under the nuclear site licensing regime. All the conditions attached to the licence apply to decommissioning activities. For decommissioning, the key element is the need for strategic planning. Licence Condition 35, which requires the licensee to make and implement adequate arrangements for the decommissioning of any plant that may affect safety, also requires the licensee to have decommissioning programmes. ONR has the power to direct the licensee to commence decommissioning in the interests of safety.

F.129. Government Policy^[144] requires ONR, in consultation with the environment agencies, to carry out five yearly reviews of licensee's decommissioning strategies to ensure that they remain soundly based as circumstances change. ONR requests, and leads the assessment of, licensee's decommissioning strategies. When it judges that the five yearly has been completed, it prepares and issues, in consultation with the environment agencies, a public statement. In addition, EIADR99 requires ONR to consult the public before it gives its consent to the commencement of dismantling and decommissioning power reactors, further details on these regulations can be found at Sections E.30 and E.31.

F.130. For the following aspects of decommissioning under Article 26, the equivalent sections under Articles 24 and 25 apply: Staff qualification; Financial resources; Radiation protection; Discharges; Unplanned and uncontrolled releases; Emergency preparedness; and Records.

F.131. A nuclear licensed site cannot be de-licensed until ONR is satisfied that there is no danger from ionising radiation. Decommissioning is the process to achieve this end. More detail of de-licensing is at Sections E.60 to E.62.

Section G/H - Safety of Spent Fuel, Reprocessing and Radioactive Waste Management

GH.1. The nature of regulatory requirements and the way nuclear activities are operated in the UK are such that there is very little difference in the UK's report under Section G (Safety of Spent Fuel Management and Reprocessing Management) and Section H (Safety of Radioactive Waste Management). Therefore, for this report, the two sections have been combined. Where there is a difference, this is clearly indicated in the text.

Long term management of radioactive waste

GH.2. In October 2006, the Government accepted CoRWM's main recommendation that geological disposal, preceded by safe and secure interim storage, was the way forward for the long-term management of the UK's higher-activity radioactive wastes.

GH.3. In June 2008, following public consultation, the UK Government and devolved administrations for Wales and Northern Ireland published a White Paper, 'Managing Radioactive Waste Safely: A Framework for Implementing Geological Disposal'. This sets out a staged framework for implementing geological disposal based on voluntarism and partnership with local communities.

GH.4. The Scottish Government was not a sponsor of the 2007 MRWS consultation on the framework for geological disposal. The Scottish Government published its policy on higher activity radioactive waste in January 2011. That policy is that the long-term management of higher activity waste should be in near-surface facilities.

GH.5. The CoRWM process focussed on assessing long-term management options for the UK's legacy of higher activity wastes. As part of its recommendations, CoRWM stated that it believed that future decisions on new build should be subject to their own assessment process, including consideration of waste.

GH.6. The UK Government considers, based on scientific consensus and international experience, that despite some differences in characteristics, waste and spent fuel from new NPPs can be accommodated in the same geological disposal facility as the UK's legacy waste.

Articles 4 and 11 – General Safety Requirements

Articles 4 and 11

Each Contracting Party shall take the appropriate steps to ensure that at all stages of [spent fuel] [radioactive waste] management, individuals, society and the environment are adequately protected against radiological [and other] hazards.

- In so doing, each Contracting Party shall take the appropriate steps to:
- ensure that criticality and removal of residual heat generated during [spent fuel] [radioactive waste] management are adequately addressed;
- ensure that the generation of radioactive waste [associated with spent fuel management] is kept to the minimum practicable, [consistent with the type of fuel cycle policy adopted];
- take into account interdependencies among the different steps in [spent fuel] [radioactive waste] management;
- provide for effective protection of individuals, society and the environment, by applying at the national level suitable protective methods as approved by the regulatory body, in the framework of its national legislation which has due regard to internationally endorsed criteria and standards;
- take into account the biological, chemical and other hazards that may be associated with [spent fuel] [radioactive waste] management;
- strive to avoid actions that impose reasonably predictable impacts on future generations greater than those permitted for the current generation;
- aim to avoid imposing undue burdens on future generations.

GH.7. Under these Articles, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the third UK report (i.e. in a way that has implications for the Joint Convention obligations).

GH.8. The way that the UK ensures adequate protection of individuals, society and the environment against radiological hazards is described in detail under other parts of this report, in particular Section E on the legislative and regulatory system and Section F insofar as it covers Article 21 on the responsibility of the licence holder, Article 24 on operational radiation protection and Article 25 on emergency preparedness.

Requirements of the nuclear site licence

GH.9. Conditions of the nuclear site licence are detailed in Annex L.6. ONR exercises the powers under these conditions.

- LC14 requires the licensee to set up arrangements for the preparation and assessment of the safety related documentation comprising 'safety cases' to ensure that the licensee justifies safety during design, construction, manufacture, commissioning, operation and decommissioning.
- LC19 enables ONR to control the design and construction of any facility used for the management of spent fuel or radioactive waste. Consent to the construction of any new facility will only be given when ONR is satisfied with the licensee's safety case that must address all nuclear safety issues,

including criticality, shielding, containment and the ability of the plant to remove decay heat under normal and fault conditions.

- LC20 allows ONR to control design changes that could impact on the plant safety case.
- LC21 requires the licensee to produce arrangements to safely commission new facilities: ONR uses its powers to ensure that there are sufficient safety systems in place. The licensee cannot take a new plant into operation without the consent of ONR and this will only be given when ONR is satisfied with the pre-operational safety case.
- LC22 is used to control modifications to any operating spent fuel or radioactive waste management facility and again the licensee cannot carry out a modification which could have a significant affect on safety without the agreement of ONR.
- LC23 requires that the spent fuel or radioactive waste management facility has an adequate safety case and that it identifies the conditions and limits that ensure that the plant is kept in a safe operating envelope.
- LC24 ensures that all operations that may affect safety, including any instructions to implement Operating Rules, are undertaken in accordance with written operating instructions.

Criticality, shielding, containment and removal of residual heat generated

GH.10. Criticality, shielding, containment and residual heat removal are aspects that are addressed in the licensees' safety cases, operating rules and operating instructions.

Minimising the generation of radioactive waste

GH.11. The licensee of a spent fuel management facility is required under Licence Condition 32 (Accumulation of Radioactive Waste) to ensure that the rate of production and total quantity of radioactive waste accumulated on the site is minimised and adequate records are made.

GH.12. Statutory Guidance issued in July 2009^[29] by the UK Government to the Environment Agency includes the use of BAT as the means an operator must use to achieve an optimised outcome for radioactive discharges into the environment. Application of BAT is required under the EPR10 in England and Wales. In Scotland and Northern Ireland, the use of BPM continues to apply to optimisation of radioactive waste discharges. Both BAT and BPM require an operator to demonstrate how optimisation has been applied to discharges of radioactive waste. In doing this, an operator should undertake a systematic and proportionate examination of waste management options having regard to the waste hierarchy, which requires those who generate waste to avoid, reduce, recycle, minimise and recover wastes as appropriate.

Interdependencies in spent fuel and radioactive waste management

GH.13. The handling treatment, storage and reprocessing of spent fuel, and the management of radioactive waste are all prescribed activities under NIA65. Therefore all such activities, including, where appropriate, storage and reprocessing

at Sellafield or storage at another licensed site, is fully regulated by ONR. DfT-DGD regulates the transport of spent fuel from the reactor site to Sellafield, or other licensed sites. To ensure seamless regulation, DfT-DGD and ONR operate an MoU to ensure consistent and complementary regulation. ONR also operates a MoU with the environment agencies in England, Wales and Scotland to ensure that the environmental impact and safety of spent fuel management is effectively regulated.

Protection of individuals, society and the environment

GH.14. Section E on the regulatory system describes how this provides effective protection of individuals, society and the environment, and how these relate to internationally endorsed criteria and standards.

Biological, chemical and other hazards

GH.15. The biological, chemical or other hazards associated with the handling, treatment, storage, and where appropriate reprocessing of spent nuclear fuel are subject to HSWA74 and associated regulations such as the Control of Substances Hazardous to Health Regulations^[145]. This comprehensive approach to regulation ensures that the licensee considers all hazards that could impact on the workers at the site, the public and the environment, and not simply those related to the radioactive hazard of such materials.

Impacts and burdens on future generations

GH.16. It is UK Government policy to ensure that the impact and burdens on future generations of today's activities are properly taken into account. This policy is described in Cm2919^[144]. It is also an important part of the UK's strategy for sustainable development, Cm2426^[146], and underpinned the setting up of NDA to deal with decommissioning the nuclear legacy now, rather than leaving it for future generations.

Articles 5 and 12 – Existing Facilities and Past Practices

Article 5 - Each Contracting Party shall take the appropriate steps to review the safety of any spent fuel management facility existing at the time the Convention enters into force for that Contracting Party and to ensure that, if necessary, all reasonably practicable improvements are made to upgrade the safety of such a facility.

Article 12 - Each Contracting Party shall in due course take the appropriate steps to review:

(i) the safety of any radioactive waste management facility existing at the time the Convention enters into force for that Contracting Party and to ensure that, if necessary, all reasonably practicable improvements are made to upgrade the safety of such a facility;

(ii) the results of past practices in order to determine whether any intervention is needed for reasons of radiation protection bearing in mind that the reduction in detriment resulting from the reduction in dose should be sufficient to justify the harm and the costs, including the social costs, of the intervention.

GH.17. Under these Articles, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the third UK report (i.e. in a way that has implications for the Joint Convention obligations).

GH.18. All existing facilities on nuclear licensed sites have to comply with Licence Conditions and in respect of the review of safety, the licensee is required to undertake periodic safety reviews for all safety related facilities. Licence Condition 15 (Periodic Review) ensures that the licensee reviews the safety case for its spent fuel management, radioactive waste management and reprocessing facilities every 10 years against an agreed programme. In addition, for those plants that require a Consent to start up following an outage for inspection and maintenance, the adequacy of the safety case is reviewed prior to the Consent for start up being granted.

GH.19. All existing spent fuel management and reprocessing facilities also hold authorisations for the disposal of radioactive waste, granted by the environment agencies. EPR10 and RSA93, as amended by the Energy Act 2004, require the environment agencies to periodically review environmental permits and authorisations for discharges. Such reviews must consider the limits and conditions attached to each environmental permit or authorisation. The Environment Agency implements this through an annual review of its environmental permits. The level of actual discharges and the margin between discharges and limits will be considered against a background of Government policy that limits should reflect closely the actual discharges. The environment agencies may decide to vary environmental permits or authorisations following a review, to set more stringent limits and conditions, and to require improvement programmes to be instituted. The conditions attached to environmental permits and authorisations ensure that doses to members of the public are kept ALARA, social and economic factors being taken into account, and exert a downward pressure on discharges of radioactive waste to the environment (see Sections E.66 to E.75).

GH.20. The Food Standards Agency in England and Wales and SEPA in Scotland carry out an extensive programme of sampling and analysis of foods produced close to nuclear installations. If this programme revealed that past activities had resulted in

unacceptable concentrations of radioactivity in foods, the Food Standards Agency would, in conjunction with SEPA or Environment Agency as appropriate, take steps to ensure that future activities do not cause these unacceptable levels to continue.

Intervention for past practices

GH.21. The Radioactive Contaminated Land Regulations 2006, as amended in 2007^[93] were introduced to put into place certain requirements of the BSS Directive^[85] in England and Wales. The Radioactive Contaminated Land (Scotland) Regulations 2007^[94] and the Radioactive Contaminated Land (Scotland) (Amendment) Regulations 2007^[95], together with the Radioactive Contaminated Land Regulations (Northern Ireland) 2006^[96] introduced similar requirements in Scotland and Northern Ireland respectively. For land to be determined as radioactive contaminated land, a 'significant pollutant linkage' must be present. A pollutant linkage comprises a radioactive contaminant and a human receptor, with a pathway capable of linking the two. All three elements need to occur on site for a pollution linkage to exist. The pollutant linkage becomes 'significant' if it results in harm to human health, or there is significant possibility of such harm occurring. This has been defined as a dose that exceeds one or more of the following:

- an effective dose of 3mSv, per year;
- an equivalent dose to the lens of the eye of 15mSv, per year; or
- an equivalent dose to the skin of 50mSv, per year.

GH.22. In addition to humans, the Radioactive Contaminated Land (Scotland) Regulations 2007^[94] include water as a receptor and include "significant pollution of the water environment" as part of the definition of "radioactive contaminated land". The Regulations also identify radioactive contaminated land exists where:

- for terrestrial biota or plants, a dose rate from lasting exposure of more than 40 microGy per hour; or
- for aquatic biota or plants, a dose rate of more than 400 microGy per hour.

GH.23. If land is 'determined' as radioactive contaminated land, intervention will be carried out to remediate the land, provided this is justified, i.e. when the benefits of reducing the detriment outweigh the harm and costs (including social costs) of taking action.

GH.24. EPA90 does not apply in Northern Ireland. Parallel regulations were introduced there in 2006 and 2007 to ensure that the UK fully complies with its obligations under Articles 48 and 53 of the BSS Directive^[85], which lays down the basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionising radiation. Further information can be found on the Defra website (see Annex L.10).

GH.25. ONR has powers under NIA65 to regulate land contaminated with radioactivity within the boundaries of nuclear licensed sites. For this reason, the extended Part 2A regime does not apply to land contaminated with radioactivity on nuclear licensed sites. Further information can be found on the Defra and DECC websites (see Annex L.10).

Articles 6 and 13 – Siting of Proposed Facilities

Articles 6 and 13

1. Each Contracting Party shall take the appropriate steps to ensure that procedures are established and implemented for a proposed [spent fuel] [radioactive waste] management facility:

(i) to evaluate all relevant site-related factors likely to affect the safety of such a facility during its operating lifetime;

(ii) to evaluate the likely safety impact of such a facility on individuals, society and the environment;

(iii) to make information on the safety of such a facility available to members of the public;

(iv) to consult Contracting Parties in the vicinity of such a facility, insofar as they are likely to be affected by that facility, and provide them, upon their request, with general data relating to the facility to enable them to evaluate the likely safety impact of the facility upon their territory.

2. In so doing, each Contracting Party shall take the appropriate steps to ensure that such facilities shall not have unacceptable effects on other Contracting Parties by being sited in accordance with the general safety requirements of Article 4.

GH.26. Under these Articles, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the third UK report (i.e. in a way that has implications for the Joint Convention obligations).

GH.27. An organisation wishing to construct any type of spent fuel management or reprocessing facility on a new site in the UK must obtain planning permission, a nuclear site licence and an environmental permit or an authorisation for radioactive waste discharges. The following text summarises the legal requirements, policy and implementation issues.

National Laws and Regulations for Planning and Licensing

Planning permission

GH.28. Arrangements for planning permission are addressed in Sections E.32 to E.38.

GH.29. Proposals for spent fuel management facilities or reprocessing facilities must be accompanied by an assessment of the environmental impact of the proposed development if required by the relevant environmental impact regulations^[121,122].

Nuclear Site Licence

GH.30. NIA65 requires that a licence is granted before any site is used for installing or operating a nuclear installation. The power to grant this licence is delegated to HM Chief Inspector of Nuclear Installations, who, under Section 4(1) of NIA65, can attach such conditions as may appear to be necessary or desirable in the interests of safety or radioactive waste management. HM Chief Inspector will not grant a licence for a new site or sanction a new facility on an existing site unless ONR is satisfied with the licensee's safety case. This safety case will address siting issues to demonstrate that the proposed site is acceptable for such an installation in respect of

its impact on the local population and environment. For new facilities on existing sites, the licensee's safety case is required to show that the new facility will not adversely affect the characteristics of the existing site. Section 6(1) of NIA65 requires the Minister to maintain a list showing every site for which a nuclear site licence has been granted, and including a map or maps showing the position and limits of each such site.

Licensing

GH.31. The site for any significant new spent fuel, reprocessing or waste management facility would normally be subject to a Public Inquiry. ONR would not licence such a facility until the completion of the Public Inquiry and a Ministerial decision made under planning law. ONR's licensing process would run concurrent with a Public Inquiry to avoid unnecessary delays. However, ONR would not grant a licence in advance of a decision on planning consent.

GH.32. Before granting a licence for any new spent fuel spent fuel, reprocessing or waste management facility, ONR would seek the views of the environment agencies under the MoU to ensure that they were content with the radioactive waste disposal and discharge implications.

Radioactive waste permits or authorisations

GH.33. Any new spent fuel, reprocessing or waste management facility would require prior authorisation under EPR10 or RSA93 in order to dispose of radioactive waste, including solid waste, and aqueous and gaseous discharges. Such disposals would not be authorised unless appropriate dose limits and constraints were met.

GH.34. If required, the Environment Agency or SEPA would give evidence to a Public Inquiry as to whether a proposed nuclear installation could be granted an environmental permit under EPR10 or an authorisation under RSA93.

Hazards

GH.35. For spent fuel, reprocessing or waste management sites, the licensee would be expected to submit to ONR a safety case to demonstrate the suitability of the site and its compliance with ONR's siting criteria. Generally, the safety case would address the impact of the facility on the surrounding area from routine operations and fault conditions. Typically, the licensee would need to consider details of present and predicted population around the site, and the local infrastructure such as housing, schools, hospitals, factories etc. The factors that ONR would assess would include: emergency planning, external hazards such as aircraft crash potential, flooding, seismicity and other geological factors. ONR would assess this information in the safety case using the siting criteria in the SAPs.

GH.36. Consideration is also given as to whether the presence of the nuclear installation might have undue effects on the local environment, for example, the environmental effects of radioactive discharges.

Emergency arrangements

GH.37. As stated above, one of the key factors in assessing the suitability of a site for a nuclear installation is the impact of a possible nuclear emergency on the population in the area. Although nuclear installations in the UK are designed and operated to high standards, it is regarded as prudent to have effective arrangements to respond to and mitigate the consequences of an emergency.

GH.38. The licensee must have an emergency plan as described under Article 25 (see Section F). ONR must be satisfied that the size, nature and distribution of the population around the site will not prevent the emergency plan from being implemented.

Topography

GH.39. The siting of the nuclear installation will require consideration of the topography of the area that might affect the dispersion of the authorised radioactivity discharged from the site in normal operation, or released in the event of an accident. In addition, aspects of the topography of the area around the site that may affect the movement of people and goods are identified, and their effect on the safety of the plant is examined. This examination determines whether the topography and road and rail systems are such as to create difficulties if it became necessary to evacuate people from the area around the plant.

Information available to the public

GH.40. The planning application process provides an opportunity to inform and obtain views from the public in relation to any proposals for the construction and operation of a spent fuel, reprocessing or waste management facility. Similarly, the environment agencies will consult on a developer's application for the authorisation of the disposal of radioactive waste from the site. ONR, the Environment Agency and SEPA have corporate policies to ensure that public information is available in an open and transparent manner subject to the requirements of the Freedom of Information Act 2000^[147] and the Freedom of Information (Scotland) Act 2002^[148].

Maintaining the continued acceptability of the site

GH.41. Once the site is in operation, ONR must be satisfied that the characteristics of the site are preserved to ensure the continued effectiveness of the emergency plan, and that the general radiological siting criteria continue to be met. ONR monitors this through the local authority land use planning controls. This requires ONR to be consulted on developments within a specified radius of the site. This ensures that unacceptable population growth, or industrial development that could pose a hazard to the site, does not occur around the site. Continued re-evaluation by the licensee of the external hazards and of the emergency plans is required under LC15 and LC11 respectively. Guidance on re-evaluation of the specific demographic requirements on siting is given to ONR nuclear inspectors in the SAPs.

GH.42. Circular 04/00: 'Planning controls for hazardous substances'^[149] issued by the Department for Communities and Local Government, and a similar circular from the Scottish Development Department (5/1993)^[150] give advice on the exercise of planning control over hazardous development and over development in the vicinity of hazardous installations.

GH.43. These circulars give guidelines for the types of development in the vicinity of hazardous installations on which HSE should be consulted. They establish HSE as a statutory consultee for development in the vicinity of hazardous installations covered by the Regulations for Control of Development (Hazardous Substances)^[151]. ONR has non-statutory arrangements, operated under the same administrative arrangements, to be consulted by local authorities in the case of planning applications in the vicinity of all nuclear installations. ONR's nuclear installation inspectors assess such planning applications to determine:

- whether a proposed development would raise the population to near the maximum guidelines set out in the Government's siting policy for nuclear installations.
- whether the external hazards in the nuclear safety case envelope include the hazard from a proposed hazardous installation, or alternatively whether the nuclear safety case can be modified to incorporate the new hazard.
- for a proposed development within the nuclear licensed site, whether the licensee has made a satisfactory safety case for the proposed development and for any existing licensable activities on the site that it would impinge upon it, and whether the proposed activity is suitable for a nuclear licensed site.
- for a proposed development within the detailed emergency planning zone (where applicable), ONR refers the application to the licensee, who must in turn liaise with those bodies having responsibilities under the off-site emergency plan, to find out:
 - a) whether the development can be incorporated into the emergency plan; or, failing that,
 - b) whether the emergency plan could be modified such that the development could be incorporated into the emergency plan.

GH.44. ONR requires assurances that the developments in the immediate vicinity of a nuclear installation can be accommodated by the existing emergency preparedness arrangements to satisfy REPPiR requirements.

GH.45. Local authorities normally follow HSE's advice as a statutory consultee, or that of ONR acting on HSE's behalf. In England and Wales, HSE will be informed if the local authority proposes not to follow HSE's advice. HSE can then, if it considers it appropriate, request the Secretary of State for Communities and Local Government to call in the application. In Scotland, a proposed development must be notified to Scottish Ministers if that development has been the subject of consultation with HSE, and HSE (based on an opinion from ONR) has advised against the granting of planning permission or has recommended conditions that the planning authority does not propose to attach to the planning permission.

GH.46. Both the licensee and ONR monitor and assess any phenomena that might affect safety (for example something that may change the assumptions concerning external hazards) around each nuclear site. This is done as part of the normal regulatory process and during the PSRs. In addition, ONR maintains a database of the estimated population around nuclear installations, based upon the most recent ten-yearly population census, updated to take account of subsequent planning applications for residential developments.

Periodic reviews of the discharge limits of Authorisations and Environmental Permits

GH.47. Environmental permits and authorisations for discharges are reviewed regularly, including consideration of the level of actual discharges, the margin between discharges and limits, and the application of BAT under EPR10 or BPM under RSA93 to minimise waste generation and discharges to the environment. Against a background of Government policy of progressive reduction in discharges overall, the environment agencies may decide to vary environmental permits or

authorisations, following a review, for example, to set revised limits or conditions or to require improvement programmes to be implemented.

International obligations

GH.48. Any new spent fuel management or reprocessing management activity is likely to involve a need to discharge radioactive waste. As such, the UK, as a Member State of the European Union, is required to provide the European Commission with such general data relating to any plan for the disposal of radioactive waste in whatever form as will make it possible to determine whether the implementation of such a plan is liable to result in the radioactive contamination of the water, soil or airspace of another Member State (Recommendation 2010/635/Euratom^[152], Article 37 procedures).

Government siting policy

GH.49. The UK Government's White Paper on Nuclear Power of January 2008^[153] announced the UK Government's programme to consider the future development of nuclear power stations in England and Wales. In this paper the Government announced an SSA process that would be subject to a consultation process. The Planning Act 2008^[9] is intended to expedite the overall planning process in England and Wales.

GH.50. Sections A.2.14 to A.2.16 explained the new role of National Policy Statements in the planning process for new nuclear power plants and how these will provide the primary input to planning decisions by the IPC for all major infrastructure projects (not just nuclear power plants) in England and Wales. The draft Nuclear NPS lists sites that the UK Government has judged to be potentially suitable for the deployment of new nuclear power plants. The list of sites is the output from the SSA process.

GH.51. The aim of the SSA is to identify and assess which sites in England and Wales will be potentially suitable for the deployment of new nuclear power plants by the end of 2025. This is intended to reduce uncertainty about the siting of new nuclear power plants and to reduce the extent to which alternative sites need to be considered as applications come forward for development consent.

GH.52. The UK Government consulted on the SSA criteria and process in July 2008 and published the response in January 2009^[10]. As part of this response, the Government issued a call for nominations of sites into the SSA process. Eleven sites were nominated – Bradwell, Braystones, Dungeness, Hartlepool, Heysham, Hinkley Point, Kirksanton, Oldbury, Sellafield, Sizewell and Wylfa. With the exception of Braystones and Kirksanton, all were existing, or located adjacent to existing nuclear sites. In assessing nominated sites against the SSA criteria, the UK Government took account of information provided by nominators, comments received from the public, advice from specialists including the nuclear regulators and other Government Departments.

GH.53. The UK Government's preliminary conclusion was that all of the nominated sites, with the exception of Dungeness, were potentially suitable for the deployment of new nuclear power stations by the end of 2025. In the consultation which ran until February 2010, the UK Government sought views on this preliminary conclusion. Following this consultation, a further two sites, Braystones and Kirksanton, were also found not to be potentially suitable as they failed against the criteria of "areas of amenity, cultural heritage and landscape value" and were also not credible for deployment by the end of 2025.

Planning/Siting for Geological Repository, including MRWS Consultation

Staged regulation of underground radioactive waste disposal facilities

GH.54. The Government has adopted an approach based on voluntarism and partnership as the best way forward for siting a geological disposal facility in England and Wales. A single facility for all higher-activity wastes is favoured if that proves technically possible. However, if this is not possible and there needs to be more than one facility, the MRWS site selection process is designed to be sufficiently flexible to accommodate this. In parallel to the publication of the MRWS White Paper^[11], the Government invited communities to express an interest in potential involvement. Formal “expressions of interest” have been received from three local authorities for the two areas of Copeland and Allerdale boroughs in Cumbria. The West Cumbrian Partnership has been set up by Copeland and Allerdale Borough Councils and Cumbria County Council with the remit to make recommendations to the three Councils whether or not they should participate in the geological siting process, without commitment to eventually hosting a facility.

GH.55. The UK Government is committed to making the voluntarist and partnership approach work through the MRWS process. However, the Government recognises it has a responsibility to deal with long-term higher-activity waste management and is committed to geological disposal as the technical solution, such that it will seek to develop alternative ways to implement that solution if the current framework, as set out in the MRWS White Paper, ultimately proves to be unsuccessful in the UK.

GH.56. Under EPR10, the Environment Agency was given a new power to implement staged regulation of underground radioactive waste disposal facilities such as a geological disposal facility for higher activity radioactive waste. The staged regulation process would begin when a developer decided to apply for an environmental permit to start intrusive site investigation work such as drilling boreholes to investigate the geological structure at a potential site. A developer would not be allowed to start intrusive site investigation work unless the Environment Agency decided to grant an environmental permit. Staged regulation would involve regulatory decisions before each major stage in developing a geological disposal facility, for example, underground characterisation, construction and operation. The developer would need to apply for regulatory approval to proceed to the next development stage and submit an appropriate environmental safety case to support the application.

GH.57. The staged regulation process is more fully described in the regulatory guidance for authorisation of geological disposal facilities for solid radioactive waste published by the Environment Agency and NIEA^[47].

Articles 7 and 14 – Design and Construction of Facilities

Articles 7 and 14

Each Contracting Party shall take the appropriate steps to ensure that:

- **the design and construction of a spent fuel management facility provide for suitable measures to limit possible radiological impacts on individuals, society and the environment, including those from discharges or uncontrolled releases;**
- **at the design stage, conceptual plans and, as necessary, technical provisions for the decommissioning of a spent fuel management facility are taken into account;**
- **at the design stage, technical provisions for the closure of a disposal facility are prepared;**
- **the technologies incorporated in the design and construction of a spent fuel management facility are supported by experience, testing or analysis.**

GH.58. Under these Articles, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the third UK report (i.e. in a way that has implications for the Joint Convention obligations).

Safety in design

GH.59. The design and construction of spent fuel, radioactive waste and reprocessing facilities are controlled under the conditions attached to the nuclear site licence, in particular the safety case requirements under LC19 (see Annex L.6).

GH.60. Disposal of solid radioactive waste to either a near-surface disposal facility or to a geological disposal facility would only be permitted if prior authorisation for disposal is obtained from the relevant environment agency. The environment agencies have published separate guidance documents on the requirements for near-surface facilities^[46] and for geological disposal facilities^[47] for disposal of radioactive waste (see Sections A.2.59 to A.2.62). The following requirement relevant to safety in design is common to both guidance documents:

- **Requirement R3: Environmental safety case**

An application under RSA93 [or EPR10] relating to a proposed disposal of solid radioactive waste should be supported by an environmental safety case.

GH.61. The environmental safety case should include an environmental safety strategy supported by detailed arguments to demonstrate environmental safety. The environmental safety strategy should present a top level description of the fundamental approach taken to demonstrate the environmental safety of the disposal system. It should include a clear outline of the key environmental safety arguments and say how the major lines of reasoning and underpinning evidence support these arguments. The strategy should explain, for example, how the chosen site, design for passive safety and multiple barriers each contribute to environmental safety.

Measures to limit radiological impacts of disposals

GH.62. Applications for environmental permits or authorisations to dispose of radioactive waste need to show how the design has used BAT or BPM (see Section B.21) to:

- a) minimise the volume and activity of radioactive waste produced that will require disposal: and
- b) minimise the activity of gaseous and aqueous radioactive waste disposed of by discharge to the environment.

GH.63. Environmental permits and authorisations also place a requirement on operators to maintain in good repair the systems and equipment provided to minimise disposals of radioactive waste, and to check these systems. Such systems will include all abatement plant, such as filters and delay tanks.

GH.64. The environment agencies' Guidance on the Requirements for Authorisation (GRA) sets out a number of principles and requirements; most of those applicable to limiting radiological impacts during design and construction are common to the near-surface disposal guidance^[46] and the geological disposal guidance^[47] with the exception of Requirement R7 relating to human intrusion which is treated differently; this difference is discussed below:

Principle 1: Level of protection against radiological hazards at the time of disposal and in the future

Solid radioactive waste shall be disposed of in such a way that the level of protection provided to people and the environment against the radiological hazards of the waste both at the time of disposal and in the future is consistent with the national standard at the time of disposal.

Principle 2: Optimisation (as low as reasonably achievable, ALARA)

Solid radioactive waste shall be disposed of in such a way that the radiological risks to individual members of the public and the population as a whole shall be as low as reasonably achievable under the circumstances prevailing at the time of disposal, taking into account economic and societal factors and the need to manage radiological risks to other living organisms and any non-radiological hazards.

• Requirement R5: Dose constraints during the period of authorisation

During the period of authorisation of a disposal facility for solid radioactive waste, the effective dose from the facility to a representative member of the critical group should not exceed a source-related dose constraint and a site-related dose constraint.

The environment agencies must have regard to the following maximum doses to individuals which may result from a defined source, for use at the planning stage in radiation protection:

- 0.3mSv per year from any source from which radioactive discharges are made; or
- 0.5mSv per year from the discharges from any single site.

- **Requirement R6: Risk guidance level after the period of authorisation**

After the period of authorisation, the assessed radiological risk from a disposal facility to a person representative of those at greatest risk should be consistent with a risk guidance level of 10^{-6} per year (i.e. 1 in a million per year).

The guidance uses the term “risk guidance level” to describe the assessment standard for natural evolution of the system (not including human intrusion), because it indicates the standard of environmental safety that the environment agencies are looking for, but does not suggest that there is an absolute requirement for this level to be met.

- **Requirement R7: Human intrusion after the period of authorisation - For near-surface disposal facilities**

The developer/operator of a near-surface disposal facility should assess the potential consequences of human intrusion into the facility after the period of authorisation on the basis that it is likely to occur. The developer/operator should, however, consider and implement any practical measures that might reduce the chance of its happening. The assessed effective dose to any person during and after the assumed intrusion should not exceed a dose guidance level in the range of around 3mSv/year to around 20mSv/year. Values towards the lower end of this range are applicable to assessed exposures continuing over a period of years (prolonged exposures), while values towards the upper end of the range are applicable to assessed exposures that are only short term (transitory exposures).

The environment agencies do not envisage that the developer/operator will be able to substantiate that human intrusion into a near-surface disposal facility is unlikely to occur after the period of authorisation. Wastes in such a facility are potentially vulnerable to disturbance by relatively commonplace human actions.

- **Requirement R7: Human intrusion after the period of authorisation - For geological disposal facilities**

The developer/operator of a geological disposal facility should assume that human intrusion after the period of authorisation is highly unlikely to occur. The developer/operator should consider and implement any practical measures that might reduce this likelihood still further. The developer/operator should also assess the potential consequences of human intrusion after the period of authorisation.

Geological facilities will receive all radioactive waste that cannot be disposed of in near-surface facilities. Human intrusion into this type of facility after the period of authorisation may be regarded as highly unlikely, but not impossible, because of the facility’s deep location, expected to be well beyond the reach of many types of intrusive activity. There can be no guarantee of protection for anyone who comes into direct contact with the waste from a geological facility. A person coming into direct contact with high level waste, for example, might receive any radiation dose up to and including a fatal dose.

The environment agencies (Environment Agency and NIEA) shall expect the developer/operator of a geological disposal facility to provide submissions on human intrusion as part of the environmental safety case. It is expected that

these submissions would be of a technical quality consistent with other parts of the case. The environment agencies shall expect the developer/operator to make the argument that human intrusion into the disposal facility is highly unlikely to occur and to use the material presented in the submissions to help judge whether the disposal facility is properly optimised.

- **Requirement R8: Optimisation**

The choice of waste acceptance criteria, how the selected site is used and the design, construction, operation, closure and post-closure management of the disposal facility should ensure that radiological risks to members of the public, both during the period of authorisation and afterwards, are as low as reasonably achievable (ALARA), taking into account economic and societal factors.

- **Requirement R9: Environmental radioactivity**

The developer/operator should carry out an assessment to investigate the radiological effects of a disposal facility on the accessible environment both during the period of authorisation and afterwards with a view to showing that all aspects of the accessible environment are adequately protected.

The GRA includes more detailed explanations of all these requirements and associated regulatory expectations.

Measures to limit radiological impacts of uncontrolled releases

GH.65. The safety case required for the design of a spent fuel, radioactive waste or reprocessing facility will include the safety of the plant under normal and fault conditions. Therefore, the safety case will address all the measures that are taken to prevent faults that could lead to an uncontrolled release of radioactivity or in the event of an accidental release, to limit its impact.

GH.66. ONR assesses the adequacy of the licensee's safety case to ensure that the required defence-in-depth standards have been met before agreeing to the construction or operation of the plant.

Requirements on reliable, stable and easily manageable operation

GH.67. Another important aspect of the design process is a detailed consideration of the role of the operator. Particular emphasis during the design stage is placed on identifying the safety actions required of the operators and specifying the user-interface design. ONR's regulatory oversight ensures that both the design and plant operating instructions address human factor considerations to ensure safe, reliable and easily managed operation. The following requirement for radioactive waste disposal facilities is common to the near-surface disposal guidance^[46] and geological disposal guidance^[47]:

- **Requirement R4: Environmental safety culture and management system**

The developer/operator of a disposal facility for solid radioactive waste should foster and nurture a positive environmental safety culture at all times and should have a management system, organisational structure and resources sufficient to provide the following functions: (a) planning and control of work; (b) the application of sound science and good engineering practice; (c) provision of information; (d) documentation and record-keeping; (e) quality management.

The environment agencies shall expect the developer/operator of a disposal facility to foster and nurture a positive environmental safety culture, i.e. appropriate individual and collective attitudes and behaviours, and require its suppliers to do the same. This culture needs to be reflected in and reinforced by the management system that the developer/operator adopts.

Prevention of accidents and their mitigation

GH.68. A central and key element during the design process is the analysis of possible accidents on the spent fuel, radioactive waste or reprocessing facility. This covers all significant sources of radioactivity associated with the plant and all planned operating modes. The analysis starts with a list of initiating faults, including internal and external hazards, and faults due to personnel error that have the potential to lead to any person receiving a significant dose of radiation. A radiological analysis is performed for fault sequences, which could lead to the release of radioactive materials, to determine the maximum effective dose to persons on or off the site. The fault sequences are normally grouped, and a "bounding case" for each group is specified. These bounding cases take account of the demands made on the safety system. They have consequences at least as severe as any member of the group of fault sequences that they bound.

GH.69. The fault analysis process leads to the determination of the Design Basis Accidents (DBAs) for the nuclear installation. These accidents are drawn from the fault analysis, but do not include initiating faults that are determined to be very improbable.

GH.70. The analyses of DBAs are done on a conservative basis and assume the worst normally-permitted configuration of equipment and unavailability for maintenance, test or repair. For each design base fault sequence or bounding case which leads to a release of radioactive material, the radiological analysis determines the maximum effective dose to a person outside the site. The design basis analysis establishes the minimum safety system requirements for each initiating fault and also identifies the operator's administrative requirements. It therefore provides information for:

- a) the performance requirements for the safety systems and safety-related equipment;
- b) the determination of the plant operational limits and the formulation of the operating rules; and
- c) the preparation of the plant operating instructions for fault conditions.

Decommissioning provisions at the design stage

GH.71. The safety case produced at the design stage should include at least an outline decommissioning plan to show how the design of the plant will facilitate its safe decommissioning and dismantling.

GH.72. The SAPs^[132] (see Annex L.8) require the licensee to prepare an outline decommissioning plan to show how the design of the plant will facilitate its safe decommissioning and dismantling.

Closure of disposal facilities

GH.73. No new specialised radioactive waste disposal facilities have been provided in the UK for many years. In relation to closure, the environment agencies' GRA^[46,47] states:

Principle 4: Reliance on human action

Solid radioactive waste shall be disposed of in such a way that unreasonable reliance on human action to protect the public and the environment against radiological and any non-radiological hazards is avoided both at the time of disposal and in the future.

- **Requirement R12: Use of site and facility design, construction, operation and closure**

The developer/operator of a disposal facility for solid radioactive waste should make sure that the site is used and the facility is designed, constructed, operated and capable of closure so as to avoid unacceptable effects on the performance of the disposal system.

- **Requirement R14: Monitoring**

In support of the environmental safety case, the developer/operator of a disposal facility for solid radioactive waste should carry out a programme to monitor for changes caused by construction, operation and closure of the facility.

GH.74. The guidance also states that although the environment agencies shall regard disposal of a consignment of waste as taking place at the time when the consignment is emplaced in the facility, they shall not consider the disposal process complete until all the requirements of the environmental safety case have been met. At the design stage and periodically during the lifetime of the facility, the developer/operator should demonstrate that it is able satisfactorily to close the disposal facility and, where relevant, seal any preferential pathways that will or may be introduced as a result of the siting, construction and operation of the disposal facility.

Technologies proven by experience or qualified by testing or analysis

GH.75. Nuclear installations designed to modern standards have included the qualification of equipment for all DBAs within their safety cases. This qualification often involved arduous testing, or comprehensive analysis, or both, usually in line with modern national or international standards or other specific regulatory requirements.

GH.76. For older plant, there will not be evidence from the design phase to address modern requirements for equipment qualification and safety analysis. However, the designers employed more conservative design approaches and less complex control and instrumentation technology than current designs and had access to comprehensive prototype and rig data. In addition, the experience of operation of earlier nuclear installations has provided operational, maintenance and inspection data. This has led to increased confidence in meeting required safety equipment performance levels or, alternatively, the need for a modification or replacement with more modern technologies meeting current safety design criteria where appropriate.

GH.77. Furthermore, the PSR requirements of the UK nuclear site licences have meant that for many years the UK has been monitoring and improving the safety of its nuclear installations as a matter of routine. This activity will continue in the future under the legal requirements of the nuclear site licence.

GH.78. The environment agencies' GRA^[46,47] states that all work that supports the environmental safety case needs to follow good engineering practice, for reasons of both quality management and optimisation. The guidance makes clear that this will usually mean applying tried and tested methods, except where the technology used in the construction and operation of a disposal facility is at the leading edge of engineering practice. It also states that in such instances, a judgement will need to be made as to whether the benefits of using a novel technology instead of a tried and tested method are sufficient to outweigh any uncertainties about the outcome of using it. Before the decision is made to use a novel technology, the environment agencies shall expect the developer/operator to have carried out trials to demonstrate that any such uncertainties are kept to a minimum.

Articles 8 and 15 – Assessment of Safety of Facilities

Articles 8 and 15

Each Contracting Party shall take the appropriate steps to ensure that:

- **before construction of a spent fuel management facility, a systematic safety assessment and an environmental assessment appropriate to the hazard presented by the facility and covering its operating lifetime shall be carried out;**
- **in addition, before construction of a disposal facility, a systematic safety assessment and an environmental assessment for the period following closure shall be carried out and the results evaluated against the criteria established by the regulatory body;**
- **before the operation of a spent fuel management facility, updated and detailed versions of the safety assessment and of the environmental assessment shall be prepared when deemed necessary to complement the assessments referred to in paragraph (i).**

GH.79. Under these Articles, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the third UK report (i.e. in a way that has implications for the Joint Convention obligations).

Systematic safety assessments

GH.80. The safety case is the basis for much of the assessment and regulation of safety at spent fuel, reprocessing and radioactive waste disposal facilities in the UK. The assessment of the licensee's safety case starts before construction commences. The safety case consists of a tiered set of safety analysis reports covering a range of topics, from general safety principles through to detailed aspects of design and operation. This set of documents provides a written justification of the safety of the installation (e.g. evidence to support the selection of the concepts and processes, detailed data used in calculations for specific components, calling as necessary on specific research and development programmes).

GH.81. The safety case is continually developed and updated as the installation progresses through the stages of its life, for example, during design, construction, commissioning, operation, and finally for decommissioning. At various stages in the life of the nuclear installation, the licence requires the licensee to review the adequacy of its safety case to ensure it is up to date and fit for purpose. In addition, ONR's nuclear inspectors verify, by the sample checks made during site inspection, that the installation and its operation remain in accordance with its current safety case.

GH.82. The Conditions attached to the site licence (see Annex L.6) require the licensee to put in place arrangements to ensure that adequate safety documentation is produced. In particular, this includes arrangements relating to: LC14 (Safety Documentation); LC16 (Site Plans, Designs and Specifications); LC19 (Construction or Installation of New Plant); LC20 (Modification to Design of Plant Under Construction); LC21 (Commissioning); LC22 (Modification or Experiment on Existing Plant); LC23 (Operating Rules); LC28 (Examination, inspection, maintenance and testing). These LCs ensure that the licensee produces and maintains a safety case of adequate standard throughout the life of the installation.

Safety case evolution

GH.83. A safety case evolves as a plant or activity moves from one phase of its lifecycle to another. It is updated or amended to take into account changing circumstances. This can include:

- a) consideration of developments in safety standards;
- b) changes in engineering approach;
- c) commissioning or operational experience feedback; and
- d) the implications of modifications (including plant aging effects) and non-conformances arising from work in the previous phase.

GH.84. It is important that the safety significance of these aspects is examined and that the safety case is updated, as appropriate, to reflect the current situation. Thus the documentation that forms the safety case is subject to appropriate quality assurance procedures, discussed under Article 23 (see Section F), and changes to the safety case are regulated as modifications.

GH.85. Supplementary documents may also be used to justify an activity at a point in time. For example, a method statement may be prepared to demonstrate that the integrity of plant will be maintained and quality ensured during any modifications or during the installation of new plant. Similarly, any temporary plant modification may require a temporary change to the safety case to justify operations which are necessary, but which lie outside the normal operating envelope described by existing rules and instructions.

Regulatory validation activities

GH.86. In the course of its nuclear regulatory work, ONR scrutinises the activities of licensees, both at their licensed nuclear sites and through assessment of the licensees' written safety submissions. Inspectors examine the licensees' safety cases to satisfy themselves that the safety claims of the licensees are justified or demonstrated. For site inspections, ONR uses the safety case to help prepare inspections and to determine parameters and values against which to judge the safety of plants. Both general and specific targeted inspections are undertaken.

Systematic environmental assessments

GH.87. Any proposed spent fuel management or reprocessing facility will be subject to EC Directive No 85/337^[98], as amended by EC Directive No 97/11^[99], on the assessment of the impacts of certain projects on the environment. Where environmental assessment is required, the developer must prepare an environmental statement that includes a description of the likely significant effects on the environment and the measures envisaged to avoid, reduce or remedy any significant adverse effects.

GH.88. The environment agencies' GRA^[46,47] includes the following requirements relevant to this Article:

- **Requirement R3: Environmental safety case**

An application under RSA93 (or EPR10) relating to a proposed disposal of solid radioactive waste should be supported by an environmental safety case.

The developer/operator will be responsible for providing and updating the environmental safety case at each step during the development of a disposal facility and at suitable intervals during the period of authorisation. The environmental safety case, including quantitative environmental safety assessments, will need at each step to be sufficiently detailed and comprehensive for the regulatory decisions it is intended to inform and support. While the disposal facility is being operated and up until the time when it is closed, we (the environment agencies) shall expect any necessary updates to be provided progressively in a timely manner.

- **Requirement R9: Environmental radioactivity**

The developer/operator should carry out an assessment to investigate the radiological effects of a disposal facility on the accessible environment both during the period of authorisation and afterwards with a view to showing that all aspects of the accessible environment are adequately protected.

- **Requirement R11: Site investigation**

The developer/operator of a disposal facility for solid radioactive waste should carry out a programme of site investigation and site characterisation to provide information for the environmental safety case and to support facility design and construction.

- **Requirement R14: Monitoring**

In support of the environmental safety case, the developer/operator of a disposal facility for solid radioactive waste should carry out a programme to monitor for changes caused by construction, operation and closure of the facility.

GH.89. In order to fulfil its responsibility for protecting consumers from unacceptable concentrations of radionuclides in foods, the Food Standards Agency carries out an assessment of the doses that would be received by consumers of locally-produced foods prior to responding to consultations led by SEPA and/or the Environment Agency on proposed authorisations and environmental permits respectively. In order to compare the assessed dose to the limits, it is necessary to consider all environmental and human health pathways in the assessment, and not just the consumption of food.

Articles 9 and 16 – Operation of Facilities

Articles 9 and 16

Each Contracting Party shall take the appropriate steps to ensure that:

- the licence to operate a spent fuel [radioactive waste] management facility is based upon appropriate assessments as specified in Article [8] [15] and is conditional on the completion of a commissioning programme demonstrating that the facility, as constructed, is consistent with design and safety requirements;
- operational limits and conditions derived from tests, operational experience and the assessments, as specified in Article [8] [15], are defined and revised as necessary;
- operation, maintenance, monitoring, inspection and testing of a [spent fuel] [radioactive waste] management facility are conducted in accordance with established procedures;
- engineering and technical support in all safety-related fields are available throughout the operating lifetime of a [spent fuel] [radioactive waste] management facility;
- procedures for characterization and segregation of radioactive waste are applied;
- incidents significant to safety are reported in a timely manner by the holder of the licence to the regulatory body;
- programmes to collect and analyse relevant operating experience are established and that the results are acted upon, where appropriate;
- decommissioning plans for a [spent fuel] [radioactive waste] management facility are prepared and updated, as necessary, using information obtained during the operating lifetime of that facility, and are reviewed by the regulatory body.
- plans for the closure of a disposal facility are prepared and updated, as necessary, using information obtained during the operating lifetime of that facility and are reviewed by the regulatory body.

GH.90. Under these Articles, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the third UK report (i.e. in a way that has implications for the Joint Convention obligations).

Licensing process and national law

GH.91. As previously described, NIA65 states that no one may operate a nuclear installation unless they hold a nuclear site licence granted by HM Chief Inspector of Nuclear Installations, acting under delegated powers. The conditions attached to the nuclear site licence define the key activities the licensee must carry out in order to effectively manage the safety of the installation.

GH.92. The environment agencies require prior authorisation, under either EPR10 or RSA93, before radioactive waste is disposed of to a repository. Compliance with conditions and limits set in environmental permits under EPR10 and in authorisations under RSA93 is monitored by the environment agencies through inspection and other assessment activities, such as monitoring of wastes disposed to the facility and monitoring of discharges from the facility.

Licence to operate

GH.93. A nuclear site licence is required prior to commencement of the construction of the nuclear installation on the site (see Sections E.47 to E.55). The report on Article 15 (see Section H) addresses the licensing process and the safety analysis during the design, construction and commissioning phases.

GH.94. In practice, there is a transitional period for the nuclear installation as it moves from its construction to its operational phase. This period is controlled by a commissioning schedule and programme, which give details and requirements for each item of plant or equipment, and groups of plant or equipment, to be brought to a state that is acceptable for operation in the totality of the facility. Certain key stages in the commissioning programme are identified at which ONR's Consent is required before further progress towards operation can be made. The final Consent during the commissioning phase is the Consent to move to routine operation. This is not issued until the safety case has been substantiated by the commissioning tests' results, and all the necessary documents and systems are in place for the continued operation and maintenance of the plant. This final Consent is effectively an authorisation for routine operation.

GH.95. The environment agencies' GRA^[46,47] states that the developer/operator of a radioactive waste disposal facility will be responsible for all information necessary to support the environmental safety case, and will need to provide it to the appropriate environment agency in a timely way within an agreed documentation structure so that its relevance to the environmental safety case is clear. The guidance also states that technical information will need to be submitted in an agreed form that allows the regulator to understand fully the arguments put forward in the environmental safety case and to carry out its own environmental safety assessments to support its judgements.

GH.96. Provision of information by the developer/operator is part of demonstrating compliance with:

- **Requirement R4: Environmental safety culture and management system**

The developer/operator of a disposal facility for solid radioactive waste should foster and nurture a positive environmental safety culture at all times and should have a management system, organisational structure and resources sufficient to provide the following functions: (a) planning and control of work; (b) the application of sound science and good engineering practice; (c) provision of information; (d) documentation and record-keeping; and (e) quality management.

- **Requirement R14: Monitoring**

In support of the environmental safety case, the developer/operator of a disposal facility for solid radioactive waste should carry out a programme to monitor for changes caused by construction, operation and closure of the facility.

Operational limits and conditions

GH.97. The operational limits and conditions for a nuclear installation are based upon its safety case and limits therein. The safety case limits are normally the measurable plant parameters that define the envelope for demonstrably safe

operation and the safety conditions that are prerequisites, in terms of plant configurations and operator actions, to keep plant within this envelope.

GH.98. Licensee's arrangements under the nuclear site licence provide for adequate control over modifications to plant operating limits or conditions. Where the limits and conditions define the nuclear safety envelope in the form of the operating rules, ONR may specify that once approved by ONR, no alteration or amendment can be made to such operating rules without ONR's prior approval.

GH.99. The environment agencies will periodically review environmental permits under EPR10 and authorisations under RSA93 for the disposal of radioactive waste. Reviews may lead to revision of the limits and conditions in environmental permits and authorisations.

Operation, maintenance, monitoring, inspection and testing

GH.100. Operation, maintenance, monitoring, inspection and testing are all covered under conditions attached to nuclear site licences. Details are provided in Annex L.6 (Licensing) but the key areas are:

- LC24 - all operations that may affect safety must be undertaken in accordance with written operating instructions; and
- LC28 - licensees must make and implement arrangements for the regular and systematic examination, inspection, maintenance and testing of all plant which may affect safety.

Engineering and technical support

GH.101. Under the conditions attached to the nuclear site licence there are a number of requirements the licensee must meet, aimed at ensuring that there is sufficient engineering and technical support available in all safety-related fields throughout the life of a nuclear installation. In particular:

- LC12 - only suitably qualified and experienced persons should perform any duties that may affect the safety of operations on the site; and
- LC36 - requires the licensee to assess the safety impact of any change to its organisational structure or resources before these changes are carried out.

GH.102. The licensees commission and undertake research to support the safe operation of their nuclear installations. In addition, the Government has given ONR the responsibility to co-ordinate a long-term generic (i.e. not site-specific) safety research programme to address the following objectives:

- a) adequate and balanced programmes of nuclear safety research continue to be carried out, based on a view of the issues likely to emerge both in the short and long term;
- b) as far as reasonably practicable, the potential contribution the research can make to securing higher standards of nuclear safety is maximised; and
- c) the results of the research having implications for nuclear safety are disseminated as appropriate.

There are two secondary objectives:

- a) to take account of the desirability of maintaining a sufficient range of independent capability to ensure the attainment of the primary objective; and
- b) to ensure that proper account is taken of the advantages of international collaboration in furthering the primary objectives.

GH.103. ONR directs the programme by identifying safety issues that are expressed in the Nuclear Research Index^[154]. The licensees use this index as a focus for commissioning the programme.

GH.104. The environment agencies require operators to demonstrate compliance with their environmental permits or authorisations. This requirement covers a need to have in place appropriate organisational structures and resources to be able to demonstrate that limits and conditions are being met. This would include setting down and adhering to work procedures and having appropriate engineering and technical resources.

Waste acceptance criteria

GH.105. The environment agencies' GRA^[46,47] sets out a requirement on waste acceptance criteria:

- **Requirement R13: Waste acceptance criteria**

The developer/operator of a disposal facility for solid radioactive waste should establish waste acceptance criteria consistent with the assumptions made in the environmental safety case and with the requirements for transport and handling, and demonstrate that these can be applied during operations at the facility.

GH.106. The guidance states that waste characterisation, treatment and packaging are the responsibility of the consignor of the radioactive waste to the disposal facility, but it is the responsibility of the developer/operator of the facility to make sure that the waste accepted for disposal is consistent with the environmental safety case and the operational requirements at the facility including transport and handling.

Reporting of incidents significant to safety

GH.107. LC7 (incidents on the site) is a general requirement to make arrangements to notify, record, investigate and report incidents:

- (i) as is required by any other condition attached to the licence;
- (ii) as ONR may specify; and
- (iii) as the licensee considers necessary.

GH.108. Under (i) above there are, for example, requirements to notify, record, investigate and report incidents arising under LC23 (Operating Rules), LC28 (Examination, Inspection, Maintenance and Testing), and LC34 (Leakage and Escape of Radioactive Material and Radioactive Waste). Incidents to be notified, etc., include those referred to in NIA65 Section 7 in the Nuclear Installations (Dangerous Occurrences) Regulations 1965^[155], and in IRR99 Regulations 25 and

30. In making the arrangements required under LC7, the licensees include the need to notify incidents which fall into any of the following categories:

- (i) occurrences on a nuclear installation site, under section 22(1) of NIA65, which are to be reported by the quickest means possible under section 4(1) of the Nuclear Installations (Dangerous Occurrences) Regulations 1965, to DECC and ONR;
- (ii) a confirmed breach of, or discharge expected to breach quantitative limits of an environmental permit under EPR10 or an authorisation under RSA93 for the disposal of radioactive waste;
- (iii) a confirmed release to atmosphere or spillage of a radioactive substance which exceeds, or is expected to exceed, the limits set out in Column 4 of Schedule 8 of the IRR99, (except where the release is in a manner specified in an environmental permit under EPR10 or an authorisation under RSA93) to be notified forthwith to ONR; and
- (iv) a confirmed or suspected over exposure of a worker to ionising radiation under Section 25 of the IRR99, to be notified as soon as practicable to ONR.

GH.109. ONR has made arrangements with licensees to be informed of incidents covered by international reporting arrangements, for which ONR is the UK reporting authority, i.e.

- (i) the International Nuclear Event Scale; and
- (ii) the IAEA/NEA Incident Reporting System.

GH.110. Certain incidents are covered by agreements for Ministerial reporting to Parliament, and these are published by ONR in a Quarterly Statement. The criteria for Ministerial reporting are:

- (i) dangerous occurrences reportable under Nuclear Installations (Dangerous Occurrences) Regulations 1965;
- (ii) confirmed exposure to radiation of individuals which exceeds or which is expected to exceed the dose limits specified in Schedule 4 to IRR99;
- (iii) examination, inspection, maintenance or test of any part of the plant that has revealed that the safe operation or condition of the plant may be significantly affected;
- (iv) a confirmed release to atmosphere or spillage of a radioactive substance which exceeds, or is expected to exceed, the limits set out in IRR99 (except where the release is in a manner specified in an environmental permit under EPR10 or an authorisation under RSA93); and
- (v) a confirmed breach of, or discharge expected to breach quantitative limits of, an environmental permit under EPR10 or an authorisation under RSA93 for the disposal of radioactive waste.

GH.111. The UK is a signatory to the 1986 IAEA Convention on 'Early Notification of a Nuclear Accident'^[156] which requires notifying the IAEA when "... a release of radioactive materials occurs or is likely to occur and which has resulted or may result in an international transboundary release that could be of radiological safety

significance for another state". The UK competent authority and contact point for issuing and receiving notification and information on the nuclear accident is DECC.

GH.112. In addition to reporting nuclear incidents, ONR publishes a quarterly newsletter that reports key events at nuclear installations in the UK, as well as the current activities of the regulatory authority.

Programmes to collect and analyse operating experience

GH.113. Operational matters which may affect safety and which are identified during operation or during maintenance, inspection and testing are notified, recorded, investigated and reported as required by LC7. These requirements ensure that experience gained during operation is properly considered, and that any findings or recommendations that will improve safety are recognised and acted upon. The operational records required under LC25 not only demonstrate to the regulators compliance with site licence and other regulatory requirements, but also constitute part of the plant history that operators need to make safety and commercial judgements. For example, the results of routine examinations of the plant under LC28 may be used to justify a change to the interval between maintenance, or a change from preventive maintenance to condition-based maintenance.

GH.114. The licensees' arrangements for investigation of plant events include requirements for the impact on other installations and operators to be considered in off-site reporting, and regular reviews of such reports by all nuclear installation licensees. The outcome of this review could be a dissemination of a plant event on one installation with a requirement on each other installation to assess and report formally on its impact on their plant.

GH.115. An analysis of operating experience is a key part of the periodic safety reviews that are required under LC15. The main review is carried out every 10 years, but other reviews also take place before start-up after statutory outages.

GH.116. ONR is responsible for national publication of the results of its regulatory activities (such as the assessment of licensees' PSRs) and international reporting of events. ONR brings to the attention of licensees any international events of significance.

Decommissioning Plan preparation and updating

GH.117. Licensees have arrangements for the safe decommissioning of any plant or process that may affect safety. This includes arrangements for the production and implementation of decommissioning programmes for each spent fuel or reprocessing facility.

GH.118. More information on decommissioning, including the review of decommissioning strategies is set out under Article 26 in Section F.

Plans for closure of a facility

GH.119. The environment agencies' GRA^[46,47] states that disposal process will not be regarded as complete until all the requirements of the environmental safety case have been met. This would include sealing and closure of the facility as set out in Requirement R12 – see Sections GH.73 and GH.74.

GH.120. The guidance states that at the design stage and periodically during the lifetime of the facility, the developer/operator should demonstrate that it is able satisfactorily to close the disposal facility and, where relevant, seal the access

tunnels, shafts and drifts, boreholes and any other potential preferential pathways for radionuclide transport that will or may be introduced as a result of the siting, construction and operation of the disposal facility. Also, in design, construction, operation and closure the developer/operator will need to take into account a number of effects that may arise from properties of the waste, including:

- gas generation through microbial, chemical, or radiolytic action, or as a result of radioactive decay;
- heat generation through microbial or chemical action, or as a result of radioactive decay; and
- criticality through concentration of fissile nuclides.

The guidance states that these topics will need to be considered in the environmental safety case.

Article 10 – Disposal of Spent Fuel

If, pursuant to its own legislative and regulatory framework, a Contracting Party has designated spent fuel for disposal, the disposal of such spent fuel shall be in accordance with the obligations of Chapter 3 relating to the disposal of radioactive waste.

GH.121. Under this Article, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the third UK report (i.e. in a way that has implications for the Joint Convention obligations).

GH.122. In the UK, spent fuel from the existing nuclear power plants has not been designated as radioactive waste for disposal. However, the Government is currently not expecting any proposals to reprocess spent fuel from new nuclear power plants and therefore spent fuel from these power stations would be designated as higher activity waste. If it should be, the information given in Section G/H of this report will be applicable.

Article 17 – Institutional Measures after Closure

Each Contracting Party shall take the appropriate steps to ensure that after closure of a disposal facility:

- (i) records of the location, design and inventory of that facility required by the regulatory body are preserved;**
- (ii) active or passive institutional controls such as monitoring or access restrictions are carried out, if required; and**

if, during any period of active institutional control, an unplanned release of radioactive materials into the environment is detected, intervention measures are implemented, if necessary.

GH.123. Under this Article, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the third UK report (i.e. in a way that has implications for the Joint Convention obligations).

GH.124. The environment agencies' GRA^[46,47] states that the developer/operator will need to set up and maintain a comprehensive system for recording information on all aspects of the project affecting the environmental safety case. The information to be recorded should include: decisions taken and the reasons for them, data and results from the site investigation and characterisation programme; design documents, drawings and engineering details of the facility as constructed; records of waste form and characterisation; records of waste emplacements and their location in the facility; other operational information; details of facility closure; and results of monitoring and assessment at all stages of the project. Duplicates of the records will need to be kept at diverse locations and in durable form. During the period of authorisation, the records will be needed by the organisation exercising control and,

potentially, by the regulators. Also the environment agencies shall expect the operator to make arrangements at the end of the period of authorisation for the records to be included in the public archive.

GH.125. The guidance also states that the process of optimising a disposal facility requires the continuous attention of the developer/operator from the design stage through to the end of the period of authorisation. The environment agencies' optimisation requirement is that radiological risks to members of the public are ALARA during the period of authorisation and afterwards. Radiological risk during the period of authorisation is reduced by reducing exposure to radiation, which, in turn, may be reduced by reducing radioactive discharges. Radiological risks after the period of authorisation are reduced either by reducing potential exposure, or by reducing the probability of that exposure being received.

GH.126. Repository developers and operators are required to establish a strategy and programme for monitoring of the facility to support the environmental safety case. This includes during any period of institutional control after closure of the facility. However, the environment agencies recognise that, in the longer term, institutional controls cannot be relied upon and the developer will be expected to assess the likelihood and consequences of possible future human actions (see Requirement R7, Section GH.64).

Period of institutional control for repositories

GH.127. The environment agencies' GRA states that if the developer/operator claims for the purposes of the environmental safety case that during the period of authorisation there will be a time after closure when the facility is under active institutional control, the developer/operator will need to show that the controls proposed for this time are sufficient to support the claim and that the arrangements for applying the controls can be relied on to be implemented as planned. A claim for active institutional control will need to be supported by detailed forward planning of organisational arrangements and a suitable demonstration of funding arrangements.

GH.128. The guidance states that organisational arrangements would need to provide for continued management, staffing and site security. In addition, a claim of active institutional control for a period of time is expected to include provisions for site surveillance with scope for remedial work if needed, a programme of environmental monitoring, control of land use and arrangements for the preservation of records. It will need to be supported by evidence that these provisions can be relied on to remain effective throughout the claimed period of time. Because of the major social changes that may take place over long periods of time, it is unlikely that the environment agencies would accept a claim for active institutional control lasting longer than 300 years after the end of waste emplacement.

GH.129. For any time after closure of the facility where the developer/operator does not claim, or the relevant environment agency does not accept, that there will be active institutional control, the regulatory approach will be to apply a risk guidance level (see Requirement R6, Section GH.64) and, for human intrusion, a dose guidance level (see Requirement R7, Section GH.64). A regulatory principle in the UK is that authorisations [or environmental permits] for disposal will not be granted unless it is shown that the continued isolation of the waste from the accessible environment shall not depend on actions by future generations to maintain the integrity of the disposal system.

Section I

Article 27 – Transboundary Movement

1. Each Contracting Party involved in transboundary movement shall take the appropriate steps to ensure that such movement is undertaken in a manner consistent with the provisions of this Convention and relevant binding international instruments.

In so doing:

- i. a Contracting Party which is a State of origin shall take the appropriate steps to ensure that transboundary movement is authorized and takes place only with the prior notification and consent of the State of destination;**
- ii. transboundary movement through States of transit shall be subject to those international obligations which are relevant to the particular modes of transport utilized;**
- iii. a Contracting Party which is a State of destination shall consent to a transboundary movement only if it has the administrative and technical capacity, as well as the regulatory structure, needed to manage the spent fuel or the radioactive waste in a manner consistent with this Convention;**
- iv. a Contracting Party which is a State of origin shall authorize a transboundary movement only if it can satisfy itself in accordance with the consent of the State of destination that the requirements of subparagraph (iii) are met prior to transboundary movement;**
- v. a Contracting Party which is a State of origin shall take the appropriate steps to permit re-entry into its territory, if a transboundary movement is not or cannot be completed in conformity with this Article, unless an alternative safe arrangement can be made.**

2. A Contracting Party shall not licence the shipment of its spent fuel or radioactive waste to a destination south of latitude 60 degrees South for storage or disposal.

3. Nothing in this Convention prejudices or affects:

- i. the exercise, by ships and aircraft of all States, of maritime, river and air navigation rights and freedoms, as provided for in international law;**
- ii. rights of a Contracting Party to which radioactive waste is exported for processing to return, or provide for the return of, the radioactive waste and other products after treatment to the State of origin;**
- iii. the right of a Contracting Party to export its spent fuel for reprocessing;**
- iv. rights of a Contracting Party to which spent fuel is exported for reprocessing to return, or provide for the return of, radioactive waste and other products resulting from reprocessing operations to the State of origin.**

I.1. Under this Article, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the third UK report (i.e. in a way that has implications for the Joint Convention obligations).

I.2. Compliance with this Article of the Joint Convention is demonstrated through compliance with Euratom Directive 2006/117/Euratom (“the Shipments Directive”) ^[35], which was drafted specifically to ensure compliance with this Article. The Shipments Directive extended the regulatory regime for transfrontier shipments to include spent fuel shipped for reprocessing. This Directive was supplemented by Commission Recommendation 2008/956/Euratom of 4 December 2008^[157] on criteria for the export of radioactive waste and spent fuel to third countries.

I.3. The Shipments Directive provides the regulatory framework for supervision and control of shipments of radioactive waste and spent fuel into, out of, or through the European Community. The Directive is implemented in UK law by the Transfrontier Shipment of Radioactive Waste and Spent Fuel Regulations 2008^[33], which require prior written approval by the competent authorities of all States involved (States of origin, destination and EU States of transit) before such a shipment can be authorised. The Environment Agency is the competent authority for authorising shipments originating in England and Wales. SEPA is the competent authority in Scotland, and NIEA is the competent authority in Northern Ireland.

I.4. On receipt of an application from the consignor of the waste or spent fuel, the relevant UK competent authority seeks the approval, in writing, of the competent authority of the country of destination (usually an environmental or nuclear regulator) using the standard document (Commission Decision 2008/312/Euratom^[112]). It is UK practice to notify all countries of transit, whether they are EU member states or not. In addition, before a shipment to or from the UK is authorised, the proposal will be checked for compliance with Government policy on the import and export of radioactive waste (Cm 2919^[144] and the policy for the long-term management of solid low-level radioactive waste^[14]).

I.5. Transboundary movements of radioactive materials and spent fuel must comply with the national and international regulations and standards applying to the mode of transport used. For shipments by sea, safety of sea transport is governed by the Merchant Shipping (Dangerous Goods and Marine Pollutants) Regulations 1997^[106].

I.6. There is a standing ban on shipments to destinations south of latitude 60 degrees south.

I.7. The export of LLW for treatment is permitted provided it meets certain conditions, including a satisfactory options assessment and an assurance that the shipment is to facilitate the recovery of reusable materials or for treatment that will subsequently enable the waste to be more easily managed or stored when returned to the UK. In all cases where import or export of LLW would add materially to the waste needing to be disposed of, the process radioactive wastes have to be returned to the UK.

I.8. The reciprocal process applies when the relevant UK competent authority responds to a request to approve the import of radioactive waste into the UK from another EU Member State. For the import of radioactive waste from outside the EU, the recipient of the waste must apply to the appropriate UK competent authority for authorisation of the shipment.

I.9. No procedures are in place to deal with the prevention of import shipments that have not been given authorisation. However, in relation to exports, if it was suspected that an unauthorised transfrontier shipment of radioactive waste was to take place, the competent authority has a range of normal regulatory enforcement options, including prohibition notice and prosecution. The competent authority may also be able to seek an injunction from the courts to prevent the shipment.

I.10. European Council Regulation Euratom 1334/2000^[158], Regulation 3(1) provides that “an authorisation shall be required for the export of the dual-use items listed in Annex 1”. Nuclear materials are included in Annex 1. Council Regulation 1334/2000 is implemented in the UK by the Dual Use Items (Export Control) Regulations 2000 (SI 2000/2620)^[159]. This usually results in an export licence application. In addition, the Nuclear Suppliers Group (NSG) Guidelines^[160] are

applied, as the UK is a member of the NSG and of the IAEA.

I.11. Transboundary movement of radioactive substances between Member States is regulated by European Council Regulation (Euratom) No 1493/93^[161].

Transboundary shipments

I.12. In 2010 the UK carried out the first shipments of high-level vitrified waste to Sellafield's overseas reprocessing customers. The first shipments were to Rokkasho, Japan and to COVRA in the Netherlands. The programme will last about 10 years. All shipments were carried out under the Shipments Directive.

I.13. Since 2007 the UK has been exporting metallic wastes from nuclear decommissioning for treatment by the metal-melt process. Shipments have been made to Sweden, Germany and the USA. The metal is mostly carbon steel, but alloy steels and lead have also been treated and recycled. The European companies engaged in these recycling processes repatriate the radioactive furnace slag and other process wastes to the UK. As the metal is recycled, the volume reduction on radioactive wastes requiring disposal to the UK's national Low Level Waste Repository is greater than 10:1. This is an ongoing international trade.

I.14. Small numbers of shipments have been made for other treatments and processes, including incineration. The quantities of oil and other combustible wastes involved are generally low, as most combustible wastes are dealt with at UK facilities.

I.15. All shipments are carried out in compliance with the Shipments Directive, and hence with this Article.

Section J

Article 28 – Disused Sealed Sources

- 1. Each Contracting Party shall, in the framework of its national law, take the appropriate steps to ensure that the possession, remanufacturing or disposal of disused sealed sources takes place in a safe manner.**
- 2. A Contracting Party shall allow for re-entry into its territory of disused sealed sources if, in the framework of its national law, it has accepted that they be returned to a manufacturer qualified to receive and possess the disused sealed sources.**

J.1. Under this Article, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the third UK report (i.e. in a way that has implications for the Joint Convention obligations).

J.2. The UK has implemented EC Directive 2003/122/EURATOM^[162] on the control of high-activity sealed radioactive sources and orphan sources. The Directive was transposed in the UK as the HASS Regulations, and as Directions from the Secretary of State and Ministers of the devolved administrations to the environment agencies. Taken together, these measures provide a new regulatory regime for high-activity sealed sources. In England and Wales, the provisions of the HASS Regulations have subsequently been incorporated into EPR10; this did not involve any change in the scope or nature of the regulatory regime.

J.3. Directive 2003/122 requires EU Member States to have in place regulatory systems for the authorisation of practices involving high-activity sealed sources. Under the HASS Regulations, before issuing such an authorisation, the relevant competent authority must ensure that adequate arrangements exist for the safe management of sources, including when they become disused sources. These latter arrangements may provide for the transfer of disused sources to the supplier or to a recognised storage facility. In addition, financial provision must have been made to cover the cost of managing disused sources safely, including in the eventuality of the holder becoming insolvent or going out of business. The Government has developed guidance for the Environment Agency on the acceptable arrangements companies can make to meet the requirements for such financial provision^[163]. Across the UK, there are approximately 300 HASS authorisations.

J.4. On nuclear licensed sites, LC4 (Restrictions on Nuclear Matter) ensures that the licensee carries out its responsibilities to control the entry and storage of nuclear matter (including sources) on the licensed site. In all cases, IRR99 Part VI applies, covering the arrangements for the control of radioactive substances, articles and equipment.

J.5. The Transfrontier Shipment of Radioactive Waste and Spent Fuel Regulations 2008 (see Section I), Regulation 3 (b), excludes “shipments where a sealed source (other than one containing fissile material) is returned by its user to the supplier of the source in another country”. This facility exists for sealed sources that are radioactive waste, i.e. they are radioactive sources “for which no use is foreseen”. In these circumstances, no transfrontier shipment authorisation is required.

J.6. Shipments of sealed sources between Member States of the EU are regulated under European Council Regulation 1493/93. The consignor of the shipment must obtain a declaration from the recipient, endorsed by the competent authority of the Member State of destination, that it has complied with the relevant provisions of the BSS Directive and other relevant national requirements. The consignor must also provide the competent authority in the State of destination with a quarterly report of such shipments. The UK competent authority under Regulation 1493/93 for shipments to or from nuclear sites is ONR); for all other consignees/consignors, the competent authority is the Environment Agency in England and Wales, SEPA in Scotland or NEIA in Northern Ireland.

J.7. The Environment Agency has completed the Government-funded Surplus Source Disposal Programme. The programme has been a major success in arranging safe management, recycling and disposal of a legacy of over 11,000 disused radioactive sources throughout the UK.

Radiation screening at ports and airports

J.8. Routine screening by the UK Border Agency at ports and airports for the illicit movement of radioactive materials began in 2003. Fixed and mobile radiation detection equipment is being introduced at all ports and airports under Programme Cyclamen; a joint programme managed by the UK Government's Home Office and the UK Border Agency, with full co-operation and input from the police. Air, sea and Channel Tunnel traffic entering the UK will be subject to screening, including container and road freight, post and fast parcels, vehicles and passengers. The equipment is entirely passive and is able to detect radiation emitted from the vehicle or object being examined. To complement the fixed equipment, mobile radiation detection units are also being deployed. These units have been developed with assistance from specialist agencies and will be used for both the UK Border Agency and Police operations. For national security reasons, more specific information about the radiation detection systems deployed under Programme Cyclamen cannot be provided. For further information see the Home Office website (see Annex L.10).

Section K - Planned Activities to Improve Safety

This section provides an opportunity to give a summary of safety issues of concern identified earlier, and planned future actions to address those issues, including where appropriate measures of international co-operation.

K.1. Improving safety levels over time is a fundamental objective of the nuclear safety and environmental regulators in the UK. The ways in which this objective is achieved at spent fuel management, reprocessing and radioactive waste management facilities have been explained in the previous Sections. The main features are explained below.

Review of the implications for the UK nuclear industry following the Japanese earthquake and tsunami

K.2. Following the unprecedented events in Japan in March 2011, HM Chief Inspector of Nuclear Installations published his Interim Report on the Implications for the UK Nuclear Industry^[2] in May. This interim report contains 11 conclusions and makes 26 recommendations. A final report has also been requested by the Secretary of State for Energy and Climate Change, and it is planned to produce this for autumn 2011. It is anticipated that many of the significant lessons can be identified by the time of the final report, although it is probable that extra insights will arise in the longer term. The UK plans to monitor any such developments closely as part of the continuing search for improvements in nuclear safety, and take these forward with the nuclear industry in line with the UK's normal regulatory approach of challenge, influence and where needed, enforcement.

K.3. The conclusions of the Interim Report are summarised as follows:

- There is no reason to curtail the operation of nuclear power plants or other nuclear facilities in the UK. Any further work needed will be considered and implemented on a case-by-case basis.
- The UK nuclear industry has reacted responsibly and appropriately, displaying leadership for safety and a strong safety culture in its response to date.
- The Government's intention to put the Office for Nuclear Regulation on a statutory basis should enhance confidence in the UK's nuclear regulatory regime.
- Consideration of the known circumstances of the Fukushima accident has not so far revealed any gaps in the scope or depth of the SAPs for the UK's nuclear facilities.
- Similarly, no significant weaknesses have been revealed in the UK's nuclear licensing regime.

- Flooding risks are unlikely to prevent construction of new nuclear power stations at potential development sites in the UK over the next few years. However, some sites with a flooding risk could require changes to their layout and protection against flooding.
- There is no need to change siting strategies for new nuclear power stations in the UK.
- There is no reason to depart from the multi-plant site concept being considered for new reactors in the UK.
- Because the UK's gas-cooled reactors have lower power densities and larger thermal capacities than water-cooled reactors, there is a longer time for remedial action.
- There is no evidence that the presence of mixed oxide fuel in Fukushima Dai-ichi Unit 3 significantly contributed to the health impact of the accident on or off the site.
- There may be considerable scope for lessons to be learned about human behaviour in severe accident conditions that may be useful in enhancing the UK's arrangements for such events.

K.4. Whilst the above conclusions refer principally to nuclear power plants, many are applicable to other types of nuclear facility, including reprocessing, enrichment, fuel manufacturing, and waste storage and disposal facilities.

K.5. The 26 recommendations in the Interim Report cover a wide variety of topics, most of which require further consideration by Government departments, regulatory bodies, other agencies involved in emergency planning and response, and also the nuclear industry. This will take some time, and it may be possible to say more when the final report is published.

Periodic review of nuclear safety

K.6. All existing spent fuel management and radioactive waste management facilities in the UK at the time of the Joint Convention coming into force were licensed and were considered to meet appropriate safety standards. All facilities on nuclear licensed sites have to comply with Licence Conditions and in respect of the review of safety, the licensee is required to undertake periodic safety reviews for all safety related facilities. LC15 (Periodic Review) ensures that the licensee reviews the safety case for its spent fuel management and reprocessing facilities every 10 years against an agreed programme. In addition, for operating nuclear power stations and those reprocessing plants for which a start-up Consent is required following an outage for maintenance or inspection, the continuing validity of the safety cases are reviewed at shorter intervals, about every 2 or 3 years, prior to granting the start-up Consent.

Periodic review of discharge authorisations

K.7. There is a formal requirement for periodic, or regular, reviews of environmental permits under EPR10 and authorisations under RSA93 as amended by the Energy Act 2004. The Environment Agency has implemented this requirement through establishing annual reviews of authorisations. Environmental

permits and authorisations for discharges are placed on public registers, where they are open to inspection, and discharge limits are published in various documents, for instance the annual RIFE report. RIFE now includes data from all government environmental monitoring results and is published jointly by the Food Standards Agency, Environment Agency, SEPA and the NIEA. The regulatory bodies carry out checks on the actual discharges made, in terms of activity and radionuclide composition, and have powers of enforcement, including prosecution under EPR10 if the terms of environmental permits are breached or under RSA93 if the terms of authorisations are breached.

Periodic review of decommissioning activities

K.8. Government Policy^[144] requires ONR, acting on HSE's behalf, in consultation with the environment agencies, to carry out five yearly ('quinquennial') reviews of licensee's decommissioning strategies to ensure that they remain soundly based as circumstances change. ONR requests, and leads the assessment of, licensee's decommissioning strategies. When it judges that the quinquennial review has been completed, it prepares and issues, in consultation with the environment agencies, a public statement.

Policy on the reduction of discharge targets and actual discharges

K.9. In July 2009, the UK Government and devolved administrations published the revised UK Strategy for Radioactive Discharges^[28]. The revised UK Strategy builds on and widens the scope of the 2002 Strategy bringing all information on radioactive discharges into one place. The strategy covers the period to 2030 and includes aerial as well as liquid discharges from operational and decommissioning activities and includes both the nuclear and non-nuclear sectors. It sets out the progress made on reducing discharges and emissions to the environment; describes, at the sectoral level, the outcomes which are expected to be achieved and by when; and sets a strategic framework for addressing radioactive discharges over the next 20 years.

K.10. The strategy demonstrates how the UK is implementing its obligations in respect of the UK's commitments on radioactive discharges as a Contracting Party to the OSPAR Convention^[164] and forms the UK's national plan on how we will achieve the overall and intermediate objectives of the OSPAR Radioactive Substances Strategy. The intended effects of the UK Strategy are:

- progressive and substantial reductions in radioactive discharges taking into account any uncertainties;
- progressive reductions in concentrations of radionuclides in the marine environment from radioactive discharges such that by 2020 they add close to zero to historic levels; and
- progressive reductions in human exposures to ionising radiation resulting from radioactive discharges, as a result of planned reductions in discharges; and delivery of the UK's commitments to OSPAR without compromising the UK energy policy.

K.11. The strategy also highlights the move in England and Wales from Best Practicable Means (BPM) and Best Practicable Environmental Options (BPEO) to Best Available Techniques (BAT) for the regulation of radioactive discharges. In parallel to the strategy, UK Government published Statutory Guidance^[29] to the Environment Agency concerning the regulation of radioactive discharges into the

environment which introduces the application of BAT in England and Wales. The move to BAT will deliver the equivalent level of environmental protection as BPM and BPEO, and is consistent with the terminology of the environmental protection regimes of the other Contracting Parties and other regimes in England and Wales. Scotland and Northern Ireland will continue to apply BPM. Statutory guidance to SEPA was issued by the Scottish Government in May 2008.

K.12. The 2009 UK Discharge Strategy removed the aim of critical group doses to anyone within the UK being less than 0.02mSv by 2020, as a result of discharges.

K.13. Since 2004, Sellafield Ltd has successfully managed to redirect one of its principal technetium-bearing streams, feeding it into the HAL storage plant instead of discharging it to the marine environment. Here it is mixed with the other HA liquor streams and ultimately vitrified. In order to support the reprocessing base load and prepare for the clean-out of its major facilities such as the HAL storage plant, Sellafield Ltd is installing new evaporative capacity, designed to handle some of the entrained materials that may arise. This, together with the application of the waste management hierarchy, is planned to further reduce discharges into the marine environment. This is a significant improvement in the strategy compared with earlier plans.

Work towards provision of a disposal facility for higher-activity waste

K.14. The 2008 MRWS White Paper^[11] set out a staged process for implementing geological disposal. In parallel with the publication of the White Paper the UK Government invited communities to express an interest in hosting the disposal facility. To date, three local authorities have expressed an interest for the two areas of Copeland and Allerdale boroughs. The authorities are currently considering whether or not they should participate in a geological siting process, without commitment to eventually hosting a facility. Detailed information on the implementing geological disposal process is set out at many points in the report (see Sections A.2.17 to A.2.20, A.2.76 and A.2.77, B.3 to B.5, B.23 to B.29, B.80 to B.85, and GH.54 to GH.57).

K.15. A geological disposal facility will be subject to existing effective regulatory regimes administered by the UK's nuclear regulators. It will not proceed unless the regulators are content that it is safe, secure and environmentally acceptable. All aspects of regulatory decision making (except those affecting security or commercial confidentiality) will be conducted in an open and transparent manner and the process for granting licences or authorisations will include public and stakeholder consultation; this will provide the opportunity for the public and stakeholders to present their views.

Radioactive Substances Regulation - Environmental Principles

K.16. The Environment Agency first published its Radioactive Substances Regulation Environmental Principles (REPs) in August 2009. They were republished in April 2010^[67] as part of a set of guidance principles supporting the implementation of EPR10. The REPs form a consistent and standardised framework for the technical assessments and judgements that the Environment Agency must make when regulating radioactive substances. The REPs will provide technical guidance that helps underpin decisions relating to radioactive substances regulation - including those decisions where the Environment Agency is the regulatory authority and those where it is being consulted by another regulatory authority. The target audience for the REPs is primarily environmental regulators, but they will be of considerable value in assisting operators and owners of nuclear sites, and other users of radioactive

substances in understanding the Environment Agency's regulatory approach. The REPs are consistent with the Environment Agency's commitment to modernising regulation and improving its effectiveness and efficiency.

K.17. One of the principles addresses the use of BAT to ensure that production of radioactive waste is prevented and, where that is not practicable, minimised with regard to activity and quantity. In July 2009, UK Government published Statutory Guidance^[29] to the Environment Agency that introduced application of BAT in England and Wales and replaced use of BPEO and BPM. Application of BAT is considered more consistent with environmental protection regimes applied in other countries.

Radioactive waste disposal regulation initiatives

K.18. Under the Environmental Permitting Programme, radioactive substances regulation was incorporated into the Environmental Permitting (England and Wales) Regulations 2010 (EPR10), which came into force in April 2010. The EPR10 replaced RSA93 in England and Wales but did not introduce any major changes in scope or nature of radioactive substances regulation except provision of a new power to allow staged regulation of geological disposal facilities.

K.19. The Environmental Permitting Programme seeks to streamline and integrate environmental permitting regimes into a single system and has already been successfully adopted for two major pollution control regimes. The Environmental Permitting Programme is a joint initiative between Defra, DECC, the Environment Agency and Welsh Government that provides a reduced administrative burden on industry and regulators in England and Wales without compromising environmental and human health standards. See Defra website, Annex L.10.

Public Health England

K.20. Subject to Parliamentary decision, the Health Protection Agency (HPA) will be abolished in 2013 and all of its functions, including that for radiation protection, and protection from chemical hazards, transferred to the Secretary of State for Health. These functions will be exercised on his behalf by Public Health England, which will be part of the Department of Health.

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Annex L.1. - Spent Fuel Policy, Practices, Facilities and Inventories

Categorisation of spent fuel, plutonium and uranium

L.1.1. Historically, spent fuel, plutonium and uranium have generally not been considered to be radioactive wastes. Until now, UK policy has been that it is up to the owners of these materials to decide whether to classify them as wastes or not.

L.1.2. However, with the creation of CoRWM, the formation of NDA and changes in the nuclear industry, it is recognised that some of these materials may in the future be categorised as radioactive wastes.

L.1.3. CoRWM has consulted widely on whether some or all of these materials may be classified as wastes in the future, and what impact that would have on the long-term management plans for them. CoRWM has concluded that such materials could be disposed of with higher-activity wastes via geological disposal.

Spent fuel management and reprocessing policy

L.1.4. The UK Government's spent fuel management policy on the question of whether to reprocess (and if so, when), or to seek alternative spent fuel management options, is that it is a matter for the commercial judgment of the owners of the spent fuel, subject to meeting the necessary regulatory requirements. The Government also accepts that spent fuel should not be categorised as waste while the option of reprocessing it remains open and a future use for the fuel can be foreseen. However, as stated in Section GH.122, the Government is currently not expecting any proposals to reprocess spent fuel from the proposed new nuclear power plants and therefore spent fuel from these power stations would be designated as higher-activity waste.

Spent fuel management and reprocessing practices

Magnox fuel

L.1.5. Spent Magnox fuel cannot be stored indefinitely because its condition deteriorates with time. Hence, it is initially stored, either in water-filled ponds at most power stations or in the case of the Wylfa power station in north Wales, in a dry store, to allow for the radioactive decay of short-lived isotopes (minimum 90 days). Splitter blades (external vanes which form part of the fuel cladding to channel reactor coolant gas flow) of the helical fuel design are removed at the power stations shortly before the spent fuel is dispatched to Sellafield in the northwest of England. Transport to Sellafield is in specially designed flasks, and (except for fuel from Chapelcross) is initially by road to a railhead local to each power station, and then by rail. Fuel from Chapelcross is transported to Sellafield by road. The flasks of Magnox fuel are received into the Fuel Handling Plant (FHP) at Sellafield. The fuel is stored under water within containers for another period of time in FHP to allow further radioactive decay. Then the Magnox cladding is removed in a decanning cave and treated as radioactive waste. The bare uranium metal fuel rods are loaded into heavily shielded containers for transfer to the Magnox Reprocessing Plant for reprocessing.

Advanced Gas-cooled Reactor fuel

L.1.6. Spent AGR fuel is first held under water in containers for at least 100 days at the power stations, before being transported by rail to Sellafield, using specially designed flasks. Again, fuel elements are stored under water in the FHP to cool before being dismantled and transferred either for interim storage or sent directly to Thorp for reprocessing. EDF Energy has contracts with Sellafield Ltd for reprocessing 5,500te of its AGR fuel. Spent fuel in excess of this contracted quantity will be stored. Under the current BE contracts, NDA has to reprocess 4,758te, with an additional 800te being optional - the remainder will be stored under water in the Thorp Receipt and Storage pools until around 2080 when it will be conditioned and disposed of to the GDF. With EDF's desire to extend the life of its fleet by an average of five years, Thorp Receipt and Storage is expected to store between 5,500te and 6,000te.

UK Pressurised Water Reactor fuel

L.1.7. Spent PWR fuel from Sizewell B power station in the southeast of England is currently being stored under water at site. For future plans, see Sections L.1.19 to L.1.22.

Other fuels

L.1.8. In the past, spent Prototype Fast Reactor (PFR) fuel from Dounreay in the north of Scotland was reprocessed in a plant at Dounreay. This plant is now closed and the current proposal is to condition the remaining spent fuel at Dounreay for safe interim storage. The options for dealing with the fuel are under consideration.

L.1.9. The spent Dounreay Fast Reactor (DFR) "driver" fuel was reprocessed at Dounreay. The majority of the spent DFR breeder fuel has been reprocessed, but there remains some breeder fuel in the reactor, and stored within the spent fuel storage facilities, which must be treated. Discussions are ongoing within the NDA estate as to whether this breeder fuel should be transported and reprocessed as part of the Magnox Operating Plan at a Sellafield facility, or should be consigned to a yet-to-be-determined solid waste route.

L.1.10. The spent fuel from the high temperature gas-cooled reactor (known as DRAGON), previously stored adjacent to the reactor at the Winfrith nuclear licensed site in the south of England, has been transferred to Harwell, the licensed site near Oxford, for packaging and storage.

L.1.11. Spent low irradiated GLEEP (Graphite Low Energy Experimental Pile) fuel is packaged and stored at Harwell.

L.1.12. Spent low irradiated ZEBRA (Zero Energy Breeder Reactor Assembly) fuel as natural uranium oxide plates have been returned to the UK from Cadarache in France and sent to Dounreay where it is currently stored. Similar plates containing plutonium continue to be stored at Cadarache and are subject to ongoing discussions between French authorities and NDA to determine final disposition.

L.1.13. Spent lightly-enriched uranium fuel from WAGR and from the Steam Generating Heavy Water Reactor (SGHWR) at Winfrith is currently stored at Sellafield. The current plan is that both types of fuel will be reprocessed in Thorp. The UK spent fuel strategy being reviewed by NDA and the eventual destination of this material will form part of that review.

L.1.14. There is an opportunity to relocate the DRAGON fuel from Harwell to another site for treatment and interim storage pending a national disposal option as part of NDA's updated strategy.

Spent fuel management facilities

Storage of spent fuel at reactor sites

Magnox reactor sites

L.1.15. Other than at Wylfa, the Magnox reactor sites have storage ponds where spent fuel is held under water for a short cooling period, before shipment to Sellafield for reprocessing. The Magnox reactors at Wylfa and Oldbury are still in the operational phase. Sizewell A, Dungeness A, Chapelcross and Calder Hall are in Stage 1 decommissioning. Bradwell, Hunterston A, Trawsfynydd and Berkeley have been de-fuelled.

L.1.16. Oldbury is currently in the generating phase and is scheduled to cease generation in June 2011. A multi-part safety case to extend generation on one reactor (Reactor 1) until mid-December 2012 is currently in production and/or undergoing assessment. This period of extended generation is termed Generation Optimisation 3 (GO3). In the absence of any new fuel stock, operation of Reactor 1 during GO3 will require the inter-reactor transfer of part-irradiated fuel from the shutdown, donor reactor (Reactor 2) to Reactor 1. A post operation and de-fuelling safety case has been prepared and was presented to the Nuclear Safety Committee in May 2008. This safety case is being reviewed in light of the changes which GO3 will bring about. It is the intention of the site that decommissioning will commence prior to February 2013.

L.1.17. Wylfa has three primary spent fuel dry store cells, plus two secondary dry store cells. The spent fuel is dispatched to Sellafield for reprocessing after a short cooling period. Wylfa remains in the generating phase. It is currently scheduled to cease generation in 2012, in line with the current version of the Magnox Operating Plan. Consideration is being given to extending generation beyond this date, should the opportunity arise as a result of changes to the Magnox Operating Programme. A business case for this extension has been submitted to NDA and safety cases are currently being prepared. This would include the inter-reactor transfer of partially irradiated fuel in order to maximise the utilisation of the limited stocks of fuel which are available for the Wylfa reactors. Generation beyond the Periodic Safety Case review date of September 2014 is considered to be very unlikely. A post-generation safety case is currently under preparation and work is in progress on de-fuelling preparations and decommissioning preparations.

Advanced gas-cooled reactor sites

L.1.18. Each AGR station has one fuel storage pond. After a short cooling period under water, the spent fuel is dispatched to Sellafield for reprocessing or long-term storage.

Sizewell B pressurised water reactor site

L.1.19. The station has capacity in the storage ponds to store fuel which arises up to 2015. For accounting purposes, Sizewell B has a lifetime of 40 years and an assumed closure date of 2035. To meet the shortfall in storage capacity, the plan is to construct an ISFSI at Sizewell to accommodate all spent fuel arising from the site, including that already in the wet store. A planning consent process and public

consultation was initiated in 2009 with the assumption that by 2015 a dry storage facility could be constructed. The ISFSI will continue to store the spent fuel for many decades after the station is decommissioned, pending final disposal in an off-site facility (assumed to be a national GDF). The estimated total spent fuel arising from 40 years operation at Sizewell B is 1,049 tonnes Uranium.

L.1.20. To accommodate the 2,280 assemblies that make up the lifetime arisings, 80 flasks are required. The building is designed to accommodate all 80 flasks. The metal flask itself will be used to transfer spent fuel assemblies from the pond to the storage building, with no other storage or transfer overpack being required. Typically, spent fuel will be transferred to metal flasks in batch campaigns. A metal flask can be processed from pond to storage in a 10-day period.

L.1.21. The metal flasks are designed to maintain an inert gas atmosphere for the storage of the spent fuel assemblies. The system is passive with heat dissipated through the external surface of the flask. Cooling of the building is achieved by natural convection.

L.1.22. All spent fuel will be progressively switched to dry storage by 2045. Thereafter, the store will operate in a passive mode until fuel is retrieved, beginning in 2080, and transported over a 20-year period to an encapsulation facility and disposed of to the national GDF. The decommissioning of the ISFSI will be effected over a 2-year period, commencing in 2100.

Storage of spent fuel at other sites

Dounreay

L.1.23. An irradiated Fuel Cave was used for the handling and temporary storage of fuel elements. A pond is used as a buffer store.

Sellafield

L.1.24. The original Windscale reactor pond built between 1948 and 1952 was subsequently modified to handle Magnox fuel from the Calder Hall reactors which it did until 1960.

L.1.25. A second pond operated from 1960 until 1986 as a receipt, storage and de-canning facility for Magnox fuel. An adjacent pond has operated since 1965 for the storage of oxide fuel, comprising receipt facilities, services and storage pond with bays built between 1965 and 1982. It also stores empty high-integrity multi-element bottles that have been used in LWR fuel transport and storage, prior to their disposal.

L.1.26. A further separate pond has operated since 1982 for the storage of AGR fuel received directly from the power stations or from FHP. Fuel is stored prior to processing, after which dismantled fuel is dispatched to Thorp Receipt and Storage ponds in internal transit flasks.

L.1.27. The FHP pond opened in 1984 comprising three bays, two of which are currently used for Magnox fuel storage and one for AGR fuel. Magnox fuel is typically stored for 6 months to allow radioactive decay of short-lived isotopes. It is then transferred to one of two de-canning caves where the Magnox cladding is then removed from the fuel rod, which is sent to the Magnox Reprocessing Plant for reprocessing. Cladding debris (known as swarf) that is produced during the de-canning of fuel is transported to another plant where it is placed into drums and encapsulated in a cement matrix. AGR fuel is stored for some years before being

sent to Thorp for reprocessing. Storage arrangements are carefully designed to eliminate the potential for criticality events.

L.1.28. The Thorp Receipt and Storage Ponds opened in 1988 and act as a temporary store for AGR fuel and LWR fuel en route to reprocessing.

Reprocessing facilities

L.1.29. The first reprocessing plant operated at Sellafield from 1952 to 1964. This reprocessed defence fuel from the Windscale Piles and fuel from the first Magnox reactors. Part of this plant was modified and used to gain experience in oxide fuel reprocessing. That operated from 1969 to 1973 processing WAGR cooled reactor fuel, SGHWR fuel and foreign water cooled fuel.

Sellafield - the Magnox reprocessing plant

L.1.30. Commissioned in 1964, the Magnox Separation Plant is where the chemical separation of the Magnox fuel rods into their chemical components takes place.

L.1.31. The effluents from the various stages of the reprocessing operation are treated in separate plants according to their level of activity. Fission products from the fuel are concentrated by evaporation, interim stored and then vitrified. Discharges of liquid and gaseous effluents are take place in conformity with environmental permits under EPR10. The licensee must demonstrate that BAT has been used to minimise environmental impact.

Sellafield - Thermal Oxide Reprocessing Plant

L.1.32. Commissioned in 1994, the Sellafield Thermal Oxide Reprocessing Plant (Thorp) reprocesses irradiated oxide fuel, primarily from AGR and LWR reactors. After a cooling period in the main storage pond, the fuel is monitored and sheared into short pieces which are then dissolved in nitric acid using a batch dissolution process. The insoluble stainless steel or Zircalloy cladding pieces (hulls) are removed from the fuel solution and, after monitoring for un-dissolved fuel, are transferred to containers for transportation to another plant for encapsulation in a cement matrix. The remaining fuel solution still contains two types of particulate materials: cladding fines, resulting from the shearing action, and insoluble fission products. The fines, which settle in the base of the dissolver, are extracted and packed in the containers together with the hulls. The insoluble fission products and any remaining fines are separated. Solvent extraction is then used to separate clarified liquid solution into the uranium bearing stream, the plutonium bearing stream and the waste fission products.

L.1.33. The effluents from the various stages of the reprocessing operation are treated in separate plants according to their level of activity. Fission products from the fuel are concentrated by evaporation, interim stored and then vitrified. Metal cladding "hulls", fines, barium carbonate and centrifuge cake are encapsulated in cement. Discharges of liquid and gaseous effluents take place in conformity with environmental permits under EPR10. The licensee must demonstrate that BAT has been used to minimise environmental impact.

Inventory of Spent Fuel

Article 32.2 - This report shall also include:

(ii) an inventory of spent fuel that is subject to this Convention and that is being held in storage and of that which has been disposed of. This inventory shall contain a description of the material and, if available, give information on its mass and its total activity;

Spent fuel inventory in the UK as at 1 April 2010

L.1.34. No spent fuel has been disposed of in the UK to date.

L.1.35. The UK's current stock of spent fuel consist mainly of Magnox, AGR and PWR fuels, but also includes small stocks of various spent experimental fuels such as PFR, DFR, GLEEP and Dragon fuels. The UK also holds stocks of LWR fuel owned by overseas customers.

L.1.36. A summary of the inventory follows in Table L1.1.

TABLE L.1.1 - Spent Fuel Inventory⁽¹⁾ (as of 1 April 2010)

Location		Approximate Quantity (tonnes Uranium)
Dounreay	Various	55 ⁽²⁾
Magnox Power Stations	Magnox fuel	290
Sellafield	Irradiated Magnox fuel	420
	Irradiated AGR fuel	2,900
	Irradiated LWR fuel	680 ⁽³⁾
	Irradiated SGHWR fuel	120
	Other fuel	358
EDF Energy	AGR and PWR fuel	480
Others	Various	14 ⁽⁴⁾

(1) Data reported is consistent with the report Radioactive Materials not reported in the 2010 UKRWI.

(2) Consists of 54te of UK owned fuel and 0.7te of overseas fuel.

(3) All LWR fuel is of overseas origin.

(4) Comprised mainly low-irradiated ZEBRA fuel as plutonium plates on loan to Cadarache in France, natural uranium oxide plates which have now been returned to Dounreay, and other fuels at Harwell and Winfrith.

Annex L.2. - Radioactive Waste Policy, Practices, Facilities and Inventories

L.2.1. Within the UK, responsibilities for radioactive waste management are allocated as follows.

L.2.2. The Government maintains and continues to develop a policy and regulatory framework which ensures that:

- radioactive wastes are not unnecessarily created;
- such wastes as are created are safely and appropriately managed and treated; and
- they are then safely disposed of, at appropriate times and in appropriate ways.

L.2.3. Policy also has the aims of safeguarding the interests of existing and future generations and the wider environment, and in a manner that commands public confidence and takes due account of issues.

L.2.4. The regulators, including the environment agencies, have the duty to ensure that the policy and regulatory framework is properly implemented in accordance with their statutory powers.

L.2.5. Within the framework, the producers and owners of radioactive waste are responsible for developing their own waste management strategies, consulting the Government, regulatory bodies and disposal organisations as appropriate.

L.2.6. They are also responsible for bearing the costs of managing and disposing of the waste, including the costs of regulation and of related research undertaken both by themselves and by the regulatory bodies.

Definition of radioactive waste

L.2.7. Radioactive waste in the UK is defined in Schedule 23 of EPR10 and Section 2 of RSA93 as follows:

“...“radioactive waste” means waste which consists wholly or partly of

(a) a substance or article which, if it were not waste, would be radioactive material, or

(b) a substance or article which has been contaminated in the course of the production, keeping or use of radioactive material, or by contact with or proximity to other waste falling within paragraph (a) or this paragraph.”

The definition depends upon the definition of radioactive material which is defined in Schedule 23 of EPR10 and in Section 1 of RSA93. These definitions are included in amending regulations made under the Exemption Order review.

L.2.8. Radioactive waste is defined in the Transfrontier Shipment of Radioactive Waste and Spent Fuel Regulations 2008 as:

“radioactive material in gaseous, liquid or solid form for which no further use is foreseen by the countries of origin and destination, or by a person whose

decision is accepted by these countries, and which is controlled as radioactive waste by a regulatory body under the legislative and regulatory framework of the countries of origin and destination”.

Categorisation of Radioactive Waste

L.2.9. In the UK, historically, radioactive waste has been classified under the following broad categories, according to its heat-generating capacity and activity content:

High-level waste

High-level waste (HLW) is waste in which temperature may rise significantly as a result of its radioactivity, so that this factor has to be taken into account in designing storage or disposal facilities.

Intermediate-level waste

Intermediate-level waste (ILW) is waste with radioactivity levels exceeding the upper boundaries for low-level waste, but which does not require heating to be taken into account in the design of storage or disposal facilities.

Low-level waste

Within the UK, low-level waste (LLW) is now defined as radioactive waste having a radioactive content not exceeding 4 gigabecquerels per tonne (GBq/te) of alpha or 12 GBq/te of beta/gamma activity. This definition is a general definition which does not relate to specific disposal sites.

Very-low-level waste

Very-low-level waste (VLLW), a sub-category of LLW is defined as:

in the case of low volumes ('dustbin loads') – Low Volume VLLW:

“Radioactive waste which can be safely disposed of to an **unspecified** destination with municipal, commercial or industrial waste (“dustbin” disposal), each 0.1m³ of waste containing less than 400 kilobecquerels (kBq) of total activity or single items containing less than 40 kBq of total activity”

For wastes containing carbon-14 or hydrogen-3 (tritium):

- in each 0.1m³, the activity limit is 4,000 kBq for carbon-14 and hydrogen-3 (tritium) taken together; and
- for any single item, the activity limit is 400 kBq for carbon-14 and hydrogen-3 (tritium) taken together.

Controls on disposal of this material, after removal from the premises where the wastes arose, are not necessary.

or, in the case of bulk disposals – High Volume VLLW:

“Radioactive waste with maximum concentrations of four megabecquerels per tonne (MBq/te) of total activity which can be disposed of to specified landfill sites. For waste containing hydrogen-3 (tritium), the concentration limit for tritium is 40MBq/te. Controls on disposal of this material, after removal from

the premises where the wastes arose, will be necessary in a manner specified by the environmental regulators”.

The principal difference between the two definitions is the need for controls on the total volumes of VLLW in the second (high volume) category being deposited at any one particular landfill site.

Higher-activity waste

In the UK, higher-activity waste (HAW) is defined by Government as HLW, ILW, and such LLW as by its nature is not currently suitable for disposal in existing LLW disposal facilities.

Consideration whether to regulate radioactive materials as radioactive waste

L.2.10. The UK accepts the decision of the owner of any radioactive material as to whether there is any foreseen use for that material, and hence whether it is, or is not, radioactive waste.

L.2.11. The Government keeps such issues under review and its assessment of waste management options includes not only materials currently classified as waste, but also considers the consequences of providing for other materials which may have to be managed as waste in the future, such as some separated plutonium and uranium, as well as certain quantities of spent nuclear fuel.

L.2.12. The future management options for the UK's civil plutonium include its possible use as a fuel. However, up to 5% of this stock may be so contaminated that, even though it may also be technically possible to treat and use this amount for fuel, it might prove uneconomic to do so. In order to advise Government, NDA undertook a study of the possible options for the management of UK-owned civil stocks. In February 2011, the Government published, for public scrutiny and consultation, its proposed approach to the long-term management of civil plutonium. This proposed approach recognises that, in view of the non-proliferation and security concerns in relation to plutonium, the Government has a duty to develop a long-term vision for its future handling. The UK's current policy is for long-term storage in safe and secure purpose-built facilities, pending a final decision on the best management solution. The Government's preliminary view is that the best prospect of delivering a long-term solution for plutonium management is through reusing the plutonium to make MOX fuel. This preliminary view will be conditional in that it will have to be tested to show that it is affordable, deliverable and offers value for money, taking into account safety and security requirements, before the UK Government will be in any position to take a final view.

L.2.13. More generally, the Government urges the other owners of these materials, on a voluntary basis, to put in hand procedures now that would allow them to identify those materials that may become not economically reusable.

L.2.14. NDA is the owner of the UK's plutonium on its designated sites and has consulted on management options for this material, as part of the development of its first strategy. NDA is also responsible, through its contractors, for the safe storage of plutonium on its sites owned by overseas customers, pending its eventual return to its owners in line with the UK's substitution policy.

Decommissioning

Objectives of decommissioning

L.2.15. The objective of decommissioning is to reduce progressively the hazard that the facility poses. Decommissioning operations should be carried out as soon as is reasonably practicable, taking all relevant factors into account.

Decommissioning strategies

L.2.16. Each operator is expected to produce and maintain a decommissioning strategy and plans for its sites. The Government expects that those strategies and plans will take into account the views of stakeholders (including relevant local authorities, the public and stakeholder groups). Such a strategy should take into account all relevant factors, assessing and presenting them in a transparent way underpinned by objective information and arguments. These include:

- a. ensuring worker and public safety;
- b. maintaining site security;
- c. minimising waste generation and providing for effective and safe management of wastes which are created;
- d. minimising environmental impacts including reusing or recycling materials whenever possible;
- e. maintaining adequate site stewardship;
- f. using resources effectively, efficiently and economically;
- g. providing adequate funding;
- h. maintaining access to an adequate and relevant skills and knowledge base;
- i. using existing best practice wherever possible;
- j. conducting research and development to develop necessary skills or best practice; and
- k. consulting appropriate public and stakeholder groups on the options considered, and the contents of the strategy.

L.2.17. The future use of the site, once decommissioning operations have been safely completed, could be a significant factor in determining decommissioning operations. The objective should be to get the best solution overall, taking into account the needs of the environment and the safety of workers and the local community.

L.2.18. Strategies should:

- harness the general benefits of radioactive decay, while the problems to which it may give rise in certain areas should be avoided;
- seek to avoid the creation of radioactive wastes in forms which may foreclose options for their safe and effective long-term waste management; and

- minimise (by the use of BAT or BPM, see Section B.21) the volumes of radioactive wastes which are created, particularly the volume of ILW.

L.2.19. Unless alternative arrangements come into effect in future, the Government confirms that operators should continue to process their decommissioning wastes, where appropriate, in accordance with 'Letter of Compliance' arrangements (see Sections B.78 and B.79).

L.2.20. Where short-term increases in discharges of some radionuclides are unavoidable, the relevant environment agency will need to be satisfied that they represent the optimal result from appropriate option studies, and reflect the application of BAT or BPM in implementing the ALARA principle (see Section B.21).

L.2.21. Operators should review their strategies when changes in circumstances, including relevant Government policies, make this necessary.

Funding of decommissioning operations

L.2.22. The Government expects that all operators will take the steps necessary to ensure that their decommissioning work is adequately funded.

Regulation

L.2.23. The Government expects that the nuclear regulators will ensure that the level of regulation is proportionate to the level of the risk to safety, the environment or security posed by the site.

Access to skills and development and spread of best practice

L.2.24. Operators should maintain the knowledge base, records and skills necessary for their decommissioning operations and management of associated wastes. NDA is fulfilling its skills obligation through its People Strategy, and is investing significantly in defining skills demands, building infrastructure, developing appropriate qualifications and provision, as well as encouraging recruitment into the industry and using world class benchmarks against other industries. To date, initiatives are being developed and implemented with partners and stakeholders including: Standard Resource Code definitions, Site Licence Company Skills Strategies, the Dalton Cumbria Facility, National Skills Academy for Nuclear and its delivery centres, a National Graduate Scheme and Community Apprenticeships in the supply chain. NDA published its Skills and Capability Strategy in April 2011, which defines the skills demands and puts forward a proactive action plan for future implementation.

Designing new nuclear facilities to take account of decommissioning

L.2.25. Any new facility should be designed and built so as to minimise decommissioning and associated waste management operations and costs.

Application of ALARA, ALARP, BAT and BPM in UK regulation

L.2.26. UK regulation is broadly based on the concept that risks should be as low as reasonably achievable (ALARA). This is translated into three broadly equivalent terms in various legislation: "As Low As Reasonably Practicable" (ALARP) in safety legislation and "Best Available Techniques" or "Best Practicable Means" (BPM) (see Section B.21).

Determining that risk has been reduced ALARP

L.2.27. HSE has published 5 documents relevant to radioactive waste management and decommissioning that give guidance to industry and ONR's staff. These are used by ONR's inspectors when making the judgement as to whether risks have been reduced to as low as reasonably practicable.

- 'Reducing Risks Protecting People'^[165] explains the basis for regulatory decisions regarding the degree and form of regulatory control of risk from occupational hazards;
- 'Principles and Guidelines to assist HSE in its Judgements that Duty-holders have reduced risk as low as reasonably practicable'^[166] sets out in plain terms what HSE believes the law requires;
- 'Assessing compliance with the law in individual cases and the use of good practice'^[167] defines what HSE means by good practice;
- 'Policy and Guidance on reducing risks as low as reasonably practicable in design'^[168] recognises the importance of taking account of health and safety in design; and
- 'Demonstration of ALARP'^[169] is used by ONR as guidance to its inspectors on how to apply the principle of ALARP to nuclear facilities and operations.

L.2.28. The essence of a demonstration that risks have been reduced ALARP is to show that the "costs" of improving safety further would be grossly disproportionate to the benefits that would accrue from implementing any further options for improvement or change to the status quo. This does not mean that a detailed analysis is necessary: the emphasis must be on an analysis that is fit for purpose. Neither does it mean that a quantitative argument based on risk estimates is always necessary, as qualitative features such as a demonstration of sound deterministic engineering principles may be sufficient in making a case.

L.2.29. However, ONR requires a Probabilistic Safety Assessment, in addition to deterministic analysis, for systems where there are significant hazards and complexity. Assessing an ALARP demonstration is essentially a consideration of whether an adequate argument has been made that a reduction in risk would not be feasible at a reasonable cost, given the magnitude of the risk. However where there are several risks that interact, whether arising from a single hazard or from different connected hazards, there may be a need for balancing to achieve the best overall solution.

L.2.30. The demonstration of ALARP will involve the licensee in evaluating the risks and deciding whether the existing control measures are sufficient or whether more should be done. This ought to include the consideration of a number of options to identify which option is the ALARP solution and making this consideration transparent. In reality, there may only be a limited number of options for dealing with a particular health and safety issue: good practice that the nuclear safety regulator may have accepted previously would provide a strong pointer in many situations.

Comparison of costs and risk reduction

L.2.31. If the ALARP demonstration employs a comparison of costs and risk reduction benefits to rule out an improvement, it must be shown that the costs of the improvement would be "grossly disproportionate". ONR has not formulated an

algorithm that can be used to determine the proportion factor for a given level of risk. The extent of the bias must be argued in the light of all the circumstances. It may be possible to come to a view in particular circumstances by examining what factor has been applied in comparable circumstances elsewhere to that kind of hazard or in that particular industry.

L.2.32. Societal concerns can arise when the realisation of a risk impacts on society as a whole. The impact may produce an adverse socio-political response (which has its origins in the public aversion to certain characteristics of the hazards concerned). The harm which results is a loss of confidence by society in the provisions and arrangements in place for protecting people and, consequently, a loss of trust in the regulator and duty-holders with respect to control of the particular hazard and hazards more generally.

Waste management – Regulators’ joint guidance

L.2.33. In February 2010, HSE and the environment agencies published revised joint guidance on management of higher activity wastes on nuclear licensed sites^[170]. The guidance applies to the whole process of managing radioactive waste from its generation to (but not including) its disposal. The joint guidance consists of:

- Overview and Glossary – both issued for trial use
- Part 1 The Regulatory Process
- Part 2 Radioactive Waste Management Case
- Part 3a Waste minimisation, characterisation and segregation
- Part 3b Conditioning and disposability - issued for trial use
- Part 3c Storage of radioactive waste - issued for trial use
- Part 3d Managing information and records relating to radioactive Waste

L.2.34. The guidance is supported by the “Fundamentals of the management of radioactive waste: an introduction to the management of higher-level radioactive waste on nuclear licensed sites” published in 2007^[171]. This is an introductory document that provides background information for those who may not be familiar with the subject of radioactive waste management on nuclear licensed sites.

L.2.35. The main aims of the guidance are to:

- provide a comprehensive source of information that can be used by nuclear site licensees and the regulators’ staff, and referred to by other stakeholders; and
- advise licensees on how to obtain regulatory acceptance of their proposals for radioactive waste management.

L.2.36. This guidance should assist licensees by providing:

- a clear and transparent regulatory process involving early dialogue between the nuclear industry, the regulators, NDA and other stakeholders;
- much greater business certainty at a time when the nuclear industry is committing significant resources to radioactive waste management; and

- a clear, auditable document trail of the basis for current regulatory decisions.

L.2.37. The joint guidance complements ONR's existing guidance to inspectors, and is used by ONR when dealing with nuclear safety cases^[55] and radioactive waste management issues^[56].

Radioactive waste management facilities

Article 32.2 This report shall also include:

(iii) a list of the radioactive waste management facilities subject to this Convention, their location, main purpose and essential features;

Nuclear Decommissioning Authority (NDA)

Sellafield (including Calder Hall and Windscale)

L.2.38. The waste treatment and conditioning facilities at Sellafield comprise:

Waste Management and Compaction plant

L.2.39. This plant receives compactable LLW from around the UK, but principally from within the Sellafield complex. The waste is compacted, and placed into containers for shipment to the LLWR. There it is grouted and placed in a shallow disposal vault.

Waste Treatment Complex

L.2.40. This plant processes PCM, including historic stored wastes and also new ongoing arisings. 200 litre drums of PCM are super-compacted. Typically an average of 6 of the resulting compacted “pucks” are placed in larger, 500 litre stainless steel drums, which are then in-filled with a cement grout, before being transported to a store for PCM.

Magnox Encapsulation Plant (MEP)

L.2.41. This plant receives the cladding debris (swarf) produced during the de-canning of the Magnox fuel. It has also received retrieved Magnox cladding material, which had been stored in bulk, underwater, in large silos. Cladding from either source is tipped into 500 litre stainless steel drums, which are then in-filled with a cement grout matrix.

Wastes Encapsulation Plant (WEP)

L.2.42. This plant encapsulates LWR and AGR fuel cladding waste from oxide fuel reprocessing in Thorp. It also encapsulates slurries generated in Thorp. As in MEP, cladding is tipped into 500 litre stainless steel drums and is then in-filled with cement grout. The slurries are treated using an in-drum mixing process: they are metered into similar drums but which are fitted with an integral paddle. Cement powder is added to the slurry in the drum, which is then intimately mixed using the paddle to produce a homogeneous waste form.

Waste Processing and Encapsulation Plant (WPEP)

L.2.43. Flocs generated by the actinide liquid effluent clean-up plant are encapsulated in WPEP using the same in-drum mixing technique used in WEP and a similar 500 litre drum design.

Future treatment plants

L.2.44. Sellafield has started construction of a number of new treatment plants. These will address the needs of the retrieval of legacy wastes from the old ponds and silos. Under construction are:

- Sludge Packaging Plant for the ILW sludges from a Magnox pond;
- Silo Direct Encapsulation Plant for the Magnox swarf from a silo; and
- Box Encapsulation Plant for miscellaneous ILW solids.

Engineered storage for conditioned wastes

L.2.45. This consists of a modern series of stores designed to store PCM waste, miscellaneous solids, vitrified HAL, encapsulated Magnox swarf and Thorp hulls and sludges, and encapsulated waste from effluent treatment plant. Additions to this series of stores will be provided as required. A third encapsulated product store for ILW from reprocessing is under construction at the time of writing this report.

L.2.46. In April 2010, there were 11,500m³ of fuel element cladding, 6,800m³ of solids from liquid effluent treatment, 1,100m³ of encapsulated PCM, 900m³ of barium carbonate, centrifuge cake and encapsulated scrap, and 766m³ of vitrified HLW in engineered storage at Sellafield.

Interim PCM drum storage, raw waste

L.2.47. This consists of a series of old buildings and temporary stores in which PCM has been accumulated in the past. A programme of work has been completed to retrieve this waste, and to store it in modern standard stores at Sellafield pending conditioning it in a waste treatment plant and transfer to the engineered drum stores described above.

L.2.48. In April 2010 there were 13,500m³ of unconditioned PCM in storage at Sellafield.

Ponds (excluding fuel storage)

L.2.49. The earlier fuel ponds at Sellafield contain, in addition to any remaining fuel and fuel debris, sludges and solid waste that has been accumulated over the years. Plans are being developed to recover this material and condition it for storage in engineered stores.

L.2.50. In April 2010 there were 1,600m³ of fuel sludges and 3,100m³ of solids (mainly fuel and fuel bearing wastes).

L.2.51. The legacy ponds and silos (see below) are the subject to regulatory requirement to remove wastes by specified times.

ILW silos

L.2.52. Two silos on the site have been used to store cladding material from Magnox fuel and also other miscellaneous solid waste. Plans are being developed to recover this material and condition it for storage in engineered stores.

L.2.53. In April 2010 there were 13,200m³ of fuel element cladding and items too contaminated to be classed as LLW. This figure includes the Magnox Swarf Storage Silo inventory.

L.2.54. The legacy ponds (see above) and silos are the subject of regulatory requirements to remove wastes by specified times.

ILW tanks

L.2.55. Liquid and sludge wastes are stored in a number of tanks on the site. These either form part of existing waste treatment processes or hold historic wastes awaiting a treatment process. In all cases, treatment plants exist or are planned to condition the waste into a solid form for storage in engineered stores. Significant progress has been made with treating the stocks of liquid since the last report.

L.2.56. In April 2010 there were 7,300m³ of solids from liquid effluent treatment. This figure includes flocculate storage tank inventory and SIXEP sludge and sand/clinoptilolite.

Miscellaneous stores

L.2.57. There are a number of storage locations around the site not fitting into any of the above categories. The wastes include used fuel assembly components, filters and miscellaneous scrap.

L.2.58. In April 2010 there were 7,700m³ of AGR dismantler wastes and miscellaneous beta gamma wastes that are in interim storage. Of this volume, 700m³ is ILW from Windscale.

Management of solid wastes, liquid and aerial effluents

L.2.59. During the years 2005 to 2007, the regulators carried out comprehensive audits of Sellafield's management of solid wastes, and of liquid and aerial effluents (see Sections A.3.38 to A.3.44).

Management of highly-active liquid wastes and vitrification

L.2.60. Sellafield stores and concentrates HA raffinates from the reprocessing of nuclear fuel. Since the last report, it has been found that the reliability and availability of the evaporators and HA storage tanks has not been adequate to support the planned throughput from reprocessing activities. New evaporative capacity is being built and a small number of new HA storage tanks is planned. In the meantime, priority is given to the management of HA liquor from Magnox reprocessing and oxide fuel reprocessing at Thorp is having to be constrained. Sellafield Ltd continues to operate WVP, with the aim of meeting the specifications placed by the HSE for the HAL stocks (see Sections A.3.35 to A.3.37). The quantity of HAL waste is governed by a regulator imposed specification, which requires Sellafield Ltd to reduce the waste inventory to steady state/buffer levels by 2015. The site is on programme to meet this commitment.

L.2.61. In April 2010 there was 1,850m³ of HAL waste.

Contaminated ground and groundwater

L.2.62. The Sellafield site has experienced leakage to ground of radioactive liquids. An extensive programme of work is in hand to characterise the extent of contaminated land, to model the movement of radioactivity in groundwater, and to identify appropriate remediation and treatment processes.

Windscale

L.2.63. The main waste management facilities at Windscale are:

Active Handling Building

L.2.64. The Active Handling Building remains an operational Post-Irradiation Examination facility for nuclear reactor fuel, which is also used for treatment and packaging of LLW and ILW, and the handling of redundant sources.

WAGR Packaging Plant and Box Store

L.2.65. The WAGR Box Store provides interim storage for the shielded boxes of waste from decommissioning WAGR. LLW is held pending transfer to the LLW Repository for disposal, and the ILW (and some LLW unsuitable for LLWR) is stored pending alternative long-term storage or the availability of an ILW Repository. Improved waste packing efficiencies achieved by the WAGR project has resulted in spare capacity within the store. Options to utilise the available space for other ILW are being assessed to maximise utilisation of the available capacity.

Magnox power stations (operational and decommissioning)

L.2.66. Across the Magnox sites, the principal waste storage facilities are as follows:

- Underground vaults;
- Above-ground vaults;
- Reactor voids; and
- Tanks.

L.2.67. The wastes stored in these facilities are of four general types:

- Solid (and some potentially mobile) intermediate level wastes; both activated and contaminated, including Magnox debris and ex-reactor components e.g. redundant Control Rods.
- Wet wastes, such as sludges and resins, which are stored in tanks or in lined vaults.
- Miscellaneous wastes, (some of which may be potentially mobile if wetted) e.g. activated or contaminated components.
- Desiccants, previously used to minimise moisture within the reactor coolant gas.

L.2.68. Generally, waste stores are adequate to the end of station lifetimes. As part of decommissioning, wastes may need to be conditioned and new stores may need to be built.

Dounreay

L.2.69. The waste treatment and conditioning facilities at Dounreay comprise:

Dounreay cementation plant for immobilisation of ILW liquors

L.2.70. This plant processes the historic liquid waste arising from reprocessing of Materials Test Reactor (MTR) fuel. The MTR liquors are being emptied from their storage tanks and immobilised in a cementitious matrix within 500 litre drums for long-term interim storage and future disposal. Options for the treatment of the remaining historic liquid waste arisings from reprocessing DFR and PFR fuels are being reviewed.

Dounreay wet silo

L.2.71. The wet silo is an engineered store that contains long-lived solid Remote-Handled ILW (RHILW), stored under water together with the sludge resulting from operations and material degradation. The wet silo shut for the receipt of solid waste in 1998 and plans are being developed to retrieve the solid waste for encapsulation and the sludge waste for immobilisation, both into 500 litre drums for long-term interim storage and future disposal.

Dounreay shaft

L.2.72. The Dounreay shaft was excavated to remove spoil during the construction of a sub-sea effluent discharge tunnel. It was subsequently used for the disposal of solid ILW arisings from historic fuel-cycle operations during the period 1959 to 1977. The 65m deep shaft has been isolated by a grout curtain to minimise the ingress of ground water, in preparation for the retrieval of solid waste for encapsulation and the sludge waste for immobilisation into 500 litre drums for long-term interim storage and future disposal.

Low-level liquid effluent treatment plant

L.2.73. This plant consists of an underground effluent receipt tank, a buffer tank, two main effluent holding tanks and final filtration equipment. The main design purpose of the plant was to adjust the pH of incoming low-active effluent to between pH5 and pH9 and to settle the resulting sludge before discharging the effluent to sea.

Low-level waste receipt assay and characterisation and supercompaction facility

L.2.74. This facility is used for assaying and volume reduction of 200 litre drums of solid LLW. After super-compaction, the compacted drum pucks are loaded into half-height ISO containers for subsequent storage and disposal.

The existing stores at Dounreay are:

Unconditioned solid RHILW 200 litre drum store

L.2.75. This facility is currently used for storing arisings of solid RHILW. These are to be progressively transferred to the combined conditioned ILW 500 litre drum store and raw solid RHILW 200 litre drum store, to allow the store to be decommissioned.

Unconditioned solid CHILW 200 litre drum store

L.2.76. This facility is currently used for storing arisings of PCM, uranium-contaminated waste and thorium-contaminated waste, collectively known as contact-handled ILW (CHILW).

Combined conditioned ILW 500 litre drum store and raw solid RHILW 200 litre drum store

L.2.77. Used for storing immobilised MTR liquors and historic arisings of solid RHILW.

Interim storage of containerised LLW

L.2.78. Dounreay is currently storing arisings of solid LLW in ISO containers within three stores on site, pending the availability of a new disposal facility to be built at Dounreay.

Liquid ILW storage facility

L.2.79. This facility provides tank storage for liquors from MTR, DFR and PFR fuel reprocessing.

Solvents and oil storage facility

L.2.80. This facility includes tanks holding ILW contaminated solvent resulting from PFR fuel reprocessing, and bulk storage containers for low-level contaminated oils.

Harwell

L.2.81. The key waste management facilities at Harwell are:

Solid waste complex

L.2.82. The solid waste complex provides facilities for retrieval, processing and repacking RHILW and a processing/packing area for CHILW and LLW operations, including decontamination. It also includes stores for RHILW, CHILW and drums of waste originally intended for sea disposal. A waste encapsulation plant is currently being constructed in the solid waste complex, to make the RHILW passively safe.

Active handling facility

L.2.83. This facility was previously used for post-irradiation examination (PIE) work and consists of two concrete cell lines. Although the facility is in a regime of care and maintenance, one suite of cell lines remains available for re-packing redundant radioactive sources which are collected from around the UK and transferred to the site before they are packaged in the solid waste complex.

Radiochemical building

L.2.84. This building contains an interim store for CHILW and a stainless steel lined cell-line which is being used in the short-term for radium-bearing RHILW requiring additional treatment before it is packaged in the Solid Waste Complex.

Liquid effluent treatment plant

L.2.85. This plant consists of legacy sludges stored in tanks, a plant for immobilising the legacy sludges, facilities for the treatment of operational liquid effluent and the storage/conditioning of the resulting operational sludges. The volume of raw liquid effluent arising at Harwell is diminishing, and by 2015 it is foreseen that the solid waste complex will be the major producer of liquid effluent. A replacement liquid effluent treatment plant is being developed within the solid waste complex which will contain and evaporate fresh arisings prior to solidification and disposal to the UK LLWR. The current liquid effluent treatment plant will be decommissioned once existing stocks of historic sludges are processed and disposed.

Winfrith

L.2.86. The key waste management facilities at Winfrith are the:

Winfrith East treatment plant

L.2.87. This plant formerly processed and encapsulated reactor sludges into 500 litre disposal drums for long-term storage on site. This plant, and the storage tanks where the raw sludges were held, are currently being decommissioned and are scheduled to be demolished during 2011.

Treated radioactive waste store

L.2.88. This store is a shielded engineered store providing long-term storage for the waste encapsulated in 500 litre drums from the Winfrith East treatment plant. There is an opportunity to re-categorise the encapsulated sludge for disposal to the LLWR which is currently being progressed by RSRL.

Steam generating heavy water reactor

L.2.89. Decommissioning of the SGHWR is anticipated to resume in 2023. The facility is currently being used to host the processing of a variety of legacy solid decommissioning wastes generated at Winfrith. Typical processing activities include size-reduction and surface decontamination.

EDF Energy (formerly British Energy Generation Ltd)

L.2.90. Across EDF Energy (formerly British Energy Generation Ltd. (BEGL)) existing nuclear sites, the principal waste storage facilities are as follows:

- Voids - Integral to the AGR reactor structures.
- Wet waste storage tanks - these are either stainless steel or lined concrete cells.
- Desiccant Storage: vaults at two AGRs and in drums in the others.
- Sizewell B uses stainless steel tanks for storage of encapsulated ion exchange resins.

L.2.91. The wastes on EDF Energy sites are of the following general types:

- Fuel stringer debris - AGRs. This is a product of the dismantling of spent fuel assemblies prior to dispatch of the elements for reprocessing. Wastes are almost all metallic and are stored in the integral voids described above.
- Other dry wastes - Miscellaneous contaminated or activated components. These are significantly less radioactive than fuel stringer debris, but are still likely to remain ILW for many decades.
- Resins and sludges - Ion exchange resins are used at all BEGL sites to minimise contamination in the fuel storage ponds. At Sizewell B, resin is more extensively used than on AGRs to keep the primary circuit water coolant within tight chemical limits.
- Desiccants - Used to minimise moisture within the gas cooling circuits of AGRs. A process has been developed to treat desiccants to remove their principal contaminant (tritium), following which they could be encapsulated and disposed to a near-surface facility such as the LLWR. However, the proposals to discharge the tritiated effluent from this process into the environment would need the relevant environment agency's agreement. A fallback option is to encapsulate this waste directly and either dispose of it as LLW with a high tritium content (this would also require the agreement of the relevant environment agency) or store it on site alongside the other encapsulated wastes.

GE Healthcare

L.2.92. GE Healthcare has wastes stored at both its Amersham and Cardiff sites. Its management strategy for these wastes is treatment and disposal where possible, storage and decay (for later disposal via authorised routes), or interim storage followed by conditioning and long-term storage prior to GDF becoming available.

L.2.93. ILW is stored in 500 litre stainless steel drums, pending waste management and the sites have a storage capacity sufficient for all operational and decommissioning wastes.

L.2.94. GE Healthcare has about 100m³ of waste in drums which were originally intended for disposal at sea, but which have been stored since the international ban on sea dumping. Work is on-going to transfer the remaining drums, as part of the decommissioning of the Harwell site, either to Amersham or a third party for waste management.

Studsvik Metal Recycling Facility (MRF)

L.2.95. The Studsvik Metal Recycling Facility (MRF) was brought into active operations in September 2009. Regulatory consultations are complete to allow all sites in England and Wales to consign unlimited quantities of metallic waste for recycling to the MRF. Sites in Scotland can also apply for an authorisation to treat metallic waste at the Studsvik MRF facility. The purpose of the facility is to reduce the volumes of metallic waste needing disposal at the LLWR, whilst recovering valuable metal for recycling. The site processes low-level radioactive metals using a range of techniques including size reduction and shot blasting.

Other Sites

L.2.96. Licensed sites other than those covered in this report do not hold any appreciable volumes of ILW.

Radioactive waste inventory in the UK

Article 32.2 This report shall also include:

(iv) an inventory of radioactive waste that is subject to this Convention that:

- a. is being held in storage at radioactive waste management and nuclear fuel cycle facilities;
- b. has been disposed of; or
- c. has resulted from past practices.

This inventory shall contain a description of the material and other appropriate information available, such as volume or mass, activity and specific radionuclides;

L.2.97. A summary of the 2010 UKRWI is in Tables L.2.1 to L.2.3.

Table L.2.1 - Radioactive Wastes from all sources in stocks from 2010 Inventory

Packaged and not yet packaged volumes (m³)

Waste type	At 1.4.2010	Volume (m ³)
HLW	Total	1,850
	Packaged	1,000
	Unpackaged	850
ILW	Total	103,000 ⁽¹⁾
	Packaged	33,000
	Unpackaged	69,800
LLW	Total	69,200 ⁽²⁾
	Packaged	24,900
	Unpackaged	44,300

(1) Can be categorised as 638m³ of LILW-SL and 102,000m³ of LILW-LL.

(2) Can be categorised as 14,600m³ of LILW-SL and 54,600m³ of LILW-LL

Table L.2.2 - Expected total waste volumes from existing facilities to end of life - Volumes when packaged

Waste type	At 1.4.2010 (m ³)	Future arisings (m ³)	Total (m ³)
HLW	1,330	-8 ⁽¹⁾	1,330
ILW	159,000	329,000	488,000
LLW	80,200	4,460,000	4,550,000
Total	240,000⁽²⁾	4,790,000⁽³⁾	5,210,000

(1) Volume is net of HLW exports to overseas customers (hence negative figure).

(2) Can be categorised as 18,100m³ of LILW-SL and 221,000m³ of LILW-LL.

(3) Can be categorised as 406,000m³ of LILW-SL and 4,390,000m³ of LILW-LL

Table L.2.3 - Annual disposals of LLW (2005-2009)⁽¹⁾

Year	Total volume (m ³)
2005	12,800
2006	12,900
2007	9,100
2008	8,600
2009	7,000

(1) Total volume of waste packages consigned to the LLWR, there is 14,900m³ held in storage in vaults 8 and 9.

Decommissioning Facilities

Article 32.2 This report shall also include:

(v) a list of nuclear facilities in the process of being decommissioned and the status of decommissioning activities at those facilities.

L.2.98. A list of nuclear facilities in the process of being decommissioned and the status of decommissioning activities at those facilities is shown below.

Sellafield

Facility	Date of closure	State of decommissioning
First reprocessing plant	1973	In progress. Priority is being given to removal of the ventilation stack on top of this facility. This stack currently supports Magnox reprocessing; a new stack and ventilation system is under construction to enable the old stack to be isolated and removed.
Solvent purification plant	1973	Plant and equipment removed.
Analytical facilities	c.1960s	In progress.
Pilot reprocessing plant	1980s	Removed.
Fast reactor fuel plant	1988	4 out of 5 phases completed.
MOX fuel demonstration plant	2003	In progress.
Calder Hall power station	2003	Secondary plant and asbestos being removed. Reactors will not be de-fuelled until 2013.
Solid waste store	c.1970s	Material being recovered and repacked for modern stores.
Pile chimneys	1957	One significantly reduced in height. Plans to restart work on the second chimney advanced.
Plutonium Purification plants (several)	various	Most plant and equipment removed, some buildings removed.

Uranium Purification Plant	1990s	Plant, equipment and building removed
Magnox sludge settling facility	1984	Sludge removed, plant and equipment being removed
Pile Fuel Storage Pond (PFSP)	1960	The collection and movement of sludge to an in-pond corral is underway with new build sludge storage tanks nearing completion. A pilot scheme to transfer Magnox fuel from PFSP to improved storage conditions is underway and transfers are due to start this year.
Pile Fuel Cladding Silo	1967	The storage conditions in the waste silo have been modernised and work to implement waste retrieval is in the design stage. Preliminary ground works for new facilities have been completed and the start of waste retrievals has been brought forward 2 years in LTP 11 to 2017.
First Generation Magnox Storage Pond	1990	Facility improvements to refurbish fuel handling equipment and repair structural weaknesses are underway. Construction of new sludge buffer tanks is well advanced and sludge transfers are planned to start in 2014. The transfer of Magnox fuel to more modern storage facilities is planned to start in 2016. Work to recover intermediate level beta gamma waste has been trialled with items of redundant equipment being recovered to sent to the waste Encapsulation Plant.
Magnox Sludge Storage Silo	1990	Successful transfers of silo liquor hare now routine and are transferring soluble mobile inventory to the SIXEP plant for capture on ion-exchange media. Preparations for retrieval work are advanced and the first waste retrieval machine is planned to be in place and operating in 2016. The design and construction of the associated treatment plant is following a similar timescale.

Dounreay

Facility	Date of closure	State of decommissioning
Materials Testing Reactor (MTR)	1969	Reactor Stage 2 decommissioning complete and now in care and maintenance. Associated pond emptied and being decommissioned and associated PIE cave undergoing Post Operation Clean Out. ILW packages have all been removed from the RHILW storage area and decommissioning of this store has started.
Experimental Dounreay Fast-breeder Reactor (DFR)	1977	Stage 1 continues with the destruction of the liquid metal coolants and development of techniques for removal of sodium potassium residues from the internal surfaces of the reactor and associated equipment. The Breeder Fuel Removal facility has been constructed and is going through a full commissioning schedule prior to operations commencing in 2012.

Facility	Date of closure	State of decommissioning
Prototype Fast Reactor (PFR)	1994	Stage 1 decommissioning in progress. The bulk sodium from the core, secondary circuits and Irradiated Fuel Cell has been removed and destroyed. The secondary circuits have completed Stage 3 decommissioning. Plant design for removal of residual sodium from the internal surfaces of the reactor and associated equipment is under way.
Range of analytical and metallurgical laboratories and fuel examination facilities	Part operational	Redundant fume cupboard and glovebox labs being decommissioned on a staged basis. First three shielded cell labs have been decommissioned and decommissioning on the remainder is progressing.
Facility for handling and examination of irradiated fuel	Part operational	Stage 2 decommissioning complete and Stage 3 demolition now underway.
Post Irradiated Examination (PIE) facility	Part operational	Stage 1 decommissioning completed on redundant cells and now in care and maintenance.
Plutonium-handling building	1963	All stages of decommissioning completed followed by successful demolition.
Shaft and Silo Disused ILW storage facilities	1977 and 1999 respectively	The shaft has been hydraulically isolated from surrounding bedrock by cementitious grouting via a matrix of boreholes. Design work being progressed on the retrieval facility. Waste will be retrieved from the ILW Shaft and Silo at the earliest practicable date.
Plants for the reprocessing of mixed oxide fuels, and associated facilities	Operational (subject to HSE Direction)	Routine maintenance and surveillance continues.
Fuel Reprocessing Plant	1998	Stage 1 decommissioning completed and currently undergoing Stage 2 decommissioning.
MTR Fuel Fabrication Facility	2005	Facility now decommissioned and demolished.
Uranium Processing facility	Still in operation	Redundant areas undergoing Stage 1 and Stage 2 decommissioning. Preparations in hand to commence Stage 1 decommissioning of the remaining plant.
LLW treatment plant	2004	Stage 2 decommissioning being progressed.

Harwell

Facility	Date of closure	State of decommissioning
Low energy, graphite reactor	1990	Reactor fully decommissioned. Graphite core incinerated at an off-site facility.
Experimental graphite reactor	1968	Stage 2 decommissioning complete. Reactor in care and maintenance.
Materials testing reactors	1990	Stage 2 decommissioning largely complete. Reactors in care and maintenance.
Radiochemistry laboratory	Facility largely in a state of care and maintenance.	Majority of former operational areas cleared and decontaminated. Facility is in a state of care and maintenance with the exception of an existing cell line which is used to encapsulate radium-bearing wastes generated by the retrieval and treatment of ILW. The facility is used to store CHILW generated during decommissioning.
PIE concrete-shielded cells	Facility largely in a state of care and maintenance.	Stage 1 decommissioning complete. Facility in a state of care and maintenance with the exception of an existing cell line which is retained for the receipt of higher activity sealed sources collected as waste from around the UK.
PIE lead-shielded cells	Progressive closure completed in 1995.	Fully decommissioned.

Windscale

Facility	Date of closure	State of decommissioning
Air-cooled, graphite reactor	1957	Pile 1 is currently in surveillance and maintenance. Work to remove fuel and isotopes from the fire-damaged area of the reactor core has been deferred to focus funding on higher hazard facility decommissioning.
Air-cooled, graphite reactor	1957	Pile 2 is currently in care and maintenance.
Windscale Advanced Gas-cooled reactor (WAGR)	1982	Stage 2 decommissioning is in progress. Reactor Core and Pressure Vessel removal is complete with all wastes packaged and encapsulated. Remaining reactor vault structures are being removed and clearance of miscellaneous ILW and asbestos residues from the Reactor vault and waste route are planned prior to moving facility to surveillance and maintenance.
Fuel examination facility	1995	Stage 1 decommissioning complete. Currently preparing to remove and encapsulate the remaining ILW inventory prior to moving facility to surveillance and maintenance.

Facility	Date of closure	State of decommissioning
Lead shielded cells, used for PIE of fuel	Part operational	Facility is currently in surveillance and maintenance. Redundant facilities decommissioned to Stage 1. Decommissioning safety case has been implemented. Decommissioning project has been deferred to focus funding on higher hazard facility decommissioning.

Winfrith

Facility	Date of closure	State of decommissioning
Experimental high temperature helium-cooled power reactor (DRAGON)	1976	All fuel has been removed from site. All plant and equipment removed from the secondary containment building. Reactor is currently in care and maintenance pending Stage 3 decommissioning.
Zero energy reactor to support fast reactor core physics (ZEBRA)	1982	Reactor now fully decommissioned.
Steam Generating Heavy Water Reactor (SGHWR)	1990	All fuel has been removed from site. All plant and equipment in the secondary containment has been removed. Reactor is currently in care and maintenance pending Stage 3 decommissioning.
PIE facility	2001	Fully decommissioned.

Magnox power stations

The decommissioning strategy being implemented at each site comprises three stages:

Stage 1: Preparations for Care and Maintenance, which involves the removal of much of the conventional plant, retrieval and packaging of the accumulated operational wastes, and decontamination and removal of the ancillary systems.

Stage 2: Care and Maintenance Period (Safestore), in which the reactors will be maintained in a safe enclosure whilst radioactive decay occurs.

Stage 3: Final reactor dismantling and site clearance.

Station	Date of cessation of generation	State of decommissioning
Berkeley	1989	<p>De-fuelled by 1992 - all fuel removed to Sellafield for reprocessing.</p> <p>The majority of conventional plant has been dismantled, much of the materials have been released for recycling and buildings demolished.</p> <p>Fuelling machinery has been dismantled and disposed of. Most reactor ancillary systems have been de-planted. The 16 boilers have been disconnected from the reactors, the primary circuit gas ducts removed.</p> <p>The fuel cooling ponds have been demolished and all pond equipment has been disposed of. The concrete structure has been demolished with the inner contaminated layer of concrete disposed of as low-level waste to the LLWR.</p> <p>The reactor buildings were placed into Stage 2 (safestore) in 2010. Trials of fuel element debris recovery and packaging from vault storage have commenced.</p>
Trawsfynydd	1993	<p>De-fuelled by 1996, - all fuel removed to Sellafield for reprocessing. Conventional plant is being dismantled and disposed of.</p> <p>Fuelling machinery has been dismantled, fuel cooling ponds have been drained, pond equipment has been removed and decontamination of the pond structure is well advanced.</p> <p>Accumulated operational wastes are being retrieved, processed and packaged in accordance with NIREX recommendations ready for final disposal.</p> <p>Preparations to reduce the height of the reactor buildings prior to the station entering Stage 2 involves cutting the boilers into sections and storing these within the reactor buildings for the Stage 2 period. Planning permission was received after an inquiry. 60% of the boiler sections have now been de-planted.</p> <p>Construction of internal capping roofs as a precursor to the Height Reduction Project is almost at 95% complete.</p>

Station	Date of cessation of generation	State of decommissioning
Hunterston A	1990	<p>All fuel has been removed and despatched to Sellafield for reprocessing.</p> <p>The turbine hall has been demolished and an ILW Store constructed on the footprint. This facility is currently nearing completion of inactive commissioning. The main cooling water pumps have been removed and the culverts sealed at each end. Much of the conventional plant has been dismantled. In addition, the insulation from the boilers has been substantially removed. Trial dismantling and decontamination of the gas coolant pipe work was undertaken successfully, but remains to be completed. The reactor has been sealed, and gas circulators removed. All glazing and supporting structure has been removed and has been replaced with a temporary durable weather barrier.</p> <p>Sludge classed as LLW post treatment has been removed from concrete tank containments and disposed of. The empty tanks await final decontamination and decommissioning.</p> <p>A new decontamination facility has been constructed in which low-level decommissioning wastes will be treated.</p> <p>Facilities have been constructed (the Solid Active Waste Building Retrieval plant and the Wet ILW Retrieval and Encapsulation Project) and are being commissioned in which to retrieve and package intermediate level wastes, including sludge, fuel element debris and activated components.</p> <p>The fuel cooling pond remains filled with water.</p> <p>A Modular Active Effluent Treatment Plant has been installed to remove the radioactive materials from the pond water prior to discharge. Miscellaneous effluent is now also being discharged via this facility.</p> <p>All of the aluminium skips have been removed and treated and disposed off site as LLW.</p> <p>A programme of works is currently under way to demonstrate the decontamination and de-planting of the pond.</p> <p>Two de-splittered fuel elements found recently in the cartridge cooling pond as part of de-sludging operations have been recovered (within the Ponds) to a secure containment position and a programme arranged for removal to road transport flask and dispatch from site.</p>
Chapelcross	2004	<p>Significant modifications to the fuel route have been carried out on all four reactors and de-fuelling has commenced.</p> <p>Redundant cooling towers were demolished by explosive demolition during 2007.</p> <p>Hazard reduction activities are focussing on removal of asbestos lagging from the 16 heat exchangers on the Reactors and within the Turbine Hall.</p>
Bradwell	2002	<p>De-fuelled and in decommissioning. Turbine hall de-lagged. Boiler house de-lagging nearing completion. Cooling water pump house demolished. Cooling pond decommissioning in progress. Reactor gas circulation plant being stripped out. ILW retrieval and packaging operations have commenced and current plans are to enter early Care and Maintenance in 2015. The regulators are engaged with the licensee concerning the plant status and expectations of this project milestone.</p>

Station	Date of cessation of generation	State of decommissioning
Hinkley Point A	2000	De-fuelled and in decommissioning. Turbine house de-plant completed and void to be used for spoil from proposed C' site ground works. Fuel removed from ponds and pond de-planting in progress.
Calder Hall	2003	Currently preparing for de-fuelling (see Section A.3.9)
Dungeness A	2006	Currently undergoing de-fuelling (see Section A.3.11)
Sizewell A	2006	Currently undergoing de-fuelling (see Section A.3.12)

NDA sites all have a number of spent fuel and waste management facilities in the process of being decommissioned.

Annex L.3. - ONR's Regulatory Powers under a Nuclear Site Licence

On 1 April 2011, the Government announced the formation of Office for Nuclear Regulation (ONR) as an Agency of HSE. ONR inspectors exercise all of the powers set out in existing legislation that refers to HSE.

Consent - A Consent is required before the licensee can carry out any activity which is specifically identified in the licence as requiring prior Consent. For example, consent is required before a reactor is allowed to be started up again following its periodic shutdown. Before being granted a Consent, the licensee must satisfy ONR that the proposed action is safe and that all procedures necessary for control are in place.

Approval - An Approval is used to freeze a licensee's arrangements. If ONR so specifies, the licensee is required to submit the arrangements and cannot carry them out until ONR has given its approval. Once approved, the procedures cannot be changed without ONR's agreement, and the procedure itself must be carried out as specified; failure to do so would infringe the licence condition and would be an offence. For example, for nuclear power stations, ONR approves operating rules important to safety in order to ensure that licensees cannot change these without seeking ONR's agreement to the change.

Direction - A Direction is issued by ONR when it requires the licensee to take a particular action. For example, LC31(1) gives ONR the power to Direct a licensee to shut down any plant, operation or process. Such a Direction would relate to a matter of major or immediate safety importance and has been used rarely.

Agreement - An Agreement issued by ONR allows a licensee, in accordance with its own arrangements, to proceed with an agreed course of action. For example, LC22 requires a licensee to have adequate arrangements to control modifications to safety related plant. Such arrangements will often state that for modifications which, if inadequately conceived or implemented, could have serious nuclear safety implications, the modification cannot be carried out without the prior agreement of ONR. Hence, the licensee submits a safety case justifying the modification and does not proceed until ONR has written agreeing to the proposal.

Notification - The standard licence gives ONR powers to request the submission of information by notifying the licensee of the requirement. For example, in LC21(8) the licensee shall, if notified by ONR, submit a safety case and not commence operation of the relevant plant or process without the consent of ONR.

Specification - The standard licence gives ONR discretionary controls with regard to a licensee's arrangements and these are implemented through Specifications. For example, in LC23(2), if ONR specifies, the licensee is required to refer the plant's operating rules to its Nuclear Safety Committee for consideration.

Licence Instruments - Agreements, notifications, and specifications are all legally binding communications between ONR and the licensee, which allow the licensee to carry out an activity or require some form of action to be taken. To administer these requests/authorisations, ONR has produced a standard form of letter known as a licence instrument.

Additional powers under the Health and Safety at Work etc. Act 1974

Improvement notice - HSWA74 provides (s.21) for an inspector, if of the opinion that a statutory provision is being or has been contravened (and the contravention will continue), to serve a notice requiring the person to remedy the contravention.

Prohibition notice - HSWA74 also provides (s.22) for an inspector, if of the opinion that activities are being carried out which risk causing serious personal injury, to serve a notice with immediate effect to prohibit the activity.

Annex L.4. - Extracts from HSWA74 relevant to the Joint Convention

Section 2 - places the following duties on employers to their employees:

- (1) It shall be the duty of every employer to ensure, so far as is reasonably practicable, the health, safety and welfare at work of all his employees.
- (2) Without prejudice to the generality of an employer's duty under the preceding subsection, the matters to which that duty extends include in particular -
 - (a) the provision and maintenance of plant and systems of work that are, so far as is reasonably practicable, safe and without risks to health;
 - (b) arrangements for ensuring, so far as is reasonably practicable, safety and absence of risks to health in connection with the use, handling, storage and transport of articles and substances;
 - (c) the provision of such information, instruction, training and supervision as is necessary to ensure, so far as is reasonably practicable, the health and safety at work of his employees;
 - (d) as far as is reasonably practicable as regards any place of work under the employer's control, the maintenance of it in a condition that is safe and without risks to health and the provision and maintenance of means of access to and egress from it that are safe and without such risks;
 - (e) the provision and maintenance of a working environment for his employees that is, so far as is reasonably practicable, safe, without risks to health, and adequate as regards facilities and arrangements for their welfare at work.

Section 3 - under Section 3 employers have the following duties to persons other than their employees:

- (1) It shall be the duty of every employer to conduct his undertaking in such a way as to ensure, so far as is reasonably practicable, that persons not in his employment who may be affected thereby are not exposed to risks to their health or safety.
- (2) It shall be the duty of every self-employed person to conduct his undertaking in such a way as to ensure, so far as is reasonably practicable, that he and other persons (not being his employees) who may be affected thereby are not thereby exposed to risks to their health or safety.
- (3) In such cases as may be prescribed, it shall be the duty of every employer and every self-employed person, in the prescribed circumstances and in the prescribed manner, to give to persons (not being his employees) who may be affected by the way in which he conducts his undertaking the prescribed information about such aspects of the way in which he conducts his undertaking as might affect their health or safety.

Section 7 - places general duties on employees:

- (a) to take reasonable care of the health and safety of himself and of other persons who may be affected by his acts or omissions at work; and

-
- (b) as regards any duty or requirement imposed on his employer or any other person by or under any of the relevant statutory provisions, to co-operate with him so far as is necessary to enable that duty or requirement to be performed or complied with.

Section 8 - places a duty on persons not to interfere with or misuse things provided pursuant to certain provisions:

'No person shall intentionally or recklessly interfere with or misuse anything provided in the interests of health, safety or welfare in pursuance of any of the relevant statutory provisions.'

Section 14 - gives powers to investigate and make a special report on any accident, occurrence, situation or other matter.

Section 15 - allows health and safety regulations to be made that:

- repeal or modify any existing statutory provisions;
- impose requirements for approval by a specified body or person;
- provide for exemptions from any requirement or prohibition imposed by or under any of the relevant statutory provisions.

Section 16 - allows, for the purpose of providing practical guidance on meeting the HSWA74, Regulations made under the Act, and of the relevant statutory provisions, the issuing of codes of practice.

Section 19 - allows the enforcing authority to appoint as inspectors such persons having suitable qualifications as it thinks necessary for carrying into effect the relevant statutory provisions within its field of responsibility. Every appointment of a person as an inspector must be made by an instrument in writing specifying which of the powers conferred on inspectors by the relevant statutory provision are to be exercisable by the person appointed.

Section 20 - gives an inspector the following powers:

- (1)for the purpose of carrying into effect any of the relevant statutory provisions within the field of responsibility of the enforcing authority which appoints him, exercise the powers set out in subsection (2) below.
- (2), namely -
 - (a) at any reasonable time (or, in a situation which in his opinion is or may be dangerous, at any time) to enter any premises which he has reason to believe it is necessary for him to enter for the purpose mentioned in subsection (1) above;
 - (b) to take with him a constable if he has reasonable cause to apprehend any serious obstruction in the execution of his duty;
 - (c) without prejudice to the preceding paragraph, on entering any premises by virtue of (a) above to take with him -
 - (i) any other person duly authorised by his (the inspector's) enforcing authority; and

- (ii) any equipment or materials required for any purpose for which the power of entry is being exercised;
- (d) to make such examination and investigation as may in any circumstances be necessary for the purpose mentioned in subsection (1) above;
- (e) as regards any premises which he has power to enter, to direct that those premises or any part of them, or anything therein, shall be left undisturbed (whether generally or in particular respects) for so long as is reasonably necessary for the purpose of any examination or investigation under paragraph (d) above;
- (f) to take such measurements and photographs and make such recordings as he considers necessary for the purpose of any examination or investigation under paragraph (d) above;
- (g) to take samples of any articles or substances found in any premises which he has power to enter, and of the atmosphere in or in the vicinity of any such premises;
- (h) in the case of any article or substance found in any premises which he has power to enter, being an article or substance which appears to him to have caused or to be likely to cause danger to health or safety, to cause it to be dismantled or subjected to any process or test (but not so as to damage or destroy it unless this is in the circumstances necessary for the purpose mentioned in subsection (1) above);
- (i) in the case of any such article or substance as is mentioned in the preceding paragraph, to take possession of it and detain it for so long as is necessary for all or any of the following purposes, namely -
 - (i) to examine it and do to it anything which he has power to do under that paragraph;
 - (ii) to ensure that it is not tampered with before his examination of it is completed;
 - (iii) to ensure that it is available for use as evidence in any proceedings for an offence under any of the relevant statutory provisions or any proceedings relating to a notice under section 21 or 22;
- (j) to require any person whom he has reasonable cause to believe to be able to give any information relevant to any examination or investigation under paragraph (d) above to answer (in the absence of persons other than a person nominated by him to be present and any persons whom the inspector may allow to be present) such questions as the inspector thinks fit to ask and to sign a declaration of the truth of his answers;
- (k) to require the production of, inspect, and take copies of or any entry in -
 - (i) any books or documents which by virtue of any of the relevant statutory provisions are required to be kept; and
 - (ii) any other books or documents which it is necessary for him to see for the purposes of any examination or investigation under paragraph (d) above;

(l) to require any person to afford him such facilities and assistance with respect to any matter or things within that person's control or in relation to which that person has responsibilities as are necessary to enable the inspector to exercise any of the powers conferred on him by this section;

(m) any other power which is necessary for the purpose mentioned in subsection (1) above.

Section 21 - gives an inspector the power to serve improvement notices.

Section 22 - gives an inspector the power to serve prohibition notices.

Section 25 - gives an inspector the power to deal with cause of an imminent danger.

Section 28 - places restrictions on the disclosure of information.

Section 39 - gives an inspector the power in England and Wales to prosecute before a Magistrates' court, proceedings for an offence under any of the relevant statutory provisions.

Annex L.5. - Extracts from NIA65 relevant to the Joint Convention

Sections 1, 3 to 6, 22 and 24A of the NIA65 are relevant statutory provisions of HSWA74. Where NIA65 (as amended) refers to HSE, these powers are now exercised by ONR, an Agency of HSE. The relevant parts of each of these sections to the Joint Convention are:

Section 1 restricts certain nuclear installations to licensed sites:

(1) *Without prejudice to the requirements of any other Act, no person shall use any site for the purpose of installing or operating -*

(a) any nuclear reactor (other than such a reactor comprised in a means of transport, whether by land, water or air); or

(b) subject to subsection (2) of this section, any other installation of such class or description as may be prescribed, being an installation designed or adapted for-

(i) the production or use of atomic energy; or

(ii) the carrying out of any process which is preparatory or ancillary to the production or use of atomic energy and which is capable of causing the emission of ionising radiations; or

(iii) the storage, processing or disposal of nuclear fuel or bulk quantities of other radioactive matter, being matter which has been produced or irradiated in the course of the production or use of nuclear fuel, unless a licence so to do (a 'nuclear site licence') has been granted in respect of that site by the HSE and is for the time being in force.

Section 3 concerns the granting and variation of nuclear site licences:

(1) *A nuclear site licence shall not be granted to any person other than a body corporate and shall not be transferable.*

(1A) *The HSE shall consult the appropriate Agency (the Environment Agency in England and Wales and SEPA in Scotland) before granting a nuclear site licence in respect of a site in Great Britain.*

(2) *Two or more installations in the vicinity of one another may, if the HSE thinks fit, be treated for the purposes of the grant of a nuclear site licence as being on the same site.*

(6) *The HSE may from time to time vary any nuclear site licence by excluding therefrom any part of the licensed site -*

(a) which the licensee no longer needs for any use requiring such a licence; and

(b) with respect to which the HSE is satisfied that there is no danger from ionising radiations from anything on that part of the site.

(6A) *The HSE shall consult the appropriate Agency (the Environment Agency or SEPA) before varying a nuclear site licence in respect of a site in Great Britain if the*

variation relates to or affects the creation, accumulation or disposal of radioactive waste, within the meaning of EPR10 (England and Wales) or RSA93 (Scotland and Northern Ireland).

Section 4 allows HSE to attach conditions to licences:

(1) The HSE by instrument in writing shall on granting any nuclear site licence, and may from time to time thereafter, attach to the licence such conditions as may appear to the HSE to be necessary or desirable in the interests of safety, whether in normal circumstances or in the event of any accident or other emergency on the site, which conditions may in particular include provision -

(a) for securing the maintenance of an efficient system for detecting and recording the presence and intensity of any ionising radiations from time to time emitted from anything on the site or from anything discharged on or from the site;

(b) with respect to the design, siting, construction, installation, operation, modification and maintenance of any plant or other installation on, or to be installed on, the site;

(c) with respect to preparations for dealing with, and measures to be taken on the happening of, any accident or other emergency on the site;

(d) without prejudice to the regulatory requirements under the EPR10^[39] or RSA93^[40], with respect to the discharge of any substance on or from the site.

(2) The HSE may at any time by instrument in writing attach to a nuclear site licence such conditions as the HSE may think fit with respect to the handling, treatment and disposal of nuclear matter.

(3) The HSE may at any time by a further instrument in writing vary or revoke any condition for the time being attached to a nuclear site licence by virtue of this section.

(3A) HSE shall consult the appropriate Agency (the Environment Agency or SEPA)

(a) before attaching any condition to a nuclear site licence in respect of a site in Great Britain or

(b) before varying or revoking any condition attached to such a nuclear site licence,

if the condition relates to or affects the creation, accumulation or disposal of radioactive waste, within the meaning of EPR10 (England and Wales) or RSA93 (Scotland and Northern Ireland).

(5) At all times while a nuclear site licence remains in force, the licensee shall cause copies of any conditions for the time being in force under this section to be kept posted upon the site, and in particular on any part thereof which an inspector may direct, in such characters and in such positions as to be conveniently read by persons having duties upon the site which are or may be affected by those conditions.

Section 5 deals with the revocation and surrender of licences:

(1) *A nuclear site licence may at any time be revoked by the HSE or surrendered by the licensee.*

(1A) *HSE shall consult the appropriate environment agency before revoking a nuclear site licence in respect of a site in Great Britain.*

(2) *Where a nuclear site licence has been revoked or surrendered, the licensee shall, if so required by the HSE, deliver up or account for the licence to such person as the HSE may direct, and shall during the remainder of the period of his responsibility cause to be kept posted upon the site such notices indicating the limits thereof in such positions as may be directed by an inspector; and the HSE may on revocation or surrender and from time to time thereafter until the expiration of the said period give to the licensee such other directions as the HSE may think fit for preventing or giving warning of any risk of injury to any person or damage to any property by ionising radiations from anything remaining on the site.*

(3) *In this Act, the expression 'period of responsibility' in relation to the licensee under a nuclear site licence means, as respects the site in question or any part thereof, the period beginning with the grant of the licence and ending with whichever ever of the following dates is the earlier, that is to say -*

(a) the date when the HSE gives notice in writing to the licensee that in the opinion of the HSE there has ceased to be any danger from ionising radiations from anything on the site or, as the case may be, on that part thereof;

(b) the date when a new nuclear site licence in respect of a site comprising the site in question or, as the case may be, that part thereof is granted either to the same licensee or to some other person.

Section 6 refers to the maintenance of a list of licensed sites by the Secretary of State for Energy and Climate Change.

Section 12 refers to the 'no fault' liability in respect of injuries or damages arising from breaches of duty imposed by Sections 7, 8, 9 or 10 ('duties of licensees') of the Act.

Section 22 refers to reporting of and inquires into dangerous occurrences:

(1) *The provisions of this section shall have effect on the happening of any occurrence of any description as may be prescribed, being an occurrence -*

(a) on a licensed site

(2) *The licensee shall cause the occurrence to be reported forthwith in the prescribed manner to the HSE and to such other persons, if any, as may be prescribed in relation to occurrences of that class or description, and if the occurrence is not so reported the licensee shall be guilty of an offence.*

Section 24A covers the recovery of expenses by the HSE.

Annex L.6. - Nuclear Site Licence: Standard Licence Conditions

In this Annex, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the third UK report (i.e. in a way that has implications for the Joint Convention obligations), except the minor change in LC3 below. Where the Licence Conditions refer to the 'Executive' (meaning the Health and Safety Executive), these functions are now exercised by ONR, an Agency of HSE.

1: Interpretation

The purpose of LC1 is to ensure that there is no ambiguity in the use of certain specified terms which are found in the text of the Conditions. It also contains important powers for the Executive to modify, revise or withdraw approvals, etc. and to approve modifications to any matter currently approved. Where appropriate, reference is made back to the relevant statutory Acts of Parliament.

2: Marking of the Site Boundary

- (1) *The licensee shall make and implement adequate arrangements to prevent unauthorised persons from entering the site or, if so directed by the Executive, from entering such part or parts thereof as the Executive may specify.*
- (2) *The licensee shall submit to the Executive for approval such part or parts of the aforesaid arrangements as the Executive may specify.*
- (3) *The licensee shall ensure that once approved no alteration is made to the approved arrangements unless the Executive has approved such alteration or amendment.*
- (4) *The licensee shall mark the boundaries of the site by fences or other appropriate means, and any such fences or other means used for this purpose shall be properly maintained.*
- (5) *The licensee shall, if so directed by the Executive, erect appropriate fences on the site in such positions as the Executive may specify and shall ensure that all such fences are properly maintained.*

The purpose of LC2 is to delineate the extent of the site in order to prevent unauthorised access in order to limit the risk of injury to intruders and to other persons or damage to their property.

3: Restriction on Dealing with the Site

The licensee shall not convey, assign, transfer, let or part with possession of the site or any part thereof or grant any licence in relation thereto without the consent of the Executive.

The purpose of LC3 is to ensure that nothing confuses the absolute responsibility of the licensee under NIA65 in respect of safety on the whole licensed site. The licensee should be able to demonstrate that there are organisational procedures to prevent individuals within the company from conveying, assigning, transferring, letting, feuing or granting any licences in relation to the site or parts of the site without first obtaining the Consent of ONR.

For sites operated under contract to NDA, LC3 has been modified to reflect the site's ownership by NDA and not the licensee and to take account of the formation of the Civil Nuclear Police Authority under the Energy Act 2004. For the Magnox sites, LC3 reads:

- (1) No person shall convey, assign, transfer, let or part with possession of the site or any part thereof or grant any licence in relation thereto, except to the Civil Nuclear Police Authority, without the consent of the Executive.*
- (2) The licensee shall notify the Executive forthwith if occupancy of any part of the site is taken by the Civil Nuclear Police Authority.*
- (3) The licensee shall make and implement adequate arrangements to control all property transactions affecting the site or parts thereof.*
- (4) The licensee shall submit to the Executive for approval such part or parts of the aforesaid arrangements as the Executive may specify.*
- (5) The licensee shall ensure that once approved no alteration or amendment is made to the approved arrangements unless the Executive has approved such alteration or amendment.*

4: Restrictions on Nuclear Matter on the Site

- (1) The licensee shall ensure that no nuclear matter is brought onto the site except in accordance with adequate arrangements made by the licensee for this purpose.*
- (2) The licensee shall ensure that no nuclear matter is stored on the site except in accordance with adequate arrangements made by the licensee for this purpose.*
- (3) The licensee shall submit to the Executive for approval such part or parts of the aforesaid arrangements as the Executive may specify.*
- (4) The licensee shall ensure that once approved no alteration or amendment is made to the approved arrangements unless the Executive has approved such alteration or amendment.*
- (5) For new installations, if the Executive so specifies, the licensee shall ensure that no nuclear matter intended for use in connection with the new installation is brought onto the site for the first time without the consent of the Executive.*

The purpose of LC4 is to ensure that the licensee carries out its responsibilities to control the introduction and storage of nuclear matter on the licensed site (nuclear matter being fuel, sources, radioactive waste, etc., as defined by NIA65).

5: Consignment of Nuclear Matter

- (1) The licensee shall not consign nuclear matter (other than excepted matter and radioactive waste) to any place in the United Kingdom other than a relevant site except with consent of the Executive.*
- (2) The licensee shall keep a record of all nuclear matter (including excepted matter and radioactive waste) consigned from the site and such record shall contain particulars of the amount, type and form of such matter, the manner in which it was packed, the name and address of the person to whom it was consigned and the date when it left the site.*

(3) *The licensee shall ensure that the aforesaid record is preserved for 30 years from the date of dispatch or such other period as the Executive may approve except in the case of any consignment or part thereof subsequently stolen, lost, jettisoned or abandoned, in which case the record shall be preserved for a period of 50 years from the date of such theft, loss, jettisoning or abandoning.*

The purpose of LC5 is to ensure that the transfer of nuclear matter, other than excepted matter and radioactive waste, to sites in the UK other than relevant sites:

- (a) is carried out only with the consent of ONR; and that
- (b) the licensee has adequate records of where such nuclear matter has been sent.

The licensee should also be able to demonstrate that there are organisational procedures to prevent individuals from inadvertently consigning such matter to non-relevant sites without first obtaining a Consent from ONR.

[Relevant sites are other licensed or Crown sites as defined in NIA65 and excepted matter is defined in NIA65 and Statutory Instrument (S.I.) 1965/1826 and S.I. 1978/1779].

6: Documents, Records, Authorities and Certificates

- (1) *The licensee shall make adequate records to demonstrate compliance with any of the conditions attached to this licence.*
- (2) *Without prejudice to any other requirements of the conditions attached to this licence, the licensee shall make and implement adequate arrangements to ensure that every document required, every record made, every authority consent or approval granted and every direction or certificate issued in pursuance of the conditions attached to this licence is preserved for 30 years or such other periods as the Executive may approve.*
- (3) *The licensee shall submit to the Executive for approval such part or parts of the aforesaid arrangements as the Executive may specify.*
- (3) *The licensee shall ensure that once approved no alteration or amendment is made to the approved arrangements unless the Executive has approved such alteration or amendment.*
- (4) *The licensee shall furnish to the Executive copies of any such document, record, authority or certificate as the Executive may specify.*

The purpose of LC6 is to ensure that adequate records are held by the licensee for a suitable period to demonstrate compliance with licence conditions.

7: Incidents on the Site

- (1) *The licensee shall make and implement adequate arrangements for the notification, recording, investigation and reporting of such incidents occurring on the site:*
 - (a) *as is required by any other condition attached to this licence;*
 - (b) *as the Executive may specify; and*
 - (c) *as the licensee considers necessary.*

(2) *The licensee shall submit to the Executive for approval such part or parts of the aforesaid arrangements as the Executive may specify.*

(3) *The licensee shall ensure that once approved no alteration or amendment is made to the approved arrangements unless the Executive has approved such alteration or amendment.*

The purpose of LC7 is to ensure that incidents are notified, recorded, investigated and reported as required by other licence conditions, as may be specified by ONR and as the licensee considers necessary.

8: Warning Notices

The licensee shall ensure that suitable and sufficient notices are kept on the site for the purposes of informing persons thereon of each of the following matters, that is to say :

(a) the meaning of any warning signal used on the site;

(b) the location of any exit from any place on the site, being an exit provided for use in the event of an emergency;

(c) the measures to be taken by such persons in the event of fire breaking out on the site or in the event of any other emergency; and

(d) that such notices are kept posted in such positions and in such characters as to be conveniently read by those persons.

The purpose of LC8 is to ensure the safety of all people on site in respect of their ability to be able to respond appropriately and without delay to an emergency situation. The licensee therefore needs to ensure that all warning notices are in appropriate places to advise people on what to do in that area in the event of fire or any other emergency.

9: Instructions to Persons on the Site

The licensee shall ensure that every person authorised to be on the site receives adequate instructions (to the extent that is necessary having regard to the circumstances of that person being on the site) as regards the risks and hazards associated with the plant and its connection therewith and the action to be taken in the event of an accident or emergency on the site.

The purpose of LC9 is to ensure that the licensee provides all persons allowed on the site with adequate instruction where necessary so that they are aware of the risks and hazards associated with the plant and its operations, the precautions that must be taken to minimise the risk to themselves and others and the actions to be taken in the event of an accident or emergency.

10: Training

(1) *The licensee shall make and implement adequate arrangements for suitable training of all those on site who have responsibility for any operations which may affect safety.*

(2) *The licensee shall submit to the Executive for approval such part or parts of the aforesaid arrangements as the Executive may specify.*

(3) *The licensee shall ensure that once approved no alteration is made to the approved arrangements unless the Executive has approved such alteration or amendment.*

The purpose of LC10 is to ensure that all those people on the site who have responsibility for an action which may affect safety are adequately trained for that purpose. This Condition is in addition to the general duty under HSWA74 s. 2(2)(c) and IRR99 Regulation 12(a).

11: Emergency Arrangements

(1) *Without prejudice to any other requirements of the conditions attached to this licence the licensee shall make and implement adequate arrangements for dealing with any accident or emergency arising on the site and their effects.*

(2) *The licensee shall submit to the Executive for approval such part or parts of the aforesaid arrangements as the Executive may specify.*

(3) *The licensee shall ensure that once approved no alteration or amendment is made to the approved arrangements unless the Executive has approved such alteration or amendment.*

(4) *Where any such arrangements require the assistance or co-operation of, or render it necessary or expedient to make use of the services of any person, local authority or other body the licensee shall ensure that each person, local authority or other body is consulted in the making of such arrangements.*

(5) *The licensee shall ensure that such arrangements are rehearsed at such intervals and at such times and to such extent as the Executive may specify or, where the Executive has not so specified, as the licensee considers necessary.*

(6) *The licensee shall ensure that such arrangements include procedures to ensure that all persons in his employ who have duties in connection with such arrangements are properly instructed in the performance of the same, in the use of the equipment required and the precautions to be observed in connection therewith.*

The purpose of LC11 is to ensure that the licensee has adequate arrangements in place to respond effectively to any incident ranging from a minor on-site event to a significant release of radioactive material.

12: Duly Authorised and Other Suitably Qualified and Experienced Persons

(1) *The licensee shall make and implement adequate arrangements to ensure that only suitably qualified and experienced persons perform any duties which may affect the safety of operations on the site or any duties assigned by or under these conditions or any arrangements required under these conditions.*

(2) *The aforesaid arrangements shall also provide for the appointment, in appropriate cases, of duly authorised persons to control and supervise operations which may affect plant safety.*

(3) *The licensee shall submit to the Executive for approval such part or parts of the aforesaid arrangements as the Executive may specify.*

(4) *The licensee shall ensure that once approved no alteration is made to the approved arrangements unless the Executive has approved such alteration or amendment.*

(5) *The licensee shall ensure that no person continues to act as a duly authorised person if, in the opinion of the Executive, he is unfit to act in that capacity and the Executive has notified the licensee to that effect.*

The purpose of LC12 is to ensure that only suitably qualified and experienced persons perform duties which may affect the safety of any operations on the site or any duties required by other licence conditions or the arrangements made thereunder.

13: Nuclear Safety Committee

(1) *The licensee shall establish a nuclear safety committee or committees to which it shall refer for consideration and advice the following:*

(a) all matters required by or under these conditions to be referred to a nuclear safety committee;

(b) such arrangements or documents required by these conditions as the Executive may specify and any subsequent alteration or amendment to such specified arrangements or documents;

(c) any matter on the site affecting safety on or off the site which the Executive may specify; and

(d) any other matter which the licensee considers should be referred to a nuclear safety committee.

(2) *The licensee shall submit to the Executive for approval the terms of reference of any such nuclear safety committee and shall not form a nuclear safety committee without the aforesaid approval.*

(3) *The licensee shall ensure that once approved no alteration or amendment is made to the terms of reference of such a nuclear safety committee unless the Executive has approved such alteration or amendment.*

(4) *The licensee shall appoint at least seven persons as members of a nuclear safety committee including one or more members who are independent of the licensee's operations and shall ensure that at least five members are present at each meeting including at least one independent member.*

(5) *The licensee shall furnish to the Executive the name, qualifications, particulars of current posts held and the previous relevant experience of every person whom he appoints as a member of any nuclear safety committee forthwith after making such appointment. Notwithstanding such appointment the licensee shall ensure that a person so appointed does not remain a member of any nuclear safety committee if the Executive notifies the licensee that it does not agree to the appointment.*

(6) *The licensee shall ensure that the qualifications, current posts held and previous relevant experience of the members of any such committee, taken as a whole, are such as to enable that committee to consider any matter likely to be referred to it and to advise the licensee authoritatively and, so far as practicable, independently.*

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- (7) *The licensee shall ensure that a nuclear safety committee shall consider or advise only during the course of a properly constituted meeting of that committee.*
- (8) *The licensee shall send to the Executive within 14 days of any meeting of any such committee a full and accurate record of all matters discussed at that meeting including in particular any advice given to the licensee.*
- (9) *The licensee shall furnish to the Executive copies of any document or any category of documents considered at any such meetings that the Executive may specify.*
- (10) *The licensee shall notify the Executive as soon as practicable if it is intended to reject, in whole or in part, any advice given by any such committee together with the reasons for such rejection.*
- (11) *Notwithstanding paragraph (7) of this condition, where it becomes necessary to obtain consideration of or advice on urgent safety proposals (which would normally be considered by a nuclear safety committee) the licensee may do so in accordance with appropriate arrangements made for the purpose by the licensee, considered by the relevant nuclear safety committee and approved by the Executive.*
- (12) *The licensee shall ensure that once approved no alteration or amendment is made to the approved arrangements described in paragraph (11) of this condition unless the relevant nuclear safety committee has considered and the Executive has approved such alteration or amendment.*

The purpose of LC13 is to ensure that the licensee sets up a senior level committee which should consider and advise on matters which affect the safe design, construction, commissioning, operation and decommissioning of the installations on the licensed site and any other matter relevant to safety. The committee must have members who are adequately qualified to perform this task and to provide a source of authoritative advice to the licensee. The committee, however, is purely advisory and must not be considered to have an executive function, but ONR must be informed if the advice of the committee is not to be followed by the licensee.

14: Safety Documentation

- (1) *Without prejudice to any other requirements of the condition attached to this licence the licensee shall make and implement adequate arrangements for the production and assessment of safety cases consisting of documentation to justify safety during the design, construction, manufacture, commissioning, operation and decommissioning phases of the installation.*
- (2) *The licensee shall submit to the Executive for approval such parts or parts of the aforesaid arrangements as the Executive may specify.*
- (3) *The licensee shall ensure that once approved no alteration or amendment is made to the approved arrangements unless the Executive has approved such alteration or amendment.*
- (4) *The licensee shall furnish to the Executive copies of any such documentation or any such category of documentation as the Executive may specify.*

The purpose of LC14 is to ensure that the licensee sets up arrangements for the preparation and assessment of the safety related documentation comprising "safety

cases" to ensure that the licensee justifies safety during design, construction, manufacture, commissioning, operation, and decommissioning.

15: Periodic Review

- (1) The licensee shall make and implement adequate arrangements for the periodic and systematic review and reassessment of safety cases.*
- (2) The licensee shall submit to the Executive for approval such part or parts of the aforesaid arrangements as the Executive may specify.*
- (3) The licensee shall ensure that once approved no alteration or amendment is made to the approved arrangements unless the Executive has approved such alteration or amendment.*
- (4) The licensee shall, if so directed by the Executive, carry out a review and reassessment of safety and submit a report of such review to the Executive at such intervals, within such a period and for such of the matters or operations as may be specified in the direction.*

The purpose of LC15 is to ensure that the plant remains adequately safe and that the safety cases are kept up to date throughout its lifetime. The safety cases should be periodically reviewed in a systematic manner against the original design intent and current safety objectives and practices.

16: Site Plan, Designs and Specifications

- (1) The licensee shall submit to the Executive an adequate plan of the site (hereinafter referred to as the site plan) showing the location of the boundary of the licensed site and every building or plant on the site which might affect safety.*
- (2) The licensee shall submit to the Executive with the site plan a schedule giving particulars of each building and plant thereon and the operations associated therewith.*
- (3) If any changes are made on the site which may affect the said buildings, plant or operations, the licensee shall forthwith send an amended site plan and schedule to the Executive incorporating these changes.*
- (4) The licensee shall furnish to the Executive such plans, designs, specifications or any other information relating to such buildings, plant and operations as the Executive may specify.*

The purpose of LC16 is to ensure that the licensee indicates, using a site plan, all buildings and plant or areas which might affect safety and provides a schedule updated as necessary, giving details of each building and its associated operations.

17: Quality Assurance

- (1) Without prejudice to any other requirements to the conditions attached to this licence the licensee shall make and implement adequate quality assurance arrangements in respect of all matters which affect safety.*
- (2) The licensee shall submit to the Executive for approval such part or parts of the aforesaid arrangements as the Executive may specify.*

(3) *The licensee shall ensure that once approved no alteration or amendment is made to the approved arrangements unless the Executive has approved such alteration or amendment.*

(4) *The licensee shall furnish to the Executive such copies of records or documents made in connection with the aforesaid arrangements as the Executive may specify.*

The purpose of LC17 is to ensure that the licensee sets out the managerial and procedural arrangements that will be used to control and monitor those actions necessary in the interests of safety, and to demonstrate compliance with the site licence conditions (and in particular the arrangements made under them) and any other relevant legislation.

18: Radiological Protection

(1) *The licensee shall make and implement adequate arrangements for the assessment of the average effective dose equivalent (including any committed effective dose equivalent) to such class or classes of persons as may be specified in the aforesaid arrangements and the licensee shall forthwith notify the Executive if the average effective dose equivalent to such class or classes of persons exceeds such level as the Executive may specify.*

(2) *The licensee shall submit to the Executive for approval such part or parts of the arrangements as the Executive may specify.*

(3) *The licensee shall ensure that once approved no alteration or amendment is made to the approved arrangements unless the Executive has approved such alteration or amendment.*

The purpose of LC18 is to ensure that the licensee makes and implements adequate arrangements to assess the average effective dose equivalent to specified classes of persons. Also the licensee shall notify ONR if such dose exceeds the specified level. This is complementary to IRR99 Regulation 13.

19: Construction or Installation of New Plant

(1) *Where the licensee proposes to construct or install any new plant which may affect safety the licensee shall make and implement adequate arrangements to control the construction or installation.*

(2) *The licensee shall submit to the Executive for approval such part or parts of the aforesaid arrangements as the Executive may specify.*

(3) *The licensee shall ensure that once approved no alteration or amendment is made to the approved arrangements unless the Executive has approved such alteration or amendment.*

(4) *The aforesaid arrangements shall where appropriate divide the construction or installation into stages. Where the Executive so specifies the licensee shall not commence nor thereafter proceed from one stage to the next of the construction or installation without the consent of the Executive. The arrangements shall include a requirement for the provision of adequate documentation to justify the safety of the proposed construction or installation and shall where appropriate provide for the submission of this documentation to the Executive.*

(5) *The licensee shall, if so directed by the Executive, halt the construction or installation of a plant and the licensee shall not recommence such construction or installation without the consent of the Executive.*

The purpose of LC19 is to ensure that the licensee provides and implements adequate control over the construction and installation of new plant which may affect safety.

20: Modification to Design of Plant under Construction

(1) *The licensee shall ensure that no modification to the design which may affect safety is made to any plant during the period of construction except in accordance with adequate arrangements made and implemented by the licensee for that purpose.*

(2) *The licensee shall submit to the Executive for approval such part or parts of the aforesaid arrangements as the Executive may specify.*

(3) *The licensee shall ensure that once approved no alteration or amendment is made to the approved arrangements unless the Executive has approved such alteration or amendment.*

(4) *The aforesaid arrangements shall provide for the classification of modifications according to their safety significance. The arrangements shall where appropriate divide modifications into stages. Where the Executive so specifies the licensee shall not commence nor thereafter proceed from one stage to the next of the modification without the consent of the Executive. The arrangements shall include a requirement for the provision of adequate documentation to justify the safety of the proposed modification and shall where appropriate provide for the submission of this documentation to the Executive.*

The purpose of LC20 is to ensure that where necessary adequate arrangements exist to control safety-related modifications during design and construction of plant or process.

21: Commissioning

(1) *The licensee shall make and implement adequate arrangements for the commissioning of any plant or process which may affect safety.*

(2) *The licensee shall submit to the Executive for approval such part or parts of the aforesaid arrangements as the Executive may specify.*

(3) *The licensee shall ensure that once approved no alteration or amendment is made to the approved arrangements unless the Executive has approved such alteration and amendment.*

(4) *The aforesaid arrangement shall where appropriate divide the commissioning into stages. Where the Executive so specifies the licensee shall not commence nor thereafter proceed from one stage to the next of the commissioning without the consent of the Executive. The arrangements shall include a requirement for the provision of adequate documentation to justify the safety of the proposed commissioning and shall where appropriate provide for the submission of this documentation to the Executive.*

(5) *The licensee shall appoint a suitably qualified person or persons for the purpose of controlling, witnessing, recording and assessing the results of any tests*

carried out in accordance with the requirements of the aforesaid commissioning arrangements.

(6) *The licensee shall ensure that full and accurate records are kept of the results of every test and operation carried out in pursuance of this condition.*

(7) *The licensee shall ensure that no plant or process which may affect safety is operated (except for the purpose of commissioning) until:*

(a) the appropriate state of commissioning has been completed and a report of such commissioning, including any results and assessments of any tests as may have been required under the commissioning arrangements referred to in paragraph (1) of this condition, has been considered in accordance with those arrangements; and

(b) a safety case or cases as appropriate, which shall include the safety implications of modifications made since the commencement of construction of the plant and those arising from the commissioning of the plant, and any matters whereby the operation of the plant may be effected by such modifications or commissioning, has been considered in accordance with the arrangements referred to in paragraph (1) of this condition.

(8) *The licensee shall, if so notified by the Executive, submit to the Executive the safety case for the aforesaid plant or processes prepared in pursuance of paragraph (7) of this condition and shall not commence operation of the relevant plant or process without the consent of the Executive.*

The purpose of LC21 is to ensure that adequate arrangements exist for the commissioning of a new or modified plant or process which may affect safety and to ensure qualified supervision of this work.

22: Modification or Experiment on Existing Plant

(1) *The licensee shall make and implement adequate arrangements to control any modification or experiment carried out on any part of the existing plant or process which may affect safety.*

(2) *The licensee shall submit to the Executive for approval such part or parts of the aforesaid arrangements as the Executive may specify.*

(3) *The licensee shall ensure that once approved no alteration or amendment is made to the approved arrangements unless the Executive has approved such alteration or amendment.*

(4) *The aforesaid arrangements shall provide for the classification of modifications or experiments according to their safety significance. The arrangements shall where appropriate divide the modification or experiment into stages. Where the Executive so specifies the licensee shall not commence nor thereafter proceed from one stage to the next of the modification or experiment without the consent of the Executive. The arrangements shall include a requirement for the provision of adequate documentation to justify the safety of the proposed modification or experiment and shall where appropriate provide for the submission of the documentation to the Executive.*

(5) *The licensee shall if so directed by the Executive, halt the modification or experiment and the licensee shall not recommence such modification or experiment without the consent of the Executive.*

The purpose of LC22 is to ensure that adequate arrangements exist to ensure that all modifications and experiments that may affect safety are adequately controlled.

23: Operating Rules

- (1) The licensee shall, in respect of any operation that may affect safety, produce an adequate safety case to demonstrate the safety of that operation and to identify the conditions and limits necessary in the interests of safety. Such conditions and limits shall hereinafter be referred to as operating rules.*
- (2) The licensee, where the Executive so specifies, shall refer the operating rules arising from paragraph (1) of this condition to the relevant nuclear safety committee for consideration.*
- (3) The licensee shall ensure that operations are at all times controlled and carried out in compliance with such operating rules. Where the person appointed by the licensee for the purposes of condition 26 identifies any matter indicating that the safety of any operation or the safe condition of any plant may be affected that person shall bring that matter to the attention of the licensee forthwith who shall take appropriate action and ensure the matter is then notified, recorded, investigated and reported in accordance with arrangements made under condition 7.*
- (4) The licensee shall submit to the Executive for approval such of the aforesaid operating rules as the Executive may specify.*
- (5) The licensee shall ensure that once approved no alteration or amendment is made to any approved operating rule unless the Executive has approved such alteration or amendment.*
- (6) Notwithstanding the preceding provisions of this condition the Executive may, if in its opinion circumstances render it necessary at any time, agree to the temporary suspension of any approved operating rule.*

The purpose of LC23 is to ensure that all operations that may affect safety are supported by a safety case, and that the safety case identifies the conditions and limits that ensure that the plant is kept within a safe operating envelope.

24: Operating Instructions

- (1) The licensee shall ensure that all operations which may affect safety are carried out in accordance with written instructions hereinafter referred to as operating instructions.*
- (2) The licensee shall ensure that such operating instructions include any instructions necessary in the interests of safety and any instructions necessary to ensure that any operating rules are implemented.*
- (3) The licensee shall, if so specified by the Executive, furnish to the Executive copies of such operating instructions and when any alteration is made to the operating instructions furnished to the Executive, the licensee shall ensure that such alteration is furnished to the Executive within such time as may be specified.*
- (4) The licensee shall make and implement adequate arrangements for the preparation, review and amendment of such operating instructions.*

(5) *The licensee shall submit to the Executive for approval such part or parts of the aforesaid arrangements as the Executive may specify.*

(6) *The licensee shall ensure that once approved no alteration or amendment is made to the approved arrangements unless the Executive has approved such alteration or amendment.*

The purpose of LC24 is to ensure that all operations as defined in LC1 which may affect safety, including any instructions to implement Operating Rules, are undertaken in accordance with written operating instructions.

25: Operational Records

(1) *The licensee shall ensure that adequate records are made of the operation, inspection and maintenance of any plant which may affect safety.*

(2) *The aforesaid records shall include records of the amount and location of all radioactive material, including nuclear fuel and radioactive waste, used and processed, stored or accumulated upon the site at any time.*

(3) *The licensee shall record such additional particulars as the Executive may specify.*

(4) *The licensee shall furnish to the Executive such copies of extracts from such records as the Executive may specify.*

The purpose of LC25 is to ensure that adequate records are kept regarding operation, inspection and maintenance of any safety-related plant.

26: Control and Supervision of Operations

The licensee shall ensure that no operations are carried out which may affect safety except under the control and supervision of suitably qualified and experienced persons appointed for that purpose by the licensee.

The purpose of LC26 is to ensure that safety-related operations are carried out only under the control and supervision of suitably qualified and experienced personnel.

27: Safety Mechanisms, Devices and Circuits

The licensee shall ensure that a plant is not operated, inspected, maintained or tested unless suitable and sufficient safety mechanisms, devices and circuits are properly connected and in good working order.

The purpose of LC27 is to ensure that plant is not used unless safety mechanisms, devices and circuits are installed and maintained to an adequate standard.

28: Examination, Inspection, Maintenance and Testing

(1) *The licensee shall make and implement adequate arrangements for the regular and systematic examination, inspection, maintenance and testing of all plant which may affect safety.*

(2) *The licensee shall submit to the Executive for approval such part or parts of the aforesaid arrangements as the Executive may specify.*

- (3) *The licensee shall ensure that once approved no alteration is made to the approved arrangements unless the Executive has approved such alteration or amendment.*
- (4) *The aforesaid arrangements shall provide for the preparation of a plant maintenance schedule for each plant. The licensee shall submit to the Executive for its approval such part or parts of any plant maintenance schedule as the Executive may specify.*
- (5) *The licensee shall ensure that once approved no alteration or amendment is made to any approved part of any plant maintenance schedule unless the Executive has approved such alteration or amendment.*
- (6) *The licensee shall ensure in the interests of safety that every examination, inspection, maintenance and test of a plant or any part thereof is carried out:*
- (a) by suitably qualified and experienced persons;*
 - (b) in accordance with schemes laid down in writing;*
 - (c) within the intervals specified in the plant maintenance schedule; and*
 - (d) under the control and supervision of a suitably qualified and experienced person appointed by the licensee for that purpose.*
- (7) *Notwithstanding the above paragraph of this condition the Executive may agree to an extension of any interval specified in the plant maintenance schedule.*
- (8) *When any examination, inspection, maintenance or test of any part of a plant reveals any matter indicating that the safe operation or safe condition of that plant may be affected, the suitably qualified and experienced person appointed to control and supervise any such examination, inspection, maintenance or test shall bring it to the attention of the licensee forthwith who shall take appropriate action and ensure that the matter is then notified, recorded, investigated and reported in accordance with the arrangements made under condition 7.*
- (9) *The licensee shall ensure that a full and accurate report of every examination, inspection, maintenance or test of any part of a plant indicating the date thereof and signed by the suitably qualified and experienced person appointed by the licensee to control and supervise such examination, inspection, maintenance or test is made to the licensee forthwith upon completion of the said examination, inspection, maintenance or test.*

The purpose of LC28 is to ensure that all plant that may affect safety is scheduled to receive regular and systematic examination, inspection, maintenance and testing, by and under the control of suitable personnel.

29: Duty to carry out Tests and Inspections

- (1) *The licensee shall carry out such tests, inspections and examinations in connection with any plant (in addition to any carried out under condition 28 above) as the Executive may, after consultation with the licensee, specify.*
- (2) *The licensee shall furnish the results of any such tests, inspections and examinations carried out in accordance with paragraph (1) of this condition to the Executive as soon as practicable.*

The purpose of LC29 is to enable ONR, following consultation, to require the licensee to perform any tests, inspections and examinations which it may specify, and to be provided with the results.

30: Periodic Shutdown

- (1) When necessary for the purpose of enabling any examination, inspection, maintenance or testing of any plant or process to take place, the licensee shall ensure that any such plant or process shall be shut down in accordance with the requirements of its plant maintenance schedule referred to in condition 28.*
- (2) Notwithstanding paragraph (1) of this condition the Executive may agree to an extension of a plant's operating period.*
- (3) The licensee shall, if so specified by the Executive, ensure that when a plant or process is shut down in pursuance of paragraph (1) of this condition it shall not be started up again thereafter without the consent of the Executive.*

The purpose of LC30 is to ensure that any part of the plant or process shall, where necessary to allow examination, inspection, maintenance and testing to take place, be shut down in accordance with the plant maintenance schedule. ONR has discretion to require its consent to start-up of any process shut down under this condition.

31: Shutdown of Specific Operations

- (1) The licensee shall if so directed by the Executive shut down any plant, operation or process on the site within such period as the Executive may specify.*
- (2) The licensee shall ensure that when the plant, operation or process is shut down in pursuance of paragraph 1 of this condition it shall not be started up without the consent of the Executive.*

The purpose of LC31 is to give discretionary powers to ONR to shut down any plant, operation or process within a given period and to require its consent to start-up of any plant, operation or process shut down under this condition.

32: Accumulation of Radioactive Waste

- (1) The licensee shall make and implement adequate arrangements for minimising so far as is reasonably practicable the rate of production and total quantity of radioactive waste accumulated on the site at any time and for recording waste so accumulated.*
- (2) The licensee shall submit to the Executive for approval such part or parts of the aforesaid arrangements as the Executive may specify.*
- (3) The licensee shall ensure that once approved no alteration or amendment is made to the approved arrangements unless the Executive has approved such alteration or amendment.*
- (4) Without prejudice to paragraph (1) of this condition the licensee shall ensure that radioactive waste accumulated or stored on the site complies with such limitations as to quantity, type and form as may be specified by the Executive.*
- (5) The licensee shall, if so specified by the Executive, not accumulate radioactive waste except in a place and in a manner approved by the Executive.*

The purpose of LC32 is to ensure that the production rate and accumulation of radioactive waste on the site is minimised, held under suitable storage arrangements, and that adequate records are made.

33: Disposal of Radioactive Waste

The licensee shall, if so directed by the Executive, ensure that radioactive waste accumulated or stored on the site is disposed of as the Executive may specify and in accordance with an Authorisation granted under the Radioactive Substances Act 1960 or, as the case may be, the Radioactive Substances Act 1993 (in Scotland) or an environmental permit, or an existing permit which has become an environmental permit, granted under the Environmental Permitting (England and Wales) Regulations 2010.

The purpose of LC33 is to give discretionary powers to ONR to direct that radioactive waste be disposed of in a specified manner. This is related to the powers available to the Environment Agency in England and Wales under EPR10, Schedule 23 and SEPA in Scotland under RSA93, s. 13. LC33 would apply to an environmental permit granted under EPR10.

34: Leakage and Escape of Radioactive Material and Radioactive Waste

(1) The licensee shall ensure, as far as is reasonably practicable, that radioactive material and radioactive waste on the site is at all times adequately controlled or contained so that it cannot leak or otherwise escape from such control or containment.

(2) Notwithstanding paragraph (1) of this condition the licensee shall ensure, so far as is reasonably practicable, that no such leak or escape of radioactive material or radioactive waste can occur without being detected, and that any such leak or escape is then notified, recorded, investigated and reported in accordance with arrangements made under condition 7.

(3) Nothing in this condition shall apply to discharges or releases of radioactive waste in accordance with an approved operating rule or disposal authorisation granted under the Radioactive Substances Act 1960 or, as the case may be, the Radioactive Substances Act 1993 [in Scotland] or an environmental permit, or an existing permit which has become an environmental permit, granted under the Environmental Permitting (England and Wales) Regulations 2010.

The purpose of LC34 is to ensure so far as reasonably practicable that radioactive material and radioactive waste is adequately controlled or contained so as to prevent leaks or escapes, and that any unauthorised leak or escape can be detected and reported.

35: Decommissioning

(1) The licensee shall make and implement adequate arrangements for the decommissioning of any plant or process which may affect safety.

(2) The licensee shall make arrangements for the production and implementation of decommissioning programmes for each plant.

(3) The licensee shall submit to the Executive for approval such part or parts of the aforesaid arrangements or programmes as the Executive may specify.

(4) *The licensee shall ensure that once approved no alteration or amendment is made to the arrangements or programmes unless the Executive has approved such alteration or amendment.*

(5) *The aforesaid arrangements shall where appropriate divide the decommissioning into stages. Where the Executive so specifies the licensee shall not commence nor thereafter proceed from one stage to the next of the decommissioning without the consent of the Executive. The arrangements shall include a requirement for the provision of adequate documentation to justify the safety of the proposed decommissioning and shall where appropriate provide for the submission of this documentation to the Executive.*

(6) *The licensee shall, if so directed by the Executive where it appears to them to be in the interests of safety, commence decommissioning in accordance with the aforesaid arrangements and decommissioning programmes.*

(7) *The licensee shall, if so directed by the Executive, halt the decommissioning of a plant and the licensee shall not recommence such decommissioning without the consent of the Executive.*

The purpose of LC35 is to require the licensee to make adequate provisions for decommissioning. It also gives discretionary powers to ONR to direct that decommissioning of any plant or process be commenced or halted.

36: Control of Organisational Change

(1) *The licensee shall make and implement adequate arrangements to control any change to its organisational structure or resources which may affect safety.*

(2) *The licensee shall submit to the Executive for approval such part or parts of the aforesaid arrangements as the Executive may specify.*

(3) *The licensee shall ensure that once approved no alteration or amendment is made to the approved arrangements unless the Executive has approved such alteration or amendment.*

(4) *The aforesaid arrangements shall provide for the classification of changes to the organisational structure or resources according to their safety significance. The arrangements shall include a requirement for the provision of adequate documentation to justify the safety of any proposed change and shall where appropriate provide for the submission of such documentation to the Executive.*

(5) *The licensee shall if so directed by the Executive halt all change to its organisational structure or resources and the licensee shall not recommence such change without the consent of the Executive.*

The purpose of LC36 is to require the licensee to make arrangements to give proper advance consideration to the effect on safety that any proposed change in its organisation might have. This includes changes to the resource levels, their competencies, responsibilities and reporting lines, at all levels in the organisation, including any external support on which it might rely for safety-related advice. It also gives discretionary powers to ONR to direct that any proposed change in its organisational structure or resources should be halted and not recommenced without the consent of ONR.

Annex L.7. - Regulatory Organisations

L.7.1. This Annex provides further information to that supplied in Article 19 on the regulators that enforce health, safety and environmental regulation in the UK.

Health and Safety Regulation

Office for Nuclear Regulation

(i) Mandate and duties

L.7.2. The original Nuclear Installations Act, enacted in 1959, set up the Nuclear Installations Inspectorate (NII) in 1960, then called the Inspectorate of Nuclear Installations. The 1959 Act was subsequently replaced by NIA65 which, although amended in some details, retains essentially the same regulatory powers. In 1974, NII was incorporated into HSE, and those parts of NIA65 relating to licensing became relevant statutory provisions of HSWA74. On 1 April 2011 NII became part of the Office for Nuclear Regulation (ONR), an Agency of HSE.

L.7.3. ONR operates the nuclear site licensing system under NIA65 and grants licences to corporate bodies to install or operate a nuclear installation on a particular site. ONR may attach to a nuclear site licence such conditions as appear necessary or desirable in the interests of safety, or such conditions as it may think fit with respect to the handling, treatment and disposal of nuclear matter.

(ii) Organisational structure

L.7.4. As at 1 April 2011, ONR is organised into seven divisions covering:

- Regulation of NPPs (operating and decommissioning);
- Regulation of fuel manufacture, fuel reprocessing, research facilities, waste management and the UK Safeguards Office;
- Regulation of Ministry of Defence related sites;
- Strategy development, planning and finance;
- Regulation of Security at licensed nuclear sites;
- GDA; and
- Corporate Affairs and Strategy.

Each division also has administrative support.

(iii) Financial resources

L.7.5. Section 24A of NIA65 enables financial charges to be imposed on the nuclear licensees to recover the expenses incurred through ONR's regulation of nuclear installations. In addition, further expenses are recovered from licensees in respect of a programme of safety research and studies agreed between ONR and the industry. ONR uses a work recording system to identify the effort and expenses of its staff attributable to each licensee.

L.7.6. Additionally, Fees Regulations are used to recover charges for work on GDA. In 2010/11, ONR's total expenditure forecast is £51 million, of which nuclear inspection expenditure is forecast to be £48 million (excluding central overheads).

(iv) Human resources

L.7.7. As of 30 April 2011, ONR has 218 nuclear safety inspectors in post and 2 in training (compared with 157 nuclear inspectors in post and 8 in training to become Nuclear Installations Inspectors noted in the third UK report). It has sufficient inspectors in post to carry out its current regulatory duties but it is recognised that recruitment will need to continue at the same rate for several years to address further developments in the industry and as older inspectors retire. As in many other countries, ONR's age distribution is heavily weighted towards the older end of the spectrum and it currently has many inspectors in post who are beyond the former retirement age of 60 years old (at present around 13% are over 60 and 30% over 57). However, the Government has recently removed all age barriers so there is now no upper age limit to employment.

L.7.8. Staffing profiles have been prepared for a number of years ahead. These are based on current and anticipated workloads and make various assumptions on the retention of staff beyond the former retirement age of 60.

L.7.9. In addition, each of ONR's divisions has identified current and anticipated staff requirements in terms of technical discipline. As well as identifying current vacancies, this work has identified potential pressure points caused by future retirements, and where there is a vulnerability arising from only having a single expert in a particular discipline.

Developing and maintaining staff competences

L.7.10. The intensive recruitment campaign over the last two years has necessitated a radical revision of the training and assimilation of new inspectors. Recruitment in excess of 30 new inspectors per year means that ONR can no longer just rely on external training courses and ad-hoc internal peer group assistance from experienced colleagues. Training and assimilation is resource intensive so it has to be structured, planned, properly resourced and continually evaluated to ensure it meets all needs. ONR has training managers in place and has a significant training budget.

Training of new inspectors

L.7.11. All inspectors joining ONR have good academic qualifications and several years of experience in a relevant industry such that they can be regarded as being technical experts in their own discipline. The purpose of the training is to expand and build on this base rather than "convert" them to acquire another knowledge base. It can be regarded as a "holistic" approach to training. To achieve this, the initial training is in two main areas:

- Training to be a regulator – as few new recruits have prior knowledge of regulation; and
- Training to expand recruits' technical expertise to gain a working knowledge of other essential technical disciplines.

Competence framework

L.7.12. In 2008 a new competence framework was developed for nuclear safety inspectors. This framework was based on the requirements of “National Occupational Standards for Nuclear Regulators”^[172]. This is a high level standard and it sets out the basic requirements for all regulators involved in nuclear safety and security including the environment agencies and transport.

L.7.13. The competence framework was initially trialled and is being refined continuously to reflect feedback. The purpose of the framework is to specify the training need for specific job functions as well as identifying the basic training needs.

Training methods

L.7.14. A new inspector's training programme is developed on a personal basis and is based on a training needs analysis. The delivery of the programmes relies extensively on an interactive tutorial approach rather than formal lectures. Training documentation focuses on providing signposts to where information can be found rather than providing detailed training material.

L.7.15. New recruits also undergo operational training (on-the-job training) where they carry out specific regulatory assignments under close supervision. The effectiveness of all training activities are evaluated initially and again after three months. This gives opportunities for trainees to evaluate training in the context of their job and gives better feedback to those developing the training courses.

Continued professional development

L.7.16. Whilst considerable effort is spent on the training of new recruits, ONR also has a refresher training programme to develop professional competencies for all staff. ONR's policy is that this is not centrally managed but is a matter for individual inspectors to agree with their line managers with advice from senior experts in their technical field. Such training covers topics such as communication, influencing skills, change management and interpersonal skills, as well as the development of technical competencies.

Technical support

L.7.17. The 'expenses' recovered from licensees include the two major cost streams of expenditure associated with the ONR's own operational activity (payroll, travel and subsistence, training and other staff-related costs) and the costs of Nuclear Safety Studies (which enables ONR to buy-in technical and scientific support in support of the regulatory function).

Environmental Regulation

Environment Agency

(i) Mandate and duties

L.7.18. The Environment Agency was created under EA95 with the aim of providing a more integrated approach to protecting and improving the environment of England and Wales as a whole – land, air and water. It is a ‘non-departmental public body’, sponsored largely by Defra and the Welsh Government. Its powers and duties relate to environmental protection, flood defence, water resources, fisheries, recreation,

conservation and navigation. EA95 sets out the principal aim of the Environment Agency “in discharging its functions so to protect or enhance the environment, taken as a whole, as to make the contribution towards attaining the objective of sustainable development”.

(ii) Structure

L.7.19. The Environment Agency has a board of up to 15 members, including the Chairman and Chief Executive, who are accountable to Government Ministers for the Environment Agency’s organisation and performance. All are appointed by the Secretary of State for Environment, Food and Rural Affairs, except for one Board Member for Wales, who is appointed by the Welsh Government. The Board delegates the Environment Agency’s day-to-day management to its Chief Executive and staff.

L.7.20. For most of its activities, the Environment Agency has broken down its work between 7 geographical regions. In each region, currently three statutory committees advise the Environment Agency about the operational performance of its functions, regional issues of concerns and regional implications of national policy proposals. These committees are the Regional Fisheries, Ecology and Recreation Advisory Committee, Regional Flood Defence Committee and the Regional Environment Protection Advisory Committee.

L.7.21. Committee members are appointed under statutory membership schemes designed to achieve representation from a wide range of the Environment Agency’s stakeholders. All Regional Environment Protection Advisory Committee meetings are advertised locally and the public is welcome to attend.

L.7.22. The Environment Agency has established two specialist groups (North and South) to carry out the regulation of radioactive waste disposals from the nuclear industry. These groups regulate discharges of liquid and gaseous wastes on and off nuclear licensed sites and disposal of solid radioactive waste. Associated with the northern group are two assessment teams providing national support on solid waste disposal and on generic designs of potential new nuclear reactors. Similarly, associated with the southern group, there is a small team providing national support on radiation incident management.

L.7.23. The Radioactive Substances Regulation Group, working within the Environment Agency’s national office, leads on regulatory process development and implementation including developing regulatory guidance. There is also a national group responsible for checking, monitoring and assessment of discharges to the environment.

L.7.24. The Environment Agency and the Food Standards Agency liaise closely to ensure that their environmental monitoring programmes in England and Wales are appropriate. Annual results from the environmental monitoring programme in the UK are published jointly by the environment agencies, the Food Standards Agency and the Environment and Northern Ireland Environment Agency in the annual RIFE report^[140]. The latest results published are from the 2009 environmental monitoring programme.

(iii) Financial resources

L.7.25. The Environment Agency has a total budget of over £1.25 billion, over half of which is spent on flood defence and, in 2006/07, £358.7 million was spent on Environment Protection. Income is derived chiefly from three sources:

- (a) Income raised from charging for regulation.
- (b) Flood defence levies.
- (c) Government grants, which help to finance amongst other things, pollution prevention and control activities.

L.7.26. Section 41 of EA95 provides the Environment Agency with the power to impose financial charges for regulatory activities in order to recover the expenses incurred through regulation. Such expenses include those incurred in respect of a programme of waste and environmental monitoring carried out by Environment Agency. The Environment Agency uses a work recording system to identify the effort and expenses of its staff attributable to each licensee.

L.7.27. The Environment Agency charges operators for its nuclear regulatory activities on the basis of a daily rate for inspectors. This rate is reviewed annually. The Environment Agency also recharges operators for the monitoring it carries out. Annual charges for nuclear and non-nuclear regulatory work and monitoring activities in financial year 2009/2010 were approximately £12.8 million.

(iv) Human resources

L.7.28. The Environment Agency has a total of over 12,000 staff, although only a small proportion of these are involved in nuclear regulation. The North and South nuclear regulatory groups have a total of around 45 technical staff, with additional administrative support. The other groups identified above involved with nuclear regulatory activities comprise approximately a further 19 technical staff.

(v) Inspectors' qualifications

L.7.29. Nuclear regulatory staff recruited by the Environment Agency are required to have a good honours degree in science or engineering, and several years experience in a technical or management role in the nuclear industry.

(vi) Inspectors' training

L.7.30. The Environment Agency has established standards of competency for its staff involved with the regulation of radioactive substances. Competence standards for nuclear regulation are separately identified within the overall framework.

L.7.31. The standards are used as a benchmark for all staff, but the need to undergo a structured programme depends on the individual's experience. For more experienced staff, the standards are used informally to better target professional development. For new inspectors, attainment of the competency standards is mandatory and these are used in a formal manner.

L.7.32. Developing the competences of staff is achieved by combination of structured training (for example on legal requirements) and developmental experience (for example on site inspection or issuing Enforcement Notices). The system adopted by the Environment Agency allows for competences to be demonstrated and the standards achieved to be recorded. More experienced staff act as mentors for new staff going through the competences programme.

Scottish Environment Protection Agency

(i) Mandate and Duties

L.7.33. The Scottish Environment Protection Agency (SEPA) was formed in 1996 to deliver an integrated environmental protection service to Scotland. SEPA has statutory powers to prevent, minimise or reduce pollution and to protect or enhance the environment, and is a non-departmental public body operating at arm's length from the Scottish Government but accountable through the Scottish Ministers to the Scottish Parliament.

L.7.34. SEPA plays an important role in achieving international environmental obligations and provides expert advice to the Scottish and UK Governments and to other partner organisations. As the principal environmental regulator for Scotland, SEPA contributes to formulating legislation and advises on the implementation of EC legislation, the development of government regulations, regulatory policies and guidance and the regulation of industrial and commercial installations. SEPA is responsible for implementing and monitoring compliance with Scottish and UK environmental laws, around 90% of which originate in Europe. Comprehensive information on the laws and directives SEPA implements can be found on the SEPA website (see Annex L.10).

L.7.35. As Scotland's environment watchdog, SEPA aims to protect the environment and human health by being an excellent environmental regulator and an effective and influential authority on the environment, limiting climate change and preparing Scotland for a sustainable future.

L.7.36. Powers under RSA 93 are devolved to the Scottish Government. Using its statutory powers, SEPA issues various permits, licences, consents, registrations and authorisations covering a wide range of commercial and institutional activities that have the potential for adverse impacts on the environment.

L.7.37. SEPA manages a monitoring programme that assesses levels of man-made radioactivity in the environment using a number of environmental indicators. The samples of water, food, soil etc, collected as part of SEPA's programme, act both as indicators of the state of the environment and to verify that the levels of radioactivity present within these commodities have low radiological significance to man.

L.7.38. Results from the environmental monitoring programme are used as the basis for dose calculations to members of the public from consumption of food and exposures of members of the public from waste disposals.

L.7.39. In Scotland, the Food Standards Agency and SEPA liaise closely together to ensure that the environmental monitoring programme for radioactivity is appropriate. Annual results from the environmental monitoring programme in the UK are published jointly by the environment agencies, the Food Standards Agency and NIEA in a report entitled 'Radioactivity in Food and the Environment'^[140]. The latest results published are from the 2009 environmental monitoring programme.

(ii) Structure

L.7.40. Legally, the Agency Board constitutes SEPA. The members of the Board are appointed by the Scottish Ministers and, as well as appointing the Chairman of SEPA, the Scottish Ministers appoint a member as Deputy Chairman. The Chairman is personally responsible to Scottish Ministers. The Board has responsibility for

ensuring that SEPA fulfils the aims and objectives set by the Scottish Ministers and membership of the Board includes a Chief Executive to whom is delegated the day-to-day management of SEPA.

L.7.41. The Board has ultimate responsibility for the organisation. It meets regularly and is specifically concerned with:

- a) Establishing the overall strategic direction of SEPA within the policy and resources framework agreed with the responsible Minister;
- b) Overseeing the delivery of planned results by monitoring performance of the organisation against agreed objectives and targets;
- c) Demonstrate high standards of corporate governance at all times; and
- e) Ensure that statutory requirements for the use of public funds are complied with.

L.7.42. SEPA has one specialist team that deals with radioactive waste disposals from nuclear sites in Scotland. The Radioactive Substances Unit (RS Unit) covers the day-to-day regulatory activities such as issuing authorisations, inspection, enforcement etc. and also covers more strategic matters such as liaison with Government or other bodies and in influencing the development of forthcoming policy or legislation. This Unit is also responsible for managing part of RIMNET in Scotland, and leads on environmental monitoring such as the collection and assessment of samples. In all, there are around 40 technical staff dealing with radioactive substances, the majority of whom have some involvement in matters relating to nuclear sites.

(iii) Financial resources

L.7.43. SEPA's income is derived chiefly from three sources:

- a) Income raised from charging for regulation.
- b) Government grant-in-aid, which helps to finance work that is not cost-recoverable through charging schemes.
- c) Other sources (like financial agreements with NDA).

L.7.44. In the financial year 2009/10, SEPA's total income was £83.75m of which £48.3m was grant-in-aid from the Scottish Government. SEPA charges operators for its nuclear regulatory activities on the basis of a daily rate for an inspector, which includes an appropriate overhead allowance. The prices for all SEPA charging schemes can be updated annually by up to the Retail Price Index. In the event that SEPA prices have to increase by more than the Retail Price Index, or a scheme requires other changes, a public consultation is held. All changes which have been the subject of consultation have to be approved by the Scottish Ministers before SEPA can implement them. SEPA's income from all charging schemes totalled £33.2m in 2009/10.

(iv) Human resources

L.7.45. SEPA has approximately 1000 staff, around 40 of whom are involved directly in nuclear site regulation, either under RSA93 or other environmental regulatory regimes that apply on nuclear licensed sites governing the management of controlled and hazardous wastes.

(v) Inspectors' qualifications

L.7.46. Nuclear regulatory staff recruited by the Agency are required to have a degree in a relevant discipline.

(vi) Inspectors' training

L.7.47. SEPA has established standards of competency for its staff involved with the regulation of radioactive substances. Competency standards for nuclear regulation are separately identified within the overall framework.

L.7.48. SEPA's grading structure for regulatory staff starts at trainee Environmental Protection Officer (EPO). Trainee EPOs are required to complete a training programme in order to progress onto Environmental Protection Officer grade. This will include training in general inspection techniques, evidence gathering and enforcement, etc. Thereafter, EPOs can progress to a more general promoted post as Senior EPOs (Specialist 2 grade), or move into a specialist area (Specialist 1 grade).

L.7.49. Specialist staff regulating nuclear facilities, who are normally recruited from outside SEPA, are required to have minimum of 3 years (Specialist 2 grade) technical or scientific professional experience upon appointment, but the majority have at least 5 years (Specialist 1 grade). Staff who enter SEPA at specialist level will be trained in the relevant general inspection techniques, enforcement etc. and the more specialised radioactive substances courses, dependent on their existing experience and training.

Annex L.8. - ONR's Safety Assessment Principles

L.8.1. In this Annex, compliance with the Joint Convention is demonstrated in a way that has substantially changed since the third UK report (i.e. in a way that has implications for the Joint Convention obligations).

Background

L.8.2. ONR inspectors use the Safety Assessment Principles (SAPs)^[132], together with the supporting TAGs^[133], to guide regulatory decision-making in the nuclear permissioning process. Underpinning such decisions is the legal requirement on nuclear site licensees to reduce risks so far as is reasonably practicable, and the use of the SAPs should be seen in that context.

L.8.3. The principles were first published in 1979 for nuclear power reactors. Corresponding principles for nuclear chemical plants followed in 1983. The principles were amended in 1988, following a recommendation by Sir Frank Layfield arising from the Sizewell B inquiry. He also recommended that HSE should publish for discussion its thinking on risk assessment. The HSE paper 'The tolerability of risk from nuclear power stations' 1988, and revised in 1992, was produced in response^[173] to this recommendation. It provides background on levels of risks that may be tolerable by comparing them with other risks that society chooses to bear in return for certain benefits.

L.8.4. In 1992, the SAPs underwent a thorough revision with the objectives of:

- a) consolidating the revisions made as a result of the recommendations of the Sizewell B inquiry;
- b) implementing lessons learned since first publication;
- c) ensuring greater consistency with international criteria (IAEA Safety Standards, Codes and Guides);
- d) implementing suggestions made in HSE's 'The tolerability of risk from nuclear power stations' (TOR) paper (1988) and also in its 1992 revision; and
- e) combining nuclear power reactor and nuclear chemical plant principles.

L.8.5. Since that review, experience in their use and developments in the field of nuclear safety, both internationally and in the UK, have led to the need to undertake a further thorough revision of the principles.

L.8.6. On the international front, the IAEA has restructured and has revised, or is revising, all of its safety standards. This has been occurring in parallel with greater European recognition that IAEA standards are an appropriately high standard to benchmark against. IAEA Requirements are explicit in requiring a Regulatory Body to keep its principles, regulations and guidance under review from time to time, taking account of internationally endorsed standards and recommendations. ONR agrees with this need for periodic review. The new edition of the SAPs, published in 2006, is the result of such a review, and has included benchmarking against the IAEA standards as they existed in 2004. The UK's goal-setting legal framework for health and safety does not apply IAEA requirements in a prescriptive manner, but they are reflected within the 2006 SAPs.

L.8.7. ONR is a member of the Western European Nuclear Regulators' Association (WENRA), which is dedicated to ensuring that all European Union countries and candidate countries with civil nuclear power stations, as well as Switzerland, have harmonised high levels of nuclear safety. To this end, WENRA is developing reference levels that represent good practices for civil nuclear power plants, and for radioactive waste management, and decommissioning. Harmonisation requires there to be no substantial differences from the safety point of view in generic, formally issued, national safety goals, and in their resulting implementation on nuclear power station licensed sites. In the UK, the reference levels will be secured using a combination of: national laws; health and safety regulations; conditions attached to nuclear site licences; and the 2006 SAPs, TAGs and other forms of guidance used when granting nuclear site licences and in regulating licensees' activities.

L.8.8. In addition, a significant proportion of assessment work is directed towards the PSRs of older facilities, decommissioning, and radioactive waste management. The 1992 SAPs, with their focus on design, were not readily suited to these applications, and complementary guidance had to be created. The 2006 revision of the SAPs, while remaining applicable to new nuclear facilities, makes greater provision for decommissioning and radioactive waste management, and is also clearer in its application to safety cases for existing facilities.

L.8.9. In 2001, HSE built upon its work on 'The tolerability of risks from nuclear power stations' with its publication 'Reducing risk, protecting people: HSE's decision making process' (known as R2P2)^[165]. This further explains HSE's decision-making process, and has been supported by guidance on the principle that risks should be ALARP. There were, however, aspects of societal concerns specific to the nuclear context that R2P2 did not tackle, and ONR has further developed its thinking in this area.

L.8.10. Since the previous edition of the SAPs in 1992, ONR has been developing assessment guidance for its inspectors in the TAGs, which give further interpretation of the principles and guidance in their application. These have been written to help interpret the 1992 SAPs, and in some cases have addressed gaps in them. The current 2006 edition of the SAPs covers these gaps, and the TAGs will be subject to review in the light of the revised principles. The SAPs and the TAGs are used by ONR's inspectors, and will be further refined to become a more integrated suite of guidance.

L.8.11. In summary, therefore, the 2006 edition of the SAPs has been:

- a) benchmarked against the IAEA Safety Standards, as they existed in 2004, that represent good practice;
- b) expanded to address emergency arrangements, remediation and decommissioning;
- c) reviewed for application to defence nuclear activities covered by the Defence Nuclear Safety Regulator;
- d) clarified for the assessment of safety cases, and now includes safety management systems; and
- e) updated to be consistent with ONR's thinking on societal risk.

L.8.12. In reviewing and revising the principles prior to their republication in 2006, HSE took into account the technical interests and views of others through inviting

comment on specific technical topic areas, and wider issues. The SAPs continue to be used by ONR as an integral part of its assessment process.

Introduction

The purpose of the Safety Assessment Principles

L.8.13. The SAPs apply to the assessment of safety cases for nuclear facilities that may be operated by potential licensees, existing licensees, or other duty holders. The term 'safety case' is used throughout the document to encompass the totality of a licensee's (or duty holder's) documentation to demonstrate high standards of nuclear safety and radioactive waste management, and any sub-set of this documentation that is submitted to ONR, or used to justify the adequacy of safety at the licensees' plants.

L.8.14. The principles presented in the SAPs relate only to nuclear safety and radioactive waste management. Other conventional hazards are excluded, except where they have a direct effect on nuclear safety or radioactive waste management. The use of the word 'safety' within the document should therefore be interpreted accordingly.

L.8.15. The SAPs provide ONR inspectors with a framework for making consistent regulatory judgements on nuclear safety cases. The principles are supported by the TAGs, and other guidance, to further assist decision making by the nuclear safety regulatory process^[133]. The SAPs also provide nuclear site duty holders with information on the regulatory principles against which their safety provisions will be judged. However, they are not intended or sufficient to be used as design or operational standards, reflecting the non-prescriptive nature of the UK's nuclear regulatory system. In most cases the SAPs are guidance to inspectors, but some reflect legal requirements and hence may incorporate mandatory elements.

SFAIRP, ALARP and ALARA

L.8.16. The 2006 SAPs are consistent with R2P2, which provides an overall framework for decision making to aid consistency and coherence across the full range of risks falling within the scope of the HSWA74. This extended the framework in TOR. R2P2 discusses the meaning of risk and hazard and explains the distinction between the terms. Hazard is the potential for harm from an intrinsic property or disposition of something that can cause detriment, and risk is the chance that someone or something is adversely affected in a particular manner by the hazard. The SAPs use these definitions. ONR regards anything that presents the possibility of danger as a 'hazard'. The relative importance of likelihood and consequence in determining control measures may vary. In some circumstances, particularly where the consequences are very serious or knowledge of the likelihood is very uncertain, ONR may choose to concentrate solely on the consequences to which the hazard could lead.

L.8.17. R2P2 describes risks that are unacceptably high and the associated activities would be ruled out unless there are exceptional reasons, and risks that are so low that they may be considered broadly acceptable and no further regulatory pressure to reduce risks further need be applied. However, the legal duty to reduce risk So Far As Is Reasonably Practicable (SFAIRP) applies at all levels of risk and extends below the broadly acceptable level. Both R2P2 and TOR set out indicative numerical risk levels, but the requirement to meet relevant good practice in engineering and operational safety management is of prime importance.

L.8.18. In applying the TOR framework, the term ALARP has been introduced: for assessment purposes, the terms ALARP and SFAIRP are interchangeable and require the same tests to be applied. ALARP is also equivalent to ALARA, a phrase used by other bodies nationally and internationally.

L.8.19. The SAPs assist ONR's inspectors in the judgement of whether, in their opinion, the duty holder's safety case has satisfactorily demonstrated that the requirements of the law have been met. The guidance associated with each principle gives further interpretation on their application.

L.8.20. The basis for demonstrably adequate safety is that the normal requirements of good practice in engineering, operation and safety management are met. This is a fundamental requirement for safety cases. In addition, this is expected to be supported by a demonstration of how risk assessments have been used to identify any weaknesses in the proposed facility design and operation, showing where improvements were considered and to demonstrate that safety is not unduly reliant on a small set of particular safety features. A number of numerical targets are included in the SAPs, and some of these embody specific statutory limits that must be met.

L.8.21. The principles are used in judging whether ALARP is achieved, and that is why they are written using 'should' or similar language. Priority should be given to achieving an overall balance of safety, rather than satisfying each principle or making an ALARP judgement against each principle. The principles themselves should be applied in a reasonably practicable manner. The judgement using the principles in the SAPs is always subject to consideration of ALARP. This has not been stated in each case to avoid repetition. ONR inspectors need to apply judgement on the adequacy of a safety case in accordance with ONR guidance on ALARP^[127].

L.8.22. In many instances, it will be possible to demonstrate that the magnitude of the radiological hazard will result in doses that will be low in relation to the legal limits, so that considerations of off-site effects or detailed worker risks will be unnecessary.

L.8.23. The development of standards defining relevant good practice often includes ALARP considerations, so in many cases, meeting these standards is sufficient to demonstrate that the legal requirement has been satisfied. In other cases, for example where standards and relevant good practice are less evident or not fully applicable, or the demonstration of safety is complex, the onus is on the duty holder to implement measures to the point where it can demonstrate to ONR inspectors that the costs of any further measures would be grossly disproportionate to the risks their adoption would reduce.

L.8.24. The application of ALARP should be carried out comprehensively and balance the risks. This requires all applicable principles to be considered as a combined set. When judging whether risks have been reduced ALARP, it may be necessary to take account of conventional risks in addition to nuclear risks.

Application of the SAPs

General

L.8.25. The SAPs contain principles and guidance. The principles form the underlying basis for regulatory judgements made by ONR inspectors, and the guidance associated with the principles provides either further explanation of a principle, or their interpretation in actual applications and the measures against which judgements can be made.

L.8.26. Not all of the principles in the SAPs apply to all assessments or every facility; clearly, principles specific to reactors do not apply to fuel-cycle facilities. Less obviously, not all of the reactor principles apply to all reactors: research reactors have significant differences from power reactors. Additionally, the assessment of a modification to a facility will only require the relevant principles to be applied, and that these principles are only applied as far as is reasonably practicable. In short, the principles are a reference set from which the inspector needs to choose those to be used for the particular nuclear safety situation.

Proportionality

L.8.27. MHSW99^[91] and its associated Approved Code of Practice^[174] define three levels of risk assessment: low, intermediate and high. Nuclear installations are in the high category, which should use 'the most developed and sophisticated techniques'. However, there are a wide range of hazards associated with different facilities and activities on nuclear licensed sites. So, within the high category of assessment, the depth and rigour of the analysis required for nuclear facilities will vary considerably. This is consistent with HSC's Enforcement Policy Statement^[126] that the requirements of safety should be applied in a manner that is commensurate with the magnitude of the hazard. Therefore, the extent and detail of assessments undertaken by duty holders as part of a safety case, including their independent assessment and verification, need to be commensurate with the magnitude of the hazards. Similarly, subject to other legal duties or public policy requirements, regulatory attention should also be commensurate with the magnitude of the hazard, although issues such as novelty and uncertainty will also be factors.

L.8.28. Safety cases, and the analyses and assessments contained within them, must be fit for purpose and in accordance with the nuclear site licence condition requirements, and with Regulation 3 of MHSW99. They must, among other things, be suitable and sufficient for the purpose of identifying all measures to control the risk.

L.8.29. Inspectors must be proportionate in what they require from duty holders. The higher the hazard, the more rigorous and comprehensive the analysis, which would be expected to lead to greater defence-in-depth to protect people. Therefore a low hazard facility may need a much more limited analysis to ensure adequacy. This might be expected to result in fewer or less extensive safety provisions.

L.8.30. In some cases, the magnitude of the potential radiological hazard may be uncertain. In these cases, a precautionary approach should be applied by erring on the side of safety. Where the absence of a radiological hazard cannot be shown, an assumption must be made of an appropriate radiological hazard and its magnitude.

Life-cycle

L.8.31. The SAPs are for regulatory assessment throughout the life-cycle of an activity on a nuclear licensed site. Specific sections of the SAPs are devoted to siting and decommissioning. However, not every principle in the other sections will apply to all the other life-cycle stages, and as always, the principles are a reference set from which the inspector chooses those to be used for the particular stage in the life-cycle. The sections of the SAPs on Leadership and management for safety and the Regulatory assessment of safety cases include life-cycle issues. The Engineering principles are relevant to design, construction, manufacture and installation, but will also apply to later operational stages. Commissioning is a key stage in providing the necessary assurance of safety, and a number of the principles include aspects of commissioning. Decommissioning also needs to be considered at all life-cycle stages. IAEA Safety Standard NS-G-1.24 provides more detailed guidance for the assessment aspects to be considered at the main life-cycle stages.

New facilities

L.8.32. One of the aims of the SAPs is the safety assessment of new (proposed) nuclear facilities. They represent ONR's view of good practice and ONR would expect modern facilities to have no difficulty in satisfying their overall intent.

Facilities built to earlier standards

L.8.33. Inspectors will assess safety cases against the relevant SAPs when judging if a duty holder has demonstrated whether risks have been controlled to be ALARP. The extent to which the principles have been satisfied must also take into account the age of the facility or plant. For facilities that were designed and constructed to standards that are different from current standards, the issue of whether sufficient measures are available to satisfy ALARP considerations will be judged case by case.

L.8.34. A common situation when the SAPs are applied to facilities built to earlier standards is in the assessment of a PSR, as required by LC15. PSRs are a thorough and comprehensive review of the safety case at regular intervals throughout a nuclear facility's life. The reviews are more wide-ranging than a restatement of the safety case (see IAEA Safety Standard NS-G-1.2 and NS-G-2.10).

L.8.35. For certain activities, such as decommissioning, it is recognised that, for short periods of time, some principles may not be met, and this is allowable provided the result is to achieve a safer end-state. However, during such periods, the requirement to reduce risks ALARP remains.

Ageing

L.8.36. As a facility ages, plant safety margins may be eroded, and a duty holder may argue that it is not worthwhile to make improvements. Remaining lifetime may be invoked in making the ALARP demonstration, but this factor should not be used to make a case for a facility to operate outside legal requirements. A minimum period of ten years, or the minimum future life of the facility if longer, should be used in ALARP demonstrations. Remaining lifetimes of less than ten years will be subject to regulatory action to ensure that the declared lifetime is not extended, beyond that assumed, without further justification.

Multi-facility sites

L.8.37. When considering the radiological hazards and risks posed by a nuclear site, all the facilities, services and activities on it need to be considered. In most cases, the SAPs are considered in relation to single facilities, and so the control of risks is also generally considered on a facility basis. However, there is a need to consider the totality of control of risks from a site. Two different situations arise: where all the facilities and services are under the control of a single licensee, covered by a single nuclear site licence, or where some of the facilities and services are on neighbouring sites under the control of different duty holders. Many of the issues are similar.

L.8.38. Sites that have multiple facilities often produce a set of individual safety cases for each facility. Shared services are also generally dealt with by separate cases. The division of the site in this way requires the definition of boundaries and interfaces between facilities and services. It also requires an appropriate combination of the individual analyses to develop the site safety case. This is necessary to account for the interactions and interdependencies between facilities and services.

L.8.39. Determining whether risks have been controlled and reduced ALARP therefore requires an overall consideration of the site and, in determining if good practices have been met, all risks need to be assessed. On a complex site there will be many different radiological hazards and risks that, in determining the necessary safety measures for the site, may need to be balanced in demonstrating that the overall risks are ALARP.

Alternative approaches

L.8.40. The principles are written bearing in mind the content of safety cases likely to be submitted to ONR. However, duty holders may wish to put forward a safety case that differs from this expectation and, as in the past, the inspector will consider such an approach. In these cases, the duty holder is advised to discuss the method of demonstration with ONR beforehand. Such cases will need to demonstrate equivalence to the outcomes associated with the use of the principles in the SAPs, and such a demonstration may need to be examined in greater depth to gain such an assurance. An example of such a situation is the greater use of passively safe concepts.

Structure of the principles

L.8.41. The SAPs are structured in separate sections, as follows:

- Fundamental principles. These principles are founded in UK health and safety law and international good practice, and underpin all those activities that contribute to sustained high standards of nuclear safety.
- Leadership and management for safety. This section sets out principles that form the foundation for the leadership and management for safety in the nuclear environment.
- The regulatory assessment of safety cases. This section sets out the principles applicable to the assessment of the production and nature of safety cases.

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- The regulatory assessment of siting. This section provides principles applied in the assessment of a site, since the nature of a site can have a bearing on accident consequences.
 - Engineering principles. This section comprises the major part of this document and covers many aspects of the design and operation of nuclear facilities.
 - Radiation protection. This section provides a link with IRR99.
 - Fault analysis.
 - Numerical targets and legal limits. This section sets out the targets to assist in making ALARP judgements.
 - Accident management and emergency preparedness. This section provides the links to assessing compliance with licence conditions and REPIR.
 - Radioactive waste management.
 - Decommissioning.
 - Control and remediation of radioactively contaminated land.

ANNEX L.9. - IAEA Requirements

In the UK report it is the intention to indicate how, in meeting the requirements of the Joint Convention, the UK takes into account the requirements set out in relevant IAEA documents. For the purpose of this report, two new IAEA documents are considered to be particularly relevant:

GSR Part 1 Government Legal and Regulatory Framework for Safety - General Requirements.

GSR Part 5 Predisposal Management of Radioactive Waste – General Requirements.

Other Requirements documents for the existing series that have been used are:

WS-R-1 Near Surface Disposal of Radioactive Waste - Requirements.

WS-R-4 Geological Disposal of Radioactive Waste - Safety Requirements.

WS-R-5 Decommissioning of Facilities using Radioactive Material - Safety Requirements.

The UK report to the Joint Convention does not address these documents point by point. However, the attached table groups all the requirements (defined as statements containing 'shall') into a number of summarised, generic requirements for which references are given to the relevant UK report sections. Labels within the report refer to these generic requirements.

Generic Ref.	<u>Text</u>	Application in UK Report
G	<u>GENERAL PRINCIPLES</u>	
G1	<u>Due consideration shall be given to the protection of workers and the public and to the protection of the environment</u>	Section B (Policy)
	GSR Part 1, 2.5(1) GSR Part 5, 2.2 GSR Part 5, 2.4 GSR Part 5, 2.5 GSR Part 5, 2.6 GSR Part 5, 2.7 WS-R-1, Chapter 2 WS-R-4, 2.7 – 2.11, 2.14, 2.19 WS-R-5, 2.2 – 2.3	Section E (Article 19) Section F (Article 24)
G2	<u>Radioactive waste arisings shall be kept to a minimum</u> GSR Part 5, 4.6 Requirement 8 GSR Part 5, 4.7 GSR Part 5, 4.8 GSR Part 5, 4.9	Section B (Policy) Section GH (Articles 4 and 11)
G3	<u>An appropriate waste classification scheme shall be established</u> GSR Part 5, 3.8	Section B (Policy)
G4	<u>Radioactive waste shall be characterized in terms of its physical, chemical, radiological and biological properties</u> GSR Pt 5, 4.10 Requirement 9 GSR Part 5, 4.11 GSR Part 5, 4.12	Section B (Policy)
G5	<u>National policies and implementation strategies for the safe management of radioactive waste shall be developed</u> GSR Part 5, 1.3 WS-R-4 3.7 WS-R-5 3.4	Section B (Policy)

Generic Ref.	<u>Text</u>	Application in UK Report
G6	<u>Interdependencies in the management of radioactive waste shall be taken into account</u>	Section GH (Articles 4 and 11)
	GSR Part 5, Requirement 5 GSR Part 5, Requirement 6 WS-R-1, 4.14 – 4.15 WS-R-4, I.4 WS-R-5, 4.8	
G7	<u>Radioactive waste shall be managed in such a way that will not impose undue burdens on future generations</u>	Section B (Policy) Section GH (Articles 4 and 11)
	GSR Part 5, 4.23 WS-R-1, 10.6 WS-R-4, 2.1 and I.3 WS-R-5, 4.2	
G8	<u>Waste producers shall have prime responsibility for safety</u>	Section B (Policy) Section E (Article 19) Section F (Article 21)
	GSR Part 1, Requirement 5 GSR Part 1, Requirement 6 GSR Part 5, 3.11 GSR Part 5, 3.14 GSR Part 1, 2.14 – 2.16 GSR Part 1, 4.32 WS-R-5, 7.2	
G9	<u>There shall be adequate arrangements for indemnification of third parties for radiation damage</u>	Section E (Article 19)
	GSR Part 1, 2.18 (6)	
G10	<u>Advisory Bodies</u>	Section E (Article 19)
	GSR Part 1, Requirement 20 GSR Part 1, 4.18 GSR Part 1, 4.22	

Generic Ref.	<u>Text</u>	Application in UK Report
L	<u>LEGISLATIVE REGIME</u>	
L1	<u>A legislative regime shall be established</u>	Section E
	GSR Part 1, Requirement 3 GSR Part 1, Requirement 4 GSR Part 1, 2.5	
L2	<u>Regulatory regime shall be proportionate</u>	Section E (Article 19)
	GSR Part 1, 2.4	
L3	<u>Legislation shall be promulgated to provide for the effective control of nuclear, radiation, radioactive waste and transport safety</u>	Section E (Article 19)
	GSR Part 1, 2.5 GSR Part 1, Requirement 3 GSR Part 1, Requirement 4	
L3.1	<u>The legal framework shall ensure an allocation of responsibility for safety at all times</u>	Section E (Article 19)
	GSR Part 1, 2.5(6) GSR Part 1, 2.28 GSR Part 5, 3.3 WS-R-4, 3.1	
L3.2	<u>Legislation shall establish authorisation / licensing processes</u>	Section E (Article 19)
	GSR Part 1, 2.5 GSR Part 5, 5.23 GSR Part 1, 2.6	
L3.3	<u>There shall be criteria for the ending of regulatory control</u>	Section E (Article 19)
	GSR Part 5, 1.3 GSR Part 5, 5.23 GSR Part 5, 5.25 WS-R-5, 9.1 WS-R-4, 3.68	

Generic Ref.	<u>Text</u>	Application in UK Report
RB	<u>REGULATORY BODY</u>	
RB1	<u>Regulatory Body shall be independent</u>	Section E (Article 20)
	GSR Part 1, Requirement 4 GSR Part 1, 2.8 WS-R-4, 3.5 WS-R-5, 3.4	
RB2	<u>If the regulatory body consists of more than one authority, effective arrangements shall be made for effective co-ordination</u>	Section E (Article 20)
	GSR Part 1, Requirement 7 GSR Part 1, 2.6 GSR Part 1, 2.12 GSR Part 1, 2.18	
RB3	<u>Regulatory body shall be responsible for authorisation, assessment, inspection and enforcement</u>	See individual items below.
	GSR Part 1, Requirement 23 GSR Part 1, 2.5 (3) GSR Part 1, Requirement 25 GSR Part 1, 4.40 - 4.44 GSR Part 1, Requirement 27 GSR Part 1, Requirement 28 GSR Part 1, Requirement 29 GSR Part 1, 4.50 GSR Part 1, 4.52 GSR Part 1, Requirement 30 GSR Part 1, Requirement 31 GSR Part 1, 4.54 GSR Part 1, 4.56 GSR Part 1, 4.58 WS-R-5, 3.6	

Generic Ref.	<u>Text</u>	Application in UK Report
RB3.1	<p data-bbox="443 353 1145 421"><u>The regulatory body shall be responsible for authorization / licensing</u></p> <p data-bbox="443 432 790 465">GSR Part 1, Requirement 23</p> <p data-bbox="443 477 675 510">GSR Part 1, 2.5 (3)</p> <p data-bbox="443 521 595 555">WS-R-5, 3.6</p>	Section E (Article 19)
RB3.2	<p data-bbox="443 573 1058 640"><u>The regulatory body shall carry out reviews and assessments</u></p> <p data-bbox="443 651 790 685">GSR Part 1, Requirement 25</p> <p data-bbox="443 696 727 730">GSR Part 1, 4.40 - 4.44</p> <p data-bbox="443 741 831 775">WS-R-1, 1.7, 3.1, 3.11, 5.1, 12.1</p> <p data-bbox="443 786 675 819">WS-R-4, 3.10, 3.39</p> <p data-bbox="443 831 699 864">WS-R-5, 3.6, 8.9, 9.3</p>	Section E (Article 19)
B3.3	<p data-bbox="443 887 1050 920"><u>The regulatory body shall carry out inspections</u></p> <p data-bbox="443 931 790 965">GSR Part 1, Requirement 27</p> <p data-bbox="443 976 790 1010">GSR Part 1, Requirement 28</p> <p data-bbox="443 1021 790 1055">GSR Part 1, Requirement 29</p> <p data-bbox="443 1066 651 1099">GSR Part 1, 4.50</p> <p data-bbox="443 1111 651 1144">GSR Part 1, 4.52</p> <p data-bbox="443 1155 595 1189">WS-R-1, 9.3</p> <p data-bbox="443 1200 699 1234">WS-R-5, 3.6, 8.9, 9.2</p>	Section E (Article 19)
RB 3.4	<p data-bbox="443 1267 1066 1301"><u>The regulatory body shall carry out enforcement</u></p> <p data-bbox="443 1312 790 1346">GSR Part 1, Requirement 30</p> <p data-bbox="443 1357 790 1391">GSR Part 1, Requirement 31</p> <p data-bbox="443 1402 651 1435">GSR Part 1, 4.54</p> <p data-bbox="443 1447 651 1480">GSR Part 1, 4.56</p> <p data-bbox="443 1491 651 1525">GSR Part 1, 4.58</p> <p data-bbox="443 1536 651 1570">WS-R-5, 3.6, 8.9</p>	Section E (Article 19)
RB4	<p data-bbox="443 1592 1090 1659"><u>The regulatory body shall provide information and advice to other bodies and the public</u></p> <p data-bbox="443 1671 790 1704">GSR Part 1, Requirement 15</p> <p data-bbox="443 1715 790 1749">GSR Part 1, Requirement 34</p> <p data-bbox="443 1760 719 1794">GSR Part 1, 4.61. 5.13</p>	Section E (Article 19)
RB5	<p data-bbox="443 1816 783 1850"><u>International Co-operation</u></p> <p data-bbox="443 1861 790 1895">GSR Part 1, Requirement 14</p> <p data-bbox="443 1906 635 1939">GSR Part 1, 3.2</p> <p data-bbox="443 1951 595 1984">WS-R-4, 3.9</p>	Section E (Article 19)

Generic Ref.	<u>Text</u>	Application in UK Report
RB6	<u>The regulatory body shall establish safety principles, criteria, regulations and guides</u>	Section E (Article 19)
	GSR Part 1, Requirement 25 GSR Part 1, Requirement 32 GSR Part 1, Requirement 33 GSR Part 1, Requirement 34 GSR Part 1, 4.61 GSR Part 1, 4.62 GSR Part 5, 2.10 GSR Part 5, 4.17 WS-R-4, 3.68 WS-R-5, 3.6	
RB7	<u>The regulatory body may also have additional functions</u>	
	GSR Part 1, 2.2 GSR Part 1, 2.6 GSR Part 1, 2.18	
RB8	<u>The regulatory body shall be structured so as to ensure that it is capable of discharging its responsibilities</u>	Section E (Article 20)
	GSR Part 1, Requirement 16 GSR Part 1, 4.5	
RB9	<u>The regulatory body shall implement appropriate quality management</u>	Section E (Article 20)
	GSR Part 1 Requirement 19 GSR Part 1, 4.15 (2)	
RB10	<u>Regulatory body shall have adequate authority and resources</u> GSR Part 1, 2.5 (9) GSR Part 1, 2.5 (10) GSR Part 1, Requirement 3 GSR Part 1, Requirement 4 GSR Part 1, 2.8 GSR Part 1, 2.13 GSR Part 1, Requirement 5 GSR Part 1, 4.10 GSR Part 1, Requirement 18 GSR Part 1, 4.11 – 4.13	Section E (Article 20)

Generic Ref.	<u>Text</u>	Application in UK report
RB11	<u>If the regulatory body is not self-sufficient in all areas it shall seek advice or assistance, as appropriate, from consultants</u>	Section E (Article 20)
	GSR Part 1, Requirement 20 GSR Part 1, 4.18 – 4.22 WS-R-4, 3.9, 3.39 WS-R-5	
WD	<u>WASTE AND DECOMMISSIONING IN PRACTICE</u>	
WD1	<u>The appropriate options shall be identified to avoid conflicting requirements that might compromise safety</u>	Section GH (Articles 7 and 14)
	GSR Part 5, 4.17 GSR Part 1, 2.19 GSR Part 5, 5.23 GSR Part 5, Requirement 10	
WD2	<u>The operator shall perform safety and environmental impact assessments</u>	Section GH (Articles 8 and 15)
	GSR Part 5, 3.11 GSR Part 5, 3.24 GSR Part 1, 2.13 (a) GSR Part 1, 2.5 (8) GSR Part 1, 4.3 (a) GSR Part 1, 4.3 (b) GSR Part 5, 3.11 GSR Part 5, 5.4 Requirement 14 WS-R-1, 9.17 WS-R-4, 1.8, 2,6 WS-R-5, 3.8, 5.1	
WD3	<u>Processing of radioactive waste shall be consistent with the type of waste, possible needs for storage and disposal</u>	Section GH (Articles 7 and 14)
	GSR Part 5, 3.22 GSR Part 5, 3.23 GSR Part 5, 4.1 – 4.5 GSR Part 5, 4.19 - 4.23, Requirement 11 GSR Part 1, 2.15	

Generic Ref.	<u>Text</u>	Application in UK report
WD4	<u>Radioactive waste storage facilities shall be designed and constructed for the likely period of storage, preferably with passive safety features</u>	Section GH (Articles 7 and 14)
	GSR Part 5, 4.19 - 4.23, Requirement 11	
WD5	<u>The operator shall identify an acceptable destination for the radioactive waste</u>	Section GH (Articles 7 and 14)
	WS-R-5, 3.8	
WD6	<u>The operator shall establish and maintain decommissioning plans</u>	Section B (Policy) Section GH (Articles 9 and 15)
	GSR Part 5, 5.17	
	GSR Part 5, 5.22	
	GSR Part 5, Requirement 20 WS-R-5, 3.8	
WD7	<u>Established criteria shall be met for release of a site from regulatory control</u>	Section E (Article 19)
	WS-R-5, 9.2	
WD8	<u>Adequate financial resources shall be ensured for radioactive waste management and decommissioning</u>	Section E (Article 19) Section F (Article 22)
	GSR Part 5, 3.11	
	WS-R-1, 4.8	
	WS-R-4, 3.69	
	WS-R-5, 3.4	
	WS-R-5, 3.7 WS-R-5, Section 6	
WD9	<u>Appropriate records shall be retained</u>	Section E (Article 19)
	GSR Part 1, 3.2 (3)	
	GSR Part 5, 3.11	
	WS-R-1, 4.9, 9.4, 11.4, 11.10, 11.11	
	WS-R-4, 3.14, 3.86 WS-R-5, 3.6, 3.8, 5.4, 5.6, 5.9 - 5.11, 7.6, 7.7, 8.4, 9.4	
WD10	<u>Operating experience shall be appropriately analysed</u>	Section GH (Articles 9 and 15)
	GSR Part 1, Requirement 15	
	GSR Part 1, 3.4	
	WS-R-1, 3.2, 3.11, 4.15 WS-R-5, 5.7	

Generic Ref.	<u>Text</u>	Application in UK report
WD11	<u>The competence of personnel responsible for the safe operation shall be assured</u>	Section F (Article 22)
	GSR Part 1, 4.30 WS-R-1, 9.14, 9.15 WS-R-5, 2.4, 3.8, 7.3, 8.4	
WD12	<u>A 'safety culture' shall be fostered</u>	
	GSR Part 5, 2.3 GSR Part 5, 3.10 GSR Part 5, 3.12 WS-R-1, 9.15 WS-R-5, 2.4	
WD13	<u>A comprehensive quality assurance programme shall be applied</u>	Section F (Article 23)
	GSR Part 5, 2.3 GSR Part 1, 4.17 WS-R-1, Section 12 WS-R-5, 3.8, 5.10, 7.7, 9.4	
IN	<u>INFRASTRUCTURE ARRANGEMENTS</u>	
IN1	<u>There shall be adequate infrastructural arrangements for decommissioning and radioactive waste and spent fuel management</u>	Section E (Article 19)
	GSR Part 1, Requirement 10 GSR Part 1, 2.30 GSR Part 1, 2.33 WS-R-5, 3.2	
IN2	<u>There shall be adequate infrastructural arrangements for transport</u>	
	GSR Part 1, 2.18 (11) GSR Part 5, 2.9	
IN3	<u>There shall be adequate infrastructural arrangements for physical protection</u>	
	GSR Part 1, 2.18 (11) GSR Part 1, 4.42 (a)	
IN4	<u>An inventory of existing and anticipated radioactive waste shall be established</u>	Section D
	GSR Part 1, 4.64	

Generic Ref.	<u>Text</u>	Application in UK report
IN5	<u>Appropriate research and development programmes shall be implemented</u>	Section GH (Articles 9 & 15)
	GSR Part 1, 2.3 (e) WS-R-1, 4.5 WS-R-4, 3.9, 3.13	
IN6	<u>There shall be effective emergency response arrangements</u>	Section F (Article 25)
	GSR Part 1, 2.5 (12) GSR Part 1, 2.18 (4) GSR Part 1, Requirement 8 GSR Part 1, Requirement 2.20 – 2.24 GSR Part 5, 3.11 GSR Part 5, 3.13 WS-R-1, 9.13 WS-R-4, 3.64 WS-R-5, 3.8, 8.7	
TBM	<u>TRANSBOUNDARY MOVEMENT</u>	
TBM	<u>Transboundary Movement</u>	Section I
	GSR Part 5, 3.3	

Annex L.10. - List of Primary Website Addresses

Babcock International Group Ltd (including UKAEA)		http://www.babcock.co.uk/default.aspx
British Energy Generation Ltd	B EGL	www.british-energy.co.uk
Committee on Radioactive Waste Management	CoRWM	http://corwm.decc.gov.uk/
Committee on Medical Aspects of Radiation in the Environment	COMARE	http://www.comare.org.uk
Department for the Environment, Food and Rural Affairs	Defra	http://ww2.defra.gov.uk/
Department for Transport	DfT	http://www.dft.gov.uk/
EDF Energy		http://www.edfenergy.com/
Environment Agency		http://www.environment-agency.gov.uk/business/sectors/32517.aspx
Food Standards Agency		http://www.food.gov.uk/
Health and Safety Executive	HSE	http://www.hse.gov.uk/index.htm
HM Revenue and Customs	HMRC	http://www.hmrc.gov.uk/index.htm
International Commission on Radiological Protection	ICRP	http://www.icrp.org/
Nuclear Decommissioning Authority	NDA	http://www.nda.gov.uk/
National Nuclear Laboratory	NNL	www.nnl.co.uk
Northern Ireland Environment Agency	NIEA	http://www.doeni.gov.uk/
Office for Nuclear Regulation	ONR	http://www.hse.gov.uk/nuclear/index.htm

Office for Civil Nuclear Security	OCNS	http://www.hse.gov.uk/nuclear/ocns/index.htm
OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic	OSPAR	http://www.ospar.org/
Scottish Environment Protection Agency	SEPA	http://www.sepa.org.uk/
Sellafield Ltd		http://www.sellafieldsites.com/
Scottish Government	SG	http://www.scotland.gov.uk/Home
United Kingdom Atomic Energy Authority (see Babcock)	UKAEA	http://www.babcock.co.uk/default.aspx
UK Nuclear Regulators – New Reactors Assessment		http://www.hse.gov.uk/newreactors/index.htm
West Cumbria Sites Stakeholder Group		http://www.wcssg.co.uk/

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Glossary and Abbreviations

AGR	Advanced Gas-cooled Reactor
ALARA	As low as reasonably achievable
ALARP	As low as reasonably practicable - the ALARP principle is fundamental to the regulation of health and safety in the UK. It requires that risks should be weighed against the costs of reducing them. Measures must then be taken to reduce or eliminate the risks unless the cost of doing so is obviously unreasonable compared with the risk
AP1000	The Westinghouse Electric Company's design of pressurised water reactor (PWR) currently being assessed by the UK's Office for Nuclear Regulation
BAT	Best available techniques
BEGL	British Energy Generation Ltd
BMS	Business Management System
BPEO	Best practicable environmental option
BPM	Best practicable means
BSS Directive	EC Basic Safety Standards Directive 96/29/Euratom ^[85]
CHILW	Contact-Handled ILW
CNS	Convention on Nuclear Safety
CNS Report	UK's Fifth National Report on Compliance with the Convention on Nuclear Safety (CNS)
CoRWM	Committee on Radioactive Waste Management
CRCE	Centre for Radiation, Chemical and Environmental Hazards, part of the Health Protection Agency
DECC	Department of Energy and Climate Change
Defra	Department for Environment, Food and Rural Affairs
DEPZ	Detailed Emergency Planning Zone
DFR	Demonstration Fast Reactor (at Dounreay)
DfT	Department for Transport
DGD	Dangerous Goods Division (of DfT)
DoH	Department of Health
DSRL	Dounreay Site Restoration Limited
EA95	The Environment Act 1995 ^[82]
EC	European Commission
EIA	Environmental Impact Assessment
EIADR99	Nuclear Reactors (Environmental Impact Assessment for Decommissioning) Regulation 1999 ^[97] (also amended in 2006)
EPA90	Environmental Protection Act 1990 ^[83]
EPR	The Areva design of pressurised water reactor (PWR) currently being assessed by the UK's Office for Nuclear Regulation
EU	European Union

FDP	Funded Decommissioning Programme
FHP	Fuel Handling Plant (at Sellafield)
GDA	Generic Design Assessment
GDF	Geological Disposal Facility
GLEEP	Graphite Low Energy Experimental Pile
GLO	Government Liaison Officer
Government	The UK Government and the devolved administrations, unless stated otherwise
GRA	Guidance on Requirements for Authorisation ^[46, 47]
GTA	Government Technical Adviser
HA	Highly-Active
HAL	Highly-Active Liquor
HALES	Highly-Active Liquor Evaporation and Storage plant at Sellafield
HASS Regulations	High-activity Sealed Radioactive Sources and Orphan Sources Regulations 2005 ^[66]
HAW	Higher-Activity Waste, a term used in the MRWS White Paper for, collectively, HLW, ILW and that LLW which is not disposable in existing facilities
HLW	High-Level Waste
HPA	Health Protection Agency
HSC	Health and Safety Commission - created by HSWA74 and responsible to the Secretary of State for Work and Pensions (and other Secretaries of State) for the administration of the Act. The HSC was merged with HSE in 2008
HSE	Health and Safety Executive - a distinct statutory body with day-to-day responsibility for making arrangements for the enforcement of safety legislation. HSE is the statutory licensing authority for nuclear installations. This function is delegated to senior officials within the HSE's Office for Nuclear Regulation (ONR)
HSWA74	Health and Safety at Work etc. Act 1974 ^[80]
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiological Protection
ILW	Intermediate-Level Waste
IRR99	Ionising Radiations Regulations 1999 ^[84]
ISFSI	Independent Spent Fuel Storage Installation
IWS	Integrated Waste Strategy
Joint Convention	Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management
LC	Licence Condition
LLW	Low-Level Waste
LLWR	Low-Level Waste Repository
LoC	Letter of Compliance
LTP	Lifetime Plans
LWR	Light Water Reactor
MEP	Magnox Encapsulation Plant, at Sellafield

MHSW99	The Management of Health and Safety at Work Regulations 1999 ^[91]
microGy	microGray
MOP	Magnox Operating Plan
MoU	Memorandum of Understanding
MOX	Mixed-oxide, or Mixed-oxide fuel
MRWS	Managing Radioactive Waste Safely White Paper ^[11]
mSv	milliSievert
MTR	Materials Test Reactor (at Dounreay)
ND	HSE's Nuclear Directorate, senior officers of which have delegated regulatory and enforcement powers relating to nuclear site licensing under NIA65 (see HSE above). On 1 April 2011, ND became part of the Office for Nuclear Regulation, ONR.
NDA	Nuclear Decommissioning Authority
NEAF	Nuclear Emergency Arrangements Forum
NEBR	Nuclear Emergency Briefing Room
NEPLG	Nuclear Emergency Planning Liaison Group
NIA65	Nuclear Installations Act 1965 (as amended) ^[18]
NIEA	Northern Ireland Environment Agency
NII	Nuclear Installations Inspectorate (a part of HSE's Nuclear Directorate, which on 1 April 2011 became part of the Office for Nuclear Regulation)
NLFAB	Nuclear Liabilities Financing Assurance Board
NNL	National Nuclear Laboratory
NPS	Nuclear National Policy Statement
OCNS	Office for Civil Nuclear Security (a part of HSE's Nuclear Directorate, and since 1 April 2011 part of ONR)
ONR	Office for Nuclear Regulation (set up on 1 April 2011 as a non-statutory Agency within HSE)
OSPAR	<u>The Convention for the Protection of the marine Environment of the North-East Atlantic</u> (the 'OSPAR Convention') ^[164] was open for signature at the <u>Ministerial Meeting of the Oslo and Paris Commissions</u> in Paris on 22 September 1992.
PCM	Plutonium-Contaminated Material
PFR	Prototype Fast Reactor (at Dounreay)
PIE	Post-Irradiation Examination
PSR	Periodic Safety Review
PWR	Pressurised Water Reactor
QA	Quality Assurance
RCIS	Redgrave Court Incident Suite, a facility within HSE's Headquarters in Bootle, Merseyside, that is used by ONR.
REPIR	Radiation (Emergency Preparedness and Public Information) Regulations 2001 ^[88]
REPs	Radioactive Substances Regulation Environmental Principles
R&D	Research and Development

RHILW	Remote-Handled ILW
RIFE	Radioactivity in Food and the Environment ^[140]
RIMNET	Radiation Incident Monitoring Network
R2P2	'Reducing risk, protecting people: HSE's decision making process' ^[165]
RSA93	Radioactive Substances Act 1993 ^[40]
RWMD	Radioactive Waste Management Directorate (a part of NDA)
SAPs	HSE's Safety Assessment Principles ^[132]
SCC	Strategic Coordination Centre
SEPA	Scottish Environment Protection Agency
SFAIRP	So Far As Is Reasonably Practicable
SGHWR	Steam Generating Heavy Water Reactor
SGoRR	Scottish Government Resilience Room
SLC	Site Licensee Company
SSA	Strategic Siting Assessment
TAGs	Technical Assessment Guides
Thorp	Thermal oxide reprocessing plant, at Sellafield
TIGs	Technical Inspection Guides
TOR	Tolerability of Risk
UCP	URENCO Chemical Plant Limited, at URENCO Capenhurst
UF ₆	Uranium Hexafluoride
UK	United Kingdom of Great Britain and Northern Ireland
UKAEA	United Kingdom Atomic Energy Authority
UKRWI	UK Radioactive Waste Inventory ^[45]
VLLW	Very-Low-Level Waste
WAGR	Windscale Advanced Gas-cooled Reactor
WEP	Waste Encapsulation Plant, at Sellafield
WVP	Waste Vitrification Plant, at Sellafield
ZEBRA	Zero Energy Breeder Reactor Assembly

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