THE UNITED KINGDOM's
THIRD 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

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Contributors to the United Kingdom's National Report

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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, nuclear safety, radiation protection and environmental systems, 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 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.

This is not to say that the UK is complacent, far from it. 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.

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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 third, report. This report does not consider matters related to the safety or environmental standards of those nuclear installations that have 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 gives 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. A closure date of 30 May 2008 was adopted for reporting new issues, developments subsequent to this date will be addressed in the UK presentation to the Joint Convention Review Meeting in May 2009.

Basis of the report

A.1.5. In addition to the Joint Convention itself and three documents providing guidelines for the Joint Convention national reports (International Atomic Energy Authority (IAEA) INFCIRC/546 and INFCIRC/602, 603 and 604 respectively), 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 Second Review Meeting of Contracting Parties', May 2006, Report of the President of the Review Meeting' JC/RM.2/05.

(b) The Rapporteur's report for the United Kingdom, Country Group 4, based on the presentation in May 2006 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 2006, and the answers provided.

(d) The IAEA Technical Meeting on the 'Use of IAEA Safety Standards in the Preparation of National Reports for the Joint Convention Review Meetings', June 2007.

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, where compliance with the Joint Convention has substantially changed since the second UK report (i.e. in a way that has implications

for the Joint Convention obligations), then 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 are as follows:

- GS-R-1: Legal and Governmental Infrastructure for Nuclear, Radiation, Radioactive Waste and Transport Safety (2000)
- WS-R-2: Predisposal Management of Radioactive Waste, Including Decommissioning. (2000)

Note, however, 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. discharge strategy and energy policy). At the general level, it is a Government policy objective to protect the population, society and the natural environment from harmful levels of radioactivity through adequate and appropriate national measures whether deriving from European Union directives and regulations, international agreements or 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, Article 32.1(iii).

Policy Developments in the United Kingdom

Energy Review

A.2.3. The UK Government announced on 29 November 2005 that it would hold an Energy Review. The Department of Trade and Industry (DTI) launched, on 23 January 2006, a consultation exercise in support of this review. The consultation document[2] stated:

> *'As part of its role in monitoring health and safety in many areas of the energy sector, the Government will be calling on the Health and Safety Executive to provide an expert report during the course of the Review. This is necessary for the Government to make informed decisions in bringing forward future proposals.'*

A.2.4. The Health and Safety Executive's (HSE) published report in response to this request[3] covers health and safety issues associated with a range of energy developments, and looks at the potential role of pre-licensing assessments of nuclear reactor designs, should the UK Government decide to look further into new nuclear electricity generation. The Environment Agency in England and Wales, at the UK Government's request, also published a report on the role of pre-authorisation assessment of candidate designs for nuclear power stations[4].

A.2.5. The UK Government's report on the Energy Review[5] was released on 11 July 2006. This work aimed to put the UK in a position to meet the two major long-term challenges in its energy policy, these being the need to:

- tackle climate change by reducing carbon dioxide emissions; and
- deliver secure, clean energy at affordable prices, as we move to increasing dependence on imported energy.

A.2.6. Regarding new nuclear power stations the Energy Review noted that:

- nuclear power is currently an important source of low carbon electricity in the UK;
- the existing fleet of nuclear power stations will close in the years ahead; and
- higher projected fossil fuel prices and the introduction of a carbon price to place a value on CO_2 have improved the economics of nuclear as a source of low carbon generation.

A.2.7. The UK Government 2006 report on the Energy Review therefore concluded that new nuclear power stations would make a significant contribution to meeting our energy policy goals. However, it would be for the private sector to initiate, fund, construct and operate new nuclear plants and to cover the full cost of decommissioning and their full share of long-term waste management costs. But in view of the potential benefits for our public policy goals, the UK Government set out

proposals in its 2006 report to address potential barriers to new nuclear build. These included:

- Requesting HSE and the Environment Agency, working together, to develop their processes and guidance on pre-licensing / authorisation assessments of potential nuclear power stations.
- Using the report of the Committee on Radioactive Waste Management (CoRWM)[6] to provide the basis for a decision on the long-term management of radioactive waste.
- Setting out a proposed framework for considering the relevant issues and context in which planning inquiries should be held.

A.2.8. The Energy Review report was accompanied by a consultation document on the policy framework for new nuclear build. Subsequently, DTI was involved in a Judicial Review, which had been sought by Greenpeace on the work which led up to that consultation. Following the Court's judgment, the Secretary of State made a written statement to the House on 22 February 2007, in which he said "We shall therefore conduct a new consultation endeavouring to meet the court's requirements." This is addressed below.

Energy White Paper

A.2.9. On 23 May 2007, the Secretary of State published a White Paper on 'Meeting the Energy Challenge'[7]. The White Paper proposed a strategy within which the key elements are to:

- Establish an international framework to tackle climate change.
- Provide legally-binding carbon targets for the whole UK economy, progressively reducing emissions.
- Make further progress in achieving fully competitive and transparent markets.
- Encourage more energy saving through better information, incentives and regulation.
- Provide more support for low carbon technologies.
- Ensure the right conditions for investment.

A.2.10. The Energy White Paper set out the Government's preliminary view that it is in the public interest to give the private sector the option of investing in new nuclear power stations as part of our strategy to tackle the challenges of climate change and security of energy supply. The Government subsequently confirmed its belief in a White Paper on Nuclear Power published on 10 January 2008[8].

A.2.11. The Energy White Paper explained how nuclear power related to the UK's overall energy strategy. In particular, it highlighted the uncertainties the UK faces in the availability and costs of its energy supplies over the coming decades. These uncertainties relate to: future fossil fuel and carbon prices; how quickly we can achieve energy efficiency savings and the therefore likely levels of energy demand; the speed, direction and future economics of the renewables sector; and the technical feasibility of and costs associated with applying carbon capture and storage technologies to electricity generation on a commercial scale.

A.2.12. It set out the Government's view that, given these uncertainties, the energy strategy should be based on diversity and flexibility in the energy mix and has accordingly developed policies which keep open the widest possible range of low-carbon generating options. These options would include renewables and the use of gas and coal with carbon capture and storage, as well as nuclear. Unnecessarily ruling out one of these options would, in the Government's view, increase the risk that the UK would be unable to meet its climate changes and energy security objectives. The Scottish Government did not endorse the Energy White Paper and does not support the building of new nuclear power stations in Scotland.

A.2.13. Alongside the Energy White Paper, the UK Government published a consultation document on nuclear power which set out the information and evidence that the UK Government considered in reaching its preliminary view. The White Paper on Nuclear Power sets out the decision the UK Government has taken in response to consultation.

White Paper on Nuclear Power

A.2.14. The White Paper on Nuclear Power, published on 10 January 2008[8], confirmed the Government's belief that nuclear power stations should have a role to play in the UK's future energy mix alongside other low-carbon options; that it would be in the public interest to allow energy companies the option of investing in new nuclear power stations; and that the Government should take active steps to open up the way for the construction of new nuclear power stations. It will be for energy companies to fund, develop and build any new nuclear power stations in the UK, including meeting the full costs of decommissioning and their full share of waste management costs. The Scottish Government did not endorse the White Paper and does not support the building of new nuclear power stations in Scotland.

A.2.15. The White Paper on Nuclear Power explains the basis for the Government's decision, how it has considered responses to the consultation, and how it has taken them into account in framing UK policy. The White Paper also sets out the actions that the Government will take to facilitate the construction of new nuclear power stations. These facilitative actions are designed to reduce the regulatory uncertainty and risk associated with investing in new nuclear power stations by:

- Running a Strategic Siting Assessment (SSA) process to develop criteria for determining the suitability of sites for new nuclear power stations. Subject to some European legislative requirements, this would enable the planning process to focus on the proposals rather than debate whether there are other more suitable sites for development.
- In conjunction with the SSA, taking further our consideration of the high-level environmental impacts in accordance with the Strategic Environmental Assessment (SEA) Directive.
- Running a process of Justification to test whether the economic, social or other benefits of specific new nuclear power technologies outweigh any health detriments.
- Assisting the nuclear regulators to pursue a process of Generic Design Assessment of industry preferred designs of nuclear power stations, to complement the existing site-specific licensing process.
- Working with the regulators to review the regulatory regime to explore ways of enhancing its effectiveness in dealing with the challenges of new nuclear power stations.

Energy Bill

A.2.16. Through an Energy Bill[9], introduced in the House of Commons on 10 January 2008, the UK Government are introducing legislative arrangements to ensure that operators of new nuclear power stations have secure financing arrangements in place to meet the full costs of decommissioning and their full share of waste management costs, minimising the risk of liabilities falling to the taxpayer. The Bill describes all those persons captured by the legislation and the requirements on them, particularly in terms of information provisions. It also sets out a framework to ensure the programme is adhered to. The Energy Bill has cleared the House of Commons and, as of May 2008, is currently going through the House of Lords. The provisions of the Energy Bill do not extend to Scotland.

A.2.17. It is currently envisaged under the Energy Bill that the Secretary of State will make a number of orders after the Bill has achieved Royal Assent.

Regulating potential new build

A.2.18. Following the Energy Review in 2006, the UK Government asked HSE, the Environment Agency and the Office for Civil Nuclear Security (OCNS)) to implement a 'pre-authorisation' system for candidate reactor designs. The process of Generic Design Assessment (GDA) would allow generic designs to be assessed in advance of any application to build a nuclear power station at a particular location. The Scottish Environment Protection Agency (SEPA) is not involved in this work, reflecting the policy views of the Scottish Government administration.

A.2.19. The guidance[10] provides advice on the processes needed to be followed and information that will be required by the regulators during the generic design assessment process.

A.2.20. The guidance envisages a four step process for generic design assessment:

- Design and safety case submission.
- Fundamental Safety Overview of the reactor design (a short review of the acceptability of the proposed reactor design).
- Overall design safety review (a more in-depth HSE safety assessment of the case submitted).
- Detailed assessment leading to potential design acceptance (examining all relevant aspects of the submission, including inspection of an applicant's procedures and records and some verification analysis).

A.2.21. This process will also ensure that generic reactor design assessments are not only rigorous and robust but also conducted in an open and transparent manner.

A.2.22. At the end of the generic assessment, the regulators will provide a view on the acceptability of a new nuclear power station design. If an application is made to build this design of reactor at a specific site, the regulators will follow their existing licensing / permissioning processes but, in addition, would take full account of the generic assessment work that has been carried out. The safety, security and environmental regulators would work in close partnership throughout both generic and site specific assessments.

A.2.23. The Energy White Paper consultation document set out criteria for and invited applications from vendors of nuclear reactors interested in having their designs assessed. It allowed them until 22 June 2007 to nominate the design they wish to be put through the GDA process. By that date four vendors had nominated designs: Toshiba-Westinghouse (AP1000); Areva (EPR); GE-Hitachi (ECBWR); and AECL (ACR1000). The Department of Business, Enterprise and Regulatory Reform (BERR) advised that all four would be suitable for GDA and confirmed that they all conformed to the criteria set out in their consultation document.

A.2.24. On 18 March 2008, HSE and the Environment Agency, announced that the first step of the GDA process had been carried out on the four designs submitted for new nuclear power stations and had found no safety shortfalls at this stage – in terms of safety, security or the environment - that would prevent any of them from ultimately being constructed on licensed sites in the UK. These findings are based on the claims made by the vendors for the designs, the basis of which will be assessed during the next steps of GDA. AECL has since withdrawn from involvement in the GDA process.

A.2.25. The nuclear regulators have published a series of reports[11] on their findings so far, maintaining transparency and openness in the GDA process. Success in the fundamental overview step of the GDA, means that a design may be able to progress to the more in-depth assessment stages.

Managing Radioactive Waste Safely

A.2.26. In 2001 the Government initiated the Managing Radioactive Waste Safely (MRWS) programme. The aim was to find a practicable solution for the UK's higher activity wastes that achieved long-term protection of people and the environment, inspired public confidence, and ensured the effective use of public monies. To assist the MRWS process and make recommendations, the Government set up an independent Committee on Radioactive Waste Management (CoRWM) in November 2003 (see Section A.2.34).

A.2.27. In October 2006 the Government accepted CoRWM's recommendations on geological disposal[12], coupled with safe and secure interim storage for legacy wastes. It also supported the recommendation to explore how a site selection approach based on voluntarism (an expression of interest by local communities in hosting a facility), and partnership with local communities, could work in practice.

A.2.28. As the next stage of the MRWS programme, in June 2007 the UK Government and the devolved administrations for Wales and Northern Ireland consulted on proposals for the way in which a site will be chosen for the long-term disposal of higher activity radioactive waste. The consultation document entitled "Managing Radioactive Waste Safely: A Framework for Implementing Geological Disposal" [13] sought views on the technical aspects of developing a geological disposal facility and on the process and criteria to be used in deciding where the future facility should be located. This covered:

- the technical programme and aspects of design and delivery of a geological disposal facility;
- the process and criteria to be used to site the facility including:

  - exploring how the voluntarism/partnership approach to siting, that CoRWM recommended, could be made to work

  - the assessment and evaluation of potential sites; including the initial screening out of areas unlikely to be suitable for geological disposal; and
- modified terms of reference for a reconstituted CoRWM to ensure strong independent scrutiny of the proposals.

A.2.29. The consultation ran until November 2007 and an analysis and summary of responses was published in January 2008 (see Defra web-site, Annex L.12). The responses indicated general support for the approach proposed for implementing geological disposal including how a voluntarism/partnership approach and site screening and assessment criteria might be used to identify a facility site. The consultation comments received have been considered in developing the next stages of implementation. These will be set out in a White Paper to be published in June 2008. This is likely to be accompanied by an invitation to communities to express an initial interest in entering into without commitment discussions with government on the possibility of hosting the disposal facility.

A.2.30. The Government acknowledges, in line with CoRWM's recommendations, that the geological implementation programme needs to be coupled with safe and secure interim storage. There will be a programme of ongoing research and development for this waste management programme, for which the NDA will have primary responsibility.

A.2.31. The Scottish Government was not a sponsor of the 2007 MRWS consultation on the framework for geological disposal. Its stated policy is to support safe, secure near surface, near site facilities where waste can be monitored and retrieved. However, the Scottish Government continues to support the CoRWM recommendations for a robust programme of interim storage 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].

Revised Low Level Waste Management Policy

A.2.32. The review of the long term management of the UK's solid LLW, was completed in March 2007[14]. The review process complements the ongoing work the UK Government is carrying out on the policy for the management of higher activity radioactive wastes under the MRWS programme, following recommendations made by CoRWM in July 2006.

A.2.33. The revised policy puts providing public safety at the forefront of dealing with LLW, and recognises that much LLW has very low levels of radioactivity and can be disposed of in a variety of ways while posing a negligible risk to human health or the environment. More information is in Section B.

Committee on Radioactive Waste Management (CoRWM)

A.2.34. The Government set up an independent committee (Committee on Radioactive Waste Management (CoRWM)) in November 2003 to assist the MRWS programme. CoRWM's role was to oversee a review of options for the long-term management of high and intermediate level radioactive wastes in the UK and to recommend the option or combination of options that can provide a long-term solution.

A.2.35. CoRWM undertook an extensive programme of public and stakeholder engagement before making its recommendations in July 2006. Following which, the three key elements of CoRWM's recommendations were that:

(i) the waste should be managed by means of geological disposal

(ii) that implementation should be based on the principles of voluntarism and partnership between communities and implementers, and

(iii) that disposal should be preceded by safe and secure interim storage.

A.2.36. In October 2007 CoRWM was reconstituted under revised terms of reference designed to meet the future needs of the Government's MRWS programme. The Committee's new role is 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 the Nuclear Decommissioning Authority's (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.2.37. Sponsoring Ministers (from the Department for Environment, Food and Rural Affairs (Defra), BERR and the devolved administrations) are to agree a three-year rolling programme and budget for CoRWM's work on an annual basis. The draft work programme for 2008-2011 is available on CoRWM's website – see Annex L.12.

A.2.38. CoRWM's work programme could include review of activities including waste packaging options, geological disposal facility delivery programmes and plans, site selection processes and criteria, and the approach to public and stakeholder engagement. Testing the evidence base of the plans for the delivery of a geological disposal facility will be a key component of the work. As well as ongoing dialogue with Government, the implementing body, local authorities and stakeholders, CoRWM will provide an annual report of its work to Government. Further details can be found on CoRWM's website.

Global Nuclear Energy Partnership (GNEP)

A.2.39. On 26 February 2008 the UK joined the Global Nuclear Energy Partnership (GNEP). The UK is the twenty-first country to join the international partnership, which promotes responsible nuclear development while reducing volumes of waste and the risk of nuclear proliferation. GNEP also enables the UK and other developed countries to share experience on a wide range of issues, such as infrastructure

assessments, security and safety requirements, which will help developing countries identify whether nuclear power generation is suitable for them and how to proceed with its implementation. The UK shares in the vision of improved non-proliferation and nuclear waste management and recognises the real benefits of initiatives such as GNEP to implement the right solutions and further develop international standards and best practice. With the UK's knowledge and capabilities, particularly in nuclear waste management, GNEP opens up the potential for UK organisations to share their expertise globally through international projects and building business partnerships. As members, the UK will be able to further contribute to the development of international policy on the use of nuclear power, non-proliferation and the disposal of nuclear waste to ensure the safe and secure development of nuclear energy worldwide.

OSPAR

A.2.40. The 1992 OSPAR Convention is the current instrument guiding international cooperation on the protection of the marine environment of the North East Atlantic. It combined and updated the 1972 Oslo Convention on dumping waste at sea and the 1974 Paris Convention on land-based sources of marine pollution.

A.2.41. The work under the OSPAR Convention is managed by the OSPAR Commission and guided by the Ministerial Declarations and Statements made at the adoption of the OSPAR Convention and at the subsequent Ministerial Meetings of the OSPAR Commission in 1998 and 2003.

A.2.42. The work applies the ecosystem approach to the management of human activities. It is organised under six strategies, one of which is for radioactive substances. More information is available on the OSPAR Commission website – see Annex L.12.

OSPAR Radioactive Substances Strategy

A.2.43. The OSPAR Radioactive Substances Strategy[15] sets the objective of preventing pollution of the maritime area from ionising radiation through progressive and substantial reductions of discharges, emissions and losses of radioactive substances

A.2.44. The ultimate aim is to reach concentrations in the environment close to background values for naturally occurring radioactive substances and reaching close to zero for artificial radioactive substances. In achieving this objective, the following issues should, inter alia, be taken into account:

- Legitimate uses of the sea
- Technical feasibility
- Radiological impacts to man and biota.

A.2.45. As its timeframe, the Radioactive Substances Strategy further declares that by the year 2020 the Commission will ensure that discharges, emissions and losses of radioactive substances are reduced to levels where the additional concentrations in the marine environment above historic levels, resulting from such discharges, emissions and losses, are close to zero.

A.2.46. Implementation of the Radioactive Substances Strategy is being taken forward through the OSPAR Radioactive Substances Committee (RSC).

A.2.47. The Government committed to progressive and substantial reductions in radioactive discharges. At the 1998 meeting of the OSPAR Commission in Sintra, Portugal, the UK agreed the OSPAR Strategy for Radioactive Substances.

The UK Strategy for Radioactive Discharges

A.2.48. In 2002 Defra published its own strategy for radioactive discharges. This represents the UK National plan for the purposes of submission to OSPAR. The UK

is currently revising the 2002 Discharges Strategy[16]. The new strategy will cover the period 2006-2030. In parallel with the strategy, the UK Government is preparing statutory guidance to the Environment Agency for England and Wales. The statutory guidance to SEPA was issued by the Scottish Government in May 2008.

A.2.49. The draft strategy and associated draft statutory guidance will be subject to public consultations in the summer of 2008. It is expected that the Strategy will be published by the end of 2008.

Standardised Reporting of Radioactive Discharges

A.2.50. The European Commission's (EC) Recommendation 2004/2/Euratom2 proposes a standardised approach to reporting information to the Commission on radioactivity discharged to the environment from nuclear power reactors and reprocessing plants in normal operation. In response to this Recommendation, the UK carried out a limited consultation by way of a questionnaire and stakeholder workshops during 2005 and published a wider formal consultation on the standardised reporting of radioactive discharges in August 2007. The consultation closed in November 2007[17]. The proposed approaches are being trialled with stakeholders that have indicated a willingness to participate to get a better idea of the costs and benefits of making any changes.

Shipment of radioactive waste and spent fuel

A.2.51. A consultation on the 'The Transfrontier Shipment of Radioactive Waste and Spent Fuel Regulations 2008' which will replace the 'Transfrontier Shipment of Radioactive Waste Regulations 1993' was published on 27 February 2008 and finished on 19 May. The new regulations will come into force at end of 2008. Further information is in Section I.

Other Developments in Radioactive Waste Management

A.2.52. The next issue of the three yearly UK Radioactive Waste Inventory (UKRWI)[18], with a stock date of 1 April 2007, will be published in June 2008. For the first time this inventory will be published with a companion document giving estimates of radioactive materials holdings. Information can be found on the NDA website – see Annex L.12.

A.2.53. The environment agencies are in the process of revising their Guidance on Requirements for Authorisation of Near Surface and Geological Disposal Facilities for Solid Radioactive Wastes, this is the subject of a current consultation.

A.2.54. A review of Exemption Orders under the Radioactive Substances Act 1993 (RSA93)[19] (including the Substances of Low Activity Exemption Order) is currently being undertaken with the aim of simplifying regulation for those using the Orders, whilst at the same time maintaining appropriate protection to human health and the environment. The review is expected to be completed by 2010.

Transport Regulation changes

A.2.55. Since the last report, the legislation applicable for rail and road transport of radioactive material have been merged into a single legislation applicable for rail and road transport, the 'GB Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2007'[20] which came into force on 1 July 2007. Further details are in Section E.35.

A.2.56. The European Parliament and Council are in the process of adopting a new Directive on the inland transport of dangerous goods which will be transposed into UK legislation by mid 2009.

Regulators' Compliance Code

A.2.57. In April 2008, the Regulators' Compliance Code[21] came into force. The Compliance Code is a statutory code of practice issued to Regulators in England and

Wales by the Government. HSE and the environment agencies must take into account the Compliance Code in carrying out their roles as regulators. It sets out standards for how regulators should work, based on the principles of better regulation. Its purpose is to promote efficient and effective approaches to regulatory inspection and enforcement which improve regulatory outcomes without imposing unnecessary burdens on business. The Code requires regulators to demonstrate holistically the benefit of new regulatory requirements.

A.2.58. The Compliance Code stresses the need for regulators to adopt a positive and proactive approach towards ensuring compliance by:

- helping and encouraging regulated entities to understand and meet regulatory requirements more easily; and
- responding proportionately to regulatory breaches.

A.2.59. The Code supports regulators' responsibility to deliver desirable regulatory outcomes. This includes having effective policies to deal proportionately with criminal behaviour which would have a damaging effect on legitimate businesses and desirable regulatory outcomes. The Code does not relieve regulated entities of their responsibility to comply with their obligations under the law.

Organisational Developments

Environmental assessment of nuclear waste management proposals

A.2.60. In 2002 the Environment Agency, SEPA and HSE began a review of their arrangements for overseeing the management of higher level solid radioactive wastes on nuclear sites in the UK. Improved arrangements were implemented at the end of 2003. Joint regulatory guidance on these arrangements was first published in March 2005. Part 1 of a revised version of this guidance was published in December 2007[22, 23] in response to the changing nuclear decommissioning scene in the UK. Work on Part 2 is continuing.

A.2.61. The improvements in the regulatory arrangements are focused on the long-term aspects of managing nuclear wastes and, in particular, the disposability of the wastes. As part of these arrangements, the Environment Agency formed a new technical assessment team (the Nuclear Waste Assessment Team - NWAT) to provide advice on the long term environmental aspects of nuclear waste. SEPA has established a separate team that carries out a similar role for Scotland. In addition to advising on environmental aspects of managing higher activity wastes on nuclear sites, NWAT also advise on existing and future disposal facilities for LLW in England and Wales and undertake scrutiny of NDA's work in developing proposals for a geological disposal facility for the UK's higher activity wastes.

Nuclear Decommissioning Authority

A.2.62. The Nuclear Decommissioning Authority (NDA) is a non-departmental public body, set up in April 2005 under the Energy Act 2004[24] 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.2.63. Following public consultation and approval by Government, NDA published its first Strategy in April 2006[25] covering the years 2006 - 2011. It is required, under the Energy Act 2004, to review its Strategy at least once every five years.

A.2.64. The nuclear legacy inherited by NDA represents about 85% of the UK's civil nuclear liabilities and is wholly the responsibility of the Government. It 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; and
- 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.2.65. Responsibility for funding and strategic direction of the decommissioning of all these sites lies with the NDA. NDA contracts with the operators of the sites, the Site Licence Companies (SLCs), 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 and Near-Term Work Plans. These SLCs are the enduring entities which are subject to regulation by HSE, the environment agencies, Department for Transport (DfT) and OCNS (see Section A.2.81). NDA is competing the ownership of these SLCs as a way of bringing in new strategic approaches and innovation to decommissioning.

A.2.66. 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. This will include identifying additional disposal capacity because the UK's existing facility will not provide enough capacity

for the expected waste from the decommissioning of the existing UK nuclear power stations.

A.2.67. In its response to CoRWM's recommendations in October 2006, the Government also decided that responsibility for securing geological disposal of higher activity radioactive waste should fall to NDA.

A.2.68. NDA already has statutory responsibility, under the Energy Act 2004, for the disposal and the safe and secure interim storage of waste on designated civil nuclear sites. Bringing these two roles together has created a single national organisation with a single point of responsibility for managing higher-activity radioactive waste in both the shorter- and longer-term. This arrangement has the advantage of allowing one organisation, NDA, to take an integrated view across the waste management chain, thereby enabling both long and short-term issues to be addressed in planning and strategy development.

A.2.69. In the past Nirex played an important role in maintaining and developing the UK's knowledge on long-term waste management options. For more than twenty years, Nirex was the nuclear industry's, and latterly the UK Government's, expert body on the long-term management of some higher-activity radioactive waste.

A.2.70. Following its response to CoRWM's recommendations, the Government transferred its shares in Nirex to NDA, since then Nirex has been successfully integrated into NDA. The integration was completed in April 2007 and NDA now performs the functions previously undertaken by Nirex.

A.2.71. As a result of the integration, a new NDA Directorate – the Radioactive Waste Management Directorate (RWMD) – has been established. This Directorate has taken on responsibility for taking forward the programme for geological disposal of higher activity waste. It is intended that the organisation will be converted into a subsidiary company as a 'shadow site licensee company' suitable for regulatory engagement.

NDA Strategy

A.2.72. NDA published its approved strategy in April 2006. This strategy was the first ever UK-wide plan for dealing with the historic civil legacy. The strategy confirmed the NDA mission as delivering a world-class programme of safe, cost-effective and environmentally responsible decommissioning and clean-up of the nuclear legacy. NDA does this both by managing contracts placed with the SLCs and by implementing competitions for the ownership of the SLCs. Key elements of the strategy are:

- Health, Safety, Security and Environment – NDA expects the site operators to deliver sustained excellence in safety, security and environmental performance, and will work with the regulators to achieve the common goal of no accidents, no harm to people and no damage to the environment.
- Decommissioning and Clean-Up – dealing with the higher-hazard legacy ponds and silos at Sellafield and Dounreay is the top decommissioning priority. In addition, NDA will work with the site operators and the regulators to develop fully-costed and robust plans for the long-term management of contaminated land on its sites.
- Waste Management – the main objective is to ensure that radioactive waste is managed safely by putting it into a passively-safe form. Other objectives include evaluating the options for rationalising Intermediate Level Waste (ILW) interim storage, reviewing the LLW strategy in the light of the Government policy for the long-term management of solid low-level radioactive waste, and ensuring that integrated waste strategies are developed for each site as well as developing a national integrated waste strategy.

- Commercial Operations – NDA will continue to maximise the revenue from operational facilities.
- Management of Nuclear Materials – NDA will ensure that civil nuclear materials are stored safely, securely and without endangering the environment and will discuss with Government options for the future management of nuclear materials. An assessment of the full life cycle implications of spent fuel management will be carried out.
- Competition and Contracting – Competition for the management and operation of NDA's sites will be used to encourage innovation, to improve site operator performance and to deliver best value to taxpayers.
- Innovation, Skills, R&D and Good Practice – NDA will take steps to ensure that a skilled workforce is available to carry out the decommissioning and clean-up mission by developing a National Nuclear Skills Academy and a Nuclear Skills Institute. Measures will be put in place to ensure the effective coordination of research and development to deliver the mission, and steps will be taken to encourage the sharing of good practice across the sites. These steps will include the adoption of common approaches to knowledge management, information management, information systems and information technology and the development of a National Nuclear Archive that will provide the opportunity for a common corporate memory and end-of-life archive.
- Financial Requirements – NDA will seek to strike the right balance between operations and decommissioning and also between dealing with high-hazard plants and earlier site clearance, and will aim to reduce the total cost of operations, decommissioning and clean-up in line with the Probabilistic Safety Assessment target and to strive to deliver better value to the taxpayer.
- Socio-economic Development and Stakeholder Relations – NDA has developed a socio-economic strategy that addresses national priorities, yet that is tailored to local needs, and will work with others to help to mitigate the socio-economic impact of decommissioning and clean-up on local communities and to create a sustainable future for affected communities. This work is completed, signed off by Ministers and was subject to public consultation in 2007.

National Nuclear Archive

A.2.73. NDA announced in February 2008 that it would invest £8 million over the next 3 years into a £20 million building project to create the UK's National Nuclear Archive (NNA) 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 NNA 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 aim is to have the NNA fully operational by April 2011.

National Nuclear Laboratory

A.2.74. On 30 June 2006, the Secretary of State, announced plans for the development of a National Nuclear Laboratory. In its Business Plan 2008 – 2011, NDA committed itself to continue dialogue with Government to establish the laboratory.

NDA Business Plan

A.2.75. The NDA Business Plan 2008 – 2011[26] was approved by the Secretary of State and the Scottish Ministers and published on 1 April 2008. The Business Plan is consistent with the approved NDA Strategy published in April 2006. It sets out NDA's key objectives and plans for delivering their priorities over the next three years.

A.2.76. Principal objectives for 2008 – 2011 are to:

- Encourage the highest standards in health, safety, security and environmental performance;
- Deliver hazard and risk reduction;
- Progress decommissioning and clean-up;
- Maximise commercial value;
- Ensure safe management of radioactive waste and materials: and
- Determine the scope of the liabilities.

A.2.77. Secondary objectives are to:

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

A.2.78. To enable NDA to deliver these objectives effectively, they will:

- Compete the management of its sites; and
- Control costs and drive efficiency.

Health Protection Agency

A.2.79. The Health Protection Agency (HPA) was established on 1 April 2005 under the Health Protection Agency Act 2004[27] as a non-departmental public body. See Section E.108 for further details.

Department for Business, Enterprise and Regulatory Reform

A.2.80. On 28 June 2007 a new Department for Business, Enterprise and Regulatory Reform (BERR) was established with responsibilities for creating the conditions for business success, developing deeper and more effective engagement with business, and with the ability to promote the competitiveness agenda across critical areas of Government policy.

A.2.81. BERR brings together functions from the former DTI, including responsibilities for enterprise, business relations, regional development, fair markets and energy policy, with the Better Regulation Executive, previously part of the Cabinet Office.

Office for Civil Nuclear Security and UK Safeguards Office joins HSE

A.2.82. With effect from 1 April 2007, the Office for Civil Nuclear Security (OCNS), the Government's security regulator for the civil nuclear industry, became a part of the HSE, having previously been a part of DTI. The operational nuclear safeguards work of the DTI (UK Safeguards Office) has also become part of HSE with effect from the same date, the staff in both areas having transferred to the HSE together with their work.

A.2.83. The aim of these arrangements was to consolidate the safety, security and safeguards activities of the Government in a single organisation, consistent with the thrust of the recommendations of the 2005 Hampton Report[28], so as to enable more effective and better coordinated regulatory activities and oversight of the industry, and to enable the more effective deployment of resources. BERR will remain responsible for security policy, and HSE operates under a Memorandum of Understanding (MoU) with BERR on security issues.

A.2.84. To reflect these changes and the wider portfolio of work being undertaken by HSE – nuclear safety, security and safeguards - the Nuclear Safety Directorate was renamed the Nuclear Directorate (ND) as of 1 April 2007.

A.2.85. In summary, these changes mean that HSE will act as the single point of contact for all operational matters concerning nuclear safety, security and safeguards. More information is available on HSE's website – see Annex L.12.

Merger of the Health and Safety Commission and Health and Safety Executive

A.2.86. The Health and Safety Commission (HSC) and Health and Safety Executive (HSE) have been in existence for over thirty years. The governance structure originally envisaged has stood the UK health and safety system in good stead. The balance involved in the tri-partite nature of the Commission has made a significant contribution to the trust invested by the public and workers in the HSC/HSE as a health and safety regulator. Additionally, the Commission was rightly valued for its independence.

A.2.87. It was considered wrong, however, to accept that the existing structures could not be improved upon. There was evidence that many people did not make any distinction between the Commission and Executive.

A.2.88. Against this background the Commission and Executive decided to look more closely at HSE's governance framework and sought views on merging the Commission and Executive into a single body.

A.2.89. Following formal Parliamentary approval to proceed with the merger, with effect from 1 April 2008, HSE became a single national regulatory body responsible for promoting the cause of better health and safety from work activities. The 'new' HSE retains its independent status, reflects the interests of employers, employees and local authorities, and the public and maintains commitment to service delivery.

A.2.90. HSE became one organisation with a board of non-executive directors. There was no change in health and safety requirements, how they are enforced or how stakeholders relate to HSE as the health and safety regulator – no health and safety protections were removed. Individual enforcement decisions continue to be taken by operational and local authority staff.

British Nuclear Fuels plc sells the Reactor Sites business

A.2.91. On 7 June 2007 British Nuclear Fuels plc. (BNFL) announced the sale of its Reactor Sites Management company (including control of Magnox Electric Ltd) to Energy Solutions. Magnox Electric Ltd. holds the contracts and licences to operate 10 nuclear reactor sites in the UK on behalf of the NDA.

New Licensee - Studsvik

A.2.92. On 18 February 2008, Studsvik UK Ltd obtained the necessary permission to allow construction and subsequent operation of its proposed UK Metallic Recycling Facility near Workington, Cumbria.

A.2.93. A licence application under the requirements of the Nuclear Installations Act 1965 (NIA65)[29] was submitted in June 2007. This was the first application of its kind in the UK for over 20 years. In addition, other regulatory submissions have been made under the requirements of the RSA93, and Euratom Treaty Article 37.

A.2.94. The Workington facility will be used to process low-level radioactive metal arising from operations and decommissioning of UK nuclear facilities. The radioactive residues will be packaged and disposed of in the UK Low Level Waste Repository (LLWR), near Drigg, Cumbria.

A.2.95. The construction of the plant is divided into a number of phases, where the first aims at creating a facility capable of undertaking waste characterisation, size reduction, decontamination and release or disposal. The first phase is planned for completion during the second half of 2008, at which point the facility will become operational.

A.2.96. In addition to the metal recycling capability, the facility can also be used to accommodate Studsvik's mobile High Force Compaction equipment which can be used for volume reduction of LLW.

LLW Repository Licensee Parent Body Organisation change

A.2.97. NDA awarded a new contract for the management and operation of the LLWR to a new SLC, LLW Repository Ltd on 31 March 2008. At the same time, shares in the SLC were transferred from British Nuclear Group to UK Nuclear Waste Management Ltd, as the new Parent Body Organisation (PBO). The event marks the end of a two year process and also the completion of the first in a series of competitions for NDA sites as required under the Energy Act 2004.

A.2.98. The initial contact is for a period of five years with the potential of further extension periods, subject to performance and NDA management approval, up to a total of 17 years. The contract is significant as it is not only for the management and operation of the existing repository but also covers the development of a UK wide strategy for managing nuclear industry low-level waste. The aim of the new contract is to provide major savings to the UK taxpayer by reducing costs and introducing innovative technical proposals, including a 20% reduction in the UK's low-level waste financial liability.

Licensee restructuring

A.2.99. NDA has been restructuring its estate resulting in significant changes in the companies holding nuclear site licences. The three site licences for the Sellafield and Calder Hall site, the Capenhurst site and the Windscale site are currently held by Sellafield Ltd. The Windscale site was transferred from the United Kingdom Atomic Energy Authority (UKAEA) to Sellafield Ltd in April 2008.

A.2.100. Magnox Electric was sold by British Nuclear Group to Energy Solutions as part of the process of winding up BNFL. The company is being restructured into two companies Magnox North and Magnox South. These are currently 'shadow working' the new arrangements prior to the sites being relicenced and new RSA93 authorisations issued to their respective stand alone companies.

A.2.101. UKAEA Ltd was established in April 2008 and became the PBO of Dounreay Site Restoration Ltd, 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 currently held by UKAEA will, following a period of shadow working, transfer to Research Sites Restoration Ltd. UKAEA Ltd will become the PBO for Research Sites Restoration Ltd at the same time. The intention is to compete the role of PBO for Dounreay Site Restoration Ltd and Research Sites Restoration Ltd; this is expected to start in late 2008.

Sellafield Licensee Parent Body Organisation change

A.2.102. In 2007, NDA commenced the process of finding a successor to BNFL as PBO for Sellafield Ltd by competing the management and ownership of the Sellafield site. The dialogue ended in December 2007 and four bidders were invited to submit final tenders. The four tenders were received in April 2008 and evaluation is scheduled for completion at the end of June 2008 with the winner to be announced on 11 July 2008. The decision will require Government approval.

A.2.103. The programme is for contract placement in October 2008 with the new PBO acquiring the shares in Sellafield and taking charge in November 2008. The initial contract is for five years with option to extend for 5, 5, and 2 years depending on the PBO's performance giving a maximum contract duration of 17 years.

A.2.104. The competition process does not effect the status of Sellafield Ltd as an enduring entity that will continue to hold the three nuclear site licences for the Sellafield and Calder Hall site, the Capenhurst site and the Windscale site and also the discharge authorisations for the Sellafield, Calder Hall, Windscale undertaking and the Capenhurst site.

Safety and Environmental Developments

Safety Assessment Principles

A.2.105. HSE's Safety Assessment Principles (SAPs) provide guidance to its nuclear inspectors when assessing a safety case and its supporting documentation. This includes guidance on proportionality and the completeness of a safety case and what to look for when judging whether a duty holder has done sufficient to meet regulatory requirements.

A.2.106. It was decided in 2003 that the SAPs, published by HSE in 1992, needed reviewing to:

- bring them up to date with health and safety legislation;
- bring them up to date with regard to HSE's Nuclear Directorate assessment practice;
- add SAPs for assessment areas that were not previously covered, including the remediation and decommissioning activities of the nuclear industry; and
- build on best practice by comparing the SAPs against the IAEA safety standards and the Western European Nuclear Regulators' Association (WENRA) reference levels.

A.2.107. In reviewing and revising the principles, HSE has taken into account the technical interests and comments of others through inviting early comment on specific technical topic areas, and undertaking wider consultation via stakeholder engagement. The stakeholder engagement was not a legal requirement since it was not a consultation on new legislation, but was carried out to give assurance that the SAPs would be understood and judged reasonable by the industry and other relevant stakeholders.

A.2.108. The 2006 revision of the SAPs[30] was finalised and is available, together with supporting information including the stakeholder engagement process. Further information is provided at Annex L.9.

Criterion for delicensing nuclear sites

A.2.109. The HSE published a policy statement in August 2005[31] that provided a basis for the considerations that need to be made in order to delicense the whole or part of a nuclear licensed site, licensed by HSE under NIA65. It attempted to achieve broad consistency with current scientific thinking, relevant guidance and other published material including RSA93 (and the exemption orders made under it), Article 5 of the European Community Basic Safety Standards Directive 96/29/Euratom (BSS Directive)[32], and the IAEA Safety Guide "Application of the Concepts of Exclusion, Exemption and Clearance". This matter is dealt with in greater detail in Section E.50.

Joint Guidance on the management of higher activity radioactive wastes

A.2.110. In December 2007, HSE and the environment agencies published Part 1 of joint guidance on management of higher-activity wastes on nuclear licensed sites[33, 34]. This covers the whole process of managing waste from its generation to (but not including) its disposal. The objective of Part I of this guidance is to explain the regulatory process associated with the management of higher-activity radioactive waste on nuclear licensed sites in the UK.

A.2.111. 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.2.112. 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;
- a clear, auditable document trail of the basis for current regulatory decisions.

The joint guidance complements HSE's existing guidance to inspectors on nuclear safety cases and radioactive waste management[35, 36].

A.2.113. Part 2 of the joint guidance will be published in stages during 2008 and 2009. This will provide technical guidance on, for example, waste minimisation, segregation and characterisation, package and waste form requirements, storage, and information management.

Nuclear Sector Plan and Report

A.2.114. In November 2005, the Environment Agency published the Nuclear Sector Plan[37] following discussions with the nuclear industry. The plan details environmental objectives and indicators of performance that will help ensure environmental impacts are minimised and managed responsibly.

A.2.115. The Nuclear Sector Plan was supported by a sector report[38] which provided an overview of the nuclear sector in England and Wales and how it impacted on the environment. The report identified the most important environmental issues facing the nuclear sector in England and Wales. In summary, the three key environmental challenges that face the nuclear sector in England and Wales were seen to be:

- to reduce effluent radioactivity levels to meet Government strategy targets and OSPAR commitments so that, after 2020, members of the public receive a radioactive dose of less than 0.02 milliSieverts (mSv) per year from liquid radioactive discharges to the marine environment made after 2020;
- to determine and implement the future long-term management option(s) for solid radioactive waste; and
- to clean-up and restore nuclear sites at the end of their operational period.

A.2.116. Operators of nuclear licensed sites committed to use the Nuclear Sector Plan as a framework to set environmental performance targets, monitor their performance and report publicly on their performance.

Nuclear Sector Plan 2006 Performance Report

A.2.117. In April 2008, the Environment Agency published the Nuclear Sector Plan 2006 Performance Report[39]. This describes the environmental performance of the nuclear sector in England and Wales during 2006, measured against the objectives and performance indicators set out in the Nuclear Sector Plan. Overall, the performance of the sector was very good during 2006, with improvements being made in a number of areas.

A.2.118. This report highlights how the nuclear sector performed against its eight main environmental objectives, where there are still areas for improvement, how performance compares with other sectors and how we intend to use this information in the future. In summary, some key findings were:

- More waste produced but being managed – Integrated waste strategies were in place at 73% of nuclear sites. The sector produced 257,000 tonnes of non-radioactive waste in 2006, of which more than 75% was classified as inert.
- Progress towards meeting targets for discharges to air and water – good progress is being made. Trends in discharges to air and water are shown in Figures A.2.1 and A.2.2. In particular, Sellafield met a challenging target of

reducing Technetium-99 discharges from 190 terabequerels (TBq) in 1995 to less than 10 TBq a year by the end of 2006.

Figure A.2.1 - Trends in radioactive discharges to air

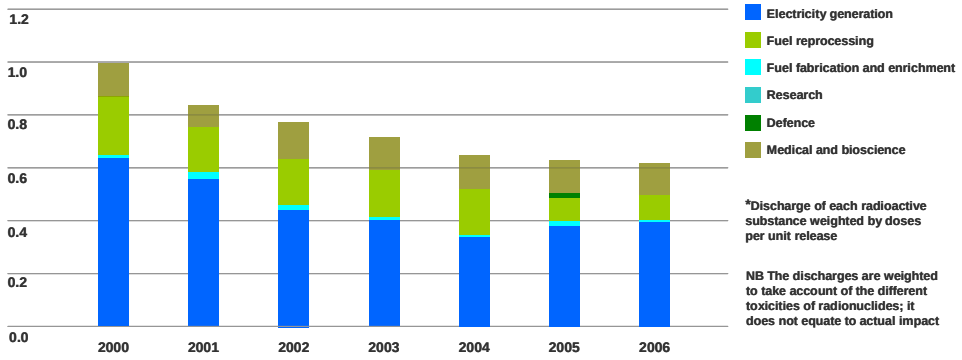
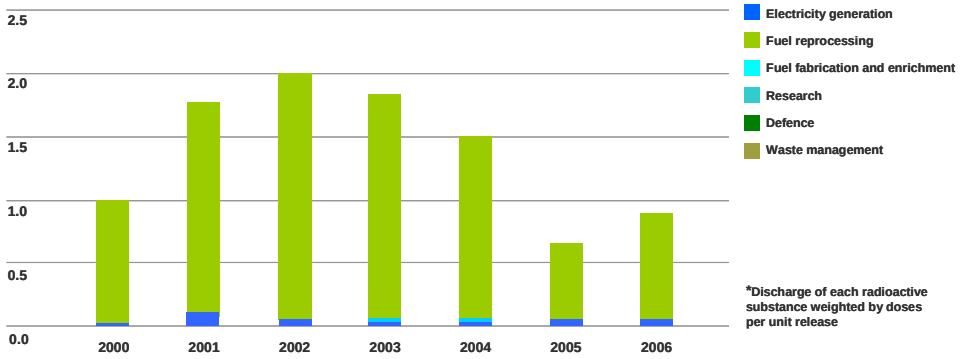


Figure A.2.2 - Trends in radioactive discharges to water



- Working to restore sites and develop biodiversity action plans – 89% of nuclear sites had a contaminated land management plan in place to characterise contamination on sites and to implement remediation work. By the end of 2006, 70% of sites had implemented biodiversity action plans.
- Links between the industry, regulators and stakeholders working well - All nuclear sites hold some form of local regular stakeholder liaison meeting. In 2006, 83% of operators published environmental reports.
- Improvements in regulatory and environmental management systems – Modern multi-media authorisations for disposing of radioactive waste were in place at 70% of nuclear sites by the end of 2006. There were no serious pollution incidents or serious breaches of permits in the sector.

A.2.119. The Environment Agency will use these results as a base for future reports, as well as for reviewing the Nuclear Sector Plan in 2008. The review will make sure that the Environment Agency and the nuclear industry continue to work together to improve the environmental performance of the sector.

A.2.120. SEPA's provisional corporate strategy 2008 – 2011 refers to the introduction of sector plans. Thus, SEPA will give consideration to the need for a sector plan that covers nuclear sector activities in due course.

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 because of the effectiveness of the UK's nuclear safety licensing and environmental permissioning regime, the high priority given to safety 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 disposal authorisations for nuclear sites. The Environment Agency carries out this review annually. The Environment Agency's performance report for 2006 showed that in a number of key areas the environmental performance of the nuclear sector was good in relation to other industry sectors. The sector is using fewer resources, greenhouse gas emissions are small, discharges of pollutants to the environment are generally falling or remaining the same and there were no serious pollution incidents or serious breaches of permits.

A.3.3. Periodic reviews of nuclear safety and environmental performance at nuclear sites will continue in the future to drive further improvement.

Spent Fuel Management Issues

Reactors now in Joint Convention

Reactors inside Joint Convention since last report

A.3.4. The Bradwell and Hinkley Point A Magnox reactors are now defuelled and in decommissioning. As such, they are no longer nuclear installations for the purposes of the Convention on Nuclear Safety. The safe management of the fuel is addressed later in this report.

Reactors Defuelling

Calder Hall (Four Magnox Reactors)

A.3.5. Calder Hall ceased generating electricity in March 2003. Since then modifications have been made to its fuel routes that are necessary to begin defuelling the reactors. Owing to issues at the reprocessing plant at Sellafield, the start of defuelling has been postponed and the time taken to defuel is likely to be extended. There are approximately 10,000 fuel elements in each of the four reactors.

Chapelcross (Four Magnox Reactors)

A.3.6. The decision to permanently cease generation at Chapelcross took effect on 29 June 2004, and the site is now preparing for defuelling, following significant safety upgrading of the fuel route. The licensee will be seeking regulator agreement for active commissioning of Reactor 3 fuel route prior to asking permission for routine defuelling of all four reactors. This may be delayed due to reprocessing issues at Sellafield. There are approximately 10,000 fuel elements in each of the four reactors.

Dungeness A (Two Magnox Reactors)

A.3.7. Dungeness A operated at power for 40 years and ceased generation in December 2006. A Post-Operation and Defuelling 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 5 years ago and further modifications have been undertaken to support defuelling. Bulk defuelling is ongoing, but at a reduced rate

owing to reprocessing issues at Sellafield. There are approximately 28,000 fuel elements in each of the two reactors.

Sizewell A (Two Magnox Reactors)

A.3.8. Sizewell A operated at power for 40 years and ceased generation in December 2006. A Post-Operation and Defuelling Safety Case was developed between 2004 and 2006 to supersede the operational safety case at the end of generation. A further PSR was completed in March 2006 to justify plant safety post generation. Refurbishment of the fuel route has been completed to support defuelling. A trial defuelling campaign of 5te uranium per reactor took place in 2007. Bulk defuelling, however, is not planned to commence in the near future. There are approximately 30,000 fuel elements in each of the two reactors.

NDA review on spent fuel management

A.3.9. NDA made a commitment in its 2006 Strategy to carry out an assessment of the full life-cycle implications of spent fuel management. This assessment was completed, and a report describing the study was published on the NDA web-site (see Annex L.12) in October 2007. The assessment intentionally makes no option recommendations. The report is being used to inform NDA's approach to spent fuel management, and includes an assessment 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.

NDA review on spent fuel, uranium and plutonium disposition

A.3.10. In July 2007, NDA published the Nuclear Materials Macro-Economic Study, which should be considered to be a sister study to the Spent Fuel work. This report provided NDA with a wide-ranging analysis of the possible futures for the UK's stocks of uranium and plutonium materials.

A.3.11. 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.
- To 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.
- To 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.3.12. 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.3.13. NDA will use these findings to inform its ongoing discussion with the Government on whether any of its stocks of spent fuel, uranium and plutonium should be regarded as waste in the future.

Update on AGR fuel storage issues at Sellafield

A.3.14. Based on Sellafield Ltd's Integrated Strategy, Advanced Gas Cooled Reactor (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.3.15. Separately, NDA is reviewing the UK-wide spent fuel management strategy and the outcome of this review may modify this position.

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

A.3.16. Sellafield Ltd and the Magnox sites coordinate the national movement of Magnox fuel and its reprocessing through a joint plan known as the Magnox Operating Plan (MOP). The current version of the MOP shows Magnox reprocessing continuing until around 2016.

A.3.17. Sellafield Ltd and the British Energy Generation Ltd (BEGL) power stations coordinate the national movement of AGR fuel and its reprocessing through a joint plan known as the Oxide Operating Plan (OOP). The current version of the OOP shows AGR reprocessing continuing until 2015.

A.3.18. Both of these developments came after setting the assumptions that support the creation of the 2007 UK Radioactive Waste Inventory (2007 UKRWI) and have recognised the need to extend the operating lives of the Sellafield reprocessing plants.

A.3.19. NDA has recently issued the first edition of a Strategy document (Oxide Fuels Strategy, see NDA website Annex L.12), whose aim is to provide a coherent plan to meet the requirements of the current UK nuclear generating programme and committed overseas spent fuel business. This strategy sits alongside but is separate from that for Magnox fuel described in the MOP.

A.3.20. Of necessity, this first edition is tactical in nature, collating current plans and operations that are being managed by the respective owners or operators of the processes. It summarises the nuclear fuel cycle and describes the key processes for fuel supply and spent fuel management, together with an identification of interdependencies and risks. This is set out against a baseline of current committed business, but also extends this in summary form to consider (in terms of both quantity and timescales) potential impacts from extended UK power stations operating lives and management of spent fuel from Sizewell B which is currently intended to be stored on the power station site.

Update on the Thorp Clarification Cell event

A.3.21. The UK's second National Report to the Joint Convention[40] provided information on the leak of dissolved nuclear fuel into a cell in Thorp. Since that report, HSE has published its investigation into the event[41]. Sellafield Ltd, as the operator, was prosecuted by the HSE and fined by the court.

A.3.22. After extensive investigation, it was concluded that the failed pipe resulted from 'motion induced fatigue' as a result of 'overblowing' of the reverse flow diverters (RFDs) used for mixing the contents of the accountancy tank. When the tanks are full, the RFDs operate correctly, however mixing of the tanks when they contained a smaller quantity of liquid allowed 'overblow' which then resulted in movement of the tank. Procedures have been updated to prevent this happening again, and all the other comparable systems within the plant have been examined to ensure that this is not a systemic issue.

A.3.23. HSE has closed out all the actions raised as a result of its investigation and cleared the plant to restart.

Radioactive Waste Management Issues

Integrated Waste Strategies

A.3.24. The safety and environmental regulators look to promote adoption of the waste hierarchy and best waste management practices through the development of Integrated Waste Strategies (IWS). The Environment Agency has specifically required this through the authorisation under the RSA93, 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.3.25. It is further specified that:

> "*The Integrated Waste Strategy should be developed and maintained according to the specification and guidance*[42, 43] *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.3.26. NDA has included a contractual requirement for its sites to prepare IWS 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 RSA93 authorisation conditions and limits, in the context of the integrated waste strategy and its supporting strategies. 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.3.27. The initial (baseline) batch of IWS, except Sellafield, were submitted to NDA and regulators by all sites in March 2006. The first (baseline) version of the IWS was submitted by Sellafield to the NDA and regulators in June 2006 and included a useful analysis of the disposal and discharge routes for wastes over time; it also identifies waste bottlenecks that might hinder waste management. The strategy continues to be developed – a second issue being submitted to the regulator in June 2007, and yearly updates will follow.

NDA contractual requirements for Life Time Plans

A.3.28. The SLCs' obligations are to perform the work in the Life Time Plan, with specific outputs identified as performance-based incentives or payment milestones. These are currently set on an annual basis. As contracts are revised through competition the opportunity exists to agree and set longer-term objectives and incentivise outputs rather than scope of work.

Environment Agency strategy for Sellafield

A.3.29. The Environment Agency began to develop its regulatory strategy for the Sellafield site in 2006. It applies the Environment Agency's wider Corporate Strategy to the unique and complex long-term issues at Sellafield, and provides clear expectations during a period of operational and management change at Sellafield. The strategy informs the Environment Agency's annual operational planning process.

A.3.30. Important objectives of the strategy include the continued application of 'fit for purpose' authorisation/permitting and review, and risk-based compliance assessment. The achievement of the best future environmental outcome from decommissioning and operational activities at Sellafield is also addressed through a number of strategic objectives which require a collaborative approach (regulators, operator, owner, local authorities etc) that embraces integrated strategic waste

planning guided by environmental protection and modern regulation principles. This is intended to be a living document which will be adapted in response to changes and feedback as the desired outcomes are achieved.

Development of an Integrated Strategy for Sellafield

A.3.31. In 2006 Sellafield Ltd produced an Integrated Strategy for the Sellafield site. This addresses all activities on the site, broadly split into clean-up activities, commercial operations (Magnox, Thorp, MOX production), waste treatment, waste storage and common infrastructure. It incorporates not only the technical processes that define plant operations but includes the complex flow of materials and wastes around the Sellafield site, the sequencing of decommissioning activities, the profiles of waste arisings, the human and financial resources necessary. An important component of this Integrated Strategy is the IWS. The first Sellafield IWS was produced in 2006 and undergoes annual revision.

A.3.32. The conclusions of the strategy are now used by the operator as the basis for setting the lifetime plans for the performance of work on the Sellafield site. The lifetime plan addresses the site's historic legacy in a prioritised manner that recognises hazard reduction as the main basis for setting a sequence of tasks, whilst recognising the need to maintain the delivery of commercial contracts.

A.3.33. A strategic governance process has now been set in place by the operator to ensure that the strategies are maintained in the light of current developments, and that business plans within the site lead to the implementation of the strategies.

Highly Active Evaporators and Storage Tanks

A.3.34. Current arisings of Highly Active (HA) raffinate are being vitrified as they arise, in line with appropriate fission product incorporation management, but a backlog of Magnox liquors remains. This is being worked off in accordance with the HA Liquor (HAL) stock curve set by the HSE specification. The regulator's specification identifies a working stock level of 200m^3 to be achieved by 2015.

A.3.35. Following the 2006 biennial review of HAL stocks, HSE made a public commitment to revise the specification to lock-in the gains arising from the unplanned Thorp shutdown, which had led to a faster reduction of HAL stocks than predicted originally when the specification was issued. A revised specification was issued on 29 October 2007 and is available on HSE's website (see Annex L.12). In May 2008 it was anticipated by the operator that this specification would be met. The working stock level remains under review with the regulators and may change to allow better management of the HAL stocks into decommissioning.

A.3.36. New evaporators and HA storage tanks are being procured by Sellafield Ltd to ensure that adequate capacity is in place when the current plant comes to the end of its service life. 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.3.37. In September 2006, a major team audit of solid waste management and control was carried out at Sellafield. The team included the Environment Agency's Sellafield and NWAT Teams and also staff from SEPA, HSE, Nirex and Lloyds Register QA. The team found no substantive issues of non-compliance with the RSA93 authorisation which would warrant formal enforcement action. Examples of good practice were found and recommendations were made for improvements to the current solid waste management system to facilitate site clean-up.

Regulatory team audit of Sellafield gaseous waste

A.3.38. A team inspection of the management and control of gaseous radioactive waste at Sellafield was carried out in June 2007. The team involved Environment

Agency staff from its Sellafield team and from other teams, together with staff from the French nuclear safety regulators and from SEPA. The key conclusions were:

- Valuable learning was gained from working with other regulators;
- There was positive, professional participation by Sellafield Ltd staff at all levels;
- Good practice was found to be balanced with opportunities for improvement;
- Good practice was seen in the areas of written standards, internal audits and strategy development.

A.3.39. Key concerns, 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 has required Sellafield Ltd to develop a programme to address all the recommendations and potential compliance issues detailed in the report.

Regulatory team audit of Sellafield liquid effluent

A.3.41. The Environment Agency, together with staff from HSE, carried out a team inspection of the management and control of liquid effluent at Sellafield in February 2005. This followed the introduction of the new RSA93 authorisation in October 2004. The new authorisation has a stronger emphasis on minimising the production, and the discharge to the environment, of radioactive waste. The new authorisation also requires the operator to demonstrate that its management systems are sufficient to do this.

A.3.42. Radioactive discharges from Sellafield are below authorised limits. Sellafield Ltd's authorisation also requires the company to do all it can to manage and minimise all its waste discharges. The inspection indicated that Sellafield Ltd needed to address certain issues, and the Environment Agency therefore recommended a number of improvements, some of which were made subject to formal enforcement action, for example in relation to the prevention and minimisation of particulate matter in aqueous waste streams.

A.3.43. The Environment Agency has continued to follow-up issues related to this team inspection, for example, through a smaller scale team inspection in December 2007. In summary, this concluded that Sellafield Ltd should improve the final filtration of liquid effluents before discharge to sea and `continue work to prevent and minimise solids in liquid effluent at source. Sellafield Ltd is currently considering how to address the recommendations.

Dounreay Cementation Plant

A.3.44. On 1 April 2008, Dounreay Site Restoration Limited (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.3.45. On 26 September 2008 an incident occurred whereby a mixture of neutralised Materials Test Reactor raffinate and cement powder, intended for emplacement into a 500 litre drum, was released into the Main Handling Cell containment. The majority of the cement powder was in the vicinity of the drum, whilst a light layer of dust was also distributed throughout the cell. There were no radiological releases outside the cell or any impact on the plant working environment as a result of the incident.

A.3.46. The UKAEA's internal investigation concluded that the incident was caused by a combination of factors, including a number of inter-related cultural issues. The investigation did not highlight any significant deficiencies in the fundamental design or construction of the facility. Nonetheless some minor improvements such as alarm location and other ergonomic issues were identified. The investigation also identified

a number of precursors and contributing factors, including uncontrolled use of over-rides, tolerance of defects and use of 'workarounds', and tolerance of alarms.

A.3.47. The recovery plan devised for restoring the plant to normal operations was divided into phases designed to lead to progressive hazard reduction whilst minimising the risk to operators, public and environment. This recovery plan has been completed and active commissioning trials commenced on 18 March 2008.

NDA review of interim storage

A.3.48. NDA has embarked on an UK-wide review of waste storage on behalf of Government. This includes storage regimes for solid ILW and for High Level Waste (HLW). NDA has extended the scope beyond the narrowest definition of 'durability of stores' in order to address the concerns expressed on storage of non-immobilised wastes in various legacy facilities. The review does not consider spent fuels and nuclear materials because these have not been declared as waste.

A.3.49. There was significant input into the review both from individual sites and the industry regulators HSE, the Environment Agency, SEPA, OCNS and DfT. A report containing the findings and recommendations from the review will be published.

LLW capacity challenges

Calder Landfill Extension Segregated Area

A.3.50. The Calder Landfill Extension Segregated Area is an engineered landfill on site at Sellafield used to dispose of high volume 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 the bottom section of the landfill at present. This should provide capacity for another 2 years. Sellafield Ltd is expected to submit an application to dispose of waste along the side walls, which will more than double the available space, later in 2008.

Clifton Marsh Disposal Facility

A.3.51. Three sites (Springfields Fuels Ltd; Sellafield Ltd (for Capenhurst); and Urenco UK Ltd) have RSA 93 authorisation terms that allow them to send LLW to the Clifton Marsh landfill site near Preston, Lancashire. The currently operational Phase 4 development of Clifton Marsh provides sufficient capacity for land filling and raising operations to continue to 2012. The volume of LLW from the three nuclear sites for disposal to the landfill in the period to 2012 is estimated to be about 80,000m^3 to 100,000m^3. This is estimated to between 10-20% of the total disposal of all wastes to Clifton Marsh landfill site, which also receives household and industrial waste from the Preston area under a waste management licence.

A.3.52. The future, after 2012, is currently uncertain as it depends on disposal and recycling rate and the landfill operator's business plans. The operator may seek planning permission for an extension to the landfill site which will also require a new waste management licence.

Dounreay LLW disposal facility

A.3.53. 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. DSRL has submitted an application to the Highland Council for planning permission for a new solid low level waste near-surface disposal facility, outside the current Dounreay nuclear site boundary. SEPA, as a statutory consultee, has advised the Council that it supports the application, provided a number of specific conditions are imposed. DSRL has also submitted an application to SEPA for authorisation under RSA93 to operate the proposed facility, which SEPA will examine and determine during 2008 - 2010.

Sellafield Beach Monitoring

A.3.54. The Environment Agency has required Sellafield Ltd to improve on the existing techniques to monitor local beaches for small radioactive objects and particles. Following successful trials using vehicle-mounted radiation detection equipment in November 2006 and February 2007, Sellafield Ltd began routine beach monitoring in May 2007.

A.3.55. Up to the end of March 2008, 365 solid items, either comprised of, or contaminated with radioactive substances, had been detected and removed from west Cumbrian beaches. About 70% of these finds are considered to be particles (<10mm diameter), with the rest either contaminated pebbles or stones. The majority of particles contain caesium-137 (highest activity - 880kBq) and a small percentage contain americium-241 (highest activity – 630kBq) and plutonium.

A.3.56. High find-rate areas appear limited to Sellafield north beach areas, with the vast majority of finds located on the stretch of beach extending 3 km north from Sellafield site. Based on pessimistic beach occupancy assumptions, the highest find-rate area identified to date (12 particles in 0.3 Hectares on Sellafield beach) is estimated to correspond to an ingestion likelihood of 1 in 4.7 million per year, and an overall encounter likelihood (external contact) of 1 in 545 per year. The Environment Agency has sought advice from HPA and, currently, no special precautionary actions are considered necessary regarding access to or use of local Sellafield beaches.

A.3.57. During 2008-09, Sellafield Ltd will monitor 250 Hectares of beaches, including repeat surveying of some to gain an understanding of the potential for re-contamination of beaches. Monitoring work in 2008/09 will also include offshore monitoring to establish whether there is a significant population of radioactive particles on the seabed. The Environment Agency has published its formal programme of work covering Sellafield beach particles[44].

A.3.58. In 2007 a limited monitoring program was undertaken in Dumfries and Galloway to determine if Sellafield derived particles could pose a realistic risk to the public in Southwest Scotland. This monitoring did not detect any particles, but is being kept under review.

A.3.59. Further information is available on the Environment Agency and West Cumbria Sites Stakeholder Group websites, see Annex L.12.

Dounreay Beach Monitoring

A.3.60. 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 and can be found on the SEPA website, see Annex L.12.

HASS update – Sealed Source removal programme

A.3.61. The UK has implemented the European Council Directive on the control of high-activity sealed radioactive sources and orphan sources. The Directive has been transposed in the UK as the High-activity Sealed Radioactive Sources and Orphan Sources Regulations 2005[45] (the HASS Regulations), and as Directions from the relevant Secretaries of State to the environment agencies.

A.3.62. In addition, the Government has funded a three-year subsidised disposal programme – due to be completed during 2008 - for surplus radioactive sources. The programme has greatly reduced the legacy of disused sources in storage on the users' premises. The Environment Agency has managed this programme for the Government. More than 10,000 surplus sources from the UK have been disposed of or recycled. The programme has encouraged recycling routes, which has reduced the costs for the larger sources.

4 - Rapporteur Feedback from the Second Review Meeting

A.4.1. At the second 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.

'Complete the evaluation of options for management of spent fuel (2007)'

A.4.2. NDA has carried out a review of spent fuel management as described in Section A.3.9.

'Complete the review of options for Very Low Level Waste (2006)'

A.4.3. UK Low Level Waste Management Policy has been revised as described in Sections B.22 and B.46.

'Review the classification system for radioactive waste

A.4.4. UK classification is described in Section L.2.8.

'Finalise Regulations for remediation of contaminated land and identification of non-licensed' sites that require remediation

A.4.5. The Radioactive Contaminated Land Regulations 2006[46], as amended in 2007[47] were introduced to put into place certain requirements of the BSS Directive in England & Wales. The Radioactive Contaminated Land (Scotland) Regulations 2007[48] and the Radioactive Contaminated Land (Scotland) (Amendment) Regulations 2007[49], together with the Radioactive Contaminated Land Regulations (Northern Ireland) 2006[50] introduce 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:

- an effective dose of 3mSv or more, per year;
- an equivalent dose to the lens of the eye of 15mSv or more, per year; or
- an equivalent dose to the skin of 50mSv or more, per year

A.4.6. 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.

A.4.7. HSE has powers under NIA65 to regulate land contaminated with radioactivity within the boundaries of nuclear licensed sites. The extended Part 2A regime does not apply to land contaminated with radioactivity '*on*' nuclear sites, but the regime was modified in December 2007 so that it applies to radioactivity '*originating from*' nuclear sites.

A.4.8. Further information can be found on the Defra website, see Annex L.12.

'Complete review of remaining capacity of the LLW repository near Drigg (3 – 5 years)'

A.4.9. NDA awarded a new contract for the management and operation of the LLWR to a new SLC on 31 March 2008, see Section A.2.96. The scope of this procurement was designed to include requirements to address key strategic concerns associated with continued national service provision for UK solid LLW management and disposal. In addition, in March 2007, the Government also published a revised policy for the long term management of solid LLW. This policy

gave the NDA responsibility for the development and publication of national nuclear industry LLW strategy, including a plan for optimum use of the LLWR.

A.4.10. As part of the two year competition process, much work has been undertaken to review potential capacity at the LLWR and how best to optimise waste routes and apply the waste hierarchy to low-level radioactive wastes. NDA launched its national strategy development process in response to the new policy on 17 April 2008 at the inaugural meeting of the NDA National LLW Strategy Group.

A.4.11. In addition, there is continuing work to address the requirements of the Environment Agency's review of the 2002 Post-closure Safety Case with interim deliverables provided to the regulator for approval up to February 2011.

A.4.12. LLW Repository Ltd will also produce initial, preliminary and developed operational strategies for the LLWR, linked to emerging national strategy in March 2009, 2010 and 2011 respectively.

A.4.13. NDA will take the findings of this programme of work into account and liaise with Government and other key stakeholders on its LLW strategy. The NDA programme to develop and publish the national nuclear industry LLW strategy is being developed further, although the current target for completion of this work is December 2009.

A.4.14. This work will allow NDA to develop and publish a plan for the optimal use of the LLWR and make recommendations as to if and when a replacement, or replacements, for the LLWR will be required.

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 substantially changed since the second UK report (i.e. in a way that has implications for the Joint Convention obligations).

B.2. Annex L.11 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. However, if new nuclear reactors are built, the current assumption is that the spent nuclear fuel from these reactors will not be reprocessed.

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 policy is that before development consents for new nuclear power stations are granted, the Government will need to be satisfied that effective arrangements exist or will exist to manage and dispose of the waste that they will produce.

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 a dry store (Wylfa power station in North Wales only) to allow for the radioactive decay of short-lived isotopes (minimum 90 days) before being dispatched by rail 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. British Energy Generation Ltd 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 2007 UKRWI reports 3,300te of spent AGR fuel will be reprocessed and some 5,500te will go for interim storage.

B.9. Spent Pressurised Water Reactor (PWR) fuel from Sizewell B power station in the southeast of England is currently being stored under water at site, with the option of either disposal or reprocessing left open for a future decision. The 2007 UKRWI reports that the Sizewell B power station is expected to generate about 1,200te (heavy metal) spent fuel over its 40-year operating lifetime. It is currently assumed that this fuel will be held on long-term storage at Sizewell.

B.10. Spent Light Water Reactor (LWR) fuel from Europe and Japan is transported from power station ponds to Sellafield for reprocessing.

B.11. Other fuels including the fuel from the UKAEA's various research and demonstration reactors are stored on sites at Dounreay and Sellafield, pending a long-term management route.

Article 32.1(iii) - Radioactive Waste Management Policy

B.12. Much of the Government's policy on radioactive waste has been updated since the last report and remains subject to a review process. In March 2007 the Government issued a 'Policy for the Long Term Management of Solid Low-level Radioactive Waste in the United Kingdom'. This amends and replaces relevant parts of the wider policy on management of radioactive wastes, Cm2919[51]. In June 2007, the UK Government and the devolved administrations of Wales and Northern Ireland published a consultation on a framework for the implementation of geological disposal of higher activity radioactive waste. The Scottish Government was not a sponsor of this consultation. Detailed information on the implementation of geological disposal of higher activity radioactive waste is available in Section A.2.26.

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 continue to develop a policy and regulatory framework which ensure that:

- radioactive wastes are not unnecessarily created in accordance with the waste hierarchy, see Section GH.8;
- wastes created are safely and appropriately managed and treated;
- 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 due to be set out in a White Paper scheduled for publication in June 2008.

Policy on radioactive waste discharges

B.20. In the UK, the policy on the regulation of radioactive waste discharges and disposals is currently governed by two optimisation concepts: Best Practicable Environmental Option (BPEO) and Best Practicable Means (BPM). The progressive reduction of discharge limits and of actual discharges, having regard to the application of BPM, is a central tenet of the way in which radioactive discharges are controlled, and has been a feature of UK policy since 1993. The Environment Agency, SEPA, and the Environment and Heritage Service, Northern Ireland (EHS), in conjunction with the Scotland and Northern Ireland Forum for Environmental Research, published a review of BPM in 2005; 'UKRSR05: BPM for the Management of Radioactive Waste'[52]. This document:

- clarifies how the UK environment agencies interpret BPM as applied to the control of radioactive substances; and
- provides advice for Agency staff when assessing an operator's application of BPM.

B.21. In 2004, SEPA and the Environment Agency jointly published a guidance document entitled 'Guidance for the Environment Agencies Assessment of Best Practicable Environmental Option Studies at Nuclear Sites'[53] to support the environment agencies assessment of BPEO studies relating to the authorisation of radioactive waste disposal at nuclear sites.

B.22. Policy on radioactive discharges is currently under review – see Section A.2. The UK Government is considering replacing the application of BPEO and BPM in England and Wales with an approach based on Best Available Techniques (BAT). BAT is considered broadly equivalent to BPM/BPEO. Application of BAT would be more consistent with environment protection regimes in other countries and with the terminology used for environmental regulation of major non-nuclear industries.

Policy for the long-term management of higher activity radioactive waste

B.23. In 2001 the Government initiated the MRWS programme, which is discussed in detail in Section A.2.26.

Policy for the management of low-level radioactive waste

B.24. 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, including HSE and the environment agencies;
- 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;
- creating a UK-wide strategy for managing low-level waste from the nuclear industry, including at what point in the future a replacement (or replacements) for the national LLW disposal facility near Drigg in Cumbria might be required and planned, to be developed by the NDA;
- initiating a UK-wide strategy for the management of non-nuclear LLW. The first step will be for the Government, in conjunction with NDA, to undertake a study that gives a clear picture of future LLW from the non-nuclear sector;
- emphasising the need to involve communities and the wider public in developing and delivering LLW management plans.

B.25. 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 being undertaken by NDA, which will greatly increase the amount of LLW generated over the coming decades;
- the lack of 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.26. In September 2004 the Government issued a statement of policy on the decommissioning of nuclear facilities updating and replacing the previous statement contained in paragraphs 120-131 of Cm 2919 published in July 1995, see Defra website, Annex L.12. Key points of this policy are noted below.

Objectives of decommissioning

B.27. 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.28. 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 research and development (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.29. 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.30. 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. The use of BPM strategies minimises the volumes of radioactive wastes created, particularly the volume of ILW.

B.31. 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 the BPM and as low as reasonably achievable (ALARA) principles.

B.32. Operators review their strategies periodically, and when changes in circumstances, including relevant Government policies, make this necessary.

B.33. 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.12.

Funding of decommissioning operations

B.34. The Government expects all operators to take the steps necessary to ensure that their decommissioning work is adequately funded.

Regulation

B.35. The nuclear regulators (HSE 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.36. 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.37. NDA is fulfilling its skills obligation through its Skills and Capability Strategy. It is investing significantly in defining skills demands, building infrastructure, developing appropriate qualifications and provision. Additionally, it encourages recruitment into the industry and using world-class benchmarks against other

industries. To date, initiatives are being developed and implemented with partners and stakeholders. Examples, include: 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. It is expected that the NDA Skills and Capability Strategy will be published early in the summer of 2008 outlining challenges, the need for action, progress to date and an Action Plan for future implementation.

Designing new nuclear facilities to take account of decommissioning

B.38. Any new facility should be designed and built so as to minimise decommissioning and associated waste management operations (see HSE website for the guidance on assessing adequacy in these areas) and costs, as part of the nuclear safety and environmental regulatory processes.

Funded Decommissioning Programme Guidance

B.39. The White Paper on Nuclear Power[8] confirmed the Government's commitment to put in place legislative arrangements to ensure that operators of new nuclear power stations have secure financing arrangements in place to meet the full costs of decommissioning and their full share of waste management costs. The Energy Bill[9] requires any operator of a new nuclear power station to have a Funded Decommissioning Programme (FDP), approved by the Secretary of State, in place before construction of a new nuclear power station begins, and to comply with this programme thereafter. On 22 February 2008, BERR published a consultation document (see BERR website Annex L.12) which includes two sets of draft guidance on what an FDP should contain. The consultation closed on 16 May 2008.

B.40. The first set of guidance (Decommissioning and Waste Management Plan 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 that which the Secretary of State may approve. This guidance also sets out the cost modelling methodology the Government expects to use to generate its own prudent estimates of the costs of decommissioning, waste management and waste disposal for new nuclear power stations.

B.41. The second set of guidance (Funding Arrangements Plan) will assist operators in setting out acceptable financing proposals to meet the costs identified. It sets out the Guiding Principles against which the Government will assess the funding proposals submitted by operators as part of their FDP for approval under the Energy Bill.

B.42. The consultation document also contains:

- an indicative timeline under which the Government expects to publish its cost estimates and to be in a position to set a fixed unit price for waste disposal. This is included for information only and views were not requested on it; and
- an indicative timetable for the creation of the Nuclear Liabilities Financing Assurance Board, which will advise the Secretary of State for Business, Enterprise and Regulatory Reform on the financial arrangements that operators submit for approval. This Board will also provide advice to the Secretary of State on the regular reviews and ongoing scrutiny of funding arrangements.

Article 32.1(iv) - Radioactive Waste Management Practices

B.43. 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.44. NDA's Strategy, see Section A.2.72, announced its plan to explore further the feasibility of full decommissioning of Magnox reactor sites and site clearance in less than 25 years, subject to long-term waste management arrangements being available. This is fully in accord with the objective of decommissioning operations being carried out as soon as reasonably practicable, taking all relevant factors into account.

B.45. In addition to the reviews described above, the Environment Agency has reviewed the Post-closure Safety Case for the LLWR and is in the latter stages of a major periodic review of the radioactive waste disposal authorisations to, and from, the LLWR.

B.46. The return of vitrified HLW to overseas customers is currently programmed to commence during financial year 2008/2009, with the return of substituted High Level Waste being included within this programme.

B.47. For LLW, it is intended to develop a new disposal facility at Dounreay.

VLLW

B.48. 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.

LLW

B.49. Solid 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.50. The LLWR is a nuclear licensed site, under the Nuclear Installations Act 1965 (as amended) (NIA65). This provides a rigorous, robust and transparent regulatory regime to secure safety and public confidence prior to closure. HSE is the regulatory body for this regime. The Environment Agency regulates any discharges from the site during its operation and the case for final closure.

B.51. In 2002 the operator of the LLWR submitted an 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[54].

B.52. The Environment Agency concluded, inter alia, 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 as early as 500 years, and insufficient optimisation and risk management to demonstrate impacts were ALARA.

B.53. In February 2006 the Environment Agency published a Decision Document[56] following a review of the LLWR authorisation. Due to issues around the safety case presented by the operator, the authorisation issued in May 2006 only allowed disposal in the existing Vault: The operator will need to present further information on optimising the performance of the site before disposals to a new Vault are permitted. The new authorisation also included a number of improvement requirements. The Environment Agency will review the authorisation again when the operator has reported on improvements specified within it. A fully-updated Environmental Safety Case is required for submission by May 2011.

B.54. Section 17A of RSA93 (as introduced by the Energy Act 2004) places a duty on the Environment Agency to conduct periodic reviews of the limits and conditions attached to each authorisation for the disposal or storage of radioactive waste. The Environment Agency carries out such periodic reviews annually on all disposal authorisations for nuclear sites. A periodic review may lead to proposals to change a radioactive waste disposal authorisation. In the case of the LLWR, the annual reviews have not resulted in any substantive change to the authorisation.

B.55. In the past, LLW has also been disposed of at the Dounreay site in the north of Scotland, but this facility is now full. See Section A.3.53.

B.56. 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 800,000m^3 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 an engineered concrete vault. At 1 April 2007, the containers occupied 196,000m^3 of vault space (compared with 21,000m^3 in 2004). Consignments to the LLWR over the past 10 years have totalled about 105,000m^3.

B.57. The 2007 UKRWI indicates that there were 36,300m^3 of LLW in storage on 1 April 2007 (compared with 21,000m^3 in 2004, and 15,000m^3 in 2001), most of this was in temporary storage awaiting disposal at the LLWR. 6,860m^3 of LLW is being stored at Dounreay pending the planned opening of a new disposal facility at the site in 2013. 10,700m^3 is held at Capenhurst and 11,200m^3 is held at Sellafield (compared with 5,900, 4,800 and 4,000m^3 respectively in 2004). Other wastes are being held for characterisation, processing and/or repackaging, before being consigned to the LLWR. A small fraction of LLW, about 300m^3, 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.58. About 33,600m^3 of LLW previously disposed of at Dounreay is planned to be recovered and packaged for disposal in the proposed new facility at Dounreay.

B.59. Recognising that existing capacity for the disposal of UK LLW is limited, the Government instigated a review of LLW policy as described in Section A.2.

ILW

B.60. 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.61. 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.62. The 2007 UKRWI indicates that there were 92,500m^3 of ILW in storage, of which 21,000m^3 had been treated to achieve passive safety by forming stable packages for long-term management (compared with 82,500m^3 and 16,400m^3 respectively in 2004; and 75,400m3 and 11,000m3 respectively in 2001). This waste is stored and conditioned on sites licensed by HSE under NIA65.

Letter of Compliance (LoC)

B.63. Regulatory guidance for the management of higher-activity radioactive wastes requires that the licensee produce a Radioactive Waste Management Case (RWMC) addressing the longer-term safety and environmental issues associated with the wastes. The RWMC 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.64. The guidance recognises the 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 (LoC) assessment process. In undertaking a LoC assessment the 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 RWMC. 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 LoC is a part of the nuclear site licensee's safety case submitted the HSE under licence conditions, who seek advice from the relevant environment agency.

HLW

B.65. HLW is heat-generating waste that has accumulated since the early 1950s at Sellafield as the concentrated liquid nitric acid waste by-product from the reprocessing of spent nuclear fuel. It therefore is stored in cooled tanks waiting to be encapsulated in glass (i.e. vitrified) to make it passively safe. The glass is then put in robust stainless steel containers and stored in environmentally controlled, safe and secure conditions pending the availability of long-term management arrangements. Current Government policy is that 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.66. The 2007 UKRWI indicates that there are 1,730m^3 of HLW in the UK in storage of which 1,090m^3 is in liquid form and 648m^3 is vitrified (Compared to 1,890m^3 in stock on 1st April 2004 of which 1,430m^3 was in the liquid form and 456m^3 vitrified). All of the previous HLW inventory at Dounreay has now decayed to an extent that it has been reclassified as ILW. This waste is stored and conditioned on sites licensed by HSE under NIA65.

Development of an HLW management strategy

B.67. To help support the long-term waste management programme, NDA has undertaken a national review on the interim storage of higher activity wastes, as

proposed by CoRWM. The key findings and recommendations from the review will be issued later on in 2008.

B.68. Sellafield Ltd is also starting to investigate its options for disposal of solidified HLW and is having preliminary discussions with NDA. Through the MRWS programme, see Section A.2.26, the NDA will undertake work to confirm the ability to develop a single 'co-located' geological disposal facility for higher activity wastes. It is expected to be several decades before such a facility would be constructed and during this time the scheduling of waste disposals would be established.

B.69. In accordance with Government policy, solid HLW that arises from the reprocessing of overseas fuel will be returned to the country of origin. The first shipments are expected to commence in financial year 2008/09.

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

Definition of radioactive waste

B.70. 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.71. 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 second 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 second 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 Table L.1.1, 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 L.2.1, L.2.2 and L.2.3 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 2007 UKRWI, published in 2008.

e) Nuclear facilities in the process of being decommissioned, see Section A.3. This includes nuclear power stations that have been defuelled (and hence no longer applicable to 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 the NDA is responsible is available on the NDA website, see Annex L.12.

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 second 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)[56] and its associated statutory provisions. One such statutory provision is the Nuclear Installations Act 1965 (as amended) (NIA65)[29], 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 Radioactive Substances Act 1993 (RSA93)[19].

E.3. The Energy Act 2004[24] established the NDA, which took over the responsibility for decommissioning, and operation via civil contracts with operators pending decommissioning of designated civil nuclear legacy sites. The creation of NDA has not changed the regulatory framework described above. However the Energy Act 2004 introduced two key amendments to the 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.

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 second UK report (i.e. in a way that has implications for the Joint Convention obligations), except in paragraphs E.20, E.27, E.50 and E.108 below.

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'.

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 the 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 paragraph E.28);

b) the safety of road, rail and sea transport of spent fuel and radioactive waste comes under the framework enforced by DfT (see also Section E.100); and

c) transfrontier shipments come under directly applicable European legislation, or European requirements implemented into the UK legislative system under the European Communities Act[57].

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)[56], 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.

Nuclear Installations Act 1965, as amended

E.10. Under the Nuclear Installations Act 1965, as amended, (NIA65)[29] 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 the NIA65 are relevant statutory provisions of the 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 empowers HSE to attach conditions in the interests of safety or radioactive waste management to any licence that it grants.

Nuclear Installations Regulations 1971

E.11. The Nuclear Installations Regulations 1971[58] 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.12. The nuclear site licensing regime is complemented by the Ionising Radiations Regulations 1999 (IRR99)[59] that provide for the protection of all workers and members of the public, whether on licensed sites or elsewhere, from ionising radiations. IRR99 implements aspects of the BSS Directive[32] 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 implements Council Directive 90/641/Euratom[60] 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.

Justification of Practices Involving Ionising Radiation Regulations 2004

E.13. In August 2004, the Justification of Practices Involving Ionising Radiation Regulations 2004[61] 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.

Environment Act 1995

E.14. The Environment Act 1995 (EA95)[62] sets the basis for the regulatory framework with respect to environmental protection. It also established the Environment Agency and the Scottish Environment Protection Agency (SEPA) as regulators together with their funding arrangements.

Radioactive Substances Act 1993

E.15. The Radioactive Substances Act 1993 (RSA93)[19] 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 the transfer of 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 the RSA93, and also harmonises radioactive substances regulation with other areas of environmental regulation.

E.16. This harmonisation is now being extended, in England and Wales, where consideration is being given to incorporating RSA93 into the Environmental Permitting Regulations 2007[63], along with a number of other conventional regulatory regimes such as those for discharges to water, groundwater and solid waste disposal. The aim is to provide a common process framework to reduce the administrative burden on those who currently have a number of different regulatory permits. This opportunity for legislative change is also being used to modernise and clarify certain aspects of RSA93 and, in particular, to introduce a staged permitting process for the development of major radioactive waste disposal facilities. These new Regulations are expected to be implemented in October 2009.

E.17. 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 HSE.

E.18. A review of Exemption Orders under RSA93 (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 completed by 2010.

Radiation (Emergency Preparedness and Public Information) Regulations 2001

E.19. The Radiation (Emergency Preparedness and Public Information) Regulations 2001 (REPPIR)[64] 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[65] 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.20. The High Activity Sealed Sources and Orphan Sources Regulations 2005 (HASS Regulations)[45] implement European Council Directive 2003/122/Euratom. 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 in the eventuality of the holder becoming insolvent or going out of business.

Management of Health and Safety at Work Regulations 1999

E.21. The Management of Health and Safety at Work Regulations 1999 (MHSW99)[66] 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.22. MHSW99 is very wide ranging. Where its requirements overlap with other Health and Safety Regulations, compliance with the more specific regulations, such as NIA65, is normally sufficient for compliance with MHSW99.

Energy Act 2004

E.23. The Energy Act 2004[23] established a new cross-border Non-Departmental Public Body, the Nuclear Decommissioning Authority (NDA), which came in to being in April 2005 to take over the responsibility for decommissioning, and operation via civil contracts with operators pending decommissioning, of designated civil nuclear sites. The creation of the NDA is described in more detail in Section A.2.62 and has not changed the UK regulatory framework, except insofar as RSA93 (see above).

Health and Safety (Fees) Regulations

E.24. The Health and Safety (Fees) Regulations are updated annually (the latest being for 2008[67]) and provide for the charging of fees for work by HSE 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 HSE 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.

Environmental Protection Act 1990

E.25. Part IIA of the Environmental Protection Act 1990 (EPA90)[68] 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.26. 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 the NIA65.

Radioactive Contaminated Land Regulations

E.27. The Radioactive Contaminated Land (Modification of Enactments) (England) (Amendment) Regulations 2007[47] modified EPA90 in England so that it applies to radioactivity originating from nuclear sites. Similar modifications apply in Wales and Scotland. Parallel regulations apply in Northern Ireland.

Nuclear Reactors (Environmental Impact Assessment for Decommissioning) Regulations

E.28. The Nuclear Reactors (Environmental Impact Assessment for Decommissioning) Regulations 1999 (EIADR99)[69] implement the requirement for an environmental impact assessment for decommissioning nuclear power stations and nuclear reactors arising from Council Directive 85/337/EEC[70] (as amended by Council Directive 97/11/EC[71] on the assessment of the effects of certain public and

private projects on the environment. Before decommissioning or dismantling of a nuclear reactor or power station can take place, a licensee must apply to HSE for consent, undertake an environmental impact assessment 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. A list of HSE determinations is given in the Fourth UK Report to the Convention on Nuclear Safety[72].

E.29. On 1 August 2005, the Health and Safety Commission published a Consultative Document outlining proposals to amend EIADR99. Two key changes are proposed:

- to implement changes made to EIADR99's parent EC Directive; and
- to simplify arrangements around decommissioning part(s) of a nuclear licensed site.

E.30. The consultation ended on 31 October 2005 and the amending regulations, 'The Nuclear Reactors (Environmental Impact Assessment for Decommissioning) (Amendment) Regulations 2006[73] came into force on 6 April 2006.

Other Relevant Legislative Frameworks

Planning / Environmental Assessment Regulation

E.31. The planning regulatory framework covers, in general, requirements for Environmental Impact Assessments (EIA). In most cases, local planning authorities are the competent authorities.

Involvement of public and other bodies in the regulatory process

E.32. Planning permission is obtained from the relevant local authority under the Town and Country Planning Act 1990[74] for England and Wales, or the Town and Country Planning (Scotland) Act 1997[75] for Scotland. In Scotland, in due course, this will be replaced by secondary legislation bringing in to force the provisions of the Planning etc (Scotland) Act 2006. In some instances, an application for planning permission may be "called in" by the relevant Minister for ministerial decision. 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", a local Public Inquiry is set up. In England and Wales the independent Planning Inspectorate arranges for one of its inspectors to hear and receive evidence for or against the proposal. The inspector then makes a report and a recommendation to the Secretary of State for Communities and Local Government or to the Welsh Assembly Government. In Scotland, 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 or, in the case of a delegated case, a decision letter will be issued by the Directorate.

E.33. The planning application process provides an opportunity to inform and obtain views from the public. For major developments such as a radioactive waste repository, this could be through the public inquiry process. Similarly, the environment agencies will consult on a developer's application for the authorisation of disposal of radioactive waste in a repository. HSE, 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 2002[76], the Freedom of Information (Scotland) Act 2002[77], and the Environmental Information Regulations 2004[78].

E.34. One of the statutory objectives of the environment agencies is to develop a close and responsive relationship with the public, local authorities and other representatives of local communities and regulated organisations. In determining applications for radioactive waste disposals on or from sites licensed under NIA65,

the agencies consult statutory bodies such as local and health authorities, fisheries and agriculture committees, in addition to the Food Standards Agency and HSE. They also undertake wide public consultation. After considering all the views expressed, they publish a "decision document" setting out their decision and the reasons behind it, including their response to issues raised during consultation. In Scotland, SEPA also consults with the Scottish Government for applications made to dispose of radioactive waste from nuclear licensed sites under the terms of a mutual agreement.

Radioactive Materials Transport

E.35. 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 2007 [20];
- the Merchant Shipping (Dangerous Goods and Marine Pollutants) Regulations 1997[79];
- Merchant Shipping Notice No MSN 1791(M), The Carriage of Dangerous Goods and Marine Pollutants in Packaged Form – Amendment 32-04 to the IMDG Code[80]; and
- the Air Navigation Order 2005[81]. Together with the Air Navigation (Dangerous Goods) Regulations 2002[82], amended in 2004, SI 2004[83].

Transfrontier Shipments

E.36. The regulatory framework for transfrontier shipment of radioactive materials and radioactive waste derive from European requirements that are either directly applicable European legislation or are implemented in the UK through the European Communities Act 1972[57].

E.37. The EC has published a new Council Directive on the supervision and control of shipments of radioactive waste and spent fuel (Council Directive 2006/117/Euratom ("the Shipments Directive")[84]). This Directive will be transposed into UK law by replacement of the Transfrontier Shipment of Radioactive Waste Regulations 1993, see Defra website Annex L.12. Consultation on draft regulations to replace the 1993 regulations commenced in March 2008, and the new regulations *(Transfrontier Shipment of Radioactive Waste and Spent Fuel Regulations 2008*) are planned to come into force in December 2008. Further information is in Section I. The European Commission is revising the Standard Document (European Commission Decision 93/552/Euratom) used in the process of authorising such shipments – the revised version is expected during 2008.

Northern Ireland

E.38. There are no nuclear installations in Northern Ireland, which has 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[85];
b) the Ionising Radiation Regulations (Northern Ireland) 2000[85];
c) the Radiation (Emergency Preparedness and Public Information Regulation) (Northern Ireland) 2001[87]; and the
d) Radioactive Contaminated Land Regulations (Northern Ireland) 2006[50]

Additionally, the Department of the Environment, Northern Ireland (DOENI) has made legislation (The Radioactive Substances (Basic Safety Standards) Regulations (Northern Ireland) 2003)[88], 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.39. 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 HSE. 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 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 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.40. 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.41. Under NIA65, no site may be used for the purpose of installing or operating a nuclear installation unless a licence has been granted by HSE. Such sites include those for spent fuel and radioactive waste as prescribed both in NIA65 and in Nuclear Installations Regulations 1971.

E.42. 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.43. Once granted, the nuclear site licence is the principal and immediate method of statutory control over a licensee's operations. Licence conditions 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.44. 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. HSE's nuclear inspectors regularly inspect the arrangements and their implementation.

E.45. HSE's powers under a nuclear site licence are outlined in Annex L.3 and described further under Article 19.2(v).

E.46. A significant proportion of HSE'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 required activity.

E.47. HSE'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. HSE 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.48. The licensing regime is described in more detail in Annexes L.5 and L.6 and the HSE publications 'Nuclear Site Licences: Notes for Applicants'[89].

E.49. 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 HSE is satisfied that there has ceased to be any danger from ionising radiations from anything on the site.

Nuclear Site Delicensing

E.50. HSE has published a policy statement[31] that provides a basis for the considerations that need to be made by HSE in order to delicence the whole or part of a nuclear licensed site. The statement attempts to achieve broad consistency with current scientific thinking, relevant guidance and other published material including RSA93 (and the exemption orders made under it), Article 5 of the BSS Directive, and the IAEA Safety Guide "Application of the Concepts of Exclusion, Exemption and Clearance"[90].

E.51. In HSE'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. To HSE, it 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. HSE would, 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.52. On the basis of existing, published guidance, HSE 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, HSE will use this criterion to remove the site from regulatory control under NIA65, i.e. allow the site to be delicenced. 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 'no danger' to discharges

E.53. Legislation such as RSA93 (and the exemption orders made under it), 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 RSA93, in line with Government policy, regulators do not seek further reductions in discharges where exposures of members of the public are optimised and less than 20 microSieverts

per year. 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 10 microSieverts 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 2 milliSieverts per year.

Authorisation of the accumulation of radioactive waste

E.54. RSA93 requires registration for the keeping and use of radioactive material and authorisation 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 and the statutory requirements for consultation between regulators on licences and authorisations.

Radioactive waste disposal

E.55. Under RSA93, no person may dispose of radioactive waste except in accordance with an authorisation under the Act, or except where the waste is excluded by the Act 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[91] is the main such instrument used by the nuclear industry and allows unconditional exemption from the reporting requirements of RSA93 for waste that complies with the conditions and limits specified in the Exemption Order.

E.56. The regulatory bodies are the Environment Agency (for sites in England and Wales), SEPA (for sites in Scotland) and the Industrial Pollution and Radiochemical Inspectorate (for the limited radioactive waste disposal that occurs in Northern Ireland from non-nuclear fuel cycle facilities).

E.57. 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.

E.58. Authorisations for the disposal of radioactive waste include several schedules addressing General Limitations and Conditions, Individual Disposal Routes, and Improvement and Additional Information Requirements.

General Limitations and Conditions

E.59. Conditions in this schedule 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 BPM to minimise further the amount of radioactivity discharged. Operators are required to use BPM to minimise the volume and activity:

a) of radioactive waste produced which will require disposal under the 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.60. 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 website at Annex L.12. They also encourage a holistic approach to radioactive waste management, exert a downward pressure on discharges, are consistent with the objectives of the 1992 OSPAR Convention, see Section A.2.40, and help to ensure that BPEO is implemented.

E.61. This schedule includes further conditions relating to measurement and assessment of discharges, record keeping and provision of information to the agencies.

Schedules for Individual Disposal Routes

E.62. The schedules for individual disposal routes each include limitations and conditions applying exclusively to that 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.63. The annual limits on discharges of radionuclides to the environment that are included in the 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 (1 milliSieverts/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 the proposed authorisations, the radiological impact on the most exposed members of the public would still be within the annual dose limit. This accords with the precautionary principle.

E.64. In setting limits, the environment agencies' aims are 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.65. A schedule of each authorisation may be included in authorisations, requiring the operator to carry out a programme of investigations and improvements.

Powers of Secretaries of State

E.66. In England and Wales, the Secretaries of State for Wales, the Department for Environment, Food and Rural Affairs, and the Department of Health hold joint powers to call in applications for authorisations for their own determination, in which case a local inquiry may be held. The Secretaries of State can also issue Directions to the environment agencies.

E.67. In Scotland, powers under RSA93 are held and administered by the Scottish Ministers. These include powers to direct applications for authorisation to 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(ii) – Prohibition of Operation without a Licence

E.68. 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 the NIA65 cannot take place without a nuclear site licence. *[The licence provides the powers to shut down any operations in the interests of safety.]*	NIA65[29]	HSE	Nuclear Site Licence
The keeping and use of radioactive material (other than on licensed nuclear sites)	RSA93	EA (E&W) SEPA (S) EHS (NI)	Registration
Accumulation of radioactive waste (other than on licensed nuclear sites)	RSA93	EA (E&W) SEPA (S) EHS (NI)	Authorisation
Disposal of radioactive waste	RSA93	EA (E&W) SEPA (S) EHS (NI)	Authorisation
Installations for: 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 [92], EIA (Scotland) Regulations 1999[93] Planning (EIA) Regulations (NI) 1999[94]	Local Planning Authority	Planning Consent (including EIA)
Decommissioning of a nuclear reactor or power station.	EIADR99	HSE	Consent (including EIA)

(E&W) = England and Wales: (S) = Scotland: (NI) = Northern Ireland

EIA = Environmental Impact Assessment, T&CP = Town and Country Planning

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.69. 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 HSE gives notice in writing to the licensee that in the opinion of HSE there has ceased to be any danger from ionising radiations from anything on the site;

b) the date when a new nuclear site licence is granted either to the same licensee or to some other person.

E.70. 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. Article 21.2, see Section F, deals with responsibilities when there is no 'operator'.

Regulatory inspection

Health and Safety Executive

E.71. HSE's nuclear inspectors regularly inspect 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.72. 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. HSE 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 HSE's specialist nuclear inspectors. The site inspector normally leads any investigation of an incident.

E.73. In addition to inspection and assessment work for specific sites, HSE 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.74. The environment agencies' inspectors carry out site inspections and formal reviews of the limits and conditions 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 of authorisations are now a formal requirement of RSA93, as amended by the Energy Act 2004. The Environment Agency has implemented this requirement through establishing an annual review of authorisations.

E.75. On occasions, team inspections or audits may be carried out on a particular plant or to investigate particular aspects. Joint inspections are sometimes carried out with HSE inspectors and other regulators from within the UK and from overseas. Site

inspections are also carried out to investigate incidents. There are no nuclear installations in Northern Ireland.

Documentation and reporting

E.76. Regulatory requirements for documentation and reporting are contained in:

a) HSE's standard nuclear site licence conditions, see Annex L.6; and

b) For the Environment Agency, the standard authorisation conditions for radioactive waste disposal from nuclear sites are set out in Schedule 1 of the authorisation[95]. SEPA applies similar standard conditions in Schedule 2 of its authorisations for nuclear sites[96].

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

E.77. 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 phrases as "As low as reasonably practicable (ALARP)" and BPM. Information on how these concepts are applied is given in Section B.20. The following provides a brief summary of the practical aspects of enforcement.

Health and Safety Executive

E.78. HSWA74 prescribes those breaches of legislation that constitute offences, and which HSE 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.79. HSWA74 enables HSE to appoint Inspectors and gives them regulatory powers to enforce applicable regulations, these powers are outlined in Annex L.4. The HSC published the 'Enforcement Policy Statement'[97], implemented by HSE in the 'Enforcement Management Model'[98], which explains the purpose and process of health and safety enforcement in UK. HSE's action, if it considers the law has been broken, 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. HSE has considerable enforcement powers, some originating from the HSWA74 and some via conditions attached to nuclear site licences. For example, under HSWA74 HSE 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.80. In England and Wales, HSE 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.81. 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 authorisations if, after consultation, they are satisfied with the applicant's proposals. Before granting an authorisation, the agencies undertake rigorous checks to ensure that both BPEO and BPM are in place to protect both human health and the environment and ensure resultant doses are

ALARA. The 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 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. UK Government is considering replacing the application of BPEO and BPM in England and Wales with an approach based on BAT. Application of BAT would be more consistent with environment protection regimes in other countries.

E.82. When the environment agencies have reasonable cause to believe that the conditions or limits set in an authorisation may have been breached, they have powers under the Environment Act 1995 to investigate. The agencies also have the power under RSA93 to issue Enforcement Notices and Prohibition Notices. These powers mirror those of HSE inspectors as described in Annex L.4. Decisions on regulatory action, including the issuing of enforcement 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 Scotland SEPA recommends prosecution to the Procurator Fiscal, whereas in England and Wales the Environment Agency can undertake prosecution itself). Variation of the conditions or limits in an authorisation is one course of action also open to the agencies.

Food Standards Agency

E.83. The Food Standards Agency is a statutory consultee to the Environment Agency and 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 authorisation. The Food Standards Agency does not grant authorisations to the operators of nuclear sites.

Northern Ireland

E.84. The Environment Act 1995 does not apply in Northern Ireland. The Chief Radiochemical Inspector of the EHS administers RSA93. Inspector enforcement powers are as for the Environment Agency and SEPA.

Enforcement of planning control

E.85. The purpose of the planning enforcement provisions in the Town and Country Planning Act 1990 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

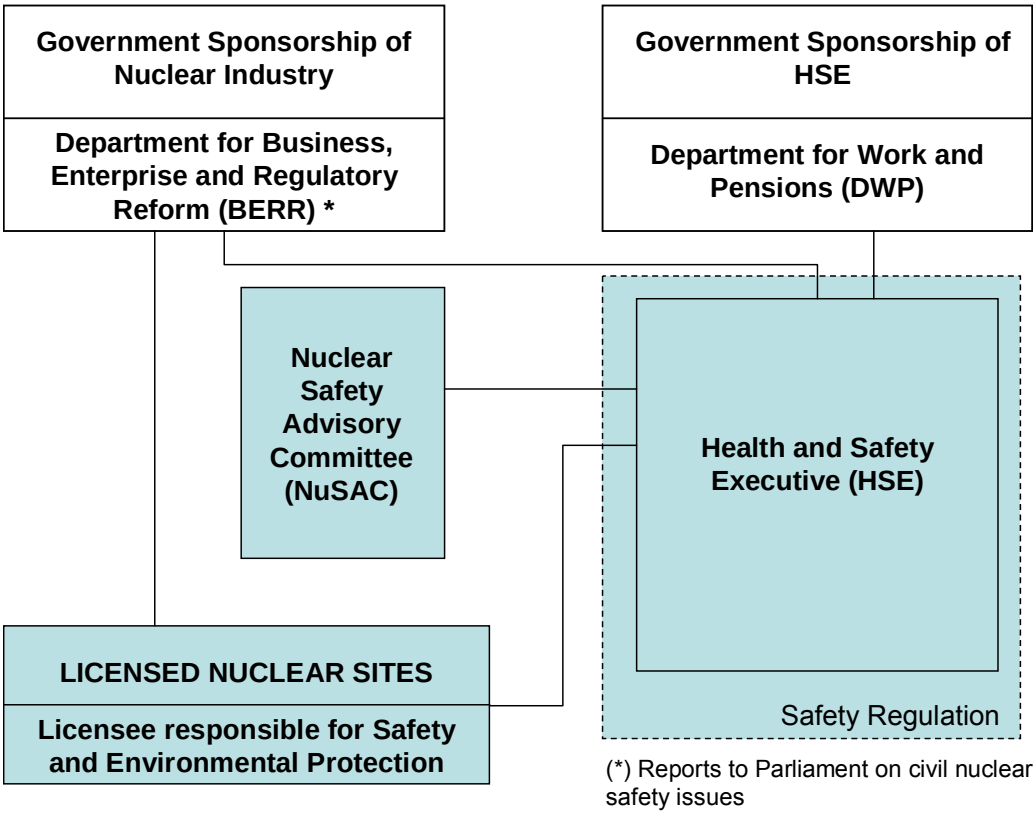
c) to serve a breach of condition notice if a there is a failure to comply with a condition imposed on a grant of planning permission.

E.86. 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.

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

E.87. 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.88. The BERR website, see Annex L.12, under the heading of Safety, sets out in summary the distribution of responsibility and accountability among Ministers, independent bodies and the devolved administrations, including:

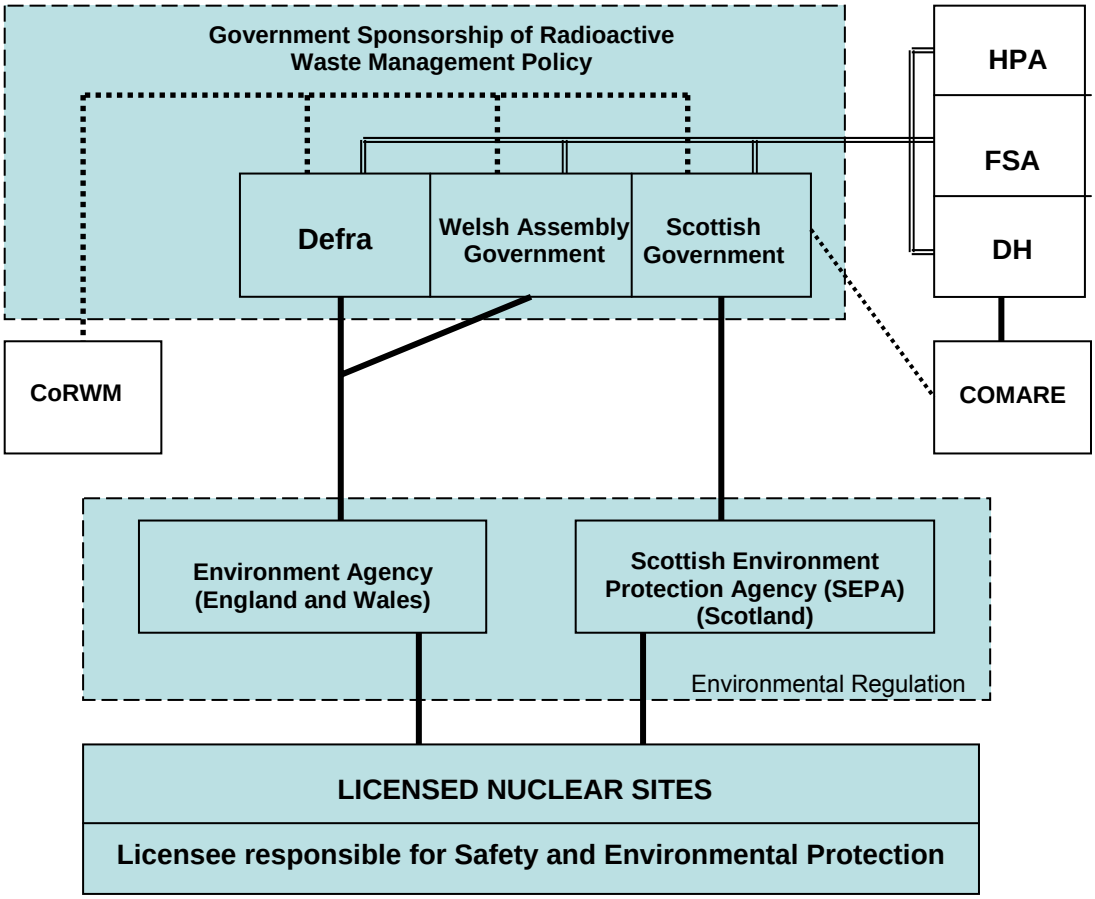
a) safety regulation at civil nuclear sites;

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.89. Sponsorship of the civil nuclear industry and accountability to Parliament for civil nuclear safety in Great Britain rests with the Secretary of State for Business, Enterprise and Regulatory Reform. Defra Ministers are accountable to Parliament for radioactive waste policy in England. Radioactive waste policy is devolved to the Scottish Government and the Welsh Assembly Government (WAG). However, the Secretary of State for Business, Enterprise and Regulatory Reform 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 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.90. Under HSWA74, employers have the prime responsibility for ensuring the safety of their workers and the public from dangers arising from their work.

E.91. 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;

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

Responsibilities of regulators

Health and Safety Executive (HSE)

E.93. As described in Section A.2.85, HSC and HSE merged on 1 April 2008 to form a single national regulatory body responsible for promoting the cause of better health and safety at work. The merged body is called the Health and Safety Executive and will provide greater clarity and transparency whilst maintaining its public accountability.

E.94. HSE will retain its independence, reflecting the interests of employers, employees and local authorities, and is committed to maintaining its service delivery. The Board of the new Executive will assume responsibility for running all aspects of the organisation, including setting the overall strategic direction, financial and performance management and prioritisation of resources.

E.95. The merger will mean:

- there will be a single national regulatory body responsible for promoting the cause of better health and safety at work;
- the overarching legislation, HSWA74, continues to apply to all of the activities which HSE regulates;
- none of the statutory functions of the previous Commission and Executive will be removed; and
- there is no change in health and safety requirements, how they are enforced or how stakeholders relate to the health and safety regulator – no health and safety protections will be removed.

E.96. HSE remains responsible for enforcing legislation on health and safety at work and in particular, in relation to spent fuel and radioactive waste management, for the operation of the nuclear site licensing regime.

E.97. The Nuclear Installations Act 1965 etc. (Repeals and Modifications) Regulations 1974[99] made HSE the nuclear licensing authority for nuclear sites. 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 the HSE. The authority to grant a nuclear site licence is delegated to Her Majesty's Chief

Inspector of Nuclear Installations, who is also the Director of HSE's Nuclear Directorate (ND), which administers this licensing function on HSE's behalf.

Environment Agency and Scottish Environment Protection Agency

E.98. The Environment Agency is the principal environmental regulator in England and 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.99. RSA93 as amended by EA95 makes the Environment Agency the regulatory body for authorisations for the disposal of radioactive waste in respect of nuclear licensed sites in England and Wales, and SEPA the regulatory body for Scotland. By issue of Directions from Government and the devolved administrations to the environment agencies, as part of the implementation of the BSS Directive, a number of the environment agencies' existing administrative practices under RSA93 were made legally binding obligations.

Radioactive Materials Transport

E.100. 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. OCNS, a part of HSE's Nuclear Directorate, regulates the security aspects of movements of nuclear material, as defined by the Nuclear Industries Security Regulations 2003[100].

E.101. 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.102. The regulatory requirements for the security aspects of transport of nuclear materials stipulate that a carrier must:

- be approved by OCNS beforehand;
- satisfy OCNS, 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 OCNS;
- report specific security matters to OCNS; and
- notify OCNS in advance of all intended movements of nuclear material.

E.103. 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 European Union (EU) have been invited to join a similar agreement through an Association of Competent Authorities of the EU.

General regulatory responsibilities

E.104. 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.105. All regulators operate in as open a way as possible 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.106. 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.107. 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.108. The Health Protection Agency (HPA) was established on 1 April 2005 under the Health Protection Agency Act 2004 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.109. 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.110. HPA is a statutory consultee for the UK Justification Regulations[63]. HPA's RPD also provides technical services to persons concerned with radiation hazards. It charges for such services, and for providing information and advice.

Responsibilities of Advisory Bodies

Committee on Radioactive Waste Management (CoRWM)

E.111. In November 2003, Government set up CoRWM, under its "Managing Radioactive Waste Safety" programme, to oversee a review of options for the long-term management of the UK's higher activity radioactive waste, and to engage with the public and stakeholders in this process. CoRWM delivered its recommendations in July 2006.

E.112. In October 2007 CoRWM was reconstituted under new terms of reference. Its new role is to provide independent scrutiny and advice to UK Government and devolved administrations. (Further information on CoRWM is in Section A.2.34)

The Nuclear Safety Advisory Committee (NuSAC)

E.113. HSWA74 allows for the appointment of committees to provide advice. Hence, HSE is able to draw on independent expert technical advice on nuclear safety policy issues from an independent committee: the Nuclear Safety Advisory Committee (NuSAC). NuSAC comprises experts from industry, academia and elsewhere. It provides a technical forum in which nuclear safety issues, and any proposals that might impact on nuclear safety, can be considered in as open and independent a manner as possible. Its terms of reference are:

- *'To advise on matters which are referred to it or which it considers require attention regarding nuclear safety policy and its implementation at nuclear installations; and*
- *To advise on the adequacy and balance of the nuclear safety research programme.'*

Ionising Radiations Health and Safety Forum

E.114. 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 (COMARE)

E.115. The Committee on Medical Aspects of Radiation in the Environment (COMARE) assists and advises the Government 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.12.

Financial provisions

E.116. 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 on 1 April 2005 with the formation of NDA. These arrangements are 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 UK's Fourth Report to the Convention on Nuclear Safety[74]. NDA provides the strategic direction for cleaning up Britain's civil public sector nuclear sites, including the Magnox reactors. It does this both by managing contracts placed with the site operators (for each of the NDA's sites, there is an 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 HSE and the relevant environment agency) and by competing 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.12.

E.117. NDA has responsibility for commercial and waste management activities on its sites and for the eventual decommissioning of those sites. It is funded partly from government and partly from revenue 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 Section F.

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

E.118. As stated in Section B, 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.119. 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.120. The Government is currently undertaking a study of the possible options for the future management of UK-owned civil plutonium stock and will want to consider the results of that exercise before reaching its own conclusions on the issue. 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. 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.121. Under this Article, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the second UK report (i.e. in a way that has implications for the Joint Convention obligations).

Article 20.1 - Regulatory Body

E.122. In the UK, the regulatory bodies entrusted with implementing the framework described in Article 19 are identified below.

Organisation of the regulatory body

E.123. 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.

Health and Safety Executive

E.124. The Health and Safety Executive (HSE) is set up 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.

E.125. HSE is responsible for enforcing legislation on health and safety at work and in particular, in relation to nuclear installations, for the operation of the nuclear site licensing regime. Within HSE, the responsibility for regulating the nuclear industry has been delegated to its Nuclear Directorate (ND). ND incorporates HM Nuclear Installations Inspectorate (NII) and it is NII that carries out the licensing and day-to-day regulation of the nuclear industry. Licensing powers are delegated to Her Majesty's Chief Inspector of Nuclear Installations, who is also HSE's Director of the Nuclear Directorate. This delegated authority from HSE gives the Chief Inspector the power to issue, add conditions to, and revoke nuclear site licences. OCNS and the UK Safeguards Office are also parts of HSE's ND.

E.126. Her Majesty's Chief Inspector of Nuclear Installations has direct lines of access, on nuclear safety matters, to Ministers for the Department of Business, Enterprise and Regulatory Reform and for the Ministry of Defence, reflecting their respective responsibilities to Parliament on civil and military nuclear safety.

Environment Agency and Scottish Environment Protection Agency

E.127. 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.

Regulatory responsibilities

E.128. HSE, 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 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, HSE 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.129. Similarly the Environment Agency or SEPA consult HSE under RSA93 on proposed (new or varied) authorisations for disposals of radioactive waste including discharges to the environment.

E.130. In addition to their own routine inspection activities on nuclear licensed sites, the Environment Agency and SEPA carry out planned joint inspections with HSE and co-operate in investigations of incidents where appropriate.

HSE's regulatory management system

E.131. HSE's ND has developed a Business Management System (BMS) to provide an integrated approach to system management, thereby ensuring that the system adds value to internal processes, and reflects the interests of ND's staff. It 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.132. Within the BMS, procedures and guides of ND'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 ND's aspirations.

HSE's principles, regulations and guides

E.133. 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, HSE does not specifically set out its requirements for nuclear safety in the form of regulations. However, some issues arising from EC and Euratom Directives have been addressed by the implementing UK regulations.

E.134. Where regulations are appropriate, the process of preparing them is as follows:

- a timetable for the preparation of the regulations is agreed with departmental lawyers;
- instructions are prepared and agreed with the lawyers;
- draft regulations are prepared and consulted on. The consultation includes a regulatory impact assessment and an equality impact assessment;
- final draft regulations are developed taking account of consultation results;
- HSE (if it has responsibility for proposing the regulations), after consideration, approves the draft; and

- draft regulations and an explanatory memorandum are prepared for relevant Minister to approve the Regulations.

E.135. The Regulations come into force at least 21 days after they are laid before Parliament. This is a complex process, but in simple terms, allows for the following:

- scrutiny by Parliamentary Committees as to the merits and the drafting accuracy of the Regulations.
- most Regulations are subject to the 'negative resolution' procedure, i.e. once they have been laid before Parliament, any member of each House of Parliament has 40 days from the laying date to object to them. If this results in a Parliamentary resolution to annul the Regulations and it is voted for in Parliament, they cease to have effect. Some Regulations are subject to the 'positive resolution' procedure, which means that they must be raised first before Parliament.

E.136. HSE has prepared Safety Assessment Principles (SAPs) which form a framework that is used by its Inspectors as a reference for technical judgments on the adequacy of licensees' safety cases. The SAPs also assist HSE in applying a consistent and uniform approach to its assessment process. In carrying out an assessment, HSE'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 embody 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.9.

E.137. HSE has prepared Technical Assessment Guides (TAGs), which are primarily guidance for its 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 through the HSE website detailing HSE'S Internal Operational Instructions and Guidance, see Annex L.12.

Authority, Competence, Financial and Human Resources

E.138. 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.139. The responsibilities and functions of the Health Protection Agency are described in Section E.108.Further information on the nuclear installations' regulators is at Annex L.7, which includes: mandates and duties; structure; and resources.

E.141. 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.142. HSE's independence as a regulator is ensured 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 RSA93.

E.143. There are also governmental mechanisms in place to maintain the independence of the regulatory bodies. HSE is sponsored by the Department for Work and Pensions (DWP), which has no role in promoting nuclear technology or responsibilities for facilities or activities. However, the Secretary of State for Business, Enterprise and Regulatory Reform is answerable to Parliament for nuclear safety in Great Britain. In this respect, HSE can provide factual information to this Minister on matters of nuclear safety regulation, but this Minister is not responsible for HSE's nuclear regulatory actions. In addition, HSE maintains good lines of communication with Defra, notably the Radioactive Substances Division, to ensure that the nuclear safety implications of environmental policy, and vice versa, are properly considered. Defra again has no role in promoting nuclear technology, or responsibilities for facilities or activities.

E.144. The Environment Agency is sponsored by Defra and the Welsh Assembly Government (WAG). On radioactive waste matters, it works closely with the Radioactive Waste and Preparedness Section in Defra, the Department of Health (DoH) and WAG. It also maintains good lines of communication with BERR.

E.145. SEPA is sponsored by the Scottish Government. On radioactive waste matters, it works closely with the Environmental Quality Directorate of the Scottish Executive, the Radioactive Substances Division of Defra and the DoH. It also maintains good lines of communication with BERR.

E.146. BERR 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 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.147. In carrying out its responsibilities, BERR will, when appropriate, seek technical factual information on safety-related matters from HSE and advice on environmental issues from the environment agencies through Defra.

E.148. Concordats or MoUs exist between the regulators and the Food Standards Agency. In addition, the Food Standards Agency acts as statutory consultee to both the Environment Agency and SEPA under RSA93. Regular liaison meetings take place between the Environment Agency and SEPA and the Food Standards Agency. On radioactive waste matters, the Food Standards Agency also works closely with the WAG.

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 second 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 RSA93 the Secretary of State has the power to provide such facilities, or may arrange for their provision by such persons as the Secretary of State may think fit. Similar powers are available to the Scottish Ministers 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 second 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 its nuclear site licence, a licensee of a spent fuel or radioactive waste management facility must demonstrate to HSE's satisfaction that:

a) it has identified all safety-related activities on the site, and that it has clearly defined and documented all safety-related duties;

b) it has adequate staff resources to carry out all safety related activities;

c) all staff who carry out safety related activities are suitably qualified, experienced and trained.

F.9. The licensee is also required, under site Licence Condition 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. HSE's role is to monitor the adequacy of, and compliance with, the arrangements made under the licence conditions. Under normal circumstances, HSE does not have any specific role in the selection, training and authorisation of staff to perform safety related duties. It does, however, have powers under the Site Licence to require that the licensee ensures that no person continues to act as a duly authorised person if, in the opinion of HSE, they are unfit to do so.

F.14. Training and human resource issues are addressed by nuclear inspectors when they are reviewing safety documentation requirements set down in HSE's SAPs. The requirement is that suitable 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.

F.15. In order to comply with regulatory requirements, a licensee must demonstrate to HSE'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;
- appropriate definitions 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, for audit and review.

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

Licensees' training programmes

Qualification, experience and training

F.16. 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.17. 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, HSE will, as part of its inspection programme, inspect the adequacy and implementation of the licensees' training programmes.

F.18. 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.

Training of external personnel

F.19. 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.

F.20. When safety analysis work and/or inspection work is contracted to organisations external to the licensee, HSE 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.21. In the UK, licensees are responsible for ensuring the safety on the licensed site, and are required under LC17 to have quality assurance arrangements for all matters that might affect safety. Licensees are therefore responsible for ensuring, amongst other things, that its contractors are suitable for the work that they do. HSE 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.

F.22. Under the BSS Directive, the UK is required to ensure that undertakings appoint suitable Qualified Experts (to ensure protection of the environment and population). The environment agencies require this as a condition of authorisation for nuclear sites.

National Nuclear Skills Academy

F.23. The UK nuclear industry along with Cogent, the Sector Skills Council covering the nuclear industry, has created the National Skills Academy for Nuclear whose role is to develop common standard for training across the industry and to develop Skills Passports which will give evidence of an individual's training, and allow skills to be transferred within the industry more easily.

Article 22(ii) - Financial resources

F.24. 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) treatment of irradiated fuel and operational radioactive waste;

b) materials and services (the cost of engineering, including contractors, and consumable spares for maintaining the facilities and other miscellaneous charges such as insurance);

c) staff costs (salaries and pension provisions); and

d) depreciation (representing the proportion of the fixed assets written off in relation to the accounting life).

F.25. 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, taking into account both the immediate costs of carrying out the improvements and future income.

F.26. 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 the NDA's

Programme Control Procedures (see NDA website, Annex L.12, for more information). The funding of the NDA is described below.

F.27. Before HSE grants a nuclear site licence it seeks assurance from the relevant body or government department on the financial standing of the prospective licensee, both in relation to safety and to radioactive waste management.

Financing radioactive waste management

F.28. The published audited accounts of UK spent fuel, reprocessing and radioactive waste management facility operators, see websites at Annex L.12, include details of waste management costs and of the provisions made in order to meet them. As there is currently no disposal route for HLW and ILW in the UK, the costs of radioactive waste management primarily comprise:

a) costs actually incurred in retrieval, conditioning, handling and storage of radioactive wastes arising during the operational phase; and

b) costs associated with the management of radioactively contaminated facilities prior to dismantling and decommissioning.

F.29. The cost of managing radioactive waste during the operational phase is an operational cost. The cost includes disposal of LLW. All disposals of radioactive waste during the operational phase, including those to the environment, are undertaken in accordance with regulatory authorisations. The regulator, either the Environment Agency or SEPA, recovers its costs in granting, monitoring and enforcing the authorisations from the operator.

F.30. NDA requires each site to prepare plans for their site, known as the Life Time Plan (LTP), 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.31. Although the plans are extremely detailed, there is a significant degree of inherent uncertainty in the future cost estimates that underpin the nuclear provisions and there are still some specific uncertainties that need to be addressed, such as:

- site end-states;
- material to be retrieved from the 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.32. 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 the NDA rather than by site contractors, and an allowance for the disposition of waste and nuclear materials. The current lifetime cost estimate for waste and nuclear material management is around £21 billion out of a total estimated lifetime cost of clean-up of around £73 billion. The published audited accounts of the NDA, available on their website, see Annex L.12, includes more detailed information.

Financing decommissioning programmes

F.33. 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 clean-up programme for these sites is around £73 billion (undiscounted) and the programme is likely to take between 50 and 100 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.34. NDA is funded directly from central Government, through its sponsoring Department, BERR.

F.35. As part of the Government's 2007 Spending Review, NDA received a budget for 2008/09 of approximately £2.9 billion, some of which depends on the level of receipts from commercial activities such as electricity generation, fuel fabrication and spent fuel management. Initially it is envisaged that revenue from commercial operations will make up approximately half of NDA's total budget although this proportion will reduce over time as operational facilities enter decommissioning.

Financing disposal of high-activity sealed sources

F.36. The High-Activity Sealed Sources (HASS) Regulations[45] have, from January 2006 onwards, 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.

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.37. Under this Article, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the second UK report (i.e. in a way that has implications for the Joint Convention obligations), but has been updated to reflect the IAEA Requirements document GS-R-3.

F.38. 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.39. The HSE SAPs (see Annex L.9) 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.40. 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.41. 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.42. 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 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.43. 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 HSE Safety Assessment Principle MS 1 on leadership, in showing commitment to safety and system improvement.

Goals, strategies, plans and objectives

F.44. 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.45. 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.46. 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.47. 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.48. 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.49. 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.50. 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.51. 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.52. 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, HSE carries out, as part of its regulatory activities, audits and inspections of the licensees' arrangements.

F.53. 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.54. 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.55. 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.56. 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.57. Under this Article, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the second UK report (i.e. in a way that has implications for the Joint Convention obligations).

F.58. 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.59. 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.60. The Radioactive Substances (Basic Safety Standards) (England and Wales) Direction 2000[1-1] and the Radioactive Substances (Basic Safety Standards) (Scotland) Direction 2000[102] require the application of ALARA in relation to the discharge and disposal of radioactive waste, which implement the BSS Directive.

F.61. 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.62. HSE's Approved Code of Practice[103] supporting IRR99 gives practical guidance on the most appropriate methods of complying with the regulatory requirements. HSE has also published advice on establishing management procedures to restrict exposure[104].

Investigations

F.63. 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.64. 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.65. 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.66. 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.67. For nuclear licensed sites LC18 requires licensees to monitor the average effective dose equivalent and notify HSE 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.68. On 1 January 1987, HSE established a computerised Central Index of Dose Information (CIDI) in order to receive and process the annual dose summaries. All dose summaries and personal data provided to HSE are treated as confidential.

F.69. CIDI 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 HSE website Annex L.12.

Article 24.1(i) - ALARA and ALARP

F.70. 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 ALARA/ALARP 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 2000 to 2006 period for workers undertaking fuel reprocessing, waste treatment and the decommissioning of nuclear facilities.

F.71. 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.72. 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 HSE'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 waste disposal authorisations issued by them under RSA93 (see Article 24.2 below).

Licensing requirements

F.73. 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.74. The adequacy of the licensees' safety cases is assessed by HSE against its 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.75. The joint responsibility for regulating doses to the public requires close cooperation between the HSE and the environment agencies. Memoranda of Understanding are in place to ensure that regulatory activities are consistent, coordinated and comprehensive, see HSE website Annex L.12.

Table F.1 - Dose information for classified persons (excluding those with a recorded dose of less than 0.1 mSv)							
Nuclear Fuel Reprocessing							
Year	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Total Classified Workers	4028	3380	3841	3869	3977	3555	3518
Collective Dose, Man-mSv	2958	2638	2791	2641	2561	2476	2918
Mean dose in mSv	0.7	0.8	0.7	0.7	0.6	0.7	0.8
Classified persons with dose:							
>6mSv	37	31	31	15	17	9	5
>10mSv	1	2	3	0	0	0	0
>15mSv	0	0	0	0	0	0	0
>20mSv	0	0	0	0	0	0	0
Radioactive Waste Treatment							
Year	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Total Classified Workers	318	360	371	364	339	291	249
Collective Dose, Man-mSv	74	81	77	69	72	60	51
Mean dose in mSv	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Classified persons with dose:							
>6mSv	0	0	0	1*	0	0	0
>10mSv	0	0	0	0	0	0	0
>15mSv	0	0	0	0	0	0	0
>20mSv	0	0	0	0	0	0	0
Decommissioning							
Year	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Total Classified Workers	1774	2375	2577	2531	2821	3317	3460
Collective Dose, Man-mSv	965	2218	2463	2642	2410	3190	4046
Mean dose in mSv	0.5	0.9	1	1	0.9	1	1.2
Classified persons with dose:							
>6mSv	21	58	43	63	31	64	48
>10mSv	1	0	1	1	0	1	58
>15mSv	0	0	0	0	0	0	0
>20mSv	0	0	0	0	0	0	0

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

Article 24.1(ii) - Dose Limitation

F.76. 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.77. 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.78. Notwithstanding dose limits, the employer responsible for the work must restrict exposure so far as is reasonably practicable.

F.79. 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.80. 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.81. Operators must obtain disposal authorisations for discharge of radioactivity to the environment, burial, incineration or transfer of waste off-site. Authorisations:

a) specify the disposal routes to be used, and place limits and conditions on disposal;

b) place a requirement to use BPM 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.82. 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 Radioactive Substances (Basic Safety Standards) (England and Wales) Direction 2000 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;

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.83. Authorisations for the disposal of radioactive waste are reviewed every four or five years by the Environment Agency and by SEPA when it is considered appropriate to do so although, in practice, this is at least once every 5 years. Discharge authorisations 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 EHS report on Radioactivity in Food and the Environment (RIFE). 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 RSA93 if the terms of authorisations are breached.

F.84. 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 BPM, 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.85. 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 for radioactivity in food and the environment are published annually in RIFE. In Northern Ireland, the EHS also carries out its own independent monitoring programme.

F.86. 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 BPM and to monitor the levels of discharged radionuclides in the local environment. Independent monitoring, by Food Standards Agency and SEPA, 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 2006, exposure of consumers to artificially produced radioactivity via the food chain remained well below the statutory UK principal 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 2006[104].

F.87. A compilation of year-on-year discharges of radioactivity from the UK's spent fuel, reprocessing and radioactive waste management facilities, together with considerable other information on radioactive wastes and public radiation exposure is

given in the annual Digest of Environmental Statistics[105] which is published by Defra. Further information can also be found on the individual organisations' websites listed in Annex L.12.

F.88. 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.12.

Radiation exposure to other countries

F.89. 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[106], 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.90. The Euratom Treaty[107] 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 resulting in contamination of the environment of another member state (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 on 1 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.91. 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.92. Under this Article, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the second 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.93. 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 HSE.

F.94. BERR co-ordinates emergency preparedness policy at national level, as the lead government department on the UK's arrangements for response to any emergency with off-site effects from a licensed civil nuclear site in England and Wales. Consequently, it chairs the Nuclear Emergency Planning Liaison Group (NEPLG), which brings together organisations with interests in off-site civil nuclear emergency planning. 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[108] to all those involved in the development of site-specific emergency plans at local level, and reviews the results of off-site exercises to ensure lessons are learned and the process of incremental improvement continues. A summary of the scope and content of the NEPLG consolidated guidance can be seen at Annex L.10.

F.95. 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. BERR would still be responsible for briefing the Westminster Parliament and the UK's international partners.

F.96. 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. BERR 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.97. In the event of a nuclear accident overseas, which may have implications for the UK, Defra 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, Defra operates the UK's Radioactive Incident Monitoring Network (RIMNET) of continuous radiation monitoring stations, which would automatically raise an alarm if abnormal increases in the levels of radiation were detected at any of the RIMNET monitoring sites. Defra's Technical Coordination Centre and Information 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.98. REPPIR implement in Great Britain the Articles on intervention in cases of radiation (radiological) emergency in Council Directive 96/29/Euratom. REPPIR also partly implement Council Directive 89/618/Euratom (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. REPPIR place on a statutory basis the arrangements whereby each local authority having a nuclear site or sites in its area prepares an off-site emergency plan. Licensees also have to comply with additional requirements on the public availability of certain information (IRR99 also require the preparation of contingency plans under Regulation 12).

F.99. A condition attached to nuclear site licences, LC11, on emergency arrangements (see Annex L.6), ensures 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. The Condition requires employees to be properly trained, and that the emergency 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 HSE for approval such parts of the arrangements as HSE may specify. Once approved by HSE, no alteration or amendment can be made to the approved arrangements unless HSE has approved the alteration or amendment. LC11 requires the arrangements to be regularly rehearsed to ensure their effectiveness.

F.100. BERR also has an ongoing lead department role in bringing together organisations involved in off-site nuclear emergency planning through NEPLG. Members include representatives of the nuclear operators, the police, fire service, local authority emergency planning officers and government departments and agencies that would be involved in the response to an emergency. The NEPLG has issued a number of guidance documents aimed at all those involved in the development of site-specific emergency plans at local level[108].

Arrangements for preparedness and response

F.101. HSE consent is required to bring nuclear fuel onto a site for the first time. As part of the assurances that HSE requires prior to granting this Consent, the establishment of appropriate emergency and evacuation arrangements have to be demonstrated, including the approval of an Emergency Plan that is in the public domain and cannot be changed without the approval of HSE. 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 HSE is required at stages specified by HSE relating to key increases in hazard on the site during the active commissioning process in which a reactor is brought from initial criticality up to its full reactor power rating. At any of these stages, HSE may require a demonstration of enhanced emergency arrangements prior to the granting of Consent to proceed to the next stage. This demonstration may be through an examination of the training records for all staff affected, or by means of a demonstration exercise against a testing scenario. Throughout the life of the nuclear installation, the emergency arrangements are subject to review and, with HSE's

approval as described above, revision, as appropriate. As part of the licensees 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.102. LC11 requires rehearsal of the arrangements to ensure their effectiveness. This is achieved by the licensee holding training exercises and HSE agreeing to a programme of demonstration emergency exercises that HSE nuclear inspectors formally observe. HSE can specify that exercises cover all or part of the arrangements. This power would be used if HSE is not satisfied with an aspect of the licensee's performance and the licensee did not agree or volunteer to repeat the exercise.

F.103. The requirements for the preparation and testing of off-site emergency plans are covered by REPPIR and are regulated by HSE. 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 are provided around nuclear installations. These zones are defined, based on the most significant release of radiation from an accident which can be reasonably foreseen. In the event of an accident being larger than the reasonably foreseeable event, there are arrangements for extending the response.

F.104. 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 implementing decisions to protect the public, and would involve all the principal organisations represented at the facility.

F.105. The Police are assisted in reaching their decisions by a Government Technical Advisor (GTA), normally one the Deputy Chief Inspectors of Nuclear Installations, appointed by BERR at the onset of the emergency. The GTA's job is to advise and to resolve any differences occurring during the coordinating group meetings, at which all the principal organisations would be represented. The GTA is normally also present during any press conferences at the media briefing centre to answer questions and give an expert view of the countermeasures being taken during the course of the emergency.

F.106. The declaration of a nuclear emergency at a Site would be followed immediately by the notification of the emergency services and local and national authorities. 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, Local Water Company and the Fire and Ambulance services. In addition, Government Departments and Agencies would also be represented. These would include Defra, (or Scottish or Welsh equivalents), BERR, HPA's RPD and HSE's nuclear inspectors. As the regulators for disposal of radioactive waste, and because of their other environment protection roles, SEPA in Scotland, and the Environment Agency in England and Wales, would also be represented, as would the Food Standards Agency to issue advice and restrictions (if it feels it necessary) on fresh food in the area affected by the emergency. These representatives 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.

F.107. The technical information regarding plant prognosis and radiological assessments by the operator is an important aspect in the response to an emergency. The SCC will receive this information from the operator's organisation. The operator's representatives at the SCC will have a prime function in ensuring that adequate information is available to those at the facility and to ensure that their own organisations are aware of what assistance the facility requires.

F.108. 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. 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.109. 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 Emergency Room (SGER) in Edinburgh. This is effectively a national exercise. The decision on which exercise should be selected as the level 3 is made jointly between the licensees, the lead government departments (BERR or the Scottish Government) and NEPLG, in consultation with HSE.

Public information

F.110. REPPIR provide 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.111. REPPIR requires that members of the public within a detailed emergency planning zone, 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.

Figure F.1 – Emergency arrangements structure

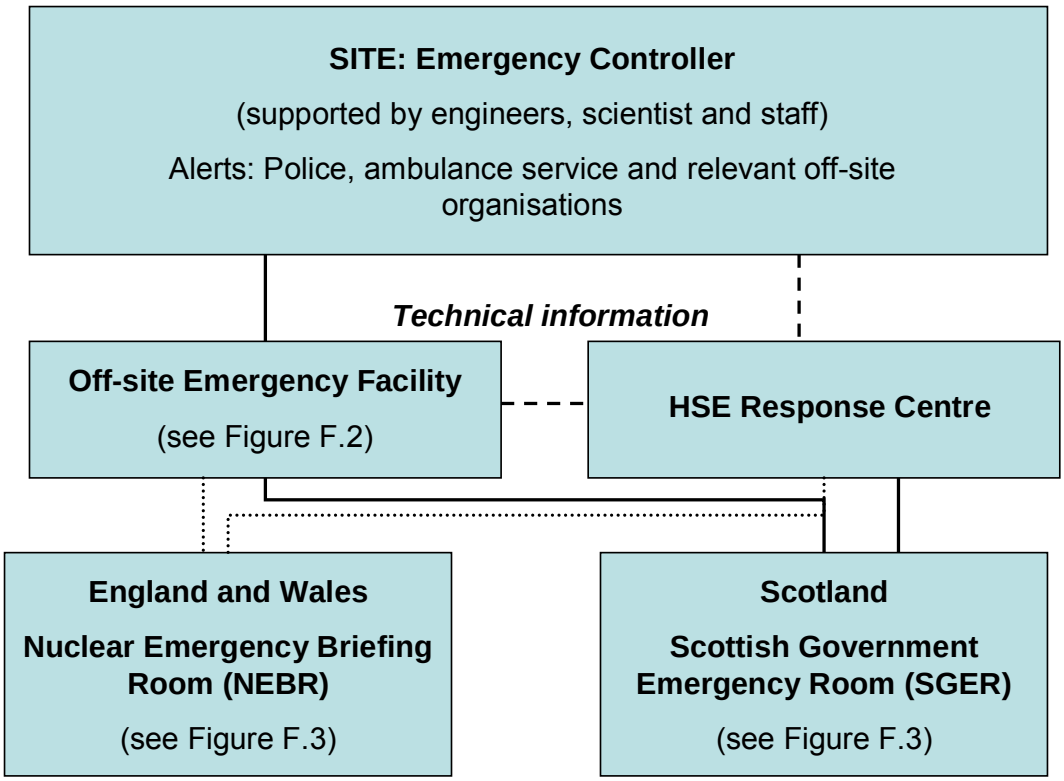


Figure F.2 – Off-site facility representatives

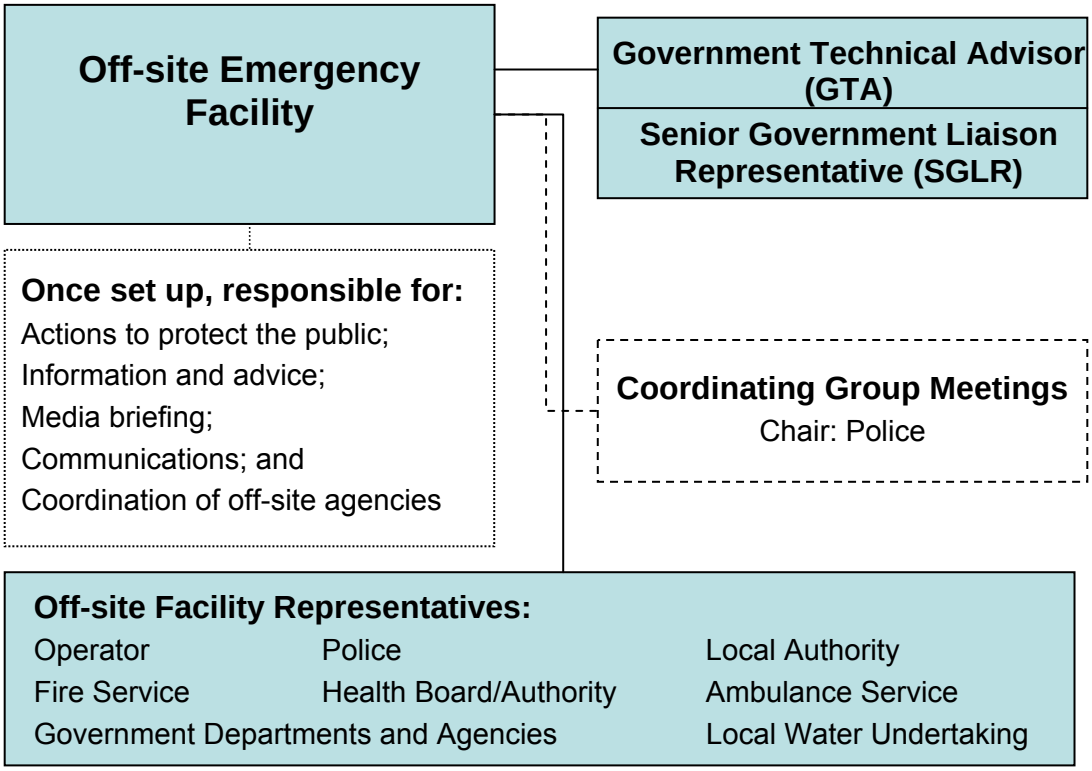
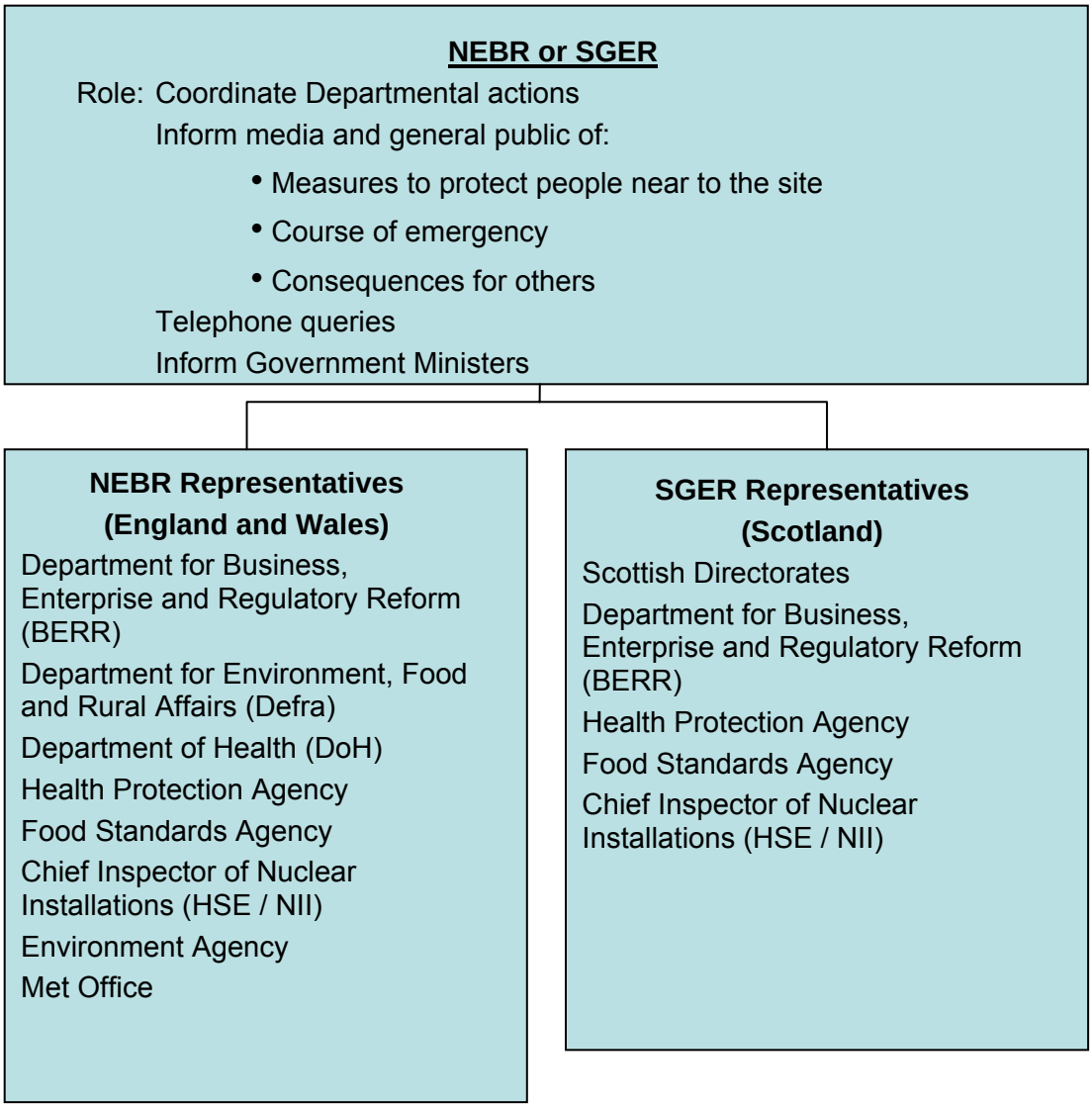


Figure F.3 – Nuclear Emergency Briefing Room (NEBR) and Scottish Government Emergency Room (SGER) representation



Information in the event of an emergency

F.112. REPPIR require 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 the media.

F.113. 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.114. For an emergency at a nuclear installation in the UK, BERR would take the responsibility for notifying other countries and initiate requests for international assistance. Under existing early notification Conventions, BERR 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.115. 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.116. 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 the Nuclear Emergency Arrangements Forum (NEAF), reviews the UK Emergency Exercise Programme to ensure that a balanced programme of exercises take 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 also been put into the exercise programme.

Response to emergencies outside of UK

F.117. Defra 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. Defra is the contact point for inward notifications under these arrangements. The National Response Plan, implemented by Defra with support from EA, provides arrangements for dealing with an emergency. This includes Defra maintaining contact arrangements and duty officers that ensure the UK can be notified of an emergency at any time. The RIMNET network operated by Defra, comprising 94 gamma dose rate monitors located throughout the UK, provides a secondary alert mechanism in the event of non-notification. RIMNET is the UK's national radiological database. Defra has established procedures including the notification and alert of those organisations within the UK with responsibilities for dealing with an overseas nuclear accident. It maintains the Technical Co-ordination Centre and Information Centre within the Defra headquarters building in London, 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.118. Under this Article, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the second UK report (i.e. in a way that has implications for the Joint Convention obligations).

F.119. In the UK, decommissioning on a licensed nuclear site is regulated by HSE 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. HSE has the power to direct the licensee to commence decommissioning in the interests of safety.

F.120. Government Policy[51] requires HSE, in consultation with the environment agencies, to carry out five yearly ('quinquennial') reviews (QQR) of licensee's decommissioning strategies to ensure that they remain soundly based as circumstances change. HSE requests, and leads the assessment of, licensee's decommissioning strategies. When it judges that the QQR has been completed, it prepares and issues, in consultation with the environment agencies, a public statement. In addition, EIADR99 requires HSE 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 Section E.

F.121. 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.122. A nuclear licensed site cannot be delicenced until HSE is satisfied that there is no danger from ionising radiation. Decommissioning is the process to achieve this end. More detail of delicensing is at Section E.

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. 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.3. The Government anticipates that, in the event that there were new nuclear power stations, waste and spent fuel from those stations could 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.4. Under these Articles, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the second UK report (i.e. in a way that has implications for the Joint Convention obligations).

GH.5. 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.6. Condition of the nuclear site licence are detailed in Annex L.6.

- 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 HSE 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 HSE 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 HSE to control design changes that could impact on the plant safety case.
- LC21 requires the licensee to produce arrangements to safely commission new facilities: HSE 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 HSE and this will only be given when HSE 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 the HSE.
- 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.7. 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.8. The licensee of a spent fuel management facility is required under Licence Condition LC32 (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.9. The environment agencies include a condition in all RSA93 authorisations that require BPM to be used to minimise the activity (for liquid and gaseous wastes) and the volume and activity (for solid wastes) of any radioactive waste generated. This condition is part of the application of the waste hierarchy principle that requires those who generate waste to avoid, reduce, recycle, minimise and recover wastes as appropriate.

Interdependencies in Spent Fuel and Radioactive Waste Management

GH.10. 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 HSE. 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 HSE operate a MoU to ensure consistent and complementary regulation. HSE 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.11. 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.12. 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 (COSHH) Regulations[109]. 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.13. 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. It is also an important part of the UK's strategy for sustainable development, Cm2426[110], and underpinned the setting up of the 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.14. Under these Articles, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the second UK report (i.e. in a way that has implications for the Joint Convention obligations).

GH.15. 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 LC15 (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.16. All existing spent fuel management and reprocessing facilities also hold authorisations for the disposal of radioactive waste, granted by the environment agencies. RSA93, as amended by the Energy Act 2004, requires the environment agencies to periodically review discharge authorisations. Such reviews must consider the limitations and conditions attached to each authorisation. The Environment Agency implements this through an annual review of its authorisations. 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 authorisations following a review, to set more stringent limits and conditions, and to require improvement programmes to be instituted. The conditions attached to such 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 Section E).

GH.17. 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.18. The radioactive contaminated land regulations were introduced to put into place certain intervention requirements of the BSS Directive. 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.

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.19. 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, 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.12.

GH.20. HSE has powers under NIA65 to regulate land contaminated with radioactivity within the boundaries of nuclear licensed sites. 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 website, see Annex L.12.

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.21. Under these Articles, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the second UK report (i.e. in a way that has implications for the Joint Convention obligations).

GH.22. 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 radioactive waste discharge authorisations. The following text summarises the legal requirements, policy and implementation issues.

National Laws and Regulations for Planning and Licensing

Planning permission

GH.23. Arrangements for planning permission are addressed in Section E.31.

GH.24. 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[93,94].

Nuclear Site Licence

GH.25. NIA65 requires that a licence is granted by HSE before any site is used for installing or operating a nuclear installation. Also, under Section 4(1) of NIA65, on granting any nuclear site licence, HSE can attach such conditions as may appear to HSE necessary or desirable in the interests of safety or radioactive waste management. HSE will not grant a licence for a new site or sanction a new facility on an existing site unless it 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.

Implementation

Licensing

GH.26. The site for any significant new spent fuel, reprocessing or waste management facility would normally be subject to a Public Inquiry. HSE would not

licence such a facility until the completion of the Public Inquiry and a Ministerial decision made under planning law. HSE's licensing process would run concurrent with a Public Inquiry to avoid unnecessary delays. However, HSE would not grant a licence in advance of a decision on planning consent.

GH.27. Before granting a licence for any new spent fuel spent fuel, reprocessing or waste management facility, HSE 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 Authorisations

GH.28. Any new spent fuel, reprocessing or waste management facility would require prior authorisation under RSA93 in order to dispose of radioactive waste, including aqueous and gaseous discharges. Such disposals would not be authorised unless appropriate dose limits and constraints were met.

GH.29. 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 Authorisation.

Hazards

GH.30. For spent fuel, reprocessing or waste management sites, the licensee would be expected to submit to HSE a safety case to demonstrate the suitability of the site and its compliance with HSE'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 HSE would assess would include: emergency planning, external hazards such as aircraft crash potential, flooding, seismicity and other geological factors. HSE would assess this information in the safety case using the siting criteria in its SAPs.

GH.31. 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.32. 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.33. The licensee must have an emergency plan as described under Article 25 (see Section F) and Annex L.10. HSE 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.34. 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.35. 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. HSE, 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 and the Freedom of Information (Scotland) Act 2002.

Maintaining the Continued Acceptability of the Site

GH.36. Once the site is in operation, HSE 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. HSE monitors this through the local authority land use planning controls. This requires HSE 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 HSE nuclear inspectors in HSE's SAPs.

GH.37. A joint circular to local authorities from the Department of the Environment, Transport and the Regions and the Welsh Office[111], and a similar circular from the Scottish Development Department[112], gave advice on the exercise of planning controls over hazardous development and over development in the vicinity of hazardous installations. These circulars established HSE as a statutory consultee for development in the vicinity of hazardous installations covered by the Regulations for Control of Development (Hazardous Installations)[113]. HSE 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. HSE's nuclear inspectors assess such planning applications to determine:

a) whether a proposed development would raise the population to near the maximum guidelines set out in the Government's siting policy for nuclear installations;

b) 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;

c) 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.

GH.38. For a proposed development within the detailed emergency planning zone (where applicable), HSE refers the application to the licensee, who must in turn liaise with those bodies having responsibilities under the off-site emergency plan, to find:

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.

HSE 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.39. Local authorities normally follow HSE's advice as a statutory consultee. 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 Environment, Food and Rural Affairs to call in the application. In Scotland, any development that has been the subject of consultation with HSE, and where HSE has advised against the granting of planning permission or has recommended conditions which the planning authority does not proposes to attach to the planning permission, must be notified to Scottish Ministers. Similar arrangements apply in Wales.

GH.40. Both the licensee and HSE 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 Periodic Safety Reviews. In addition, HSE 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[114]. This database is used to compare the projected population, following a proposed residential development, with government demographic guidelines, before HSE advises a local authority on the acceptability of such a planning application.

Periodic Reviews of Discharge Authorisations

GH.41. Discharge Authorisations are reviewed regularly, including consideration of the level of actual discharges, the margin between discharges and limits, and the application of BPM 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 authorisations, following a review, for example, to set revised limits or conditions or to require improvement programmes to be implemented.

International Obligations

GH.42. 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 1999/829/Euratom[115], Article 37 procedures).

Government Siting Policy

GH.43. The UK's initial policy for the siting of nuclear power stations and spent fuel management facilities was to site such facilities in remote locations where few people lived. Since that time, UK Government policy on siting nuclear installations has developed based on nuclear power reactor criteria. The current policy is under review.

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.44. Under these Articles, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the second UK report (i.e. in a way that has implications for the Joint Convention obligations).

Safety in design

GH.45. 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 Licence Condition LC19 (see Annex L.6).

Measures to Limit Radiological Impacts of Disposals

GH.46. Applications for authorisations to dispose of radioactive waste need to show how the design has used BPM – see B.20, 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.47. 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.48. Disposal of solid radioactive waste to a repository would only be permitted if prior authorisation for disposal is obtained under RSA93. The environment agencies' guidance on the requirements for disposal of low and intermediate level radioactive waste[116] sets out a number of principles and requirements. Those applicable to limiting radiological impacts during design and construction are:

- Principle No. 2 - Effects in the future: Radioactive wastes shall be managed in such a way that predicted impacts on the health of future generations will not be greater than relevant levels of impact that are acceptable today.
- Principle No. 3 - Optimisation (as low as reasonably achievable): The radiological detriment to members of the public that may result from the disposal of radioactive waste shall be as low as reasonably achievable, economic and social factors being taken into account.
- Principle No. 4 - Radiological protection standards: The assessed radiological impact of the disposal facility before withdrawal of control over the facility shall be consistent with the source-related and site-related dose constraints and, after withdrawal of control, with the risk target.

- Requirement R1 - Period before control is withdrawn (dose constraint): In the period before control is withdrawn, the effective dose to a representative member of the critical group from a facility shall not exceed a source-related dose constraint. Also during this period, the effective dose to a representative member of the critical group resulting from current discharges from the facility aggregated with the effective dose resulting from current discharges from any other sources at the same location with contiguous boundaries shall not exceed an overall site-related dose constraint of 0.5 milliSieverts/y.
- Requirement R2 - Period after control is withdrawn (risk target): After control is withdrawn, the assessed radiological risk from the facility to a representative member of the potentially exposed group at greatest risk should be consistent with a risk target of 10^{-6} per year (i.e. 1 in a million per year).
- Requirement R3 - Use of best practicable means: The best practicable means shall be employed to ensure that any radioactivity coming from a facility will be such that doses to members of the public and risks to future populations are ALARA.
- Requirement R4 - Environmental radioactivity: It shall be shown to be unlikely that radionuclides released from the disposal facility would lead at any time to significant increases in the levels of radioactivity in the accessible environment.

Measures to Limit Radiological Impacts of Uncontrolled Releases

GH.49. 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.50. HSE 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.51. 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. HSE’s regulatory oversight ensures that both the design and plant operating instructions address human factor considerations to ensure safe, reliable and easily managed operation.

Prevention of accidents and their mitigation

GH.52. 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.53. 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.54. 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;
c) the preparation of the plant operating instructions for fault conditions.

Decommissioning Provisions at the design stage

GH.55. 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.56. HSE's SAPs (see Annex L.9) 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.57. No new radioactive waste disposal facilities have been provided in the UK for many years. However the environment agencies have issued guidance on requirements for authorisation (GRA)[116] , which sets out regulatory requirements and principles. Relevant principles and requirements are:

- Principle No. 1 - Independence of safety from controls: Following the disposal of radioactive waste, the closure of the disposal facility and the withdrawal of controls, 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.
- Requirement R7 - Facility design and construction: The facility shall be designed, constructed, operated and be capable of closure so as to avoid adverse effects on the performance of the containment system.

GH.58. The guidance also states "*disposal will not be regarded as complete until all the requirements of the safety case have been met, including sealing and closure of the facility. The developer should show that the design takes full account of these requirements and that suitable techniques are available*".

GH.59. The environment agencies plan to publish in late 2008 updated guidance on requirements for authorisation of land-based radioactive waste disposal facilities.

Technologies Proven by Experience or Qualified by Testing or Analysis

GH.60. 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.61. 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.62. Furthermore, almost all nuclear installations have now completed at least one major PSR. These reviews and other routine regulatory activities, together with the ongoing plant monitoring and collection of lifetime data, provide additional assurance that safety-related equipment is capable of performing its intended duty.

Articles 8 and 15 – Assessment of Safety of Facilities

Articles 8 and15
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.63. Under these Articles, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the second UK report (i.e. in a way that has implications for the Joint Convention obligations).

Systematic Safety Assessments

GH.64. The safety case is the basis for much of the assessment and regulation of safety at spent fuel and reprocessing 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.65. 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, HSE'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.66. 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: LC14 "Safety Documentation"; LC16 "Site Plans, Designs and Specifications"; LC19 "Construction or Installation of New Plant"; LC20 "Modification to Design of Plant Under Construction"; LC 21 "Commissioning"; LC 22 "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. See Annex L.13 for the content of safety cases.

Safety Case Evolution

GH.67. 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 and non-conformances arising from work in the previous phase.

GH.68. 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 and changes to the safety case are regulated as modifications.

GH.69. 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.70. In the course of its nuclear regulatory work, HSE 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, HSE 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.71. Any proposed spent fuel management or reprocessing facility will be subject to EC Directive No 85/337[72], as amended by EC Directive No 97/11[73], on the assessment of the effects 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.72. The environment agencies' GRA on applications for disposal sets out regulatory principles and requirements. Requirements relevant to this Article are:

- Requirements R1 to R4 – see Section GH.48.
- Requirement R6 - Site investigations: the developer shall carry out to provide information necessary for the safety case and to demonstrate the suitability of the site.
- Requirement R7 - see Section GH.57.

GH.73. 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 by SEPA and the Environment Agency on proposed authorisations. In order to compare the assessed dose to the limits, it is necessary to consider all pathways in the assessment and not just the consumption of food.

GH.74. The environment agencies are currently updating their guidance on requirements for authorisation of land-based radioactive waste disposal facilities to reflect national and international developments since the current version was published in 1997. Two versions of the revised guidance are in preparation covering near-surface disposal facilities and deep geological disposal facilities. The near-

surface guidance will be published jointly by all three UK environment agencies, but to reflect current Scottish Government policy, the guidance on geological disposal will only be published by the Environment Agency and the EHS. It is expected that the revised guidance will be published in late 2008.

GH.75. Further developments in the environmental assessment of nuclear waste management proposals are addressed in Section A.2 and information can be found on the Environment Agency website, see Annex L.12.

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.76. Under these Articles, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the second UK report (i.e. in a way that has implications for the Joint Convention obligations).

Licensing Process and National Law

GH.77. As previously described, NIA65 states that no one may operate a nuclear installation unless they hold a nuclear site licence granted by HSE. 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.78. The environment agencies require prior authorisation, under RSA93, before radioactive waste is disposed of to a repository. Compliance with authorisation conditions and limitations 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.79. A nuclear site licence is required prior to commencement of the construction of the nuclear installation on the site (see Section E). The report on Article 15 (Section H) addresses the licensing process and the safety analysis during the design, construction and commissioning phases.

GH.80. 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 HSE'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.81. The environment agencies have set out guidance on their requirements for authorisation of disposal facilities[116]. This states that they would expect to agree a programme with the developer for the progressive supply of information as the project proceeds. In agreeing this programme, they would be looking for demonstration of the requirements in the guidance being met, including:

- Requirement R7 – see Section GH.57.
- Requirement R9 – Monitoring: In support of the safety case, the developer shall carry out a programme to monitor for changes caused by construction of the facility and emplacement of the waste.

Operational Limits and Conditions

GH.82. 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.83. 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, HSE may specify that no alteration or amendment can be made to such operating rules without HSE's prior approval.

GH.84. The environment agencies will periodically review authorisations for the disposal of waste. Reviews may lead to revision of the limits and conditions in authorisations.

Operation, Maintenance, Monitoring, Inspection and Testing

GH.85. Operation, maintenance, monitoring, inspection and testing are all covered under conditions attached to nuclear site licences. Details are provided in Annex L.4 (Licensing) but the key areas are:

- Licence Condition LC24 - all operations that may affect safety must be undertaken in accordance with written operating instructions; and
- Licence Condition 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.86. 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:

- Licence Condition LC12 - only suitably qualified and experienced persons should perform any duties that may affect the safety of operations on the site; and

- Licence Condition 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.87. The licensees commission and undertake research to support the safe operation of their nuclear installations. In addition, the Government has given HSE 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.88. HSE directs the programme by identifying safety issues that are expressed in the Nuclear Research Index[117]. The licensees use this index as a focus for commissioning the programme.

GH.89. The environment agencies require operators to whom authorisations are issued to be able to demonstrate compliance with these authorisations. This requirement covers a need to have in place appropriate organisational structures and resources to be able to demonstrate that authorisation limits and conditions are being met. This would include setting down and adhering to work procedures and engineering and technical resources.

Characterisation and Segregation of Waste

GH.90. The environment agencies' guidance on disposal facility authorisation requires the developer to derive waste acceptance criteria consistent with assumptions made in assessments of the performance of the system and with the requirements for handling and transport. These would need to be addressed in operating procedures for the facility.

Reporting of Incidents Significant to Safety

GH.91. Licence Condition 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 the HSE may specify; and

(iii) as the licensee considers necessary.

GH.92. 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, 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 the NIA65, which are to be reported by the quickest means possible under section 4(1) of the Nuclear Installations (Dangerous Occurrences) Regulations 1965, to BERR and HSE;

(ii) a confirmed breach of, or discharge expected to breach quantitative limits of a Certificate of Authorisation for the disposal of radioactive waste issued under the RSA93;

(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 Authorisation under RSA93) to be notified forthwith to HSE; 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 HSE.

GH.93. HSE has made arrangements with licensees to be informed of incidents covered by international reporting arrangements, for which HSE is the UK reporting authority, i.e.

(i) the International Nuclear Event Scale (INES); and

(ii) the IAEA/NEA Incident Reporting System (IRS).

GH.94. Certain incidents are covered by agreements for Ministerial reporting to Parliament, and these are published by HSE 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 Authorisation under RSA93); and,

(v) a confirmed breach of, or discharge expected to breach quantitative limits of, a Certificate of Authorisation for the disposal of radioactive waste issued under RSA93.

GH.95. The UK is a signatory to the 1986 IAEA Convention on 'Early Notification of a Nuclear Accident' 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 points for issuing and receiving notification and information on the nuclear accident are BERR and Defra, respectively.

GH.96. In addition to reporting nuclear incidents, HSE 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.97. 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.98. 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.99. 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.100. HSE is responsible for national publication of the results of its regulatory activities (such as the assessment of licensees' PSRs) and international reporting of events. HSE brings to the attention of licensees any international events of significance.

Decommissioning Plan Preparation and Updating

GH.101. 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.102. 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.103. In their guidance on requirements for disposal authorisation, the environment agencies state that disposal will not be regarded as complete until all the requirements of the safety case have been met, including sealing and closure of the facility. A specific requirement is Requirement R7 – see Section GH.57.

GH.104. The developer must show that the design takes full account of these requirements, and that suitable techniques are available. In addition, information on the form of the waste, its physical and chemical properties and the radionuclide inventory, will be maintained and progressively updated. This will provide an input to periodic reviews of disposal authorisations.

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

GH.106. In the UK, spent fuel has not been designated as radioactive waste for disposal. 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.107. Under this Article, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the second UK report (i.e. in a way that has implications for the Joint Convention obligations).

GH.108. In their Guidance on Requirements for Authorisation (GRA), the environment agencies state that the information to be recorded should include data and results from the site investigation and characterisation programme, design documents, drawings and details of the engineering construction of the facility, records of waste emplacements and their location in the facility, operational information and results of monitoring at all stages of the project. Duplicates of the records are required to be kept in diverse locations and in durable form. Up to withdrawal of control, the records will be needed by the organisation exercising control and, potentially, by the regulators. After that time, the records may be subject to public archive.

GH.109. In submissions related to the design and operation of a disposal facility, the applicant for authorisation should show that the best practicable means are being employed to ensure that the radiological detriment to members of the public, both before and after withdrawal of control over the facility, will be as low as reasonably achievable and take due account of social and economic aspects. Demonstration of optimisation will entail showing that, among other things, the safety case has a sound scientific and technical basis and that good engineering principles are being applied in facility design, construction, operation and closure.

GH.110. Repository developers and operators are required to establish a strategy and programme for monitoring of the facility to support the safety case. This includes during any period of institutional control after closure of the facility. However it is recognised 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.

Period of Institutional Control for Repositories

GH.111. There is no assumed period of institutional control in the UK, as the length of the period would depend on the prevailing circumstances, the chosen concept and design, the length of the operational period, etc. It is expected that a site-specific and risk-informed approach will be adopted, taking full account of radiological inventory, site characteristics and facility design and construction.

GH.112. A regulatory principle in the UK is that authorisations 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. There is a broad international agreement that it is unreasonable to rely on people to take action for more than a few hundred years at most to control risks from a disposal facility for solid radioactive waste. It is not likely that the environment agencies would accept an environmental safety case which assumed that the period of authorisation for the facility would extend longer than a few hundred years.

GH.113. CoRWM commissioned a paper on institutional control[118] which concluded that with regard to longevity of control, the survival of a control system depends on the survival of the society in which it exists and the continued perception of the society that control is needed. It is not possible to estimate the time over which control of a radioactive waste management facility can be maintained because it is not possible to estimate the time over which society may remain stable.

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 second UK report (i.e. in a way that has implications for the Joint Convention obligations).

I.2. The European Directive 92/3/Euratom[119] makes provision for a regulatory regime for transfrontier shipments of radioactive waste into, out of, or through the European Community. The Directive is implemented in the UK by the Transfrontier Shipment of Radioactive Waste Regulations 1993[120], which require prior written approval by the competent authorities of all States involved (States of origin, transit and destination) 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 EHS is the competent authority in Northern Ireland.

I.3. On receipt of an application from the consignor of the waste, the relevant UK competent authority sends the competent authority of the country of destination (usually an environmental or nuclear regulator) Sections 1 and 2 of the standard form

(European Commission Decision 93/552/Euratom[121]). Section 2 is the mechanism by which the country of destination approves the shipment. Where radioactive waste originates from within the EU, each state of transit and destination, whether within the EU or not, is contacted and their approval obtained, before the export of the waste from the EU takes place. 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 and the policy for the long term management of solid low level radioactive waste[14]).

I.4. There is a standing ban on shipments to destinations south of latitude 60 degrees south. In all cases where import or export of LLW would add materially to the waste needing to be disposed of, shipments of low-level waste to Organisation for Economic Co-operation and Development (OECD) countries for treatment are now permitted provided they meet 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.

I.5. The same procedure 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 competent authority for authorisation of the shipment.

I.6. No procedures are in place to deal with the prevention of shipments that have not been given authorisation. However, 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.7. Currently, spent fuel that is destined for reprocessing is not categorised as radioactive waste and does not fall within the scope of the Transfrontier Shipment of Radioactive Waste Regulations, but it will fall within the scope of the Regulations from December 2008. Like other shipments of radioactive materials, transboundary movements of 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.

I.8. In April 2001, the European Commission started the process of revision of Directive 92/3/Euratom as part the Commission's fifth phase of the SLIM process (Simpler Legislation for the Internal Market) with a view to make the Directive more user-friendly and transparent. On 20 November 2006, the EU Council adopted Council Directive 2006/117/Euratom ('the Shipments Directive')[86] on the supervision and control of shipments of radioactive waste and spent fuel. Member States have until 25 December 2008 to bring into force national legislation to comply with this Directive. The existing Directive 92/3/Euratom will be repealed with effect from the same date.

I.9. The new Directive will be implemented in the UK by means of new Regulations made under the European Communities Act 1972: *The Transfrontier Shipment of Radioactive Waste and Spent Fuel Regulations 2008,* which will replace the *Transfrontier Shipment of Radioactive Waste Regulations 1993*. A public consultation on the draft Regulations finished on 19 May 2008, see Defra website, Annex L.12. The Regulations will come into force by the end of 2008.

I.10. European Council Regulation Euratom 1334/2000[122], 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)[123]. This usually results in an export licence application. In addition, the Nuclear Suppliers Group (NSG) Guidelines[124] 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[125].

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 second UK report (i.e. in a way that has implications for the Joint Convention obligations).

J.2. The UK has implemented European Council Directive 2003/122/EURATOM[126] on the control of high-activity sealed radioactive sources and orphan sources. The Directive has been transposed in the UK as the High-Activity Sealed Radioactive Sources and Orphan Sources Regulations 2005 (the HASS Regulations) and as Directions from the relevant Secretaries of State to the environment agencies. Taken together, these measures provide a new regulatory regime for high-activity sealed sources. 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[127]. Across the UK there are approximately 300 HASS registrations. The requirements of Directive 2003/122/EURATOM have been implemented in Northern Ireland by means of "The High Activity Sealed Radioactive and Orphan Sources Regulations 2005 SI 2005 No 2686 and the HASS (Northern Ireland) Directions 2005.

J.3. On nuclear licensed sites, Licence Condition 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.4. The Transfrontier Shipment of Radioactive Waste Regulations (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.5. 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 HSE; for all other consignees/ consignors, the competent authority is the Environment Agency in England and Wales, SEPA in Scotland or EHS in Northern Ireland.

J.6. The Environment Agency has managed 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 about 9000 disused radioactive sources throughout the UK.

Radiation screening at ports and airports

J.7. Routine screening by HM Revenue and Customs (HMRC) 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 HMRC, 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 HMRC 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 HMRC website Annex L.12.

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.

Periodic review of nuclear safety

K.2. 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. Licence Condition 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.3. Periodic, or regular, reviews of authorisations are now a formal requirement of RSA93 as amended by the Energy Act 2004. The Environment Agency has implemented this requirement though establishing annual reviews of authorisations. Discharge authorisations are placed on public registers, where they are open to inspection, and discharge limits are published in various documents, for instance the annual report on Radioactivity in Food and the Environment (RIFE). RIFE now includes data from all government environmental monitoring results and is published jointly by the Food Standards Agency, Environment Agency, SEPA and the EHS. 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 RSA93 if the terms of authorisations are breached.

Periodic review of decommissioning activities

K.4. Government Policy[51] requires HSE, in consultation with the environment agencies, to carry out five yearly ('quinquennial') reviews (QQR) of licensee's decommissioning strategies to ensure that they remain soundly based as circumstances change. HSE requests, and leads the assessment of, licensee's decommissioning strategies. When it judges that the QQR has been completed, it prepares and issues, in consultation with the environment agencies, a public statement.

Policy on the reduction of discharge limits and actual discharges

K.5. The UK is currently working on a review of the Strategy for Radioactive Discharges 2001-2020. The new strategy will cover the period 2006-2030. In parallel with the strategy, the Government is preparing statutory guidance to the Environment Agency. The statutory guidance to SEPA was issued by the Scottish Government in May 2008. The draft strategy will be subject to public consultation in the summer of 2008 and it is expected that it will be published by the end of 2008.

K.6. The effect of reducing discharges to meet these targets will be to reduce estimated critical group doses, from liquid discharges made from 2020 onwards, to 0.02mSv (20 microSieverts) a year or less.

K.7. Since 2004, Sellafield Ltd has successfully managed to redirect one of its principal technetium bearing streams from discharge to the marine environment and into the HA liquor storage plant. Here it is mixed with the HA liquor streams and ultimately vitrified. In preparation for the clean out of its major facilities such as the Magnox reprocessing plant when it comes to the end of its programme of work, Sellafield Ltd is installing new evaporative capacity, designed to handle some of the entrained materials that will arise. This represents a change in strategy as earlier plans involved greater volumes being discharged into the marine environment.

K.8. GE Healthcare, at its site in Cardiff, South Wales, has commenced active commissioning of its tritium recycling plant part of its commitment to environmental improvement under Project Paragon. Previously, 95% of the tritium feedstock to their radio-labelling process became waste, and much has been stored on site for a number of years. The new facility enables GE Healthcare to process the waste tritium instead of discharging into the environment. This, and changes relating to water treatment, is leading to reduced discharges to the Severn Estuary. GE Healthcare's plans to develop and operate a similar process for recycling carbon-14 have been shelved and alternative options are being considered. The tritium process, the first in the world, should be regarded as a major success in recycling technology.

Work towards provision of a disposal facility for Higher Activity Waste

K.9. The MRWS White Paper is due to be published in June 2008 (see Section A.2.26.). This is likely be accompanied by an invitation to communities to express an initial interest in entering into without prejudice discussions with government on the possibility of hosting the disposal facility.

K.10. A geological disposal facility will be subject to existing effective regulatory regimes administered by independent 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.

K.11. The UK Government is also considering whether any changes to the planning law may be required for repositories.

Radioactive Substances Regulation - Environmental Principles

K.12. The Environment Agency is developing Radioactive Substances Regulation Environmental Principles (REPs). These will 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. The Environment Agency plans to consult on the draft REPs during 2008.

K.13. One of the principles addresses the use of Best Available Techniques (BAT) to ensure that production of radioactive waste is prevented and, where that is not practicable, minimised with regard to activity and quantity. Introduction of BAT will replace application of BPEO and BPM in England and Wales and will be more consistent with environmental protection regimes applied in other countries.

Radioactive Waste Disposal Regulation Initiatives

K.14. The UK Government is reviewing whether to incorporate radioactive substances regulation into the Environmental Permitting Programme (EPP). EPP seeks to streamline and integrate environmental permitting regimes into a single system and has already been successfully adopted for two major pollution control regimes. EPP is a joint initiative between Defra, the Environment Agency and Welsh Assembly Government that aims to reduce administrative burdens on industry and regulators in England and Wales without compromising environmental and human health standards. Depending on the outcome of the review, new regulations might be produced in late 2009 to replace and modernise the existing legal provisions under the RSA93 as applicable to England and Wales. See Defra website Annex L.12.

Section L

List of Annexes

Annex L.1. - Spent Fuel 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. With the creation of CoRWM, the formation of NDA and changes in the nuclear industry, however, 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 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.

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 in either water-filled ponds (most power stations) or in a dry store (Wylfa power station in north Wales only) to allow for the radioactive decay of short-lived isotopes (minimum 90 days). Splitter blades (external vanes attached to the fuel 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 (except for fuel from Chapelcross) is by rail, using specially designed flasks to carry the fuel. Fuel from Chapelcross is transported 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 fuel rods are transferred 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 station, 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. BEGL has contracts with Sellafield Ltd. for reprocessing 3,500te of its AGR fuel. Spent fuel in excess of this contracted quantity will be stored. Current business plans of Sellafield Ltd indicate that some 5,500 tonnes will be stored.

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, with the option of either disposal or

reprocessing left open for a future decision. The station is expected to generate about 1,200te (heavy metal) spent fuel over its 40-year lifetime.

Light Water Reactor Fuel from Europe and Japan

L.1.8. Spent LWR fuel assemblies from Europe and Japan is transported from power station ponds to Sellafield, in flasks containing high integrity multi-element bottles (MEBs) to provide containment and protection for the fuel. On arrival the MEBs are stored in ponds before being moved to the Thorp feed pond for flushing before the fuel assemblies are removed for reprocessing.

Other fuels

L.1.9. 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.1.10. The spent Demonstration Fast Reactor (DFR) 'driver' fuel was reprocessed at Dounreay. The majority of the spent DFR breeder fuel has been reprocessed. There is a small quantity of the fuel still in the reactor and the current plan is for it to be removed and prepared for conditioning as waste for treatment within the Immobilisation and Encapsulation Facility or the Waste Treatment plant (when both constructed) with a fall back option of sending it to Sellafield for reprocessing.

L.1.11. The spent high temperature gas-cooled reactor (known as DRAGON) fuel, previously stored 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.1.12. Spent low irradiated GLEEP (graphite low energy experimental pile) fuel is packaged and stored at Harwell.

L.1.13. Spent low irradiated Zero Energy Breeder Reactor Assembly fuel as plutonium and natural uranium oxide plates is currently on loan to Cadarache in France. It is expected that this fuel will be returned to the UK in the near future. The plutonium plates are currently intended to be put into long-term storage at Harwell, but these will form part of the NDA's review of UK plutonium strategy. The natural uranium oxide plates will be stored (at a location yet to be decided) and eventually conditioned for disposal as waste.

L.1.14. Spent lightly-enriched uranium fuel from the Windscale Advanced Gas-cooled Reactor (WAGR) and the Steam Generating Heavy Water Reactor (SGHWR) is stored at Sellafield and a small amount of associated post-irradiation examination (PIE) remnants are stored in cave facilities at Windscale, 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.

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 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 defuelled.

L.1.16. 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.

AGR reactor sites

L.1.17. Each AGR station has one fuel storage pond.

Sizewell B PWR site

L.1.18. Sizewell B has a fuel storage pond on site.

Storage of spent fuel at other sites

Dounreay

L.1.19. An irradiated Fuel Cave was used for the handling and temporary storage of fuel elements.

L.1.20. A pond is used as a buffer store.

Sellafield

L.1.21. A pond built between 1948 and 1952 was subsequently modified to handle Magnox fuel from the Calder Hall reactors which it did until 1960.

L.1.22. A pond operated from 1960 until 1986 as a receipt, storage and decanning facility for Magnox fuel.

L.1.23. A 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, MEBs that have been used in LWR fuel transport and storage, prior to their disposal.

L.1.24. A pond has operated since 1982 for the storage of AGR fuel received directly from the power stations or from the FHP (see below). Fuel is stored prior to processing, after which dismantled fuel is dispatched to Thorp Receipt and Storage in internal transit flasks.

L.1.25. 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 decanning caves where the Magnox cladding is then removed from the fuel rod, which is sent to the Magnox Reprocessing Plant for reprocessing. AGR fuel is either stored for some years or after several years it is sent to Thorp for reprocessing. Storage arrangements are carefully designed to eliminate the potential for criticality events.

L.1.26. The Thorp Receipt and Storage Pond opened in 1988 and stores fuel as a temporary store for AGR fuel and LWR fuel en route to reprocessing.

Reprocessing facilities

L.1.27. 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. It operated from 1969 to 1973, processing WAGR cooled reactor fuel, SGHWR fuel and foreign water cooled fuel.

Sellafield - the Magnox reprocessing plant

L.1.28. Commissioned in 1964, the Magnox Separation Plant is where the chemical separation of the fuel rod into its component parts takes place.

L.1.29. 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. Cladding swarf that is produced as part of the decanning of fuel is transported to another plant where it is placed into drums and encapsulated in a cement matrix.

L.1.30. Discharges of liquid and gaseous effluents are only made in conformity with authorisations under RSA93. The licensee must demonstrate that BPM has been used to minimise environmental impact.

Sellafield - Thermal Oxide Reprocessing Plant (Thorp)

L.1.31. Commissioned in 1994, the Thermal Oxide Reprocessing Plant (Thorp) at Sellafield reprocesses irradiated oxide fuel, primarily from AGR and LWR reactors. After a cooling period in the main storage pond, the fuel is monitored and dissolved in nitric acid using a batch dissolution process before solvent extraction to separate the uranium, the plutonium and the waste fission products. The insoluble stainless steel or Zircalloy cladding pieces (hulls) are removed from the fuel solution and, after monitoring for undissolved fuel, are transferred to containers for transportation to another plant for encapsulation in a cement matrix. The fuel solution 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.

L.1.32. 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 are only made in conformity with authorisations under RSA93. The licensee must demonstrate that BPM 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 31 March 2008

L.1.33. No spent fuel has been disposed of in the UK to date.

L.1.34. 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, GLEEP and Dragon fuels. The UK also holds stocks of LWR fuel owned by overseas customers.

L.1.35. A summary of the inventory follows in Table L1.1

TABLE L.1.1 - SPENT FUEL INVENTORY[1] (as of 31 March 2008)

Location		Approximate Quantity (te)
UKAEA Dounreay	Various	13[2]
Magnox Power Stations	Magnox fuel	180
Sellafield	Irradiated Magnox fuel	1200
	Irradiated AGR fuel	2800
	Irradiated LWR fuel	750[3]
	Irradiated SGHWR fuel	120
	Other fuel	350
British Energy	AGR & PWR fuel	440
Others	Various	8[4]

1. Data reported is consistent with the report Radioactive Materials not reported in the 2007 UKRWI.

2. Consists of 13te of UK owned fuel and 0.7te of overseas fuel.

3. All LWR fuel is of overseas origin.

4. Comprised mainly low irradiated Zero Energy Breeder Reactor Assembly fuel as plutonium and natural uranium oxide plates on loan to Cadarache, France.

Annex L.2. – Radioactive Waste 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 Section 2 of RSA93 as:

> *In this Act "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 materials which is defined in Section 1 of the Act.

L.2.8. Radioactive waste is defined in the draft Transfrontier Shipment of Radioactive Waste and Spent Fuel Regulations 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, radioactive waste is classified under the following broad categories, according to its heat-generating capacity and activity content:

High level wastes (HLW)

High level wastes are wastes in which temperature may rise significantly as a result of their radioactivity, so that this factor has to be taken into account in designing storage or disposal facilities.

Intermediate level wastes (ILW)

Intermediate level wastes are wastes with radioactivity levels exceeding the upper boundaries for low-level wastes, but which do not require heating to be taken into account in the design of storage or disposal facilities.

Low level wastes (LLW)

Within the UK, 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 wastes (VLLW)

Very Low Level Radioactive 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 $0.1m^3$ 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 $0.1m^3$, 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.

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 is currently undertaking a study of the possible options for the management of UK-owned civil stocks. The Government will consider the results of that exercise before reaching its own conclusions on this issue. 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.2.13. 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. The first such returns are planned for 2008.

Decommissioning

Objectives of decommissioning

L.2.14. 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

L.2.15. 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.2.16. 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.2.17. 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,
- minimise (by the use of BPM (see Section B.20)) the volumes of radioactive wastes which are created, particularly the volume of ILW.

L.2.18. 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 Section B.63).

L.2.19. 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 the BPM/ALARA principles. (see Section B.20)

L.2.20. Operators should review their strategies when changes in circumstances, including relevant Government policies, make this necessary.

Funding of decommissioning operations

L.2.21. The Government expects that all operators will take the steps necessary to ensure that their decommissioning work is adequately funded.

Regulation

L.2.22. 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.2.23. 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 Skills and Capability 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. It is expected that the NDA Skills and Capability

Strategy will be published early in the summer of 2008, outlining challenges, the need for action, progress to date and an Action Plan for future implementation.

Designing new nuclear facilities to take account of decommissioning

L.2.24. Any new facility should be designed and built so as to minimise decommissioning and associated waste management operations and costs.

Application of ALARA, ALARP and BPM in UK regulation

L.2.25. UK regulation is broadly based on the concept that risks should be as low as reasonably achievable (ALARA). This is translated into two broadly equivalent terms in various legislation: "As Low As Reasonably Practicable" (ALARP) in safety legislation and "Best Practicable Means" (BPM) (see Section B.20) in environmental legislation.

Determining that risk has been reduced ALARP

L.2.26. HSE has published 5 documents relevant to radioactive waste management and decommissioning that give guidance to industry and/or its own inspectors on how to make the judgement as to whether risks have been reduced to as low as reasonably practicable.

- 'Reducing Risks Protecting People'[128] explains the basis for HSE's 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'[129] 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'[130] defines what HSE means by good practice,
- 'Policy and Guidance on reducing risks as low as reasonably practicable in design'[131] recognises the importance of taking account of health and safety in design,
- 'Demonstration of ALARP'[132] is produced by HSE's Nuclear Directorate as guidance to its inspectors on how to apply the principle of ALARP to nuclear facilities and operations.

L.2.27. 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.2.28. However, HSE 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.2.29. 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 HSE may have accepted previously would provide a strong pointer in many situations.

Comparison of costs and risk reduction

L.2.30. 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". HSE 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.2.31. 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.

L.2.32. This might arise where large numbers of people are killed at one time (which is called "societal risk"), where potential victims are particularly vulnerable (such as children), or where the nature of the risks inspire dread (such as long-term or irreversible effects).

L.2.33. The judgment as to whether measures are grossly disproportionate should reflect societal risk, that is to say, large numbers of people (employees or the public) being killed at one go. This is because society has a greater aversion to an accident killing 10 people than to 10 accidents killing one person each.

Transfer of risks

L.2.34. Introduction of a health and safety measure to control a hazard may transfer risk to other employees or members of the public. If the transferred risk arises from the *same* hazard, then it should be offset against the benefit from the measure under consideration. For example, the introduction of mechanical exhaust ventilation may transfer the risk from the same hazard (fumes) from the employee to the general public as the fumes are pumped outside the workplace. The added risk to the public should be offset against the benefits the measure otherwise brings to employees.

L.2.35. If the transferred risk arises from a *different* hazard, it should be treated as a separate matter for which control measures must be introduced to reduce its risk ALARP. For example, providing scaffold fans to protect members of the public from being struck by objects dropped from the scaffold will transfer some of the risk from the public to the scaffolders involved in erecting the fans. Since a different hazard is involved (i.e. scaffolders falling from a height), the fans should be provided to reduce the risks to the public ALARP, but at the same time, the duty holder must ensure that the risks of the scaffolders' working methods are reduced ALARP. However, if the risks from the health and safety measure to be introduced (in this example, scaffolding fans) when properly controlled are still greater than the risks which it is sought to prevent (injury to members of the public) when properly controlled, the measure should not be introduced.

Good practice

L.2.36. The determination of control measures forms part of the statutory risk assessment duty-holders are required to undertake. Such assessments involve duty-holders identifying the hazards in their workplace, determining who might be harmed and how; evaluating the risk from the hazards and deciding whether the existing control measures are sufficient or whether more should be done.

L.2.37. In reality, there is often only a limited number of options for dealing with a particular health and safety issue and the optimum option is in many cases likely to have been already established as relevant good practice. Duty-holders should use good practice that is appropriate to their activities, relevant to the risks from their undertaking, and covering all the risks from that undertaking.

L.2.38. A universal practice in the industry may not necessarily be good practice or reduce risks ALARP. Duty holders should not assume that it is. HSE keeps its acceptance of good practice under review since it may cease to be relevant with the passage of time; new legislation may make it no longer acceptable; new technology may make a higher standard 'reasonably practicable'. Similarly HSE expects duty-holders to keep relevant good practice under review.

L.2.39. Probably the majority of judgements made by HSE involves it in comparing duty-holders' actual or proposed practice against 'relevant good practice'. Relevant good practice provides duty-holders with generic advice for controlling the risk from a hazard. In so far as they can adopt relevant good practice, this relieves duty-holders of the need (but not the legal duty) to take explicit account of individual risk, costs, technical feasibility and the acceptability of residual risk, since these will also have been considered when the good practice was established.

L.2.40. In practice therefore, explicit evaluations of risk rarely need to be made in relation to day-to-day hazards. However, duty-holders have to make them where there is no relevant good practice establishing clearly what control measures are required.

L.2.41. The guidance outlined above should be used in conjunction with the philosophy given in the HSE document 'Tolerability of Risk' (TOR) which is addressed further in Annex L.8 and HSE's Safety Assessment Principles (SAPs) which are addressed in Annex L.9.

Waste management - HSE and environment agencies' joint guidance

L.2.42. On December 2007, HSE and the environment agencies published Part 1 of joint guidance on management of higher activity wastes on nuclear licensed sites[33, 34]. The guidance applies to the whole process of managing radioactive waste from its generation to (but not including) its disposal. The objective of Part I of this guidance is to explain the regulatory process associated with the management of higher-activity radioactive waste on nuclear licensed sites in the UK. Part II, which provides more detailed technical guidance to site licensees, will be published as a series of modules over 2008 – 2009.

L.2.43. 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.2.44. 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;

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

L.2.45. The joint guidance complements HSE's existing guidance to inspectors on nuclear safety cases and radioactive waste management[35,36].

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.2.46. The waste treatment and conditioning facilities at Sellafield comprise:

Waste Management and Compaction (WAMAC)

L.2.47. 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 low level waste repository. There it is grouted and placed in a shallow disposal vault.

Waste Treatment Complex (WTC)

L.2.48. This plant processes Plutonium Contaminated Material (PCM), both 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.2.49. This plant receives the cladding material de-canned from metal 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.2.50. 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 by in-drum mixing with cement powder. They are metered into similar drums but fitted with an integral paddle. The cement powder is added to the slurry in the drum, which is then intimately mixed to produce the waste form.

Waste Processing and Encapsulation Plant (WPEP)

L.2.51. 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.2.52. 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

Box Encapsulation Plant for miscellaneous ILW solids.

Engineered storage for conditioned wastes

L.2.53. 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.2.54. In April 2007, there were 10,500 m^3 of fuel element cladding, 5,600 m^3 of solids from liquid effluent treatment, 800m^3 of encapsulated PCM, 800m^3 of barium carbonate and centrifuge cake, and 650m^3 of vitrified HLW in engineered storage at Sellafield.

Interim PCM drum storage, raw waste

L.2.55. 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 then store it in the engineered drum stores described above.

L.2.56. In April 2007 there were 12,800m^3 of unconditioned PCM in storage at Sellafield.

Ponds (excluding fuel storage)

L.2.57. 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.2.58. In April 2007 there were 1600 m^3 of fuel sludges.

L.2.59. The legacy ponds and silos (see below) are the subject to regulatory requirement to remove wastes by specified times.

ILW silos

L.2.60. 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.2.61. In April 2007 there were 13,100m^3 of fuel element cladding and items too contaminated for LLW.

L.2.62. The legacy ponds (see above) and silos are the subject to regulatory requirement to remove wastes by specified times.

ILW tanks

L.2.63. 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.2.64. In April 2007 there were 7,900m^3 of solids from liquid effluent treatment.

Miscellaneous stores

L.2.65. There are a number of storage locations around the site not fitting into any of the above categories. The wastes include HAL waste, used fuel assembly components, filters and miscellaneous scrap.

L.2.66. In April 2007 there were 1,100m^3 of HAL waste, 10,700m^3 of fuel assembly components and items too contaminated for LLW.

Windscale

L.2.67. The main waste management facilities at Windscale are:

Active Handling Building

L.2.68. The Active Handling Building remains an operational PIE facility for nuclear reactor fuel which is also used for treatment and packaging of LLW and ILW, and the handling of redundant sources.

Windscale Advanced Gas-cooled Reactor (WAGR) Packaging Plant

L.2.69. The packaging plant is a shielded facility built onto the bioshield of WAGR. Its function is to assay and sentence waste (both ILW and LLW) from decommissioning of WAGR into shielded boxes. The waste is grouted within a box and then concrete poured to cast the box lid.

WAGR Box Store

L.2.70. This 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.

Contaminated ground and groundwater

L.2.71. 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.

Management of solid wastes, liquid and aerial effluents

L.2.72. During the years 2005 to 2007, the Environment Agency carried out comprehensive audits of Sellafield's management of solid wastes, and of liquid and aerial effluents (see Section A.3).

Management of HA liquid wastes and vitrification

L.2.73. 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: oxide fuel reprocessing at Thorp is having to be constrained, resulting in the timetable reported in Section L.1. Sellafield Ltd continues to operate its vitrification plant, WVP, with the aim of meeting the specifications placed by the HSE for the HAL stocks (see Section A.2).

Magnox Power Stations (Operational and Decommissioning)

L.2.74. Across the Magnox sites the principal waste storage facilities are as follows:

- Underground vaults;
- Above-ground vaults;
- Reactor voids;
- Tanks.

L.2.75. The wastes stored in these facilities are of four general types:

- Chemically reactive, i.e. Magnox debris.
- Wet wastes, such as sludges and resins, which are stored in tanks or in lined vaults.
- Miscellaneous wastes, which are potentially mobile if wetted e.g. activated or contaminated components.
- Desiccants, previously used to minimise moisture within the reactor coolant gas.

L.2.76. 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.2.77. The waste treatment and conditioning facilities at Dounreay comprise:

Dounreay Cementation Plant for Immobilisation of ILW Liquors

L.2.78. 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.

Dounreay Wet Silo

L.2.79. 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.2.80. 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, both into 500 litre drums for long term interim storage and future disposal.

Low-Level Liquid Effluent Treatment Plant

L.2.81. 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. No pH adjustment has been necessary. Filtration of the liquid waste was required by SEPA rather than simple settlement.

Low-Level Waste Receipt Assay and Characterisation and Supercompaction Facility

L.2.82. This facility is used for assaying and volume reduction of 200 litres 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.2.83. 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.2.84. Currently used for storing arisings of PCM, Uranium Contaminated Material and Thorium Contaminated Material waste collectively known as contact-handled ILW (CHILW).

Combined Conditioned ILW 500 litre Drum Store and Raw Solid RHILW 200 litre Drum Store

L.2.85. Used for storing immobilised MTR liquors and historic arisings of solid RHILW.

Interim Storage of Containerised LLW

L.2.86. 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.

Outdoor Storage of LLW

L.2.87. Certain items of LLW are stored in the open, pending size reduction and decontamination.

Liquid ILW Storage Facility

L.2.88. Provides tank storage for liquors from MTR, DFR and the PFR fuel reprocessing.

Solvents and Oil Storage Facility

L.2.89. This facility includes tanks holding ILW Contaminated Solvent resulting from PFR fuel reprocessing and Bulk Storage Containers for low-level contaminated oils.

Harwell

L.2.90. The key waste management facilities at Harwell are:

Solid Waste Complex

L.2.91. 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.2.92. This facility was previously used for post-irradiation examination work and consists of two concrete cell lines currently used for segregation, size reduction and treatment of RHILW before it is packaged in the Solid Waste Complex.

Radiochemical Building

L.2.93. 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 RHILW requiring additional treatment before it is packaged in the Solid Waste Complex.

Liquid Effluent Treatment Plant

L.2.94. 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.

Winfrith

L.2.95. The key waste management facilities at Winfrith are the :

Winfrith East Treatment Plant

L.2.96. This plant processes and encapsulates sludges into 500 litre disposal drums for long term storage on site. These sludges are LLW, but are not acceptable for disposal at the LLWR and have to be managed as ILW.

Treated Radioactive Waste Store

L.2.97. This store is a shielded engineered store providing long-term storage for the encapsulated waste in 500 litre drums from the Winfrith East Treatment Plant.

British Energy Generation Ltd (BEGL)

L.2.98. Across BEGL 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.2.99. The wastes on BEGL 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 coolant circuit 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 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 Environment Agency) or store it on site alongside the other encapsulated wastes.

GE Healthcare

L.2.100. GE Healthcare (formally Amersham) has process and laboratory wastes stored at both its Amersham and Cardiff sites. Its management strategy for these wastes is storage and decay (including sorting and re-categorisation of the LLW component), followed by conditioning and long-term storage prior to a disposal route becoming available.

L.2.101. The storage facilities at both Amersham and Cardiff meet current standards, their construction being completed in 1997. They both store ILW in 500 litre stainless steel drums, and have a storage capacity in excess of 40 years worth of arisings.

L.2.102. GE Healthcare has about 800 cubic meters of waste in sea dump drums stored at Harwell. Sorting and re-categorisation of part of it as LLW for disposal at the LLWR have reduced the volume of such waste. This work will continue, and it is estimated that the volume of waste for long-term storage will be reduced to about 120 cubic meters, which will be accommodated within the facilities above.

Other Sites

L.2.103. Licensed sites other than those covered in this report do not hold any appreciable volumes of ILW.

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.

Sellafield

Facility	Date of closure	State of decommissioning
First reprocessing plant	1973	In progress
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 defuelled until 2013.
Solid waste store	c.1970s	Material being recovered and repacked for modern stores.
Pile chimneys	1957	One removed
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

In addition to the above decommissioning projects, a number of the legacy ponds and silos at Sellafield are subject to projects to retrieve the wastes stored in them and condition these wastes for storage pending disposal. This is discussed elsewhere in this section.

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 being removed from the RHILW store in preparation for decommissioning.
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. Plant under construction for removal of the Breeder material within the reactor core.
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 1 decommissioning completed and Stage 2 nearing completion prior to Stage 3 demolition.
Post Irradiated Examination (PIE) facility	Part operational	Stage 1 decommissioning completed on redundant cells and now in care and maintenance.
Plutonium-handling building	1963	Decommissioning, essentially to Stage 2, completed in 1993/4. Currently undergoing Stage 3 decommissioning.
Shaft & 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.

Facility	Date of closure	State of decommissioning
MTR Fuel Fabrication Facility		Stage 3 decommissioning completed.
Uranium Processing facility		Redundant areas undergoing Stage 1 and Stage 2 decommissioning. Preparations in hand to commence Stage 1 decommissioning of the remaining plant.
LLW treatment plant		Stage 2 decommissioning being progressed.

Harwell

Facility	Date of Closure	State of decommissioning
Low energy, graphite reactor.	1990	Reactor fully decommissioned. Graphite core currently being incinerated.
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	Redundant areas are being cleared and decontaminated for re-use.	Clearance of redundant laboratory areas and shielded cells is in progress. Decommissioning of redundant glove boxes is complete. Facility to be operated until 2010 and then transitioned into care and maintenance.
PIE concrete-shielded cells.	Operational	Stage 1 decommissioning complete. Facility has returned to operational mode until 2009 for dismantling and repacking of a range of waste items, and then will be put into care and maintenance.
PIE lead-shielded cells.	Progressive closure completed in 1995.	Stage 2 decommissioning complete. Facility now in care and maintenance.

Windscale

Facility	Date of Closure	State of decommissioning
Air-cooled, graphite reactor	1957	Work in progress on Pile 1 to remove fuel and isotopes from the fire-damaged area of the reactor core.
Air-cooled, graphite reactor	1957	Pile 2 is currently in care and maintenance.
Windscale Advanced Gas-cooled reactor (WAGR)	1982	Stage 2 decommissioning in progress. Reactor core removed and pressure vessel largely removed.
Fuel examination facility	1995	Stage 1 decommissioning complete. Currently preparing to remove the remaining ILW inventory prior to commencing Stage 2 decommissioning.
Lead shielded cells, used for PIE of fuel	Part operational	Redundant facilities decommissioned to Stage 1. Decommissioning safety case produced and a review of decommissioning strategy is being undertaken.

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	All above ground structures demolished and the base slab is in the final phase of remediation.

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 closure	State of decommissioning
Berkeley	1989	Defuelled by 1992 - all fuel removed to Sellafield for reprocessing. The majority of conventional plant has been dismantled, much of the materials have been released for recycling and buildings demolished. Fuelling machinery has been dismantled and disposed of. Most reactor ancillary systems have been deplanted. The 16 boilers have been disconnected from the reactors, the primary circuit gas ducts removed. 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.
Trawsfynydd	1993	Defuelled by 1996, - all fuel removed to Sellafield for reprocessing. Conventional plant is being dismantled and disposed of. 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 with the scabbling of the ponds lanes commencing last year. Accumulated operational wastes are being retrieved, processed and packaged in accordance with NIREX recommendations ready for final disposal. 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. 40% of the boiler sections have now been deplanted. It is planned to begin construction on internal Capping Roofs this year as a precursor to the Height Reduction project.
Hunterston A	1990	All fuel has been removed and despatched to Sellafield for reprocessing. The turbine hall has been demolished. 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.

		Sludge classed as LLW post treatment has been removed from concrete tank containments and disposed of. The empty tanks await final decontamination and decommissioning. A new decontamination facility has been constructed in which low-level decommissioning wastes will be treated. Facilities are being developed in which to retrieve and package intermediate level wastes, including sludge, fuel element debris and activated components. The fuel cooling pond remains filled with water. A processing facility has been installed to remove the radioactive materials from the pond water prior to discharge. Approximately 20% of the aluminium skips have been removed and treated to render them LLW for disposal. A programme of works is currently under way to demonstrate the decontamination and de-planting of the pond.
Chapelcross	2004	Significant modifications to the fuel route have been carried out on all four reactors. De-fuelling will commence soon. Redundant cooling towers were blown down by explosive demolition during 2007. Hazard reduction activities are focussing on removal of asbestos lagging from the 16 heat exchangers on the Reactors and within the Turbine Hall.
Bradwell	2002	Defuelled 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.
Hinkley Point A	2000	Defuelled and in decommissioning
Calder Hall	2003	Currently preparing for defuelling (see Section A.3.5)
Dungeness A	2006	Currently undergoing defuelling (see Section A.3.7)
Sizewell A	2006	Currently undergoing defuelling (see Section A.3.8)

NDA sites all have a number of spent fuel and waste management facilities in the process of being decommissioned.

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;

A summary of the 2007 UKRWI is in Tables L.2.1 to L.2.3.

Table L.2.1 - Radioactive Wastes from all sources in stocks from 2007 inventory

Packaged and not yet packaged volumes (m³)

Waste type	At 1.4.2007	Volume (m^3)
HLW	**Total**	**1,937**
	Packaged	847
	Unpackaged	1,090
ILW	**Total**	**101,000** (1)
	Packaged	29,000
	Unpackaged	71,500
LLW	**Total**	**236,000** (2)
	Packaged	200,000
	Unpackaged	36,300

Source: 2007 UK Radioactive Waste Inventory[18]

Table L.2.2: Expected total waste volumes from existing facilities to end of life - Volumes when packaged

Waste type	At 1.4.2007	Future arisings (m^3)	Total (m^3)
HLW	1,270	150	1,420
ILW	134,000	230,000	364,000 (1)
LLW	241,000	3,230,000	3,470,000 (2)
Total	**377,000**	**3,460,000**	**3,830,000**

(1) Can be categorised as 11,700m^3 of LILW-SL and 364,000m^3 of LILW-LL.

(2) Can be categorised as 608,000m^3 of LILW-SL and 2,850,000m^3 of LILW-LL.

Source: 2007 UK Radioactive Waste Inventory[18]

Table L.2.3: Annual disposals of LLW (2002-2006) (1)

Year	Total volume (m^3)
2002	10,800
2003	11,400
2004	12,900
2005	12,800
2006	12,900

(1) Total volume of waste packages disposed of at the LLWR

Annex L.3. – HSE's Powers under a Nuclear Site Licence

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 HSE 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 HSE so specifies, the licensee is required to submit the arrangements and cannot carry them out until HSE has given its approval. Once approved, the procedures cannot be changed without HSE'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, HSE has approved operating rules important to safety in order to ensure that licensees cannot change these without seeking HSE's agreement to the change.

Direction - A Direction is issued by HSE when it requires the licensee to take a particular action. For example, LC31(1) gives HSE 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 HSE 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 HSE. Hence, the licensee submits a safety case justifying the modification and does not proceed until HSE has written agreeing to the proposal.

Notification - The standard licence gives HSE 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 HSE, submit a safety case and not commence operation of the relevant plant or process without the consent of HSE.

Specification - The standard licence gives HSE discretionary controls with regard to a licensee's arrangements and these are implemented through Specifications. For example, in LC23(2), if HSE 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 HSE 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, HSE 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.

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 the HSWA74. 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)

(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 the Radioactive Substances Act 1993."

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 Sections 13 and 16 of the Radioactive Substances Act 1993[32], 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 RSA93.

(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 which 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 Business, Enterprise and Regulatory Reform.

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 second UK report (i.e. in a way that has implications for the Joint Convention obligations), except the minor change in LC3 below.

1: Interpretation

The purpose of Licence Condition (LC) 1 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 the Executive.

For sites operated under contract to the NDA, LC3 has been modified to reflect the site's ownership by the 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 the Executive; 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 the Executive.

[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 the Executive 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 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.

(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 the Executive 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 the Executive 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 Condition 1 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 the Executive, 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. The Executive 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 the Executive 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.

The purpose of LC33 is to give discretionary powers to the Executive to direct that radioactive waste be disposed of in a specified manner. This is related to the powers available to the EA in England and Wales and SEPA in Scotland under RSA93, s. 13.

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 with disposal authorisation granted under the Radioactive Substances Act 1960 or, as the case may be, the Radioactive Substances Act 1993.

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 the Executive 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 the Executive to direct that any proposed change in its organisational structure or resources should be halted and not recommenced without the consent of HSE.

Annex L.7. - Regulatory Organisations

L.7.1. In this Annex, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the second UK report (i.e. in a way that has implications for the Joint Convention obligations).

L.7.2. 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

Health and Safety Executive

(i) Mandate and Duties

Nuclear Installations Inspectorate (NII)

L.7.3. The original Nuclear Installations Act, enacted in 1959, set up the Nuclear Installations Inspectorate (NII), then called the Inspectorate of Nuclear Installations, in 1960. The 1959 Act was subsequently replaced by NIA65 that, though amended in some details, retains essentially the same regulatory powers. In 1975, NII was incorporated into HSE and now forms part of HSE's Nuclear Directorate (ND). Those parts of NIA65 relating to licensing became relevant statutory provisions of HSWA74.

L.7.4. NII operates the nuclear site licensing system under NIA65 on behalf of HSE. NII grants licences to corporate bodies to install or operate nuclear installation on a particular site. NII, on behalf of HSE, may attach to a nuclear site licence such conditions as appear necessary or desirable in the interest of safety, or such conditions as it may think fit with respect to the handling, treatment and disposal of nuclear matter.

L.7.5. HSE's Nuclear Directorate is organised into six Divisions.

- Divisions 1-3 are the main operational Divisions which carry out the day-to-day regulation, and each has the inspection, technical and administrative resources relevant to their dealings with a particular licensee or group of licensees. They employ specialists in such areas as civil engineering, human factors, structural integrity, health physics, radioactive waste management, decommissioning, management of safety, as well as electrical, mechanical and chemical engineering. Division 2 includes the UK Safeguards Office, which oversees the application of nuclear safeguards in the UK to ensure that the UK complies with its international safeguards obligations.
- Division 4 is responsible for nuclear operational strategy; planning, performance and finance; communications and stakeholder engagement; and the Director's administrative support system.
- Division 5, ND's Office for Civil Nuclear Security (OCNS), is the security regulator for the UK's civil nuclear industry, responsible for approving security arrangements within the industry and enforcing compliance.
- Division 6, formed in July 2007, is responsible for dealing with ND's Generic Design Assessment of potential new nuclear power reactors and nuclear safety research.

L.7.6. Each Division also has administrative support.

(iii) Financial resources

L.7.7. ND is funded through HSE, which is a "Non-Departmental Public Body", sponsored in Parliament by the Department for Work and Pensions (DWP). HSE is funded by Parliament, through grant-in-aid. NIA65 requires HSE to recover its 'expenses' for regulatory work in support of the licensing regime from the nuclear licensees. HSE is required to operate a gross accounting arrangement, and receipts from charges are treated as appropriation-in-aid. Parliament, through the Spending Review, sets the overall level of HSE's expenditure and therefore its receipts.

L.7.8. The principal charges applied to nuclear licensees fall under the provisions of the NIA65. ND determines the exact amount to be recovered, in total, from the licensees and then, on the basis of the amount of regulatory effort each has consumed, apportions charges to each licensee. For example, if a licensee consumes 10% of the NII's effort, it will be charged 10% of ND's expenses.

L.7.9. These charges are not for the provision of a "service" to the licensee; they are analogous to taxation. HSE also applies a Levy to the major nuclear licensees, in order to recover its expenses applied to the Nuclear Safety Research Programme.

L.7.10. In 2007/08, ND's total expenditure forecast is £24.5 million, of which NII's expenditure forecast is £21 million (excluding central HSE overheads).

(iv) Human Resources

L.7.11. For the efficient and effective delivery of its work, NII relies upon qualified and well-trained staff from within ND and from other parts of HSE; also upon external sources of expert support and the results of research, and information exchange with other countries.

L.7.12. On 30 May 2008, ND employed 314 staff. This includes 157 nuclear inspectors who are in post and an additional 8 who are being trained and developed to become Nuclear Installations Inspectors. This figure also includes 31 OCNS and 5 Safeguards staff. The majority of staff are based at Bootle in Merseyside, OCNS has offices at Harwell and Safeguards is based in London. It is recognised that this is significantly less nuclear safety inspectors than current predictions for future workloads require. HSE and the UK Government are actively engaged in measures to address this shortfall.

(v) Inspectors' Qualifications

L.7.13. All ND nuclear inspectors are technically qualified, educated to degree level and have at least 5-7 years experience in a responsible position in industry, normally nuclear but exceptionally other high-hazard industries. Most are members of recognised professional institutions. They carry out site inspection or specialist/safety case assessment roles, delivering the regulatory functions required by the HSWA74 and nuclear legislation.

(vi) Inspectors' training

L.7.14. All new ND staff receives a range of induction training. For inspectors this includes, within 12-18 months of their appointment, specific training to develop the skills and attitudes necessary to become an effective regulator. Linked activity includes several mandatory courses. For example:

- some modules of a Diploma in Occupational Health and Safety;
- familiarisation with IRR99;
- an introduction to health and safety law, relevant nuclear regulation and nuclear licence compliance;
- understanding the assessment of safety cases;
- awareness of radiological protection; and,

- awareness of personal safety on site.

L.7.15. In addition to the mandatory courses identified above, all new inspectors receive on-the-job support. Many shadow experienced staff to benefit from the practical guidance that they can offer. Examples include participating in emergency exercises and being part of team inspections at nuclear sites.

L.7.16. Once through the 12–18 month induction period, Continuous Professional Development provides for the on-going training and development of ND staff - especially for the technical training of nuclear safety regulators. Opportunities are provided to help regulatory staff develop in their discipline or specialist area or to acquire new skills after a change of duties. For example, ND runs its own Site Inspection Course for all regulators new to, or returning to, site inspection duties, and arranges for full-scale reactor simulator training to refresh the skills of reactor inspectors and assessors. Inspectors can also attend externally organised courses/ conferences, both in the UK and abroad. Such events are usually designed to keep delegates abreast of the latest technological developments and ways of working in the nuclear and other high-hazard industries. A range of non-technical training is also provided for management and personal development; examples include leadership training, effective management, team working, effective communication, and stress awareness workshops.

L.7.17. As a further strand of Continuous Professional Development, each year there is a strategic overview of staffing, and positioning of expertise, in relation to delivery of the short-medium term business objectives. This is known as the Career Development Review process. Its aim is to ensure that ND continues to have the right expertise, in the right place, at the right time to enable it to sustain delivery of its mission, and wherever possible, to achieve this whilst meeting individuals' development goals.

L.7.18. ND senior management also review the Training and Development Plan each year in order to monitor the impact that ND's investment in training and development is having on the delivery of ND's business. On average, the training and development budget runs at around £250k per annum for the direct cost of off-job training activity, and when on-job activity is added, the total cost is about £750k per annum, with a significant proportion invested in the technical training and development of inspectors.

Technical support

L.7.19. The 'expenses' recovered from licensees include the two major cost streams of expenditure associated with the NII's own operational activity (payroll, travel and subsistence, training and other staff-related costs) and the costs of Nuclear Safety Studies (which enables NII to buy-in technical and scientific support in support of the regulatory function).

Environmental Regulation

Environment Agency

(i) Mandate and Duties

L.7.20. The Environment Agency was created by the Environment Act 1995 (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 the Defra and the Welsh Assembly Government (WAG). 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.7.21. 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 EA'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 WAG. The Board delegates the EA's day-to-day management to its Chief Executive and staff.

L.7.22. For most of its activities, the Environment Agency has broken down its work between 8 geographical regions. In each region, 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. There is also an advisory committee for Wales.

L.7.23. 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.7.24. Following a reorganisation in mid-2002, the Environment Agency has established two specialist groups (North and South) to carry out the regulation of radioactive waste disposals, including discharges of liquid and gaseous wastes on and off nuclear licensed sites and radioactive waste management on other sites. 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. The national groups, working within the Environment Agency's head office, include the Radioactive Substances Regulation Policy and Process Group, and the group responsible for checking, monitoring and assessment of discharges to the environment. 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 Heritage Service for Northern Ireland in a report entitled 'Radioactivity in Food and the Environment' (RIFE). The latest results published are from the 2006 environmental monitoring programme.

(iii) Financial resources

L.7.25. The Environment Agency has a total budget of over £1000 million, over half of which is spent on flood defence and, in 2006/07, £311 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. 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 regulatory work and monitoring activities in financial year 2006/2007 were approximately £8.6 million.

(iv) Human resources

L.7.27. The Environment Agency has a total of over 13,000 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 20 technical staff.

(v) Inspectors' qualifications

L.7.28. 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.7.29. 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.7.30. 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.7.31. 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.7.32. SEPA was established up by EA95 to provide environmental protection and improvement in Scotland. Powers under RSA 93 are devolved to the Scottish Government. SEPA is a 'non-departmental public body' whose main source of funding is from Grant in Aid provided by the Scottish Government.

L.7.33. 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.7.34. SEPA's main aim is to provide an efficient and integrated environmental protection system for Scotland which will both improve the environment and contribute to the Scottish Ministers' goal of sustainable development.

L.7.35. 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.7.36. 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.7.37. 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 the Environment and Heritage Service for Northern Ireland in a report entitled

'Radioactivity in Food and the Environment' (RIFE). The latest results published are from the 2006 environmental monitoring programme.

(ii) Structure

L.7.38. Members of SEPA's Main Board are appointed by the Scottish Ministers, and comprise a Chairman, a Deputy Chairman and ten members, including the Chief Executive. 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 against agreed objectives and targets;

(c) Ensuring that SEPA operates sound environmental policies in relation to its own operations; and

(d) Ensuring that high standards of corporate governance are observed at all times.

L.7.39. SEPA also has three Regional Boards, reflecting its regional structure, each chaired by a member of the main Board. A Regional Board's general responsibilities include advising on the development of the business plans for the region, the generation and implementation of local initiatives for the environment, and advising on applications that have major effects on the local area.

L.7.40. SEPA has two specialist teams dealing with the radioactive waste disposals from nuclear sites in Scotland. The Environmental Protection and Improvement Unit covers the day-to-day regulatory activities such as issuing authorisations, inspection, enforcement etc. The Policy Unit covers more strategic matters such as liaison with Government or other bodies, 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 30 technical staff dealing with radioactive substances, the majority of whom have some involvement in matters relating to nuclear sites.

(iii) Financial resources

L.7.41. 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.7.42. In the financial year 2008/09, SEPA's grant-in-aid from the Scottish Government will be £48.4 million and the total budget is £83.4 million. 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 are updated annually by 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 Minister before SEPA can implement them.

(iv) Human resources

L.7.43. SEPA has approximately 1300 staff, around 25 of whom are involved directly in nuclear site regulation.

(v) Inspectors' qualifications

L.7.44. Nuclear regulatory staff recruited by the Agency are required to have a degree in a relevant discipline.

(vi) Inspectors' training

L.7.45. SEPA 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.7.46. 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, or move into a specialist area.

L.7.47. 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. - Extracts from HSE's 'Tolerability of Risk' (TOR)

L.8.1. HSE's 'Tolerability of Risk' (TOR)[133] gives guidelines on the tolerable levels of individual and societal risks to workers and the public from nuclear installations for both normal and accident situations. It puts forward the concept that risk can be divided into three regions on the TOR diagram (Figure L.8.1): an unacceptable region; the ALARP region; and a broadly acceptable region.

L.8.2. In the **unacceptable risk region,** arguments of reasonably practicability cease to be acceptable. In essence, risks in this region cannot be justified except in extraordinary circumstances. The maximum tolerable risk to workers should not exceed 1 in 10^3 each year. The maximum tolerable risk to any member of the public from any large industrial plant should not exceed 1 in 10^4 each year, but with a benchmark figure for any new nuclear installation of 1 in 10^5 each year. For accidental risks, the risks for both normal operation and accidents taken together, then the risk for most people in the vicinity of a nuclear installation would be at or near 1 in 10^6 each year. For societal risk, the tolerable risk is linked to the number of persons affected and a figure of around 1 considerable accident per 10,000 years from any one of a programme of nuclear installations would be just tolerable, bearing in mind the complications of what constitutes the programme.

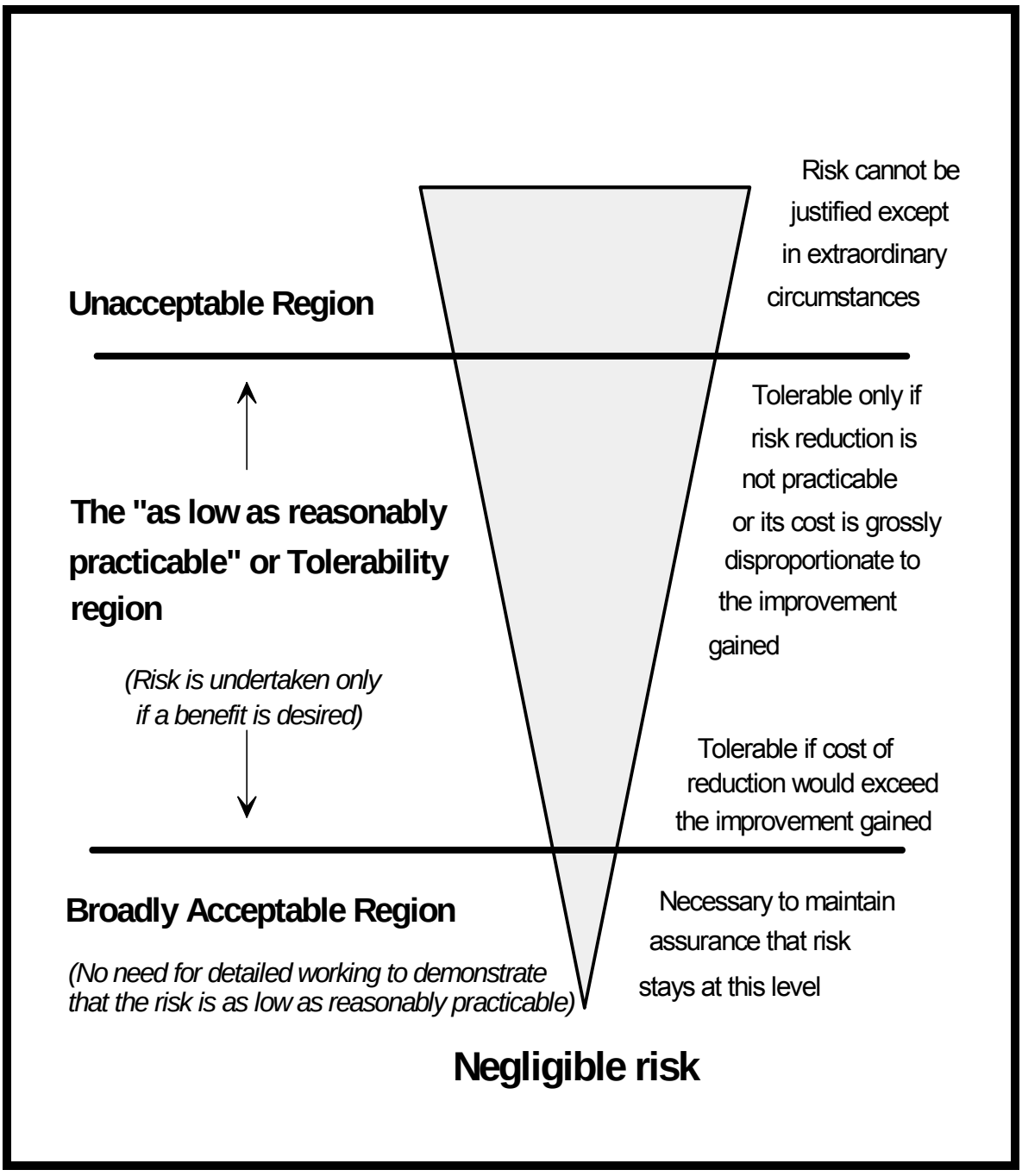
L.8.3. In the **ALARP (or tolerable) region,** licensees are required to do what they reasonably can to reduce risks, until the cost of doing so more than outweighs any benefit likely to be gained. The risks should be weighed against the costs of reducing them; measures must be taken to reduce or eliminate the risks, unless the cost of doing so would be obviously unreasonable compared to the risks.

L.8.4. In the **broadly acceptable region**, risks are low and so insignificant that they need not claim attention. Although the legal duty of ALARP still applies, the regulator need not ask employers and licensees (in the case of nuclear licensed sites) to seek further improvement, provided that it is satisfied that the low levels of risk will be attained in practice, and maintained.

L.8.5. Risks must always be balanced against the benefits arising from the activity.

L.8.6. These concepts of 'unacceptable', 'tolerable' and 'broadly acceptable' levels of risk are embedded in the SAPs (see Annex L.9). The SAPs are written as guidance for HSE's nuclear inspectors to use when carrying out assessment but they are also available to licensees and the public. They do not place mandatory requirements on licensees, although a few include figures that reflect statutory limits. If a proposed plant design can be shown to satisfy the principles, licensing is generally straightforward. On the other hand, the non-mandatory nature of the SAPs gives the UK's licensing approach a flexibility which would enable the UK, for instance, to consider licensing nuclear installations built to non-UK standards, despite apparent differences in the wording of those standards and the HSE's SAPs.

Figure L.8.1: Tolerability of Risk



Annex L.9. - HSE's 'Safety Assessment Principles' (SAPs)

L.9.1. In this Annex, compliance with the Joint Convention is demonstrated in a way that has substantially changed since the second UK report (i.e. in a way that has implications for the Joint Convention obligations).

Background

L.9.2. HSE inspectors use these Safety Assessment Principles (SAPs)[30], together with the supporting TAGs[134], 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 these SAPs should be seen in that context.

L.9.3. 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, revised in 1992) was produced in response[133] 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.9.4. 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.9.5. 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.9.6. 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. HSE agrees with this need for periodic review. This 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 newly-revised SAPs.

L.9.7. HSE 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.9.8. 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. This new 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.9.9. 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)[126]. 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 HSE has further developed its thinking in this area.

L.9.10. Since the previous edition of the SAPs in 1992, HSE 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 will become a more integrated suite of guidance.

L.9.11. In summary, therefore, this 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 (DNSR);
d) clarified for the assessment of safety cases, and now includes safety management systems; and
e) updated to be consistent with HSE's thinking on societal risk.

L.9.12. In reviewing and revising these principles, HSE has taken into account the technical interests and views of others through inviting comment on specific technical topic areas, and wider issues. However, the final decision on the content has been HSE's.

Introduction

The purpose of the Safety Assessment Principles

L.9.13. 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 HSE, or used to justify the adequacy of safety at the licensees' plants.

L.9.14. 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.9.15. The SAPs provide HSE inspectors with a framework for making consistent regulatory judgements on nuclear safety cases. The principles are supported by TAGs, and other guidance, to further assist decision making by the nuclear safety regulatory process[134]. 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 where guidance refers to legal requirements, those legal requirements take clear precedence.

SFAIRP, ALARP and ALARA

L.9.16. The 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 HSE makes between those 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. HSE 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, HSE may choose to concentrate solely on the consequences, that is, concerned only with the hazard.

L.9.17. 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.9.18. In applying the TOR framework, the term 'as low as reasonably practicable' (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 the phrase 'as low as reasonably achievable' (ALARA) used by other bodies nationally and internationally.

L.9.19. The SAPs assist 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.9.20. 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 reflect specific statutory limits that must be met.

L.9.21. 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. HSE inspectors need to apply judgement on the adequacy of a safety case in accordance with HSE guidance on ALARP[127].

L.9.22. 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.9.23. 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 HSE inspectors that the costs of any further measures would be grossly disproportionate to the risks their adoption would reduce.

L.9.24. 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.9.25. The SAPs contain principles and guidance. The principles form the underlying basis for regulatory judgements made by HSE 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.9.26. 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.9.27. The Management Regulations and their Approved Code of Practice[135] 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[47] 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.9.28. 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 the Management Regulations. They must, among other things, be suitable and sufficient for the purpose of identifying all measures to control the risk.

L.9.29. 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.9.30. 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.9.31. The SAPs are for regulatory assessment throughout the life-cycle of an activity on a nuclear licenced 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.9.32. One of the aims of the SAPs is the safety assessment of new (proposed) nuclear facilities. They represent HSE's view of good practice and we would expect modern facilities to have no difficulty in satisfying their overall intent.

Facilities built to earlier standards

L.9.33. 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.9.34. 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.

L.9.35. 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.9.36. 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.9.37. 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.9.38. 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.9.39. 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.9.40. The principles are written bearing in mind the content of safety cases likely to be submitted to HSE. 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 HSE 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.9.41. 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.
- 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 REPPIR.
- Radioactive waste management.
- Decommissioning.
- Control and remediation of radioactively contaminated land.

Annex L.10 - Emergency Arrangements

L.10.1. In this Annex, compliance with the Joint Convention is demonstrated in a way that has not substantially changed since the second UK report (i.e. in a way that has implications for the Joint Convention obligations).

L.10.2. The Nuclear Emergency Planning Liaison Group (NEPLG), see under Article 25, has issued consolidated guidance[106] 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 for an emergency in the nuclear industry by NEPLG and its constituent organisations. The following paragraphs summarise the structure of the document, and the scope of the information that it provides in each of its chapters.

Emergency plans

L.10.3. This chapter gives guidance on the formulation of emergency plans. It covers the scope and objectives of planning and identifies the key elements that should be included.

Roles and responsibilities of responding organisations

L.10.4. This chapter identifies the all organisations that will need to play some part in responding to an emergency. It addresses the roles and responsibilities of each participating organisation and identifies other organisations with which it must interface. Where necessary, the legal obligations, with respect to emergency response, of participating organisations are identified. The organisations include:

- Police
- Fire and Rescue Service
- Local Authorities
- Health Service
- Ambulance Service
- Nuclear Site Licensees
- Department for Business, Enterprise and Regulatory Reform
- HSE (Nuclear Installations Inspectorate)
- Food Standards Agency
- Department of the Environment, Food and Rural Affairs
- Department of Health
- Department for Transport
- Environment Agency
- Scottish Environment Protection Agency
- Cabinet Office
- Foreign and Commonwealth Office
- Health Protection Agency
- Meteorological Office
- Nuclear Decommissioning Authority

The testing of off-site preparedness

L.10.5. This chapter describes a process for testing off-site preparedness at civil nuclear sites. It covers the programming, planning, scope, conducting, debriefing and reporting of off-site emergency exercises. The arrangements for testing off-site preparedness are well established, and involve the simulation of a range of accidents which may involve the release of radioactivity and off-site consequences. The

exercise or modules undertaken should provide a thorough test of the off-site plan and show that the arrangements are in a state of readiness, should an emergency occur, appropriate to the hazard.

Exercise assessment

L.10.6. Every year the nuclear industry undertakes many exercises. These range from onsite facility exercises to off-site exercises. Exercises are the main vehicle whereby areas for improvement are identified, and as such, it is important that there is an effective assessment process. This chapter of the NEPLG document provides guidance on how to develop an assessment process for an off-site emergency exercise. Developing appropriate and relevant assessment criteria allows areas for improvement to be defined and good points to be clearly identified to assist the learning process for emergency response.

Off-site facilities

L.10.7. Following the Three Mile Island accident in 1979, it was recognised that, in the event of an emergency, a facility would need to be established to bring together organisations with a role in the off-site response. Such facilities, generically known as off-site facilities, have been an important feature of civil nuclear emergency response arrangements since that time. This chapter outlines principles agreed by NEPLG which should apply to the operation of off-site facilities. The choice and location of off-site facilities should take into account local circumstances and, where relevant, existing emergency provisions, and should be agreed by local organisations with executive responsibility in the event of a nuclear emergency.

Early countermeasures within the detailed emergency planning zone

L.10.8. This chapter describes the principles that need to be applied in considering early countermeasures within the detailed emergency planning zone in the event of an emergency at a civil nuclear site. It addresses sheltering, evacuation, and the issue of potassium iodate tablets. This chapter also notes the need for regular communication with affected population.

Extendibility

L.10.9. This chapter concerns circumstances where it is necessary to extend countermeasures for emergencies with effects extending beyond the detailed emergency planning zone. The aim is to provide emergency planners, particularly those from county or regional local authorities, health authorities and the police, with information which would assist them in deciding upon the extent of extendibility planning they deem necessary, and what this should involve.

L.10.10. It is a long-standing guiding principle of civil nuclear emergency planning that detailed plans covering the area defined by the detailed emergency planning zone should be drawn up on the basis of the reasonably foreseeable accident (i.e. the design basis accident or reference accident), which is now required through the Radiation (Emergency Preparedness and Public Information) Regulations 2001 (REPPIR). These plans must be capable of being extended, using general contingency plans to deal with a larger, even less-likely accident. The improbability of a larger accident means that the absence of a detailed plan would not significantly increase the risk to the public.

The Government Technical Advisor

L.10.11. Following the Three Mile Island accident in 1979, the Government reviewed UK civil nuclear emergency response arrangements. That review identified a need for somebody to provide authoritative and independent statements 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. The review also concluded that

the most suitably qualified person to undertake the role would be a senior member of NII. As a result, the arrangements for appointing a Government Technical Adviser (GTA) were put into effect.

L.10.12. This Chapter of the NEPLG guidance covers in detail the terms of reference and the duties of the GTA. The following chapter provides guidance on how the GTA will interface with the Health Advisor. Feedback from exercises has identified that both are key participants who need to work closely together.

Food Standards Agency – advice and interface

L.10.13. Experience of exercises has pointed to the need for guidance on the arrangements for provision of precautionary advice and the making of food restriction orders by the Food Standards Agency, and on the interface and liaison arrangements between the Food Standards Agency and other organisations located at the off-site facility. This chapter provides guidance on how this might be done within the overall planning framework.

Media briefing centres

L.10.14. The guidance set out in this chapter is based on best practice developed and refined by NEPLG since 1991 when the principles relating to the organisation and operation of media briefing centres was agreed. These were developed as a result of lessons learned following the Three Mile Island accident which identified the need for media briefing centres in the event of an accident at a civil nuclear site.

L.10.15. The purpose of this chapter is to describe:

(a) the principles to be applied and arrangements agreed, for briefing the media in a nuclear emergency

(b) the information that should be set out in the Off-Site Emergency Plan detailing who is responsible for delivering public information.

L.10.16. The subsequent chapter sets out in detail the media roles of respective organisations and the interaction between these organisations.

Radiation monitoring coordination

L.10.17. Extensive resources and equipment are available to undertake environmental and personal radiation monitoring following an accident at a civil nuclear site. These belong to the various organisations and agencies forming NEPLG and are part of their well-established emergency plans. Hence, the arrangements are regularly tested and maintained in a state of readiness. This chapter concentrates on the principles that need to be applied to, and the practical arrangements involved in, the co-ordination of radiation monitoring following an accident at a civil nuclear site.

Recovery phase

L.10.18. The procedures for recovery planning, following a civil nuclear accident, became prominent following the experience of the Chernobyl accident. The guidance in this chapter is based on the lessons of UK consideration and wider experience, with contributions from all the main responding organisations. Subsequent chapters of the guidance document addresses planning for recovery, and procedures for recovery.

ANNEX L.11. - 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 IAEA documents are considered to be particularly relevant:

GS-R-1 Legal and Government Infrastructure for nuclear, radiation, radioactive waste and transport safety.

WS-R-2 Predisposal Management of Radioactive Waste, Including Decommissioning

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.	***Text***	Application in UK Report
G	***GENERAL PRINCIPLES***	
G1	***Due consideration shall be given to the protection of workers and the public and to the protection of the environment***	**Section B (Policy) Section E (Article 19) Section F (Article 24)**
	GS-R-1 2.4(1) WS-R-2 2.4 WS-R-2 2.5 WS-R-2 2.6 WS-R-2 2.2	
G2	***Radioactive waste arisings shall be kept to a minimum***	**Section B (Policy) Section GH (Articles 4&11)**
	WS-R-2 5.5 WS-R-2 5.6 WS-R-2 5.7 WS-R-2 5.8	
G3	***An appropriate waste classification scheme shall be established***	**Section B (Policy)**
	WS-R-2 3.5	
G4	***Radioactive waste shall be characterized in terms of its physical, chemical, radiological and biological properties***	**Section B (Policy)**
	WS-R-2 5.4	
G5	***National policies and implementation strategies for the safe management of radioactive waste shall be developed***	**Section B (Policy)**

G6	***Interdependencies in the management of radioactive waste shall be taken into account***	**Section GH (Articles 4&11)**
	WS-R-2 6.7 WS-R-2 6.8 WS-R-2 4.1 WS-R-2 5.2 WS-R-2 5.17	
G7	***Radioactive waste shall be managed in such a way that will not impose undue burdens on future generations***	**Section B (Policy)** **Section GH (Articles 4&11)**
	WS-R-2 5.3	
G8	***Waste producers shall have prime responsibility for safety***	**Section B (Policy)** **Section E (Article 19)** **Section F (Article 21)**
	GS-R-1 2.3 WS-R-2 3.11 WS-R-2 3.16 GS-R-1 3.3(13) GS-R-1 2.4(7)	
G9	***There shall be adequate arrangements for indemnification of third parties for radiation damage***	**Section E (Article 19)**
	GS-R-1 2.2(10) GS-R-1 2.4(11) GS-R-1 2.4(12)	
G10	***Advisory Bodies***	**Section E (Article 19)**
	GS-R-1 4.9	
L	***LEGISLATIVE REGIME***	
L1	***A legislative regime shall be established***	**Section E**
	GS-R-1 2.2(1)	
L2	***Regulatory regime shall be proportionate***	**Section E (Article 19)**
	GS-R-1 2.1	
L3	***Legislation shall be promulgated to provide for the effective control of nuclear, radiation, radioactive waste and transport safety***	**Section E (Article 19)**
	GS-R-1 2.4 GS-R-1 2.4(2) GS-R-1 2.4(14)	

L3.1	***The legal framework shall ensure an allocation of responsibility for safety at all times***	**Section E (Article 19)**
	GS-R-1 2.4(8) GS-R-1 6.7 WS-R-2 3.2 GS-R-1 6.12	
L3.2	***Legislation shall establish authorisation / licensing processes***	**Section E (Article 19)**
	GS-R-1 2.4(3) WS-R-2 3.4 GS-R-1 2.4(6) GS-R-1 2.4(9) GS-R-1 2.4(10) GS-R-1 2.4(13) GS-R-1 2.4(15) GS-R-1 2.4(16) GS-R-1 2.4(17) GS-R-1 2.5	
L3.3	***There shall be criteria for the ending of regulatory control***	**Section E (Article 19)**
	WS-R-2 3.7 WS-R-2 3.8 WS-R-2 3.18	
RB	***REGULATORY BODY***	
RB1	***Regulatory Body shall be independent***	**Section E (Article 20)**
	GS-R-1 2.2(2) GS-R-1 4.1	
RB2	***If the regulatory body consists of more than one authority, effective arrangements shall be made for effective co-ordination***	**Section E (Article 20)**
	GS-R-1 4.2.	
RB3	***Regulatory body shall be responsible for authorisation, assessment, inspection and enforcement***	**See individual items below.**
	GS-R-1 2.2(3) GS-R-1 3.3(13) GS-R-1 2.2(5)	
RB3.1	***The regulatory body shall be responsible for authorization / licensing***	**Section E (Article 19)**
	GS-R-1 3.2 (3) GS-R-1 3.3(1) GS-R-1 3.3(2) GS-R-1 3.3(5) GS-R-1 5.2. to 1 5.6	

RB3.2	***The regulatory body shall carry out reviews and assessments***	**Section E (Article 19)**
	GS-R-1 2.6(3) GS-R-1 2.6(6) GS-R-1 3.2(2) GS-R-1 3.3(3) GS-R-1 3.3(10) GS-R-1 5.7 GS-R-1 5.8 GS-R-1 5.9.(1) GS-R-1 5.9(1) GS-R-1 5.9(2) GS-R-1 5.9(3) GS-R-1 5.10 GS-R-1 5.11	
RB3.3	***The regulatory body shall carry out inspections***	**Section E (Article 19)**
	GS-R-1 3.2(4) GS-R-1 5.12 GS-R-1 5.13 GS-R-1 5.14 GS-R-1 5.15 GS-R-1 5.16 GS-R-1 5.17	
RB 3.4	***The regulatory body shall carry out enforcement***	**Section E (Article 19)**
	GS-R-1 3.2(5) GS-R-1 3.2(6) GS-R-1 5.19 to 1 5.24	
RB4	***The regulatory body shall provide information and advice to other bodies and the public***	**Section E (Article 19)**
	GS-R-1 3.3(6) GS-R-1 3.3(4) GS-R-1 3.3(11) GS-R-1 3.4	
RB5	***International Co-operation***	**Section E (Article 19)**
	GS-R-1 4.11	
RB6	***The regulatory body shall establish safety principles, criteria, regulations and guides***	**Section E (Article 19)**
	GS-R-1 2.6(1) and GS-R-1 2.6(2) GS-R-1 3.1 GS-R-1 3.2 (1) GS-R-1 3.3(9) GS-R-1 5.25 to 1 5.28 WS-R-2 2.7 WS-R-2 3.6	

RB7	***The regulatory body may also have additional functions***	
	GS-R-1 3.5	
RB8	***The regulatory body shall be structured so as to ensure that it is capable of discharging its responsibilities***	**Section E (Article 20)**
	GS-R-1 4.1	
RB9	***The regulatory body shall implement appropriate quality management***	**Section E (Article 20)**
	GS-R-1 4.5	
RB10	***Regulatory body shall have adequate authority and resources***	**Section E (Article 20)**
	GS-R-1 2.2(4) GS-R-1 2.4(4) GS-R-1 2.4(5) GS-R-1 2.6(4) GS-R-1 2.6(5) GS-R-1 2.6(7) to 1 2.6(14) GS-R-1 4.6 GS-R-1 4.8 GS-R-1 4.7	
RB11	***If the regulatory body is not self-sufficient in all areas it shall seek advice or assistance, as appropriate, from consultants***	**Section E (Article 20)**
	GS-R-1 4.3 GS-R-1 4.4 GS-R-1 4.8	
WD	***WASTE AND DECOMMISSIONING IN PRACTICE***	
WD1	***The appropriate options shall be identified to avoid conflicting requirements that might compromise safety***	**Section GH (Articles 7&14)**
	WS-R-2 4.2 GS-R-1 6.9 GS-R-1 6.10 WS-R-2 6.8 WS-R-2 6.9	
WD2	***The operator shall perform safety and environmental impact assessments***	**Section GH (Articles 8&15)**
	WS-R-2 3.12 GS-R-1 2.6(3) GS-R-1 2.6(6) GS-R-1 3.3(3) WS-R-2 7.1 to 2 7.5 WS-R-2 6.10	

WD3	***Processing of radioactive waste shall be consistent with the type of waste, possible needs for storage and disposal***	**Section GH (Articles 7&14)**
	WS-R-2 5.9 WS-R-2 5.10 WS-R-2 5.11 WS-R-2 5.31 WS-R-2 5.12 WS-R-2 5.13 WS-R-2 5.15 WS-R-2 5.19 WS-R-2 5.20 GS-R-1 2.3 WS-R-2 5.22	
WD4	***Radioactive waste storage facilities shall be designed and constructed for the likely period of storage, preferably with passive safety features***	**Section GH (Articles 7&14)**
	WS-R-2 5.23 WS-R-2 5.25 WS-R-2 5.26 WS-R-2 5.27 WS-R-2 5.28 WS-R-2 5.29 WS-R-2 5.30	
WD5	***The operator shall identify an acceptable destination for the radioactive waste***	**Section GH (Articles 7&14)**
	WS-R-2 3.15	
WD6	***The operator shall establish and maintain decommissioning plans***	**Section B (Policy)** **Section GH (Article 9&15)**
	WS-R-2 3.13 WS-R-2 6.2 WS-R-2 6.3 WS-R-2 6.4 WS-R-2 6.5 WS-R-2 6.6 WS-R-2 6.7	
WD7	***Established criteria shall be met for release of a site from regulatory control***	**Section E (article 19)**
	WS-R-2 6.11 WS-R-2 6.12 WS-R-2 6.13	
WD8	***Adequate financial resources shall be ensured for radioactive waste management and decommissioning***	**Section E (Article 19)** **Section F (Article 22)**
	WS-R-2 3.17	

WD9	***Appropriate records shall be retained***	**Section E (Article 19)**
	GS-R-1 3.3(8) WS-R-2 3.9	
WD10	***Operating experience shall be appropriately analysed***	**Section GH (Article 9&15)**
	GS-R-1 3.3(7)	
WD11	***The competence of personnel responsible for the safe operation shall be assured***	**Section F (Article 22)**
	GS-R-1 3.3(12)	
WD12	***A 'safety culture' shall be fostered***	
	WS-R-2 2.8	
WD13	***A comprehensive quality assurance programme shall be applied***	**Section F (Article 23)**
	WS-R-2 7.6 WS-R-2 7.7	
IN	***INFRASTRUCTURE ARRANGEMENTS***	
IN1	***There shall be adequate infrastructural arrangements for decommissioning and radioactive waste and spent fuel management***	**Section E (Article 19)**
	GS-R-1 2.2(6)	
IN2	***There shall be adequate infrastructural arrangements for transport***	
	GS-R-1 2.2(7) WS-R-2 5.32	
IN3	***There shall be adequate infrastructural arrangements for physical protection***	
	GS-R-1 2.2(9) GS-R-1 2.2(11)	
IN4	***An inventory of existing and anticipated radioactive waste shall be established***	**Section D**
	GS-R-1 6.11	
IN5	***Appropriate research and development programmes shall be implemented***	**Section GH (Article 9&15)**
	GS-R-1 6.13	
IN6	***There shall be effective emergency response arrangements***	**Section F (Article 25)**
	GS-R-1 2.2(8) WS-R-2 3.14 WS-R-2 6.2 to 6.6 WS-R-2 6.14 to 6.16	

TBM	***Transboundary Movement***	**Section I**
	WS-R-2 3.3	

Annex L.12. - List of Primary Website Addresses

British Energy Generation Ltd	BEGL	www.british-energy.co.uk
Committee on Radioactive Waste Management	CoRWM	www.corwm.org.uk
Committee on Medical Aspects of Radiation in the Environment	COMARE	www.doh.gov.uk/comare/comare.htm
Department for the Environment, Food and Rural Affairs	Defra	www.defra.gov.uk
Department for Transport	DfT	www.dft.gov.uk
Environment Agency		www.environment-agency.gov.uk/nuclear
Environment and Heritage Service, Northern Ireland	EHS	www.ehsni.gov.uk
Food Standards Agency		www.food.gov.uk
Health and Safety Executive	HSE	www.hse.gov.uk/index.htm
HM Revenue and Customs	HMRC	www.hmrc.gov.uk/
HSE's Nuclear Directorate / Nuclear Installations Inspectorate	ND / NII	www.hse.gov.uk/nuclear/index.htm
International Commission on Radiological Protection	ICRP	www.icrp.org/
Nuclear Decommissioning Authority	NDA	www.nda.gov.uk/
Office of Civil Nuclear Security	OCNS	www.hse.gov.uk/nuclear/ocns.htm
	OSPAR	www.ospar.org
Scottish Environment Protection Agency	SEPA	www.sepa.org.uk
Sellafield Ltd		www.sellafieldsites.com
United Kingdom Atomic Energy Authority	UKAEA	www.ukaea.org.uk
UK Nuclear Regulators – New Reactors Assessment		www.hse.gov.uk/newreactors/index.htm
West Cumbria Sites Stakeholder Group		www.wcssg.co.uk/library/wcssg.htm

Annex L.13. – Nuclear Safety Cases

Definition of a Nuclear Safety Case

L.13.1. The term 'nuclear safety case' may relate to a site, a plant, part of a plant, a plant modification, or a set of significant issues. In subsequent discussion 'nuclear safety case' is shortened to 'safety case'.

L.13.2. A safety case is the totality of documented information and arguments that substantiates the safety of the plant, activity, operation or modification in question. It provides a written demonstration that relevant standards have been met and that risks have been reduced ALARP. The safety case for the plant as a whole should be a living document that is subject to review, change and amendment as time proceeds. For example, the safety case may change due to important changes to the plant, its mode of operation, or the understanding of safety related issues. It may also change in the light of operating experience.

The Purpose of a Nuclear Safety Case

L.13.3. The purpose of a safety case is to establish and demonstrate in written form that the plant, process, activity, modification, etc. being proposed:

- has been soundly assessed and meets the required safety principles;
- conforms to good nuclear engineering practice and to appropriate criteria, standards and codes of practice;
- is adequately safe during both normal operation and fault conditions;
- is, and will remain, fit for purpose;
- gives rise to a level of nuclear risk to both public and workers which is ALARP; and
- has a defined and acceptable operating envelope, with defined limits and conditions, and the means to keep within that envelope.

The safety case also forms the basis for delivering safe operation. The analysis it provides of normal operation and possible accidents should identify the measures that need to be implemented to realise the required safety standards. These measures include: operating rules and instructions; examination, maintenance and testing requirements; minimum staffing levels in key areas (e.g. control rooms); staff training needs; and emergency procedures.

L.13.4. The normal approach for establishing safety in nuclear installations begins with robust engineering design and defence-in-depth. The safety case should show how these have been achieved, and how safety functions have been identified and delivered. Deterministic analysis should be included covering both normal operations and fault behaviour and may be supported by appropriate probabilistic analysis to judge the significance of uncertainties, show that risks are balanced, and demonstrate compliance with numerical risk criteria. In addition, there should be a demonstration that risks are ALARP. This demonstration should include the options that have been considered and justify those chosen.

L.13.5. The safety analyses require an input of engineering and operational knowledge and judgement. It is therefore important to have active co-operation between designers, analysts and operators, and adequate referencing to establish clear links with supporting documentation.

L.13.6. The safety case also provides a means, for example, of:

- Aiding training and awareness of personnel in the safety aspects of the plant;
- Providing the context within which changes must be reviewed;
- Providing information on designers' understanding and intentions with respect to the plant/facility; and

- Providing a means by which operators of the plant understand the significance and achievement of plant safety.

Overall Qualities of a Safety Case

L.13.7. There are several features that are fundamental to a good safety case. These are summarised here in terms of the following nine overall qualities:

- Complete - All reasonably-foreseeable threats to safety should be identified. It should be shown that the plant incorporates adequate protection against these threats, or that their contribution to the overall risk is negligible. All foreseeable plant states should be covered, including transients and non-steady state conditions such as start-up and shutdown sequences.
- Clear - The safety case should highlight the key points in terms of both strengths and weaknesses. There should be a clear statement as to the nature and magnitude of the significant hazards, and the protection in place to prevent or mitigate their effects. The safety case needs to be readily accessible as well as understandable. It should be possible to navigate easily around the safety case documents to find relevant information. The basis of all assumptions, conclusions and recommendations should be given and any unresolved issues explained and justified. Clarity needs to extend to correct referencing of supporting information. It is important that the basis for the level of safety portrayed in the documentation is clearly evident to all users, including the regulator.
- Rational - The safety case should be reasonable and sensible. It should provide cogent, cohesive and logical arguments to support the conclusions. This includes the arguments in support of claims that risks have been reduced so far as is reasonably practicable.
- Accurate - The safety case should accurately reflect the 'as is' state of the plant, equipment, processes and procedures.
- Objective - The arguments developed in the safety case should be supported with factual evidence, i.e. evidence which is documented, measurable, etc. The necessary understanding of the behaviour of novel systems or processes should be established from appropriate research and development. Claims relating to the integrity or performance of engineering features should be supported in the engineering substantiation documents. The link between engineering and safety provisions should be demonstrated, in line with the requirements of defence-in-depth. In the absence of directly relevant data, the use of inferred or extrapolated information needs to be carefully substantiated. There is a need to provide visibility of the sensitivity to assumptions to validate the robustness of associated claims. The adequacy of operational procedures, managerial controls and resources should be demonstrated by task analysis to an appropriate level.
- Appropriate - The analytical methods used to substantiate safety, together with computer code assessments should be shown to be fit-for-purpose with adequate verification and validation. If a limit on the validity of an approach exists, evidence is required to show that the approach is used within the valid region. Any assumptions that have been made should be identified and shown to be appropriate. Where safety is demonstrated using claims based on previous experience, sufficient evidence should be presented to show that equivalent principles, criteria and standards to those previously used have been applied, and that existing data are relevant to the new facility.
- Integrated - The safety case should be holistic so that there are clear links between the safety analysis and the engineering substantiation. It should also define where it depends on other external facilities and services, for example

grid supply, and specify and substantiate clearly any associated assumptions that are being made. There should also be clear links from the safety case to operational requirements and constraints to be implemented in other documents.

- Current - The plant safety case must be reviewed, revised and updated to ensure it remains current. As the plant passes through its life cycle, the development of the safety case should be managed to ensure it remains valid at any point in time. The content of a safety case may also change if the plant undergoes a significant modification, or a series of minor modifications that have a significant cumulative effect on safety. A safety case is therefore a living suite of documents which should reflect the current state of the facility in all the physical, operational and managerial aspects.
- Forward looking - the safety case should demonstrate that the plant will remain safe throughout a defined life time.

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Glossary and Abbreviations

AECL	Atomic Energy of Canada Ltd.
AGR	Advanced Gas-cooled Reactor
ALARA	As low as reasonably achievable
ALARP	As low as reasonably practicable
BAT	Best available techniques
BEGL	British Energy Generation Ltd
BERR	Department for Business, Energy and Regulatory Reform (established in June 2007 to replace the Department of Trade and Industry)
BMS	Business Management System
BNFL	British Nuclear Fuels plc
BPEO	Best practicable environmental option
BPM	Best practicable means
BSS Directive	EC Basic Safety Standards Directive 96/29/Euratom[32]
CHILW	Contact-handled ILW
CIDI	Central Index of Dose Information
Cm2426	Sustainable Development – the UK Strategy[110]
Cm2919	Review of Radioactive Waste Management Policy – Final Conclusions, July 1995[51]
COMARE	Committee on Medical Aspects of Radiation in the Environment
CoRWM	Committee on Radioactive Waste Management
DBA	Design base accident
Defra	Department for Environment, Food and Rural Affairs
DFR	Demonstration Fast Reactor (at Dounreay)
DfT	Department for Transport
DGD	Dangerous Goods Division (of DfT)
DNSR	Defence Nuclear Safety Regulator - Under NIA65, nuclear activities under the control of the Crown are exempted from civil nuclear licensing requirements, although they are subject to regulation by HSE under HSWA74. DNSR is a department within the Ministry of Defence which exercises an internal regime for assessing the safety of defence-related nuclear activities, wherever possible using equivalent standards to those used by HSE for the regulation of licensed civil nuclear activities.
DoH	Department of Health
DSRL	Dounreay Site Restoration Limited
DTI	Department of Trade and Industry (replaced in June 2007 by BERR)
DWP	Department for Work and Pensions
EA95	The Environment Act 1995[62]
EC	European Commission
EHS	Environment and Heritage Service, Northern Ireland

EIA	Environmental impact assessments
EIADR99	Nuclear Reactors (Environmental Impact Assessment for Decommissioning) Regulation 1999[69]
Environment Agency	Environment Agency, for England and Wales
EPA90	Environmental Protection Act 1990[68]
EPO	Environmental Protection Officer
EPP	Environmental Permitting Programme
EU	European Union
FDP	Funded Decommissioning Programme
FHP	Fuel Handling Plant (at Sellafield)
GDA	Generic Design Assessment
GLEEP	Graphite Low Energy Experimental Pile
GNEP	Global Nuclear Energy Partnership
Government	The UK Government and the devolved administrations, unless stated otherwise
GRA	Guidance on Requirements for Authorisation[116]
GTA	Government Technical Adviser
HA	Highly Active
HAL	HA Liquor
HASS Regulations	High-activity Sealed Radioactive Sources and Orphan Sources Regulations 2005[45]
HMRC	HM Revenue and Customs
HSC	Health and Safety Commission – merged with HSE 1 April 2008.
HSE	Health and Safety Executive
HLW	High Level Waste
HSWA74	Health and Safety at Work etc. Act 1974[56]
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiological Protection
ILW	Intermediate Level Waste
IRR99	Ionising Radiations Regulations 1999[59]
IWS	Integrated Waste Strategies
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

MEB	Multi-element bottle
MHSW99	The Management of Health and Safety at Work Regulations 1999[66]
MOP	Magnox Operating Plan
MoU	Memorandum of Understanding
MOX	Mixed-oxide fuel
MRWS	Managing Radioactive Waste Safely
mSv	milliSieverts
MTR	Materials Test Reactor (at Dounreay)
ND	Nuclear Directorate (a part of HSE)
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)[29]
NII	Nuclear Installations Inspectorate (a part of HSE's Nuclear Directorate)
NNA	National Nuclear Archive
NPP	Nuclear Power Plant
NRPB	National Radiological Protection Board
NuSAC	Nuclear Safety Advisory Committee
NWAT	Nuclear Waste Assessment Team (a part of the Environment Agency)
OCNS	Office for Civil Nuclear Security (a part of HSE's Nuclear Directorate)
OECD	Organisation for Economic Cooperation and Development
OOP	Oxide Operating Plan
PBO	Parent Body Organisation
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
QQR	Five yearly ('quinquennial') review
REPPIR	Radiation (Emergency Preparedness and Public Information) Regulations 2001[64]
REPs	Radioactive Substances Regulation Environmental Principles
RHILW	Remote-handled ILW
RIFE	Radioactivity in Food and the Environment[104]
RIMNET	Radiation Incident Monitoring Network
R2P2	'Reducing risk, protecting people: HSE's decision making process'[128]
RPD	Radiation Protection Division (of Health Protection Agency)

RSA93	Radioactive Substances Act 1993[19]
RSC	Radioactive Substances Committee
RWMC	Radioactive Waste Management Case
RWMD	Radioactive Waste Management Directorate (a part of NDA)
SAPs	HSE's Safety Assessment Principles[30]
SCC	Strategic Coordination Centre
SEA	Strategic Environmental Assessment
SEPA	Scottish Environment Protection Agency
SFAIRP	So far as is reasonably practicable
SGER	Scottish Government Emergency Room
SGHWR	Steam Generating Heavy Water Reactor
SLC	Site Licensee Company
SSA	Strategic Siting Assessment
TAG	Technical Assessment Guide
Thorp	Thermal Oxide Reprocessing Plant, at Sellafield
TOR	Tolerability of Risk
UK	United Kingdom of Great Britain and Northern Ireland
UKAEA	United Kingdom Atomic Energy Authority
UKRWI	UK Radioactive Waste Inventory[18]
VLLW	Very Low Level Waste
WAG	Welsh Assembly Government
WAGR	Windscale Advanced Gas-cooled Reactor
WENRA	Western European Regulators Association

End of
The United Kingdom's
Third 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