THE UNITED KINGDOM'S SECOND 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

Contributors to the UK's National Report

The Health and Safety Executive prepared this report on behalf of the Department for Environment Food and Rural Affairs in consultation with and incorporating contributions from:

- Department for Environment, Food and Rural Affairs
- Department of Trade and Industry
- Food Standards Agency
- Scottish Executive
- Environment and Heritage Service, Northern Ireland
- Environment Agency
- Scottish Environment Protection Agency
- Nuclear Decommissioning Authority
- British Nuclear Fuels plc
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FOREWORD

I. 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. It considers each of the Convention's obligations and explains how the UK addresses them.

II. The report covers spent fuel management and radioactive waste management facilities in the UK as defined within Article 2 of the Convention. For the purposes of this report, the UK has included spent fuel reprocessing as part of spent fuel management.

SUMMARY OF SIGNIFICANT DEVELOPMENTS SINCE FIRST REPORT

This report is the United Kingdom's (UK) submission to the second review meeting of the Contracting Parties to 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 meets them. It does not consider matters relating to the safety of nuclear reactors that have been addressed by the UK's submissions for the review meetings of the Convention on Nuclear Safety. Section C gives the scope of the report.

For the purposes of this report, the term "the Government" means "the UK Government and/or the Devolved Administrations, as appropriate".

The UK has a robust domestic regulatory framework, which provides the basis for reporting on its obligations under the Joint Convention, and in general the UK has made steady progress. There follows some of the key changes and relevant events in the UK since the first report.

Inventory of Radioactive Waste

The report contains information on the quantities of radioactive waste in the UK as calculated in 2004.

Committee on Radioactive Waste Management (CoRWM)

The Government established CoRWM in November 2003 to provide a recommendation on the best option, or combination of options, for the long-term management of the UK's higher activity radioactive waste, which will protect both people and the environment. As well as drawing on the best available science, CoRWM is required to engage with both the public and stakeholder groups in arriving at its recommendations.

The Committee published in August 2005 its final short-list of options, which it will be carrying through to detailed assessment, and its proposed assessment methodology. The Committee is due to deliver its final recommendation in July 2006.

Further information can be found at paragraphs K-7 to K-15.

Nuclear Decommissioning Authority (NDA)

The NDA is a new organisation, set up by the UK Government to provide a UK-wide strategic focus on cleaning-up nuclear sites. It has been fully operational since April 2005. Its mission is to deliver a world class programme of safe, cost-effective, accelerated 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.

Further information can be found throughout the report.

Thorp Feed Clarification Cell incident

On 22 April 2005, British Nuclear Group (BNG) reported that a pipe had failed in Thorp, in one of the heavily shielded cells, known as the feed clarification cell, in the Thorp Head End plant resulting in a quantity of dissolved nuclear fuel being released into a sealed contained area. The liquid, around 83m3, escaped from a fractured pipe (primary containment) feeding one of the Accountancy Tanks into a purpose built, thick walled concrete cell lined with stainless steel (secondary containment). The situation within the cell remains safe and secure and the recovery of all liquid back into primary containment was completed in July 2005. BNG has accounted for all of the material on the floor of the cell.

The HSE is investigating the incident. As a result of the preliminary investigation, the HSE served two improvement notices, the first relating to leak detection equipment and the second to operating instructions relating to the use of this equipment and the response to alarms. The HSE will publish the results of its investigation in due course.

Further information can be found at paragraphs L1.30 to L1.33

END OF LIFE SOURCE MANAGEMENT

The UK is in the process of implementing European Council Directive on the control of high activity sealed sources and orphan sources. The Directive will be 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.

In addition, the UK Government is funding a three-year subsidised disposal programme for surplus sealed sources. The programme will reduce the legacy of disused sources in storage on the users' premises.

Further information can be found at paragraphs A-17 and A-18.

RADIOACTIVE CONTAMINATED LAND

There was a public consultation in England and Wales in the summer of 2005 on a proposed extension of Part 2A of the Environmental Protection Act 1990 to include radioactively contaminated land. A similar consultation is scheduled for Scotland starting in October 2005.

Further information can be found at paragraph GH 12.

Criterion for delicensing nuclear sites

The Health and Safety Executive (HSE) published a policy statement in August 2005 that provides 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 the Nuclear Installations Act. It attempts to achieve *broad* consistency with current scientific thinking, relevant guidance and other published material including the Radioactive Substances Act 1993 (and the exemption orders made under it), article 5 of the Basic Safety Standards Directive, and the International Atomic Energy Agency (IAEA) Safety Guide "Application of the Concepts of Exclusion, Exemption and Clearance".

Further information can be found at paragraphs E-29 to E-31.

HSE Safety Assessment Principles (SAPs)

HSE is reviewing and revising the SAPs revision project with two objectives:

1. To benchmark the SAPs and other guidance against IAEA Safety Standards; and

2. To take into account the needs of the future remediation and decommissioning activities of the UK nuclear industry.

The target date for producing a SAPs document suitable for public consultation is March 2006. To this end, in November 2004 the proposed architecture for the revised SAPs was developed and the areas where additions or changes were required were identified.

The draft text for the Sections of the revised SAPs is being posted on the HSE web site as it becomes available. HSE is seeking any comments on the draft text before 25 November 2005. An editorial board has been set up to produce a set of revised SAPs for public consultation at the end of March 2006.

Further information can be found at paragraph L-54.

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Section A

Introduction

Purpose of the Report

A-1 This report is the United Kingdom's (UK) submission to the second review meeting of the Contracting Parties to 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 meets them. It does not consider matters relating to the safety of nuclear reactors that have been addressed by the UK's submissions for the review meetings of the Convention on Nuclear Safety. Section C gives the scope of the report.

Structure of the Report

A-2 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. Detailed information in the previous report, which has not changed significantly, has not been repeated, but rather reference is made to the relevant part of the first report. Lists of facilities, inventories, other data and references to further information are provided in Section L. The report addresses the UK's obligations arising from the Joint Convention in the following sections, ordered as proposed by the "Guidelines regarding the form and structure of national reports" [1]:

Section	Article	Topic
A		Introduction and major developments since the last report
B	32.1	Reporting Obligations – policies and practices
C	3	Scope
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GH	4-17	Safety of Spent Fuel, Reprocessing and Radioactive Waste Management
I	27	Transboundary Movement
J	28	Disused Sealed Sources
K		Planned Activities to Improve Safety
L		Annexes

A-3 The report indicates how, in meeting the safety issues addressed by the articles of the Joint Convention, the UK takes into account the requirements set out in relevant IAEA safety standards documents. In this respect, two International Atomic Energy Agency (IAEA) Requirements documents are particularly relevant:

> Legal and Government Infrastructure for Nuclear, Radiation, Radioactive Waste and Transport Safety. Safety Standards Series No. GS-R-1 [2]: Predisposal Management of Radioactive Waste, Including Decommissioning. Safety Standards Series No. WS-R-2 [3].

A-4 Note, however, the UK report to the Joint Convention does not address the issues raised by the IAEA Requirements document on a point for point basis. The table at Annex A, at the end of this report, groups all the requirements (defined as statements containing 'shall') into generic issues for which references are given to the relevant sections of this report. Boxes next to the text refer to these generalised IAEA Requirements and the text summarises how the UK takes these into account in addressing the safety issues related to the Articles of the Joint Convention.

Main Themes of the Report

A-5 The report explains how the UK responds to the objectives of the Joint Convention, including how the nuclear industry demonstrates to the UK's independent nuclear safety and environmental regulators that it achieves and maintains a high level of safety and environmental protection in spent fuel management (including reprocessing) and radioactive waste management, as required by the UK's relevant Acts and Regulations.

National Nuclear Policy

A-6 The UK's nuclear policy covers several topics, from general issues to the specifics (discharge strategy and energy policy). At the general level, it is a UK Government policy objective to ensure there are adequate and appropriate national and European Union statutory powers, international agreements and other measures to protect the people, society and the natural environment from harmful levels of radioactivity.

A-7 The UK Radioactive Discharges Strategy [4] was published in July 2002. This sets out how the UK intends to meet its Oslo-Paris Convention (OSPAR) obligations agreed[5] at Sintra, Portugal in 1998 by ensuring that, by 2020, 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. The Strategy is under review and a revised version will be issued in 2007.

A-8 The Government published a White Paper[6] "Our Energy Future – Creating a Low Carbon Economy" in February 2003 setting out its future energy policy. The White Paper recognised the contribution nuclear power makes to the UK energy needs.

Legislative and Regulatory System

A-9 An independent authorative national body, the Health and Safety Executive (HSE) regulates spent fuel management and radioactive waste management on all the nuclear licensed sites in the UK. These sites contain over 99% of the UK's radioactive waste by activity. The main legislation covering the safety of workers and the general public at nuclear installations, in the UK, is the Health and Safety at Work Act 1974 (HSWA74)[7] and associated statutory provisions, which include the Nuclear Installations Act 1965 (as amended) (NIA65) [8]. The NIA65 provides for the licensing

of nuclear sites by the HSE for specified activities.

A-10 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)[9], by the Environment Agency (EA) in England and Wales, the Scottish Environment Protection Agency (SEPA) in Scotland and the Environment and Heritage Service (EHS) in Northern Ireland. These bodies are referred to collectively in this report as the environment agencies.

A-11 The White Paper "Managing the Nuclear Legacy", published in 2002, set out the Government's approach on handling the legacy of the clean-up of decommissioned nuclear facilities. The approach suggested in the White Paper was enacted by the Energy Act 2004[10], which included establishing the Nuclear Decommissioning Authority (NDA). The NDA became formally operational on 1 April 2005, and given responsibility for delivering the safe, cost effective, secure and environmentally responsible clean up of the UK's civil nuclear sites. Full information is available on the NDA website at www.nda.gov.uk.

Recent Safety Regulatory Initiatives

A-12 In August 2004 the "Justification of Practices Involving Ionising Radiation Regulations 2004" came into force (SI 1769)[11]. These regulations require 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 efficacy.

A-13 The UK is in the process of implementing European Council Directive 2003/122/Euratom[12] on the control of high activity sealed sources and orphan sources. The Directive will be transposed in the UK as the High-Activity Sealed Radioactive Sources and Orphan Sources Regulations 2005[13] (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.

A-14 There was a public consultation in England and Wales in the summer of 2005 on a proposed extension of Part 2A of the Environmental Protection Act 1990[14] to include radioactively contaminated land. Details at paragraph GH-12. A similar consultation is scheduled for Scotland starting in October 2005

A-15 The HSE's web site provides information on recent regulatory activity relevant to the safety of spent fuel management and radioactive waste management (http://www.hse.gov.uk/nsd/index.htm). This web site includes further information on: strategies for decommissioning nuclear licensed sites; the storage of liquid high level waste; team inspections of the control and supervision of spent fuel and radioactive waste operations; intermediate level waste storage in the UK; safety audits of UK nuclear licensed sites and five yearly 'quinquennial' reviews of the decommissioning strategies of some smaller UK licensed nuclear sites.

Radioactive Waste Management Government Initiatives

A-16 The Department for Environment, Food and Rural Affairs' (Defra) web site provides information on Government initiatives relevant to radioactive waste management (http://www.defra.gov.uk).

Radioactive Waste Disposal Regulation Initiatives

A-17 The UK Government is funding a three-year subsidised disposal programme for surplus sealed sources. The programme will reduce the legacy of disused sources in storage on the users' premises. The Environment Agency is managing

this programme for the Government.

A-18 The EA and SEPA web sites (http://www.environment-agency.gov.uk and http://www.sepa.gov.uk) provide information on relevant matters to radioactive discharges and disposal in Great Britain. The EHS provides information for Northern Ireland (http//www.ehsni.gov.uk).

Managing the Nuclear Legacy

A-19 The Department of Trade and Industry (DTI) web site has information on managing the nuclear legacy sites in Great Britain (http://www.dti.gov.uk).

Developments in Policy

The Nuclear Decommissioning Authority (NDA)

A-20 The NDA is a non-departmental public body, set up in April 2005 to take strategic responsibility for the UK's nuclear legacy. It is responsible for the sites previously operated by BNFL and UKAEA, including Sellafield and Dounreay. It will carry out its work through site operating contracts. Currently contracts are in place with UKAEA and a number of BNFL subsidiaries to run these sites but the management of these sites will be competed. The NDA's plans for the competition of its sites are described in its draft strategy, which is available on its web site. The NDA could be given responsibilities in respect of other UK nuclear sites, and the waste arising from them, if Government so desired. Its operations and those of its contractors on its sites are subject to the independent legal oversight of the HSE and environment regulators as described above.

A-21 The estimated cost for all the decommissioning and clean-up work for which the NDA is currently responsible is around £50 billion, and is likely to take 50-100 years to complete.

A-22 The NDA is currently consulting on its first draft strategy. More information is available on the NDA's website.

Committee on Radioactive Waste Management (CoRWM)

A-23 The Government established CoRWM in November 2003. It is sponsored by the Government. The Committee's task is to provide a recommendation on the best option, or combination of options, for the long-term management of the UK's higher activity radioactive waste, which will protect both people and the environment. As well as drawing on the best available science, CoRWM is required to engage with both the public and stakeholder groups in arriving at its recommendations. The Committee is due to deliver its final recommendation in July 2006. Further information on CoRWM and the results of its work can be found at paragraphs K-7 to K-15 and on its website at http://www.corwm.org.uk.

Review of Low Level Waste management policy

A-24 The Government is carrying out a review of policy for the long-term management of the UK's low-level radioactive waste (LLW), where the issue is one of how to make best use the kinds of disposal route that already exist. Long-term management of LLW is currently provided for by: the national LLW facility located at Drigg in Cumbria (NW England); various forms of management on existing nuclear sites; controlled burial to landfill; and some small amounts of very low-level waste, (for example, from hospitals and educational establishments) being disposed of with normal refuse.

A-25 As a number of UK nuclear sites approach their decommissioning and clean-up stage, it has been recognised that the amounts of LLW that will be generated in future will exceed currently available capacity. Hence a review of long-term LLW management policy has been initiated to consider how the UK might address this using the various forms of disposal already available. Two stakeholder workshops have been arranged in 2005 (the first already having been held on 21/22 April) to discuss the issues. This will be followed by the issue of a Government consultation document around the end of 2005 or early 2006 and a decision on future LLW management policy around mid-2006.

Nirex

A-26 Nirex was originally set up in 1982 by the nuclear industry to provide it with waste disposal services. Nirex's programme for developing a deep repository for intermediate level radioactive waste (ILW) was abandoned following a Planning Inquiry in 1997. The company continues to provide advice on standards for the conditioning and packaging of radioactive waste, compiles the UK Radioactive Waste Inventory in conjunction with Defra, and serves as the main UK source of knowledge on underground disposal of waste.

A-27 To ensure Nirex advice is independent of the nuclear industry, the company was taken into joint Defra/DTI ownership from 1 April 2005: a jointly owned shareholding company has been established for this purpose. The long-term future of Nirex will be decided in light of CoRWM's recommendations and policy decisions taken by Government in light of them. Further information on Nirex can be found at paragraphs B-47 and B-48.

2004 Radioactive waste Inventory

A-28 The 2004 UK Radioactive Waste Inventory and summary document were published in 2005 [15]. Further information on inventories of radioactive waste can be found in Section D, page 16 and Section L2, from page 99.

Section B

Policies and Practices

B-1 This section covers the UK's response to Article 32.

Wording of 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-2 The table on page (vii) lists the Sections of this report that explain how the UK meets each of its obligations under the Joint Convention. There follows 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.

32.1(i) Spent Fuel Management Policy

B-3 The UK Government's spent fuel management policy on the question of whether to reprocess (and if so when) or to seek alternative spent fuel management options is that it is a matter for the commercial judgment of the owners of the spent fuel, subject to meeting the necessary regulatory requirements. The UK 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.

32.1(ii) Spent Fuel Management Practices

B-4 Spent fuel management practices, summarised below, have not changed substantially since the last report. A fuller description, as presented in the 2003 UK National Report (updated where appropriate), is at Section L1.

B-5 **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-6 **Spent Advanced Gas-cooled Reactor (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 British Nuclear Group Sellafield Ltd (BNGSL) 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 2004 Inventory reports 3,500te of spent AGR fuel will be stored.

B-7 **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 2004 Inventory reports 1,200te will be stored at Sizewell.

B-8 **Spent Light Water Reactor (LWR) fuel from Europe and Japan** is transported from power station ponds to Sellafield for reprocessing.

B-9 **Other fuels** including the fuel from the United Kingdom Atomic Energy Authority's (UKAEA) various research and demonstration reactors are stored on UKAEA sites at Dounreay, Harwell and Windscale, pending a long-term management route.

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

Definition of radioactive waste

B-10 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, i.e. radioactive waste is "*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*".

B-11 One of the more self-contained definitions is in UK national regulations for the transfrontier shipment of radioactive waste[16], which define radioactive waste as "*any material which contains or is contaminated by radionuclides and for which no use is foreseen".*

Categorisation of radioactive waste

B-12 Radioactive waste in the UK is classified into four categories – Very Low Level Waste (VLLW), Low Level Waste (LLW), Intermediate Level Waste (ILW) and High Level Waste (HLW) as shown in Table B1 below. More details on classification are in Section L2.

IAEA Requirement: An appropriate waste classification scheme shall be established. (see Annex A G3)

TABLE B1: CATEGORISATION OF RADIOACTIVE WASTE IN THE UK

VLLW
Wastes which can be disposed of with ordinary refuse, each 0.1 cubic metre (m^3) of material containing less than 400 kilobecquerels (kBq) of beta/gamma activity or single items containing less than 40 kBq

LLW
Wastes other than those suitable for disposal with ordinary refuse, but not exceeding 4 gigabecquerels per tonne (GBq/te) of alpha or 12 gigabecquerels per tonne (GBq/te) of beta/gamma activity

ILW
Wastes with radioactivity levels exceeding the upper boundaries for LLW, but which do not need self-heating to be taken into account in the design of storage or disposal facilities

HLW
Wastes in which the temperature may rise significantly as a result of their radioactivity, so this factor has to be taken into account in designing storage or disposal facilities

32.1(iii) Radioactive Waste Management Policy

IAEA Requirement: National policies and implementation strategies for the safe management of radioactive waste shall be developed. (See Annex A, G5)

B-13 Much of the Government's policy on radioactive waste management is unchanged from the previous report, although it is currently subject to a review process. The following is a summary of the key points of the policy. More details, as presented in the 2003 report, updated as appropriate, are in Section L2. There are devolved administrations for Scotland, Wales and Northern Ireland with responsibilities for radioactive waste management policies.

General radioactive waste management policy

IAEA Requirement: Radioactive waste shall be managed in such a way that will not impose undue burdens on future generations. (See Annex A, G7)

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.

IAEA Requirement: Due consideration shall be given to the protection of workers and the public and to the protection of the environment. (See Annex A, G1)

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;
- wastes created are safely and appropriately managed and treated;
- they are then safely disposed of at appropriate times and in appropriate ways.

IAEA Requirement: Waste producers shall have prime responsibility for safety. (Annex A, G8)

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;
- 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.

IAEA Requirements: Radioactive waste shall be characterized in terms of its physical, chemical, radiological and biological properties. (Annex A, G4)

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 on the management of LLW is also covered by "Review of Radioactive Waste Management Policy Final conclusions" published in July 1995, Cm2919[17]. LLW is disposed of to a national disposal site, located at Drigg in the northwest of England. Having previously been owned and run by BNFL, from 1 April 2005 this facility became the responsibility of the NDA (with BNGSL as managing and operating contractor). Limited amounts of VLLW can be disposed of alongside

ordinary household refuse given the minimal amounts of radioactivity it contains. Cm2919 LLW management policy is currently being reviewed (see Section A).

Policy on radioactive waste discharges

B-19 In the UK, the policy on the regulation of radioactive waste discharges and disposals is 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. In conjunction with the Scotland and Northern Ireland Forum for Environmental Research (SNIFFER), SEPA, EA and EHS published a review of BPM in 2005; *UKRSR05: BPM for the Management of Radioactive Waste*[18]*.* This document:

- clarifies how the UK environmental agencies (the '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.

In 2004, SEPA and EA jointly published a guidance document entitled 'Guidance for the Environment Agencies Assessment of Best Practicable Environmental Option Studies at Nuclear Sites'[19] to support the Agencies assessment of BPEO studies relating to the authorisation of radioactive waste disposal at nuclear sites.

Policy on long-lived radioactive waste

B-20 Policy on the long-term management of long-lived radioactive waste in the UK is currently under review. These wastes, as they arise, are being safely stored and rigorously monitored on site, whilst Defra and the devolved administrations work towards finding a policy which has widespread public support and which is scientifically and technically feasible.

B-21 The first step has been to explain the problem and the Government's proposals, and how the public could be involved in the decision making process. Defra and the devolved administrations did this when they published the joint consultation paper *'Managing Radioactive Waste Safely'*[20] on 12 September 2001 and invited responses from interested parties over a six-month period. This led to the establishment in 2003 CoRWM to oversee an assessment of the best option, or combination of options, for the long-term management of the UK's higher activity radioactive waste. CoRWM was required to include a wide programme of public and stakeholder engagement, as well as consulting experts, as part of its work programme. See also paragraphs K-5 to K-15.

B-22 The programme of work set out by CoRWM is set out in Table B2.

TABLE B2: CoRWM Work Programme

Phase 1 - Preparation and trialling (*March to September 2004)*

Prepare preliminary reports on the radioactive waste inventory, a long list of options, screening criteria, assessment methodology, and decision-making process.
Trial of assessment methodologies.
Design public and stakeholder engagement (PSE) activities.

Phase 2 - Framing and initial short-listing (*October 2004 to July 2005)*

Publish reports on the inventory, options and issues; propose screening criteria to produce a short-list of options.
Public and Stakeholder Engagement 1: review the waste inventory, the long list of options, and the proposed screening criteria; raise other issues.
Propose a short-list of options.
Propose option assessment criteria and questions.
Public and Stakeholder Engagement 2: review short-list and proposed assessment process, comment on ethical issues relevant to assessing options, and raise issues on combining and implementing options.
Develop a methodology for assessing options in Phase 3.
Identify further information needs and commission work.
Identify issues relevant to the implementation of recommendations.
Finalise a short-list of options.

Phase 3 Options assessment (*August 2005 to March 2006)*

Specialist panels produce scoring schemes for the assessment criteria and apply them to the options.
Public and Stakeholder Engagement 3: participation in the assessment and comparison of options.
Take the outputs from the options assessment process and all other relevant material collected during these three phases of work to draw up recommendations.

Phase 4 Reporting (*April to July 2006)*

Drafting of the report and recommendations to Government.
Final report to Government.

Policy on decommissioning

B-23 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 the DTI website at http://www.dti.gov.uk/consultations/files/publication-1365.pdf. Key points of this policy are noted below.

Objectives of decommissioning

B-24 The objective of decommissioning is to remove the hazard the facility poses progressively. Decommissioning operations should be carried out as soon as reasonably practicable, taking all relevant factors into account.

Decommissioning strategies

IAEA Requirement
The operator shall establish and maintain decommissioning plans. (Annex A WD6)

B-25 Each operator produces and maintains decommissioning strategies and plans for its sites. The strategies and plans take into account the views of stakeholders (including relevant local authorities, public and stakeholder groups). The strategies 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-26 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-27 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-28 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/ALARA principles.

B-29 Operators review their strategies periodically and when changes in circumstances, including relevant Government policies, make this necessary.

B-30 The operators of sites for which the NDA is responsible are also required through their contracts with the 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.

Funding of decommissioning operations

B-31 The Government expects all operators to take the steps necessary to ensure that their decommissioning work is adequately funded.

Regulation

B-32 The nuclear regulators (HSE, EA and SEPA) ensure that the level of 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-33 Operators maintain a knowledge base, records and skills as necessary for their decommissioning operations and management of associated wastes. In addition. The 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.

Designing new nuclear facilities to take account of decommissioning

B-34 Any new facility has to 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.

32.1(iv) Radioactive Waste Management Practices

B-35 Radioactive waste management practices have not changed substantially since the last report. The following is a short summary of practices. A fuller description as presented in the 2003 UK National Report (updated where appropriate) is at Annex L2.

VLLW

B-36 VLLW covers wastes with very low concentrations of radioactivity. It arises from a variety of sources, including hospitals and non-nuclear industry. Because VLLW contains little total radioactivity, it may be safely managed by various means, such as disposal with domestic refuse directly at landfill sites or indirectly after incineration. In general, storage is not necessary.

LLW

B-37 Solid LLW includes metals, soil, building rubble and organic materials, which arise principally as lightly contaminated miscellaneous scrap. Most LLW is disposed of at the Low Level Waste Repository at Drigg in northwest England. The Drigg site is owned by the NDA and operated on their behalf by British Nuclear Group Sellafield Ltd. 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 the most suitable form for disposal to Drigg. Drigg 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. EA is reviewing the Drigg's disposal authorisation.

B-38 In the past, LLW has also been disposed of at the Dounreay site in the north of Scotland but this facility is now full. However, earlier in 2005 the Scottish Executive directed the Scottish Environment Protection Agency (SEPA) not to authorise consignments of LLW from Dounreay to the Drigg facility, and expressing the intention to develop a new on site disposal facility at Dounreay.

B-39 Since the 1950s around 1,000,000m^3 of LLW has been disposed of at Drigg and at Dounreay. The 2004 United Kingdom Radioactive Waste Inventory Main Report[15] (2004 Inventory) indicates that there were 21,000m^3 of LLW in storage on 1 April 2004 (c.f. 15,000m^3 in 2001), most of this was in temporary storage awaiting disposal at Drigg. 5,900m^3 of LLW is being stored at Dounreay pending a decision on future disposal strategy. 4,800m^3 is held at Capenhurst and 4,000m^3 is held at Sellafield. Other LLW is also being stored temporarily as a matter of policy before being processed for disposal. A small fraction of stocks, about 740m^3,is unsuitable for disposal in the currently available facilities.

B-40 Recognising that existing capacity for the disposal of UK LLW is limited, the Government instigated a review of LLW policy as described in paragraph L2.7.

ILW

B-41 ILW arises mainly from the reprocessing of spent fuel, and from general operations and maintenance of radioactive plant. The major components of ILW are metals and organic materials, with smaller quantities of cement, graphite, glass and ceramics. Until a long-term management solution is available, ILW will be stored in a passively safe form in shielded buildings, vaults or silo's, potentially for several

decades. The current approach to interim storage of ILW has been to build facilities at each site where it has arisen. The majority of ILW originates at Sellafield.

B-42 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, avoid costs and radiological doses involved in repackaging. Waste conditioning is carried out as far as practical in such a way to anticipate the requirements for future long term management.

B-43 The 2004 Inventory indicates that there were then 82,500m^3 of ILW in storage, of which 16,400m^3 had been treated to achieve passive safety by forming stable packages for long term management (compared with 75,400m^3 and 11,000m^3 respectively in 2001).

The role of Nirex and the Letter of Compliance (LoC)

B-44 Historically, proposals by the licensees for the conditioning of wastes were put to United Kingdom Nirex Limited (Nirex), the body originally given responsibility for delivering a disposal site for ILW in the UK. Nirex assessed the industry's proposals to condition radioactive waste to check suitability for disposal. Following such assessments, Nirex provided formal advice to guide waste producer's plans and future development. When satisfied that the proposals were consistent with Nirex standards, specifications, packaging principles and the phased geological repository concept, Nirex provided endorsement in the form of a 'Letter of Comfort' (now termed 'Letter of Compliance').

B-45 Arrangements have been made [21] to strengthen the "Letter of Compliance" system by introducing improved arrangements between the regulators (HSE and the environment agencies). Licensees provide safety cases to HSE to demonstrate the adequate protection and safeguards for activities involving ILW conditioning operations. The submission is supported by an assessment of the suitability for disposal of the conditioned waste, which a "Letter of Compliance" (LoC) assessment is one way of providing. To achieve this Nirex assesses the waste producer's conditioning proposal and provides advice and, where appropriate, endorsement through the issue of an LoC. For those safety cases that are chosen for assessment, HSE consults the appropriate environment agency and if both regulators are content, HSE grants permission for the treatment and packaging of the waste, as justified by the submission. If the regulators are not satisfied with the submission the licensee is told the reasons why and improves the submission until it is agreeable to the regulators. The improved regulatory arrangements are set out in joint guidance to industry[22].

Development of an ILW management strategy

B-46 The development of an ILW management strategy is dependent on the outcome of the long-lived radioactive waste policy review described above.

HLW

B-47 HLW is heat-generating waste that has accumulated since the early 1950s at Sellafield as the concentrated liquid nitric acid waste byproduct 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-48 The 2004 Inventory indicates that there were 1890m^3 of HLW in the UK in storage of which 1430m^3 is in liquid form and 456m^3 is vitrified. Some HLW at Dounreay, about 230m^3, has decayed to an extent that consideration is being given to classifying, and treating, this as ILW. Following stakeholder consultation, the decision to reclassify has been taken and a conceptual stage LoC and associated assessment report was issued to UKAEA in August 2005.

Planned reduction in liquid HLW at Sellafield

Development of an HLW management strategy

B-49 The development of an HLW management strategy is dependent on the outcome of the long-lived radioactive waste policy review described above.

Section C

Article 3: Scope of Application

Wording of 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 In September 1997, during the diplomatic conference to adopt this 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-2 Taking into account that declaration, this report addresses the UK 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.
c) Discharges as provided for in Articles 4, 7, 11, 14, 24 and 26 of the Joint Convention.

C-3 The UK Government has decided not to address in this report 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. However, the UK will reconsider this position in the future.

Section D

Inventories and Lists

Wording of 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 Inventories and lists required by Article 32.2 for the UK are in the following Annexes to this report.

a) Spent Fuel Management Facilities: see Section L1

b) Inventory of Spent Fuel: see Table L1.1, no spent fuel has been disposed of in the UK.

c) Radioactive Waste Management Facilities: see Section L2.

d) Inventory of Radioactive Waste

Tables L2.1, L2.2 and L2.3 summarises 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 for 2004 and published in 2005.

IAEA Requirement: An inventory of existing and anticipated radioactive waste shall be established. (Annex A IN4)

e) Nuclear Facilities in the process of being decommissioned: see Section L2. 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 via http://www.nda.gov.uk/

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Section E

Legislative and Regulatory System

Articles 18, 19 & 20

Wording of 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.

IAEA Requirement: A legislative regime shall be established. (Annex A L1)

E-1 The main legislation covering the safety of workers and the general public at nuclear licensed sites is the HSWA74[7] and associated statutory provisions, which include the Nuclear Installations Act 1965 (as amended) (NIA65)[8]. 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)[9].

E-2 The Energy Act 2004[10] established a new Non Departmental Public Body, the Nuclear Decommissioning Authority (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 the NDA has not changed the regulatory framework described above. However the Energy Act also amended RSA93 to enable a streamlined approach for the EA and SEPA to transfer radioactive substances authorisations. These transfers are necessary for the restructuring of the nuclear industry and future competition for contracts for the NDA sites.

Article 19

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

Wording of Article 19.

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.

IAEA Requirement: Regulatory regime shall be proportionate. (Annex A L2)

E-3 The following 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 as indicated in the boxes that appear throughout the text. 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'.

E-4 There are no nuclear installations in Northern Ireland, which has its own regulatory framework that mirrors that in the rest of the UK. The following, therefore, does not mention Northern Ireland legislation. The relevant statutory provisions for the province were included in the UK's first national report[23].

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

IAEA Requirement: Due consideration shall be given to the protection of workers and the public and to the protection of the environment. (Annex A G1)

E-5 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. The objectives and application of each piece of legislation is given in more detail in the UK's first national report for the Joint Convention[23].

IAEA Requirement: Legislation shall be promulgated to provide for the effective control of nuclear, radiation, radioactive waste and transport safety. (Annex A L3)

E-6 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 E18);
b) Road transport of radioactive material comes under a framework enforced by the Department for Transport.
c) Transfrontier shipments come under directly applicable European legislation, or European requirements implemented into the UK legislative system under the European Communities Act[24].

E-7 Much of the legislation is unchanged from the previous report. The following provides a brief summary of each key piece of legislation. More detailed information was presented in the UK's first national report[23].

The Health and Safety at Work etc. Act 1974 (HSWA74)[7]

E-8 HSWA74 places a general duty 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. HSWA74 also established the Health and Safety Executive (HSE) as a regulator and sets out its funding arrangements.

IAEA Requirement: Waste producers shall have prime responsibility for safety. (Annex A G8)

Nuclear Installations Act 1965 (as amended) (NIA65)[8]

E-9 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 Act empowers HSE to attach conditions in the interests of safety or radioactive waste management on the site to any licence that it grants.

Radioactive Substances Act 1993 (as amended) (RSA93)[9]

E-10 RSA93 requires prior authorisation to dispose of radioactive waste, including 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). The Act empowers the appropriate environment agency to attach conditions to any authorisation that it issues. The Energy Act 2004[10] amended RSA93 to allow the transfer of authorisations from one person to another following consultation with statutory consultees. This harmonises radioactive substances regulation with other areas of environmental regulation.

Environment Act 1995 (EA95)[25]

E-11 EA95 sets the basis for the regulatory framework with respect to environmental protection. It also establishes the Environment Agency (EA) and the Scottish Environment Protection Agency (SEPA) as regulators together with their funding arrangements.

Ionising Radiations Regulations 1999 (IRR99)[26]

E-12 IRR99 provides for the protection of all workers and members of the public, whether on licensed sites or elsewhere, from ionising radiations.

Justification Regulations [11]

E-13 In August 2004, the Justification of Practices Involving Ionising Radiation Regulations 2004 came into force (SI 1769). 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 efficacy.

The Radiation (Emergency Preparedness and Public Information) Regulations 2001 (REPPIR) [27]

E-14 REPPIR implements in Great Britain the articles on intervention in cases of radiation emergency in European Council Directive 96/29/Euratom[28]. It also partly implements Council Directive 89/618/Euratom[29] 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 an event that is likely to result in any member of the public receiving an effective dose of 5 mSv during the year immediately following the emergency.

High Activity Sealed Sources and Orphan Sources Regulations 2005 (HASS Regulations) [13]

E-15 The HASS Regulations 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.

Other Relevant Legislative Frameworks

Planning / Environmental Assessment Regulation

E-16 The planning regulatory framework covers, in general, requirements for Environmental Impact Assessments (EIA). In most cases local planning authorities (LPAs) are the competent authorities.

E-17 EIA requirements on the dismantling and decommissioning of nuclear power stations and reactors have been implemented by the Nuclear Reactors (Environmental Impact Assessment for Decommissioning) Regulations 1999[30], which apply to England, Scotland and Wales (there are no nuclear reactors in Northern Ireland). They prohibit dismantling or decommissioning from being carried out without the consent of the HSE. These Regulations implement Council Directive 85/337/EEC[31] on the assessment of the effects of certain public and private projects on the environment, as amended by Council Directive 97/11/EEC[32].

E-18 The Health and Safety Commission (HSC) undertook a public consultation during the period from 1 March to 31 May 2005 on HSE's proposals for redrafted Guidance on the EIADR99. The redrafted guidance provides interpretative advice on a number of difficult EIADR-related issues, drawing on experience with the initial application of the regulations. It is hoped that the guidance will be useful to consultees and others who have an interest in the process.

E-19 Once the comments received from the consultation exercise have been analysed, it's expected that the guidance will be published, as an online document only, during the beginning of 2006. The Consultation Document is on HSE's website at www.hse.gov.uk/consult/condocs/eiadr.htm

Proposed Amendments to the EIADR99

E-20 The Health and Safety Commission (HSC) published on 1 August 2005 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-21 The consultation will end on 31 October 2005 and the amending regulations should come into force in April 2006. A copy of the Consultation Document is on HSE's website at www.hse.gov.uk/consult/condocs/eiadr05.htm

Transfrontier Shipments

E-22 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[24].

E-23 The two relevant pieces of legislation are:

a) Council Regulation (Euratom) No 1493/93[33] on shipments of radioactive substances between Member States; and

b) The Transfrontier Shipment of Radioactive Waste Regulations 1993[16].

E-24 The European Commission has proposed a new Council Directive on the supervision and control of shipments of radioactive waste and spent fuel, which is currently under discussion. This Directive will be transposed into UK law through amendments to, or replacement of, the Transfrontier Shipment of Radioactive Waste Regulations 1993.

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

IAEA Requirement: Legislation shall establish authorisation / licensing processes. (Annex A L3.2)

E-25 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 in turn in the following paragraphs:

IAEA Requirement: The regulatory body shall be responsible for authorization / licensing. (Annex A RB3.1)

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.

d) For most sites[1] planning consent will also be required from local planning authorities before a new spent fuel or radioactive waste management activity takes place.

E-26 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 and Delicensing

E-27 Under NIA65, no site may be used for the purpose of installing or operating a nuclear installation unless a licence has been granted by the HSE. Such sites include those for spent fuel and radioactive waste as prescribed both in the Act and in subsidiary legislation, and are installations designed or adapted for:

a) 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;
b) 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.

E-28 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 is no longer any danger from ionising radiations from anything on the site.

IAEA Requirement: There shall be criteria for the ending of regulatory control. (Annex A L3.3)

E-29 HSE has published a policy statement[34] that provides a basis for the considerations that need to be made by HSE in order to delicense 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 Basic Safety Standards Directive, and the International Atomic Energy Agency (IAEA) Safety Guide "Application of the Concepts of Exclusion, Exemption and Clearance".

E-30 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.

IAEA Requirement: Established criteria shall be met for release of a site from regulatory control. (Annex A WD7)

[1] Other than power stations for which a separate consent regime exists. However, nuclear reactors are not covered by this convention.

E-31 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 delicensed.

Application of 'no danger' to discharges

E-32 Legislation such as RSA93 (and the exemption orders made under it) and the Basic Safety Standards Directive (Euratom 96/29) 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[2], 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 Basic Safety Standards Directive (Euratom 96/29) 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[3].

Authorisation of the accumulation of radioactive waste

E-33 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-34 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[35] 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.

Planning consent for spent fuel and radioactive waste management facilities

E-35 Planning permission is required for any development of land. "Development" is defined in Section 55 of the Town and Country Planning Act 1990[36] as "the carrying out of building, engineering, mining or other operations in, on, over or under land, or the making of any material change in the use of any buildings or other land".

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[2] Cm 2919 Review of Radioactive Waste Management Policy – Section 73

[3] National Radiological Protection Board publication "Living with Radiation", ISBN 0-85951-419-6, 1998. This states (Page 24) that the average annual risk of death in the UK from all sources of ionising radiation, including medical and background, is about 1 in 7700.

19.2 (iii) Prohibition of Operation without a Licence

E-36 The UK legislative framework prohibits the operation of spent fuel or radioactive waste management facilities without a licence as described in table E1 below:

Table E1 – 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[8]	HSE	Nuclear Site Licence
The keeping and use of radioactive material (other than on licensed nuclear sites)	RSA93[9]	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 [37], EIA (Scotland) Regulations 1999[38] Planning (EIA) Regulations (NI) 1999[39]	Local Planning Authority	Planning Consent (including EIA)
Decommissioning of a nuclear reactor or power station.	Nuclear Reactors (EIA Decomm.) Regs 99[30]	HSE	Consent (including EIA)
(E&W) = England and Wales: (S) = Scotland: (NI) = Northern Ireland EIA = Environmental Impact Assessment, T&CP = Town and Country Planning			

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

Institutional control

E-37 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 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;
b)the date when a new nuclear site licence is granted either to the same licensee or to some other person.

E-38 In other words, the legislation provides for a continuous period of institutional

control for a site, either by a single organisation 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-39 HSE's nuclear installation 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 maximum impacts on improving safety.

IAEA Requirement: The regulatory body shall carry out inspections. (Annex A RB3.3)

E-40 Each major nuclear licensed site has an allocated site inspector. Large multi-plant sites have more than one inspector, e.g. BNGSL's 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 hand over 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. See Section E of first report for more details.

Environment Agency and Scottish Environment Protection Agency

E-41 Authorisations for the disposal of radioactive waste, including discharges to the environment, contain a range of conditions and limitations. These include waste disposal limits, reporting requirements and conditions relating to the operation of the process. Assessment of compliance with disposal limits is primarily based on the operator's own sampling and monitoring with a requirement for prompt notification of breaches of limits and conditions and an investigation and resolution of the breach. Compliance with operational conditions is established through a programme of site inspections, which are prioritised according to the radiological risk.

E-42 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. Site inspections are also carried out to investigate incidents. See Section E of first report for more details.

Documentation and reporting

E-43 Regulator requirements for documentation and reporting are contained in:

IAEA Requirement: Appropriate records shall be retained. (Annex A WD9)

a) HSE's standard nuclear site licence conditions (see Section L4 of the UK's first report[23] for full details); and
b) the EA and SEPA standard authorisation conditions for radioactive waste disposal from nuclear sites (see Section L4 of the UK's first report[23] for further details).

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

IAEA Requirement: The regulatory body shall carry out enforcement. (Annex A RB3.4)

E-44 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 "Best practicable means (BPM)". Information on how these concepts are applied is given in Section L2. The following provides a brief summary of the practical aspects of enforcement.

Health and Safety Executive

E-45 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 *"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-46 HSWA74 enables the HSE to appoint Inspectors and gives them regulatory powers to enforce applicable regulations. The Health and Safety Commission (HSC) has published the *'Enforcement Policy Statement'*[40], implemented by HSE in the *'Enforcement Management Model'*[41], 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 enforcement notices 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 under the nuclear site licence conditions are described in Table E2 on the next page.

E-47 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, HSWA Section 33 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. More details of offences and penalties are given in Table L3, page 112.

Table E2: HSE enforcement powers under nuclear site licence conditions

Consents - A Consent is required before the licensee can carry out any activity, which is specifically identified in the licence. 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.
Approvals - 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.
Directions - A Direction is issued by HSE when it requires the licensee to take a particular action. For example, Licence Condition 31(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.
Agreements - An Agreement issued by HSE allows a licensee, in accordance with its own arrangements, to proceed with an agreed course of action. For example, Licence Condition 22 requires a licensee to have adequate arrangements to control modifications to safety related plant. An agreement may state that modifications, which, if inadequately conceived or implemented, could have serious nuclear safety implications, can only be carried out with the agreement of HSE. Hence, the licensee submits a safety case justifying the modification and does not proceed until HSE has written agreeing to this proposal.
Notification - The standard licence gives HSE powers to request the submission of information by notifying the licensee of the requirement. For example in Licence Condition 21(8) the licensee shall, if notified by HSE, submit a safety case and shall 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 Licence Condition 23(2), if HSE specifies, the licensee is required to refer operating rules to the licensee's 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.

Environment Agencies

E-48 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 also include a schedule for setting out improvements to be made by the operator, and information to be supplied to the environment agencies within specified time limits.

E-49 The environment agencies' inspectors carry out site inspections and formal reviews of the limitations and conditions in RSA93 authorisations. This ensures operators are complying with the requirements of authorisations and that these remain appropriate and up to date. Reviews of authorisations are now a formal requirement of RSA93 after it was amended by the Energy Act 2004.

E-50 When the environment agencies have reasonable cause to believe that the conditions or limitations of an authorisation may have been broken, they have powers under the Environment Act 1995 to investigate. Powers are extensive and include (but are not limited to) the right of entry, examination, direction to remain undisturbed, taking of measurements, photographs and samples, taking possession of articles, requiring answers to questions and production of records.

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 EA can undertake prosecution itself). Variation of the conditions or limitations in an authorisation is one course of action also open to the agencies.

E-51 The agencies have the power under RSA93 to issue Enforcement Notices and Prohibition Notices. Enforcement Notices can be issued when an operator is failing to comply with any limitation or condition in an authorisation or where the agencies believe the operator is likely to fail to comply. Enforcement Notices specify the matters constituting the failure, the steps that must be taken to remedy those matters and the timescales within which those steps must be taken. Prohibition Notices can be issued when an operator is carrying on an activity that involves an imminent risk of pollution of the environment or harm to human health. Prohibition Notices can be served even if the activity complies with the conditions or limitations of an authorisation. Prohibition Notices must specify the opinion of the agency, the matters giving rise to the risk involved in the activity, the steps that must be taken to remove the risk and the period within which those steps must be taken. The Notice must also direct that relevant conditions or limitations in an authorisation cease to have effect until the Notice is withdrawn.

Offences and the corresponding penalties under RSA93

Offences relating to registration or authorisation

E-52 Any person who uses radioactive material, or mobile radioactive apparatus without registration or accumulates or disposes radioactive waste without authorisation shall be liable to

a) on summary conviction, to a fine not exceeding £20,000 or to imprisonment for a term not exceeding six months, or both;

b) on conviction on indictment, to a fine or to imprisonment for a term not exceeding five years, or both.

Offences relating to sections 19 and 20 of RSA93

E-53 Any person who contravenes section 19 of the Act, i.e. the duty to display certificates of registration or authorisation shall be guilty of an offence and liable

a) on summary conviction, to a fine not exceeding the statutory maximum;

b) on conviction on indictment, to a fine

E-54 Any person who fails to comply with a requirement imposed on him under section 20, i.e. duty to retain and produce site or disposal records, shall be guilty of an offence and liable

a) on summary conviction, to a fine not exceeding the statutory maximum or to imprisonment for a term not exceeding three months, or both;

b) on conviction on indictment, to a fine or to imprisonment for a term not exceeding two years, or both.

Offences relating to disclosure of trade secrets

E-55 If any person discloses any information relating to any relevant process or trade secret used in carrying on any particular undertaking which has been given to or obtained by him under this Act or in connection with the execution of this

Act, he shall be guilty of an offence

a) on summary conviction, to a fine not exceeding the statutory maximum;

b) on conviction on indictment, to a fine.

Offences under the Environment Act 1995 (EA95)[25]

E-56 Powers of entry under section 31 and the offence of obstruction are in the EA95. The relevant sections are 108 to 110. Any person who intentionally obstructs an inspector or other person in the exercise of any powers conferred by the section, i.e. the right of entry and inspection, or refuses or without reasonable excuse fails to provide facilities or assistance or any information or to permit any inspection reasonably required by an inspector or other person under that section shall be guilty of an offence and liable

a) on summary conviction, to a fine not exceeding the statutory maximum;

b) on conviction on indictment, to a fine.

Food Standards Agency

E-57 The Food Standards Agency is a statutory consultee to SEPA and the EA 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 EA to vary or revoke the authorisation. The Food Standards Agency does not grant authorisations to the operators of nuclear sites.

Northern Ireland

E-58 EA95 does not apply in Northern Ireland. The Chief Radiochemical Inspector of the EHS administers RSA93. Inspector enforcement powers are as for EA and SEPA.

Enforcement of planning control

E-59 The purpose of the planning enforcement provisions in the Town and Country Planning Act 1990[36] 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:

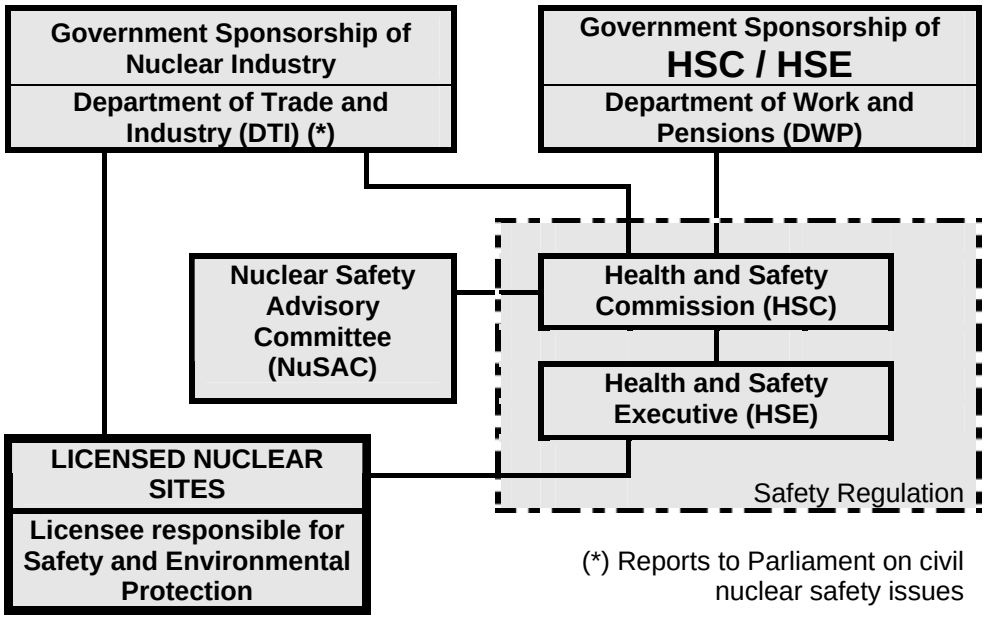
a) to issue an enforcement notice;
b) to serve a stop notice which can prohibit, almost immediately, any activity to which the accompanying enforcement notice relates; and
c) to serve a breach of condition notice if a there is a failure to comply with a condition imposed on a grant of planning permission.

E-60 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-61 The diagrams at Figures E1(a) and E1(b) illustrate the responsibilities of the various bodies in the UK and how they interact.

Figure E1(a) Responsibilities for the safety of spent fuel, reprocessing and radioactive waste management at nuclear licensed sites:



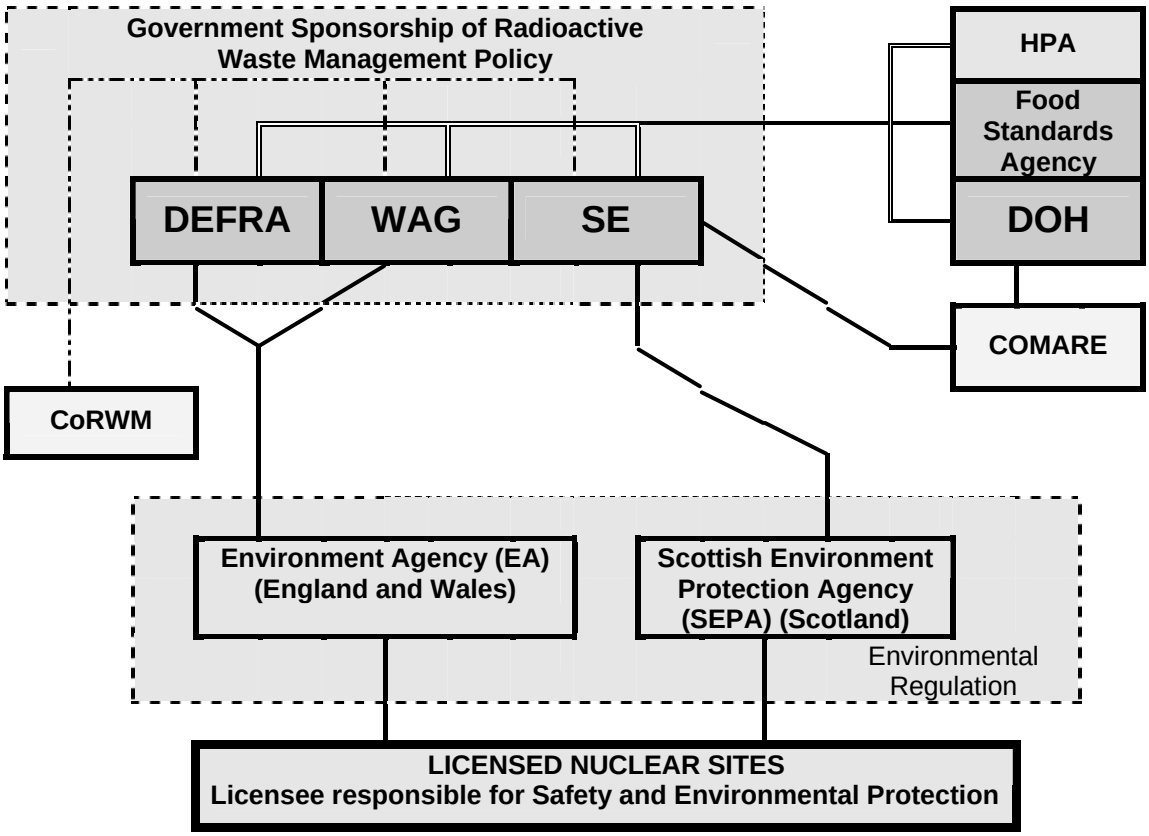
Government Responsibilities

E-62 The DTI website[4] 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.

[4] http://www.dti.gov.uk/energy/nuclear/safety

Figure E1(b) Responsibilities for the environmental effects of spent fuel, reprocessing and radioactive waste management



[DOH is the Department of Health, COMARE (see paragraph E-82) and HPA is the Health Protection Agency (see paragraphs E-76 and E-77) in the above diagram]

E-63 Sponsorship of the civil nuclear industry and accountability to Parliament for civil nuclear safety in Great Britain rests with the Secretary of State for Trade and Industry. Defra Ministers are accountable to Parliament for radioactive waste policy in England. Radioactive waste policy is devolved to the Scottish Executive and the Welsh Assembly Government (WAG). However, the Secretary of State for Trade and Industry 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 the Health and Safety Commission (HSC) and the 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 department, and is a statutory consultee to the EA 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 independency.

Responsibilities of operators or employers

Operators/ employers

IAEA Requirement: The legal framework shall ensure an allocation of responsibility for safety at all times. (Annex A L3.1)

E-64 Under HSWA74, employers have the prime responsibility for ensuring the safety of their workers and the public from dangers arising from their work.

IAEA Requirement: There shall be adequate infrastructural arrangements for decommissioning and radioactive waste and spent fuel management. (Annex A IN1)

E-65 As stated at paragraph 16, 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-66 The producers and owners of radioactive waste bear the cost of managing and disposing of the waste.

Responsibilities of regulators

Health and Safety Commission (HSC)

E-67 HSC was set up under HSAW74 as the overarching body that sets the policy framework for health and safety regulation. The HSC's duty is to:

a) assist and encourage people to promote health and safety at work;
b) make arrangements to carry out and publish research and provide training and information in connection with health and safety at work;
c) ensure that people are kept informed of, and adequately advised on, matters relevant to health and safety at work;
d) submit proposals for the making of regulations.

E-68 See Section E of the first report for more details.

Health and Safety Executive (HSE)

E-69 HSE's or 'the Executive's' duty is to enforce the relevant statutory provisions where it is the enforcing authority; to exercise on behalf of the HSC such of the HSC's functions as HSC directs; and to give effect to any directions given to it by HSC (except that HSC cannot give the Executive any directions as to enforcement in a particular case). HSE is 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. See Section E of first report for more details

Environment Agency and Scottish Environment Protection Agency

E-70 The Environment Agency (EA) is the principal environmental regulator in England and Wales. The Scottish Environment Protection Agency (SEPA) has broadly equivalent responsibilities in Scotland. Their regulatory responsibilities

include the authorisation of the disposal of radioactive wastes from nuclear licensed sites.

Radioactive Materials Transport

E-71 Radioactive Materials Transport Division (RMTD) of the Department for Transport is responsible, throughout Great Britain, for regulating the packaging, labeling and vehicle marking standards for radioactive material carried by road.

General regulatory responsibilities

E-72 In addition to the responsibilities mentioned above, each of the regulators provide advice on matters within their remit as required, or when requested, to other bodies, government and the public.

IAEA Requirement: The regulatory body shall provide information and advice to other bodies and the public. (Annex A RB4)

E-73 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 their work is published, in particular, and where appropriate:

IAEA Requirement: The regulatory body shall establish safety principles, criteria, regulations and guides. (Annex A RB6)

a) any internal guidance on implementing legislation;
b) reports of inspection or assessment or other regulatory activities;
c) specific guidance to operators on complying with legislation.

E-74 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.

IAEA Requirement: International Co-operation. (Annex A RB5)

E-75 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.

IAEA Requirement: The regulatory body shall carry out reviews and assessments. (Annex A RB3.2)

Responsibilities of other Agencies and bodies

Health Protection Agency (HPA)

E-76 The National Radiological Protection Board (NRPB), merged with the new Health Protection Agency for England and Wales in April 2005, becoming the Radiation Protection Division within the HPA Centre for Radiation, Chemical and Environmental Hazards. The Radiation Protection Division retains, across the UK, the statutory functions of the former NRPB:

a) by means of research and otherwise, to advance the acquisition of knowledge about the protection of mankind from radiation hazards.
b) to provide information and advice to persons (including Government Departments and the Devolved Administrations) with responsibilities in the United Kingdom in relation to the protection from radiation hazards either of the community as a whole or of particular sections of the community.

E-77 The Radiation Protection Division can:

a) provide technical services to persons concerned with radiation hazards; and
b) make charges for such services, and for providing information and advice.

UK Nirex Ltd

E-78 Nirex is a Government-owned and controlled company whose mission is, in support of Government policy, to develop and advise on safe, environmentally sound and publicly acceptable options for the long-term management of radioactive materials in the UK.

E-79 Nirex plays a key part in the improved regulatory arrangements[5] for the conditioning of intermediate level radioactive waste on nuclear licensed sites, through its 'Letter of Compliance' system described in paragraphs B-44 and B-45 above.

Responsibilities of Advisory Bodies

IAEA Requirement: Advisory Bodies. (Annex A G10)

Committee on Radioactive Waste Management (CoRWM)

E-80 In November 2003, Government set up the independent Committee 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 is due to deliver its recommendations by July 2006. For the period of CoRWM's work, the Government's previous advisory committee, the Radioactive Waste Management Advisory Committee (RWMAC), has been put into abeyance. Government has said that, once CoRWM's work is complete, it will review its radioactive waste management advisory committee machinery and decide what is required to meet the UK's future needs.

The Nuclear Safety Advisory Committee (NuSAC)

E-81 HSC is able to draw on independent expert technical advice on nuclear safety issues from an independent committee: NuSAC. 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:

a) To advise the HSC on major issues affecting the safety of nuclear installations including design, siting, operation, maintenance and decommissioning which are referred to them or which they consider require attention.
b) To advise the HSC on the adequacy and balance of its nuclear safety research programme.'

Committee on Medical Aspects of Radiation in the Environment (COMARE)

E-82 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

[5] Improved regulatory arrangements for the conditioning of intermediate level radioactive waste on nuclear licensed sites, Provision of advice to the Health and Safety Executive by the Environment Agency and the Scottish Environment Protection Agency, December 2003

information can be found on COMARE's web site www.doh.gov.uk/comare/comare.htm

19.2 (vi) .7 Financial provisions

IAEA Requirement: Adequate financial resources shall be ensured for radioactive waste management and decommissioning. (Annex A WD8)

E-83 The NDA has responsibility for the operation of commercial and waste management activities on their sites and for the eventual decommissioning of those sites. It is funded partly from government and partly from revenue from commercial activities on NDA sites. The 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 the NDA are at paragraphs F-14 to F-18.

19.3 Consideration of whether to Regulate Radioactive Materials as Radioactive Waste

E-84 As stated at paragraph B-10, 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-85 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.

E-86 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 this issue. More generally, the UK 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. The 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. The NDA is also responsible for the safe storage of Plutonium on its sites owned by overseas customers pending its eventual return to its owners.

Article 20. REGULATORY BODY

Wording of Article 20.

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.

20.1 Regulators

IAEA Requirement: The regulatory body shall be structured so as to ensure that it is capable of discharging its responsibilities. (Annex A RB8)

E-87 In the UK, the regulatory bodies entrusted with implementing the framework described in Article 19 are identified below.

Health and Safety Regulation

E-88 HSE is responsible for general health and safety regulations and the nuclear site licensing system under NIA65.

Environmental Regulation

E-89 EA was set up by EA95 to provide environmental protection and improvement in England and Wales.

E-90 SEPA was set up by EA95 to provide environmental protection and improvement in Scotland.

E-91 EHS, an executive agency of the Department of the Environment in Northern Ireland (DOENI), was established in 1996.

Authority, Competence, Financial and Human Resources

E-92 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 Section E of the first report.

IAEA Requirement The regulatory body shall implement appropriate quality management. (Annex A RB9)	IAEA Requirement Regulatory body shall have adequate authority and resources. (Annex A RB10)	IAEA Requirement If the regulatory body is not self-sufficient in all areas it shall seek advice or assistance, as appropriate, from consultants. (Annex A RB11)	IAEA Requirement If the regulatory body consists of more than one authority, effective arrangements shall be made for effective co-ordination. (Annex A RB2)

Interactions between Regulators

E-93 For effective overall regulation of spent fuel and radioactive waste it is necessary that all of the regulators work well together. Where appropriate, Memoranda of Understanding (MoU) or Concordats are signed between regulators to set out how the interaction between regulators should operate. Particular examples of significance to radioactive waste and spent fuel management are those between HSE and each of the environment agencies.

E-94 The joint HSE, EA and SEPA statement of December 2003[21] "The improved regulatory arrangements for the conditioning of intermediate level radioactive waste on nuclear licensed sites" sets out the role of Nirex in relation to the

regulators' statutory functions. Nirex is not a regulator: its role under the improved regulatory arrangements is to assess the waste producers' packaging proposals and issues a 'Letter of Compliance' (LoC) or 'Letter of Advice' (LoA) as appropriate, which forms part of the licensee's safety case submitted to HSE. HSE consults the appropriate environment agency under the MoU and if both regulators are content HSE grants permission for the treatment and packaging of the waste. Nirex's work is scrutinised by both environment agencies.

Independence of the regulatory function

Relationship of HSE, EA and SEPA with government departments

IAEA Requirement: Regulatory Body shall be independent.
(Annex A RB1)

E-95 HSE is sponsored by the Department for Work and Pensions (DWP). However, the Secretary of State for Trade and Industry is answerable to Parliament for nuclear safety in England, Wales and Scotland. The Executive provides factual information to the DTI Minister on matters of nuclear safety regulation. HM Chief Inspector of Nuclear Installations (who is also a Director of HSE and sits on the HSE Board) provides independent advice to the DTI Minister on nuclear safety related matters for civil licensed sites. 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.

E-96 EA is sponsored by Defra and WAG. On radioactive waste matters it works closely with the Radioactive Substances Division of Defra, the Department of Health (DoH) and WAG. It also maintains good lines of communication with DTI.

E-97 SEPA is sponsored by the Scottish Executive. On radioactive waste matters it works closely with the Scottish Executive Environment and Rural Affairs Department, the Radioactive Substances Division of Defra and the DoH. It also maintains good lines of communication with DTI.

E-98 Concordats or MOUs exist between the regulators and the Food Standards Agency. On radioactive waste matters it works closely with the Scottish Executive Environment and Rural Affairs and Health Departments and with the Radioactive Substances Division of Defra.

Relationship of HSE, EA and SEPA to bodies responsible for promotion and utilisation of nuclear energy

E-99 The DTI 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, this includes British Nuclear Fuels plc (BNFL).

E-100 In carrying out its responsibilities, DTI 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-101 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. The environment agencies are responsible, as appropriate, to Defra,

WAG, the SE, or the DOENI to provide the environmental protection regulatory system.

Section F

Other General Safety Provisions

Articles 21 – 26

Wording of 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.

Article 21.1 Prime Responsibility for Safety

F-1 A fundamental principle of the British regulatory system is that responsibility for health and safety lies with those who own, manage or work in industrial and commercial undertakings.

IAEA Requirement
Waste producers shall have prime responsibility for safety. (Annex A G8)

F-2 Although ownership of many sites in the UK has transferred to the 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-3 The UK 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[9] 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-4 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-5 For radioactive waste that is 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

Wording of Article 22.

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.

Article 22(i) Availability of Qualified Staff

F-6 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:

IAEA Requirement: The competence of personnel responsible for the safe operation shall be assured. (Annex A WD11)

a) it had identified all safety related activities on the site, with a clear definition and documentation of 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-7 The licensee is also required, under site Licence Condition 36 (see Annex 6.2c in first UK report) to have arrangements for the control of any change to its organisational structure or resources that might affect safety.

Article 22(ii) Financial resources

F-8 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:

IAEA Requirement: Adequate financial resources shall be ensured for radioactive waste management and decommissioning. (Annex A WD8)

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

F-9 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-10 The site licensee remains responsible for the safety of sites. However, where sites are owned by the NDA, under the site licencee's contract with the 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 www.nda.gov.uk for more information). The

Funding of the NDA is described below.

Financing radioactive waste management

F-11 The published audited accounts of UK spent fuel, reprocessing and radioactive waste management facility operators[42,43,44] 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-12 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 EA or SEPA, recovers its costs in granting, monitoring and enforcing the authorisations from the operator.

Financing decommissioning programmes

F-13 The 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 £50 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-14 The NDA is funded directly from Central Government, through its Sponsoring Department, the DTI.

F-15 As part of the Government's 2004 Spending Review, the NDA received a budget for 2005/06 of approximately £2.2 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 the NDA's total budget although this proportion will reduce over time as operational facilities enter decommissioning.

F-16 The European Commission recently announced an investigation into possible State aid arising out of the establishment of the NDA. Pending the outcome of the investigation, funding available to the NDA will be limited so far as activities formerly conducted by BNFL are concerned.

Financing disposal of high-activity sealed sources

F-17 The HASS Regulations will, from 2006 onwards, strengthen 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), will have to be made to meet the costs of disposal of any high-activity source to be acquired. Government is developing guidance for the UK regulators on the acceptable arrangements companies can make to meet the requirements for such financial provision.

Article 23. QUALITY ASSURANCE

Wording of Article 23.

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.

IAEA Requirement: A comprehensive quality assurance programme shall be applied. (Annex A WD13)

F-18 In the UK, Quality Assurance (QA) is, and has been for many years a condition attached to nuclear site licenses, an essential part of a licensee's spent fuel, reprocessing and radioactive waste safety management systems. All licensees are required to make and implement adequate QA arrangements in respect of all matters that may affect safety. This applies throughout the lifecycle of a spent fuel, reprocessing and radioactive waste management facility - siting, design, construction, commissioning, operation (including maintenance and modification), and decommissioning - and to all activities associated with the safe operation of the installation. Each phase in the life of a spent fuel, reprocessing and radioactive waste management facility is covered by a document, usually called a QA Programme, which describes the commitment to the adoption of QA principles. The documented arrangements are prepared by the licensee prior to the commencement of any of the plant life phases.

F-19 Little has changed since the last report, more details are given in Section F of the UK's first report.

Article 24. OPERATIONAL RADIATION PROTECTION

Wording of Article 24:

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*.

IAEA Requirements: Due consideration shall be given to the protection of workers and the public and to the protection of the environment. (Annex A G1)

F-20 The UK's safety requirements and regulations for radiation safety are described under Article 19.2(i) (in Section

E). Nothing has fundamentally changed in the way radiation exposure and radioactive discharges are limited. Details are provided in the UK's first report. This section comments on the trends since the previous report.

Article 24.1(i) ALARA and ALARP

F-21 The results of the practical application of ALARA/ALARP are seen in the trends in occupational doses. Table F1 below shows this over the 1999 to 2003 period for workers undertaking fuel reprocessing, waste treatment and the decommissioning of nuclear facilities. Further information on occupational doses can be found at http://www.hse.gov.uk/radiation/ionising/doses/cidi.htm

F-22 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, employers have achieved considerable dose reductions over the past ten years.

Article 24.1(ii) Dose Limitation

F-23 IRR99 lays down dose limits for persons engaged in work with ionising radiation. For adult employees the dose limit for whole body exposure is currently 20 millisieverts (mSv) per year. No workers in UK radioactive waste or spent fuel management facilities exceeded this limit since the previous report.

Table F1 Dose information for classified persons

(excluding those with a recorded dose of less than 0.1 mSv)

Nuclear Fuel Reprocessing

Year	1999	2000	2001	2002	2003
Total Classified Workers	3521	4028	3380	3841	3869
Collective Dose, Man-mSv	3858	2958	2638	2791	2641
Mean dose in mSv	1.1	0.7	0.8	0.7	0.7
Classified persons with dose:					
>6mSv	176*	37	31	31	15
>10mSv	6	1	2	3	0
>15mSv	0	0	0	0	0
>20mSv	0	0	0	0	0

Radioactive Waste Treatment

Year	1999	2000	2001	2002	2003
Total Classified Workers	289	318	360	371	364
Collective Dose, Man-mSv	97	74	81	77	69
Mean dose in mSv	0.3	0.2	0.2	0.2	0.2
Classified persons with dose:					
>6mSv	2*	0	0	0	0
>10mSv	0	0	0	0	0
>15mSv	0	0	0	0	0
>20mSv	0	0	0	0	0

Decommissioning

Year	1999	2000	2001	2002	2003
Total Classified Workers	1579	1774	2375	2577	2531
Collective Dose, Man-mSv	1220	965	2218	2463	2642
Mean dose in mSv	0.8	0.5	0.9	1	1
Classified persons with dose:					
>6mSv	65*	21	58	43	63
>10mSv	3	1	0	1	1
>15mSv	1	0	0	0	0
>20mSv	0	0	0	0	0

* 1999 dose band was >5 mSv

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

F-24 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

Regulatory environmental radiological surveillance

F-25 Authorisations under RSA93 for discharges of radioactivity to the environment not only set numerical limits on such discharges but also require operators to minimize the activity of waste discharged by applying BPM and to monitor the levels of discharged radionuclides in the local environment. Monitoring 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 2004, 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 1 mSv for all artificial sources of radiation (excluding doses from medical sources). Details can be found in Radioactivity in Food and the Environment 2004 [45].

F-26 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[46] which is published by Defra. Further information can also be found on the following organisations' Internet sites:

www.environment-agency.gov.uk/nuclear

www.defra.gov.uk

www.sepa.org.uk

www.ehsni.gov.uk

F-27 Many nuclear site licensees also publish, annually, reports of their safety and environmental performance, see, for example:

www.british-energy.co.uk

www.bnfl.com

www.ukaea.org.uk

F-28 Information on radioactive waste management and disposal is also available from United Kingdom Nirex Limited at its Internet site: www.nirex.co.uk.

Radiation exposure to other countries

F-29 Radiation exposure to 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[47] and the Euratom Basic Safety Standards Directive[48]. Dose estimates indicate that the radiation exposure to the public in other countries, as a consequence of UK radioactive discharges will also be less than these dose limits.

F-30 The Euratom Treaty[49] 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 European Commission 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 European Commission 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 European Commission as required under Article 36 of the Treaty.

Article 24.3 Unplanned or Uncontrolled Releases

F-31 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

Wording of Article 25:

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.

IAEA Requirement: There shall be effective emergency response arrangements. (Annex A IN6)

F-32 This section also deals with Article 24.3. There have been no fundamental changes since the last report, hence the following is a brief summary of the UK's emergency planning arrangements. A more detailed description of the UK's emergency preparedness can be found in Section F of the UK's first report[23]. Key points of the UK arrangements are outlined below.

F-33 Members of the public are:

a) properly informed and prepared, in advance, about what to do in the unlikely event of a radiation emergency occurring, and
b) provided with information if a radiation emergency actually occurs.

F-34 Based on an assessment of reasonably foreseeable accidents, licensees / employers are required to prepare contingency/emergency plans to restrict any exposure that arises from an accident both to the employees and to others, including emergency services personnel, who may be affected by it.

F-35 Emergency Plans are required to cover the following aspects:

a) the control of the incident or accident at the site;
b) the assessment of actual and potential accident consequences and alerting the relevant authorities and the public;
c) the introduction of counter measures to mitigate the consequences regarding:
d) individuals who could be affected in the short term; and
e) longer term effects such as the contamination of food supplies, land and adjoining waters;
f) the return to normal conditions.

F-36 Emergency actions for spent fuel, reprocessing and radioactive waste management facilities are based upon the following principles:

a) There is a 'detailed emergency planning zone' around each spent fuel, reprocessing and radioactive waste management facility within which arrangements to protect the public are planned in detail. The boundary of this zone is defined in relation to the most significant release of radiation from an accident that can reasonably be foreseen.
b) Emergency planning for the spent fuel, reprocessing and radioactive waste management facility needs to be capable of responding to accidents which although being extremely unlikely, could have consequences beyond the boundaries of the detailed emergency planning zone.

Classification of emergencies

F-37 The UK uses the International Nuclear Event Scale (INES) to communicate to the public, and the media, the safety significance of events reported at spent fuel, reprocessing and radioactive waste management facilities in consistent terms.

Emergency plans and Government response

F-38 A detailed description of the UK's emergency plans and response arrangements can be found in Section F of the UK's first report[23].

Public information

Prior information

F-39 REPPIR[27] provides the legal basis for the supply of information to members of the public who may be affected by a nuclear emergency. The requirements on the operator and the local authorities under these Regulations are:

a) Members of the public who could be at risk from a reasonably foreseeable radiation emergency should receive certain prescribed information. Such information is required to be distributed in advance of any emergency occurring.
b) The information supplied has to be updated at regular intervals not exceeding three years.
c) The operator also has a duty to make the information available to the wider public and this is usually done by providing information on request or by placing copies in public buildings such as libraries and civic centres.

F-40 Every spent fuel, reprocessing and radioactive waste management facility operator has local liaison arrangements that provide links with the public in the vicinity of the site.

Information in the event of an emergency

F-41 REPPIR requires local authorities to prepare and keep up-to-date arrangements that ensure that members of the public actually affected by a nuclear emergency receive prompt and appropriate information. The operator would also be expected to make a formal announcement as soon as possible after the emergency had been declared. In addition, the various information services of the local agencies involved and of central government, together with the news media, are available to help in informing the public of the facts and of the assessments being made of the course of the accident.

Longer term actions

F-42 In the longer term, Defra and the Scottish Executive Environment and Rural Affairs Department (SEERAD) would be involved with other government departments in actions to be taken should a restoration phase be necessary following a major accident involving serious contamination of the environment. Restrictions on milk and other foodstuffs introduced by the Food Standards Agency may need to remain in force for some time. Monitoring in the affected areas would continue until it was confirmed that levels of radioactivity no longer posed a threat to people's health. In the event of high radiation levels persisting in some areas, local authorities would need to give consideration to longer-term relocation of those people affected. SEPA in Scotland and EA in England and Wales have a duty to investigate the impact of the accident on the wider environment and to mitigate the effects of any resulting pollution on the environment.

Emergency Exercises

F-43 It is a condition of nuclear site licences that all employees at spent fuel, reprocessing and radioactive waste management facilities who could be involved in an emergency are trained so that the emergency plan can be implemented. To show that this training is effective, licensees have regular emergency exercises.

F-44 In addition to these training exercises, there are regular demonstration exercises at each site as follows:

a) Level 1 exercises are required annually for each site. These are witnessed by HSE inspectors and are the primary means to assesses the effectiveness of the arrangements, training and resources of the operators for dealing with emergencies.
b) Level 2 exercises test the function of each off-site facility at least once every three years. Each such exercise requires the operator to staff the off-site facility and provides an opportunity for agencies and other bodies with responsibilities or duties to take part and exercise their function as appropriate. There are on average six of these exercises in the UK each year.
c) One of the planned Level 2 exercises each year is selected to be a national or Level 3 exercise. The Level 3 exercise, in addition to testing the setting up and operation of the offsite facility, includes the exercising of the various government departments to test their training and the communications between them.

International Arrangements

F-45 For an emergency at a spent fuel, reprocessing and radioactive waste management facility in the UK, the DTI would take responsibility for notifying other countries and initiate requests for international assistance. Under existing early notification conventions, the DTI would inform the European Community, the IAEA, and countries with which the UK has bilateral agreements, about the accident and its likely course and effects.

F-46 Defra is the nominated first point of contact in the UK in the event of a nuclear accident overseas. The Radiation Incident Monitoring Network (RIMNET) has been set up as part of the UK Government's National Response Plan for dealing with overseas nuclear accidents. It is operated by Defra and provides facilities for the collection and analysis of radiological monitoring data, necessary for the response to a nuclear accident. It also provides communications systems for distributing data summaries and Government information and advice bulletins.

F-47 RIMNET provides continuous gamma radiation dose rate measurements from over 90 fixed sites throughout the UK. In addition, it allows other key radiological monitoring measurements, necessary for accident response, to be directly input to a UK national database facility. These additional data would include measurements of radioactivity in air, food, water, other environmental materials and people. The design of RIMNET permits input of these additional data both by Government departments and other bodies approved by Defra. Data entry by the latter group is by way of computers linked to the RIMNET database via a public data network.

F-48 Measurements held on the RIMNET database would be used as a basis for decisions aimed to ensure the safety of members of the public within the UK. As such, they must be adequately quality assured and reliable. They must also be supported by known and consistent techniques of sample collection and measurement. Only bodies that can demonstrate their ability to meet the necessary standards and to operate to RIMNET protocols are, therefore, approved to supply data.

Article 26. DECOMMISSIONING

Wording of Article 26.

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-49 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-50 Government Policy[17] 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, the Nuclear Reactors (Environmental Impact Assessment for Decommissioning) Regulations 1999[30] require 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 E-17.

F-51 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; Records.

F-52 A nuclear licensed site cannot be delicensed 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 E-28 to E-31.

Section G/H

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 United Kingdom (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). For this report, the two sections are therefore combined. Where there is a difference this is clearly indicated in the text.

Articles 4&11 GENERAL SAFETY REQUIREMENTS

Articles 4&11 Text.

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][6] 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][7] is kept to the minimum practicable,[consistent with the type of fuel cycle policy adopted][8];*
- *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-2 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.

Criticality and Removal of Residual Heat Generated

GH-3 Criticality and residual heat removal are aspects that are addressed in the licensees' safety cases, operating rules and operating instruction. For further details

[6] Article 11 only
[7] Article 4 only
[8] Article 4 only

see report on Articles 4 and 11 in the first report[23] .

Minimising the Generation of Radioactive Waste

GH-4 The licensee of a spent fuel management facility is required under Licence Condition 32 (Accumulation of Radioactive Waste) to ensure that the rate of production and total quantity of radioactive waste accumulated on the site is minimised and adequate records are made.

IAEA Requirement: Radioactive waste arisings shall be kept to a minimum. (Annex A G2)

Interdependencies in Spent Fuel and Radioactive Waste Management

GH-5 The handling treatment, storage and reprocessing of spent fuel and the management of radioactive waste are all prescribed activities under the NIA65. Therefore all such activities, including, where appropriate, storage and reprocessing at Sellafield or storage at another licensed site, is fully regulated by HSE. The Department of Transport's Radioactive Materials Transport Division (RMTD) regulates the transport of spent fuel from the reactor site to Sellafield, or other licensed sites. To ensure seamless regulation, RMTD and HSE operate an MOU to ensure consistent and complementary regulation. HSE also operates an 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.

IAEA Requirement: Interdependencies in the management of radioactive waste shall be taken into account. (Annex A G6)

Protection of Individuals, Society and the Environment

GH-6 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-7 The biological, chemical or other hazards associated with the handling, treatment, storage and where appropriate reprocessing of spent nuclear fuel are subject to HSWA74[7] and associated regulations such as the Control of Substances Hazardous to Health (COSHH) Regulations[50]. 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.

Impacts and Burdens on Future Generations

GH-8 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[17]. It is also an important part of the UK's strategy for sustainable development[51], and underpins the setting up of the NDA to deal with decommissioning the nuclear legacy now rather than leaving it for future generations.

IAEA Requirement: Radioactive waste shall be managed in such a way that will not impose undue burdens on future generations (Annex A G7)

Articles 5&12. EXISTING FACILITIES

Article 5. Text

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. Text

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-9 All existing facilities on nuclear licensed sites have to comply with Licence Conditions and in respect of the review of safety, the licensee is required to undertake periodic safety reviews for all safety related facilities. Licence Condition 15 (Periodic Review) ensures that the licensee reviews the safety case for its spent fuel management and reprocessing facilities every 10 years against an agreed programme. In addition, for operating nuclear power stations and reprocessing plants the safety cases are reviewed at shorter intervals 2 or 3 years, when plants are shut down for inspection and maintenance.

GH-10 All existing spent fuel management and reprocessing facilities are also in receipt of authorisations for the disposal of radioactive waste, granted by the environment agencies. RSA93 has recently been amended by the Energy Act 2004 to require the environment agencies to periodically review discharge authorisations. Such reviews must consider the limitations and conditions attached to each authorisation. 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 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 and exert a downward pressure on discharges of radioactive waste to the environment (see paragraphs E-44 and E-48).

GH-11 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 have resulted in unacceptable concentrations of radioactivity in foods, the Food Standards Agency would, in conjunction with SEPA or EA as appropriate, take steps to ensure that future activities do not cause these unacceptable levels to continue.

Intervention for Past Practices

GH-12 Work has started in the UK on developing a new regulatory regime specifically for radioactively contaminated land resulting from past practices on non nuclear licensed sites (that for licensed sites is already covered by nuclear licence conditions, including both its identification and, where intervention is appropriate, its remediation. Consultation is currently underway seeking views on draft Regulations and associated draft Statutory Guidance that will extend the existing contaminated

land regime under Part 2A of the Environmental Protection Act 1990 to cover radioactivity. The extended regime will provide a system for the identification and remediation of contaminated land, where such land is causing lasting exposure of radiation to any person or where there is a significant possibility of such exposure.

GH-13 The extended regime will also ensure that the UK complies with its obligations to transpose and implement articles 48 and 53 of Council Directive 96/29/Euratom, 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. The consultation ended on 9 October 2005. Further information can be found at http://www.defra.gov.uk/environment/radiactivity

Articles 6&13. SITING OF PROPOSED FACILITIES

Articles 6&13. Text

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-14 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. More details can be found under Articles 6 and 13 of the UK's first report[23].

National Laws and Regulations for Planning and Licensing

Planning permission

GH-15 Planning permission is obtained from the relevant local authority under the Town and Country Planning Act 1990[36] (TCP Act) for England and Wales or the Town and Country Planning (Scotland) Act 1997[52] for Scotland.

GH-16 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 Office of the Deputy Prime Minister for England or the Welsh Assembly Government. In Scotland, the Scottish Executive Inquiries Reporter usually reviews written evidence and issues a decision letter. Some cases are considered by means of a Public Inquiry, with the decision taken by the Scottish Ministers. This decision is made public by letter issued by the staff of the Planning Division of the Scottish Executive Development Department.

GH-17 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[38,39].

Nuclear Site Licence

GH-18 NIA65[8] requires that a licence is granted by HSE before any site is used for installing or operating a nuclear installation. 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.

Government Siting Policy

GH-19 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 that any new facility should be placed on a remote site.

Articles 7&14. DESIGN AND CONSTRUCTION OF FACILITIES

Articles 7& 14 . Text

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;9*
- *the technologies incorporated in the design and construction of a spent fuel management facility are supported by experience, testing or analysis.*

Safety in design

IAEA Requirements

The appropriate options shall be identified to avoid conflicting requirements that might compromise safety. (Annex A WD1)

Processing of radioactive waste shall be consistent with the type of waste, possible needs for storage and disposal. (Annex A WD3)

Radioactive waste storage facilities shall be designed and constructed for the likely period of storage, preferably with passive safety features. (Annex A WD4)

The operator shall identify an acceptable destination for the radioactive waste. (Annex A WD5)

GH-20 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 19 (see Annex L6.2c in the UK's first report[23]).

Measures to Limit Radiological Impacts of Discharges

GH-21 Applications for authorisations to dispose of radioactive waste need to show how the design has used 'best practicable means' 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-22 See Sections G and H of the UK's first report[23] (RSA93 Authorisations) for more details.

Measures to Limit Radiological Impacts of Uncontrolled Releases

GH-23 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. See Sections G and H of the UK's first report[23] (Safety Cases) for more detail.

[9] Article 14 only

Decommissioning Provisions at the design stage

GH-24 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. See Sections G48 and H52 of the UK's first report[23] (Safety Cases) for more detail.

Closure of Disposal Facilities

GH-25 No new radioactive waste disposal facilities have been provided in the UK for many years. However the environment agencies have issued guidance [53] '*Disposal facilities on land for low and intermediate level radioactive wastes: Guidance on requirements for authorisation'*, 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-26 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*".

Technologies Proven by Experience or Qualified by Testing or Analysis

GH-27 Nuclear installations designed to modern standards have included the qualification of equipment for all design basis accidents (DBA) 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-28 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-29 Furthermore, almost all nuclear installations have now completed at least one major periodic safety review (PSR). These reviews and other routine regulatory activities, together with the ongoing plant monitoring and collection of lifetime data provides additional assurance that safety related equipment is capable of performing its intended duty.

Articles 8&15. ASSESSMENT OF SAFETY OF FACILITIES

Articles 8&15. Text

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;*[10]
- *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).*

Systematic Safety Assessments

IAEA Requirement: The operator shall perform safety and environmental impact assessments. (Annex A WD2)

GH-30 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 basic process is unchanged since the previous report, hence the following provides only a summary of key points. See Section G of the UK's first report[23] (Safety Cases) for more details.

Safety Case Evolution

GH-31 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-32 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-33 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 installation work. Similarly, a temporary plant modification may require definition to justify operations which are necessary, but outside the normal operating envelope described by existing rules and instructions.

Regulatory validation activities

GH-34 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

[10] Article 15 only

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-35 Any proposed spent fuel management or reprocessing facility will be subject to EC Directive No 85/337[31], as amended by EC Directive No 97/11[32], 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-36 The environment agencies' guidance[54] on applications for disposal sets out regulatory principles and requirements. Requirements relevant to this Article are:

> Requirement R1 - Period before control is withdrawn (dose constraint): 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 mSv/y.
>
> Requirement R2 - Period after control is withdrawn (risk target): 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 1 in a million per year.
>
> Requirement R3 - Use of best practicable means: ensure that any radioactivity coming from a facility will be such that doses to members of the public and risks to future populations are as low as reasonably achievable (ALARA - see glossary).
>
> 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.
>
> 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 - 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-37 In order to fulfill 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 EA 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.

Articles 9&16. OPERATION OF FACILITIES

Articles 9&16. Text

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;*[11]
- *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.*[12]

Licensing Process and National Law

Licence to Operate

GH-38 Details on the licensing process and of the authorisation process are given in Sections G and H of the UK's first report[23].

Operational Limits and Conditions

GH-39 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-40 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 has approval.

GH-41 The environment agencies will periodically review authorisations for the disposal of waste. Reviews may lead to revision of the limits and conditions in authorisations.

[11] Article 16 only
[12] Article 16 only

Operation, Maintenance, Monitoring, Inspection and Testing

GH-42 Operation, maintenance, monitoring, inspection and testing are all covered under conditions attached to nuclear site licences. Details are provided in Section L4 (Licensing) but the key areas are:

> Licence Condition 24, - all operations that may affect safety must be undertaken in accordance with written operating instructions.
>
> Licence Condition 28 - 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-43 Under the conditions attached to the nuclear site licence there are a number of requirements the licensee meets 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 12 - only suitably qualified and experienced persons should perform any duties that may affect the safety of operations on the site.
>
> Licence Condition 36 requires the licensee to assess the safety impact of any change to its organisational structure or resources before these changes are carried out.

GH-44 The licensees commission and undertake research to support the safe operation of their nuclear installations. In addition, the UK Government has given HSC the responsibility to co-ordinate a long-term generic (i.e. not site specific) safety research programme to address the following objectives:

IAEA Requirement
Appropriate research and development programmes shall be implemented. (Annex A IN5)

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.

GH-45 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-46 HSE directs the programme, on behalf of HSC, by identifying safety issues that are expressed in the Nuclear Research Index[55]. The licensees use this index as a focus for commissioning the programme.

GH-47 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-48 The environment agencies' guidance on disposal facility authorisation[54] 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-49 Meeting the Nuclear Site Licence Conditions ensures licensees make arrangements to notify, record, investigate and report incidents. Additionally, the Secretary of State for Trade and Industry has identified classes of incidents on sites which the licensee has agreed to notify so that Parliament may be fully informed on matters of public interest. A report of such incidents is issued by HSE in a Quarterly Statement from HM Chief Inspector of Nuclear Installations. These Ministerial reporting requirements are for incidents that meet the following criteria:

a) Dangerous occurrences reportable under Nuclear Installations (Dangerous Occurrences) Regulations 1965;
b) Confirmed exposure to radiation of individuals which exceeds or which is expected to exceed the dose limits specified in Schedule 4 to the IRR99;
c) 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;
d) Confirmed breach of, or discharge expected to breach, quantitative limits of a Certificate of Authorisation for the disposal of radioactive waste issued under RSA93;
e) An abnormal occurrence leading to 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 granted under RSA93;
f) An abnormal occurrence leading to a confirmed release or spread of radioactivity off the site if the estimated effective dose equivalent to the potentially most exposed member of the general public is or is expected to be in excess of 0.05 millisieverts; and
g) An abnormal occurrence leading to a release or suspected release or spread of radioactivity on or off the site which requires special action or special investigation by the operators.

GH-50 The UK is a signatory to the 1986 IAEA Convention on 'Early Notification of a Nuclear Accident', which requires the UK to notify 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 authorities and contact points for issuing and receiving notification and information on such nuclear accidents are DTI and Defra, respectively.

GH-51 HSE has made arrangements with licensees to be informed of incidents covered by international reporting arrangements, for which HSE is the UK reporting authority, that is:

a) the International Nuclear Event Scale (INES);
b) the IAEA/OECD-NEA Incident Reporting System (IRS).

Programmes to Collect and Analyse Relevant Operating Experience

GH-52 Operational matters which may affect safety and which are identified during operation or maintenance, inspection or testing are notified, recorded, investigated and reported to the appropriate regulator. These requirements ensure that experience gained during operation is properly considered and any findings or recommendations that will improve safety are recognised and acted upon. The operational records required to be kept 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 judgments.

IAEA Requirement: Operating experience shall be appropriately analysed. (Annex A WD10)

GH-53 HSE is responsible for national publication of the results of its regulatory activities (such as the assessment of licensees' Periodic Safety Reviews) and international reporting of events. HSE brings to the attention of licensees any international events of significance.

Decommissioning Plan Preparation and Updating

GH-54 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.

IAEA Requirement: The operator shall establish and maintain decommissioning plans. (Annex A WD6)

GH-55 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-56 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 - 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-57 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

Article 10. Text

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-58 In the UK, spent fuel has not been designated as radioactive waste for disposal. If it should be, the information given in Section GH of this report will be applicable.

Article 17. INSTITUTIONAL MEASURES AFTER CLOSURE

Article 17. Text

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-59 In their Guidance on Requirements for Authorisation[53], 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-60 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 when viewed against wider perspectives. 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-61 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.

Section I

ARTICLE 27. TRANSBOUNDARY MOVEMENT

Article 27. Text

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.*

IAEA Requirement: Transboundary Movement. (Annex A T|BM)

I-1. The European Directive 92/3/Euratom[56] 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 (SI 1993 No.3031)[16], 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 EA 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-2. 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[57]). 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[17]). There is a standing ban on shipments to destinations south of latitude 60 degrees south.

I-3. 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-4. 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-5. 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. 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[58].

I-6. The European Commission brought forward proposals in 2004 for a new Directive to replace 92/3 Euratom. The proposed Directive would include shipments of spent fuel being sent for reprocessing within the regime currently applying to transboundary movements of radioactive waste.

I-7. OJ L 159, 30.06.2000 p.1[59], 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)[60]. This usually results in an export licence application. In addition, the Nuclear Suppliers Group (NSG) Guidelines[61] are applied, as the UK is a member of the NSG and of the IAEA.

Section J

Article 28: Disused Sealed Sources

Article 28. Text

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 reentry 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 The UK is in the process of implementing European Council Directive 2003/122/EURATOM[62] on the control of high-activity sealed radioactive sources and orphan sources. The Directive will be 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. Government is developing guidance for the UK regulators on the acceptable arrangements companies can make to meet the requirements for such financial provision.

J-2 On nuclear licensed sites, Licence Condition 4 (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[26] Part VI applies covering the arrangements for the control of radioactive substances, articles and equipment.

J-3 The Transfrontier Shipment of Radioactive Waste Regulations (see para I-1), 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-4 Shipments of sealed sources between Member States of the EU are regulated under European Council Regulation 1493/93[33]. 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 EU Basics Safety Standards 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 EA in England and Wales, SEPA in Scotland or EHS in Northern Ireland.

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 nuclear safety and environmental regulators in the UK. The way that this objective is achieved at spent fuel management, reprocessing and radioactive waste management facilities have been explained in the previous Sections. The main features of this 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 15 (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 reprocessing plants the safety cases are reviewed at shorter intervals 2 or 3 years, when plants are shut down for inspection and maintenance.

Periodic review of discharge authorisations

K-3 Authorisations for the disposal of radioactive waste are reviewed at least every 5 years by either EA or SEPA. 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)[45]. RIFE now includes data from all government environmental monitoring results and is published jointly by the Food Standards Agency, EA, SEPA and the Environment and Heritage Service (EHS) in Northern Ireland. 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[17] 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 for the Long-Term Management of Higher Activity Radioactive Waste

K-5 Policy for the long-term management of higher activity radioactive waste is currently being reviewed by the Government and is, for the moment, undecided. It is

considered vitally important to find a solution that is both scientifically and technically feasible and which has the support of the public. In order to gain this support, the Government needs to involve the public in the process. Hence the first step in the current review was to explain the problem and to offer the public and other interested stakeholders the opportunity to say how they believed the policy for its solution should be decided. The Government, through Defra, did this when they published the joint consultation paper "Managing Radioactive Waste Safely" in September 2001.

K-6 Having reviewed the outcome of the "Managing Radioactive Waste Safely" consultation, the Government published a "next steps" announcement in July 2002. This concluded that there should be a review of all the options for the long-term management of the UK's higher activity radioactive waste, and that this review should be overseen by a new independent advisory body which would make recommendations on the option, or combination of options, for managing this higher activity waste which would achieve long-term protection for people and the environment. The Government will continue to be responsible for taking the ultimate decision on future management policy in light of the recommendations received.

K-7 As explained at paragraph A-23, this new independent advisory body, "the Committee on Radioactive Waste Management (CoRWM)", was appointed during the course of 2003, and began its work in November of that year. The Committee was comprised of people with technical expertise and people with a wider perspective of environmental, health, social and ethical issues, drawn from across the UK. It was charged with winning public confidence through operation in an open, transparent and inclusive manner, and engaging with the public and stakeholder groups in their option review process. To this end, the first step of CoRWM's review was to set the framework for debate by establishing broad agreement on the wastes to be considered, the range of management options for each of them, and the criteria against which these options should be assessed. The second step was to assess each option, including commissioning any new research required. And the final step was to draw up recommendations for Ministers to consider. CoRWM's agreed objective is to deliver its recommendations by July 2006.

K-8 The priority is to reach the decision that: achieves long-term protection of people and the environment; inspires public confidence; and is practicable. It is thought that the CoRWM programme, coupled with regular reports to the UK and Scottish Parliaments, Welsh and Northern Ireland Assemblies, will reach far more people, and encourage more active involvement in decision making, than occasional opportunities to react to consultation papers.

K-9 The waste from existing nuclear facilities will arise over the next century or so. So the assessment of waste management options will include not only materials currently classified as waste but also consider the consequences of providing for other materials which may have to be managed as waste during the period, such as some separated plutonium, and uranium, as well as certain quantities of spent nuclear fuel. 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 thought it may also be technically possible to treat and use this amount for fuel, it might prove uneconomic to do so. Government together with the new Nuclear Decommissioning Authority (NDA), which has assumed management responsibility for the majority of the UK plutonium stock, is currently reviewing options for the future management and utilisation of these stocks and the outcome of this review is being appropriately integrated with the CoRWM programme.

K-10 CoRWM is currently working to a three-phase programme. Phase 1, completed in September 2004, led to preliminary reports on the inventory of wastes

to be considered; the options for its management; the criteria against which these options would be assessed; and the decision-making process. It also provided a design for the Committee's future work programme and the public and stakeholder engagement processes to be contained within that programme. CoRWM's Phase 2 work ended in August 2005 with final agreement of the short-list of management options to be carried forward to detailed assessment, the criteria to be used for this assessment, and the assessment methodology. In reaching this outcome the Committee undertook an extensive programme of public consultation between April and July 2005 and held a series of expert workshops to discuss their final assessment methodology. Phase 3 of CoRWM's work, which commenced in August 2005, will carry it through its final option assessment process to delivery of its final recommendations in July 2006.

K-11 The short-list of options that will be carried forward to final detailed assessment by CoRWM is deep geological disposal; phased deep geological disposal; long-term interim storage; and near surface (non-geological) disposal. The latter is being considered in relation to a limited range of wastes, and its inclusion is still under review. The headline criteria against which detailed evaluation will be carried out in the final phase of CoRWM's work are: safety to workers and the wider public; security; environmental impact; socio-economic impact; impact on amenity; burden on future generations; implementability; flexibility; and cost.

K-12 A key objective of CoRWM's programme is that, as well as involving wide engagement with the public and stakeholders, it will provide a full and clear audit trail for the policy decisions that are taken. CoRWM's review of options will not consider potential radioactive waste sites. The priority is to assess the management options and decide how to manage the waste. But the assessment of some options will raise siting issues, including whether local communities should have a veto or be encouraged to volunteer, and whether they should be offered incentives. The Committee has been invited to comment on such generic siting issues. The UK Government has stated that once CoRWM's recommendations have been delivered in July 2006, policy has been decided in light of them, and the facility or facilities required are clear, it is foreseen that the process and criteria to be adopted for site selection will also be the subject of discussion in an open and transparent way.

K-13 More generally, in the context of the wider "Managing Radioactive Waste Safety" programme, the Government saw the original consultation as Stage 1. Stage 2 comprises CoRWM's work up until July 2006. Stage 3 will be the debate as how the decision should be implemented, including any site selection. Stage 4, around 2007, will be the start of the implementation process, including any necessary legislation. There will be no rigid timetables and deadlines. But the process will go faster if possible.

K-14 The "Managing Radioactive Waste Safety" programme covers the long-term management of the UK's higher activity radioactive waste. But, at the same time, it is recognised that with the NDA now established to take responsibility for the decommissioning and cleanup of the UK's older, publicly-owned civil nuclear sites, previously owned and operated by BNFL and UKAEA, there will be increasing future arisings of LLW. In particular, this will consist of building rubble and contaminated soil. Forecasts of such arisings over the longer term exceed the capacity of the national LLW disposal facility at Drigg in Cumbria. Consequently, a review of LLW management policy is being carried out, again by the Government.

K-15 The issue with the long-term management of LLW is different from that of the management of higher activity radioactive waste, being how best to deploy already available solutions. Under the LLW management policy review, national stakeholder workshops in April and October 2005 discussed the issues and potential way

forward. This will lead to the issue of a public consultation document in early 2006 and a decision on future long-term management policy around the middle of 2006, at about the same time as CoRWM delivers its recommendations on higher activity radioactive waste. The two programmes are being run in parallel, with appropriate co-ordination between them.

Policy on the reduction of discharge limits and actual discharges

K-16 The UK is developing further its policy on radioactive discharges. In July 2002, a UK strategy for radioactive discharges 2001-2020 was published, which sets targets and projected profiles for liquid discharges from each sector of the nuclear industry [4]. The sectors covered are:

- Uranium enrichment and nuclear fuel production;
- Energy production;
- Reprocessing;
- Research;
- Defence; and
- Other sources of discharges.

K-17 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 0.02 mSv (20 microsieverts) a year or less.

K-18 Since 1993, discharges of technetium-99 from Sellafield have been reduced by about 90 per cent following plant-scale trials of abatement technology using tetraphenylphosphonium bromide (TPP). The Environment Agency has reduced the site discharge limit for this radionuclide from 90 TBq to 20 TBq a year, and will reduce this limit to 10TBq/y in 2006.

K-19 The GE Healthcare site at Cardiff, South Wales, is developing the technology to collect, oxidize and purify waste tritium and carbon-14 from its radioactive labeling processes. This work is being conducted in conjunction with experts in the USA and Canada, and is referred to as Project Paragon. The project objective is to recover and reuse most of the radioactivity that would previously have been disposed of as radioactive waste. This, and changes relating to water treatment, will over time lead to reduced discharges to the Severn Estuary.

K-20 The UK is currently working on a review of the 2002 discharges strategy. This should reflect the outcome of the CoRWM process, NDA estimates for discharges from decommissioning and any decisions that may be taken about future activities on the Sellafield site and on the possibility of new nuclear build. In parallel with this strategy for discharges, the Government and the Devolved Administrations for Scotland and Wales issued draft statutory guidance to the environmental regulators to help them to take account of radiological principles and environmental policy objectives when determining authorised limits for radioactive discharges from nuclear licensed sites. The statutory guidance provides the vehicle through which the UK discharges strategy is implemented. In the light of experience in using the draft guidance, and following public consultation due to start in November 2005, it will be reviewed as necessary and issued formally in summer 2006.

SECTION L

Detailed Information

This section provides more details for those reading sections A to K and who wish to find out more about a particular issue. Much of the text was originally provided in the UK's first report to the Convention. The information is arranged as follows.

Section L1	Spent Fuel Management and Reprocessing Policies, Practices, Facilities and Inventories
Section L2	Radioactive Waste Management and Decommissioning Policies, Practices, Facilities and Inventories

Section L1

Spent Fuel Management and Reprocessing Policies, Practices, Facilities and Inventories

Spent fuel management and reprocessing policy

L1.1. The United Kingdom (UK) Government's spent fuel management policy on the question of whether to reprocess (and if so when) or to seek alternative spent fuel management options is that it is a matter for the commercial judgment of the owners of the spent fuel, subject to meeting the necessary regulatory requirements. The UK 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

L1.2. 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 gas flow) of the helical fuel design are removed at the power stations shortly before the spent fuel is dispatched to Sellafield in the northwest of England. Transport to Sellafield is by rail, using specially designed flasks to carry the fuel. The flasks of Magnox fuel are received into the Fuel Handling Plant (FHP) at Sellafield. The fuel is stored 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

L1.3. Spent Advanced Gas-cooled Reactor (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 in the FHP to cool before being dismantled and transferred either for interim storage or sent directly to the Thermal Oxide Reprocessing Plant (Thorp) for reprocessing. British Energy Generation Ltd. has contracts with British Nuclear Group Sellafield Ltd. (BNGSL) for reprocessing 5,000 te of its AGR fuel. Spent fuel in excess of this contracted quantity will be stored. The 2004 Inventory[15] reports 3,500 te of spent AGR fuel will be stored.

UK Pressurised Water Reactor fuel

L1.4. 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 2004 Inventory reports 1,200 te will be stored at Sizewell.

Light Water Reactor Fuel from Europe and Japan

L1.5. Spent Light Water Reactor (LWR) fuel 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 is removed for reprocessing.

Other fuels

L1.6. 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.

L1.7. 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 sent to Sellafield for reprocessing.

L1.8. 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.

L1.9. Spent low irradiated Graphite Low Energy Experimental Pile (GLEEP) fuel is packaged and stored at Harwell.

L1.10. Spent low irradiated Zero Energy Breeder Reactor Assembly (ZEBRA) 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 will be put into long-term storage at Harwell. The natural uranium oxide plates will be stored (at a location yet to be decided) and eventually conditioned for disposal as waste.

L1.11. 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. Both fuel items will be reprocessed in Thorp.

Spent fuel management facilities

Storage of spent fuel at reactor sites

Magnox reactor sites

L1.12. Other than at Wylfa, the Magnox reactor sites have storage ponds where spent fuel is held for a short cooling period, before shipment to Sellafield for reprocessing. Wylfa, Oldbury, Sizewell A and Dungeness A are operational. Bradwell, Chapelcross and Calder Hall are in Stage 1 decommissioning. Hunterston A, Trawsfynydd and Berkeley have been defuelled.

L1.13. 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

L1.14. Each AGR station has one fuel storage pond.

Sizewell B PWR site

L1.15. Sizewell B has a fuel storage pond on site.

Storage of spent fuel at other sites

Dounreay

L1.16. An irradiated Fuel Cave was used for the handling and temporary storage of fuel elements.

L1.17. A pond is used as a buffer store.

Winfrith

L1.18. There is no longer any spent nuclear fuel of any category on the Winfrith site.

Sellafield

L1.19. A pond built between 1948 and 1952 was subsequently modified to handle Magnox fuel from the Calder Hall reactors. Waste movements ceased in 1970.

L1.20. A pond operated from 1964 until 1986 as a receipt, storage and decanning facility for Magnox fuel.

L1.21. 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, multi-element bottles (MEBs) that have been used in LWR fuel transport and storage, prior to their disposal.

L1.22. 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.

L1.23. 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 stored for several years. It is sent to Thorp for reprocessing. Storage arrangements are carefully designed to eliminate the potential for criticality events.

L1.24. 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

Sellafield - the Magnox reprocessing plant

L1.25. Commissioned in 1964, the Magnox Separation Plant is where the chemical separation of the fuel rod into its component parts takes place.

L1.26. 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.

L1.27. Discharges of liquid and gaseous low level wastes are only made in conformity with authorisations under the Radioactive Substances Act 1993 (RSA93)[9]. The licensee must demonstrate that Best Practicable Means (BPM) have been used to minimise environmental impact.

Sellafield - the Thermal Oxide Reprocessing Plant (Thorp)

L1.28. The Thermal Oxide Reprocessing Plant (Thorp) at Sellafield reprocesses irradiated oxide fuel, primarily from AGR and PWR 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 is used to separate the uranium and plutonium from the waste fission products. The insoluble stainless steel or zircaloy cladding pieces (hulls) are removed from the fuel solution and, after monitoring for undissolved fuel, are transferred to containers for downstream treatment. 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.

L1.29. 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. Metals cladding "hulls", fines and centrifuge cake are encapsulated in cement. Discharges of liquid and gaseous low level wastes are only made in conformity with authorisations under RSA93. The licensee must demonstrate that BPM has been used to minimise environmental impact.

Thorp Feed Clarification Cell incident

L1.30. On 22 April 2005, British Nuclear Group (BNG) reported that a pipe had failed in Thorp, in one of the heavily shielded cells, known as the feed clarification cell, in the Thorp Head End plant resulting in a quantity of dissolved nuclear fuel being released into a sealed contained area. The liquid, around 83m3, escaped from a fractured pipe (primary containment) feeding one of the Accountancy Tanks into a purpose built, thick walled concrete cell lined with stainless steel (secondary containment). The secondary containment was specifically designed for failure of primary containment. It is fitted with engineered systems to pump liquid from the cell floor back into primary containment tanks in the cell.

L1.31. The situation within the cell remains safe and secure and the recovery of all liquid back into primary containment was completed in July 2005. BNG has accounted for all of the material on the floor of the cell.

L1.32. The HSE is investigating the incident. As a result of the preliminary investigation, the HSE served two improvement notices, the first relating to leak detection equipment and the second to operating instructions relating to the use of this equipment and the response to alarms. The HSE will publish the results of its investigation in due course.

L1.33. BNG published its Board of Inquiry report on 29 July 2005. And as a result of the Inquiry's findings, BNG has instigated further reviews aimed at ensuring that the learning from this event is embedded across the organisation and that any wider implications are picked up and fully addressed. A copy of the report can be found at www.britishnucleargroup.com/index.php under the publications heading.

Inventory of spent fuel

> ***Article 32.2*** *This report shall also include:*
> *(ii) an inventory of spent fuel that is subject to this Convention and that is being held in storage and of that which has been disposed of. This inventory shall contain a description of the material and, if available, give information on its mass and its total activity;*

Spent fuel inventory in the UK as at 1 April 2005

L1.34. No spent fuel has been disposed of in the UK to date.

L1.35. The UK's current stock of spent fuel consist mainly of Magnox, AGR and PWR fuels, but also includes small stocks of various spent experimental fuels such as PFR Gleep and Dragon fuels. The UK also holds stocks of foreign LWR fuel.

L1.36. A summary of the inventory follows in Table L1.1

TABLE L1.1 - SPENT FUEL INVENTORY

Location		Approximate Quantity (te)
UKAEA		
Dounreay		58
Windscale		15
Harwell		31
Winfrith		0
UKAEA material located at Cadarache (France)		8
BNFL Magnox Power Stations		
		1337
BNFL Sellafield		
	Irradiated Magnox fuel	1216
	Irradiated AGR fuel	4539
	Irradiated LWR fuel	2200
	Irradiated SGHWR fuel	124
	Other fuel	57
British Energy		
	AGR	2450 elements
Sizewell B	PWR	All fuel discharged since commissioning in 1995

Section L2

Radioactive Waste Management and Decommissioning Policies, Practices, Facilities and Inventories

Radioactive waste management and decommissioning policy

Radioactive waste management policy

Current policy

L2.1. The UK Government's policy on radioactive waste management is that it should be based on the same basic principles as apply more generally to environmental policy, and in particular on that of sustainable development. The principle of sustainable development is outlined at greater length in '*Sustainable Development – the UK Strategy*' (Cm2426)[51], which also sets out the following supporting principles:

a. Decisions should be based on the best possible scientific information and analysis of risks;

b. Where there is uncertainty and potentially serious risks exist, precautionary action may be necessary;

c. Ecological impacts must be considered, particularly where resources are non-renewable or effects may be irreversible;

d. Cost implications should be brought home directly to the people responsible – the polluter pays principle.

L2.2. More specifically and consistent with the above, radioactive wastes should be managed and disposed of in ways which protect the public, workforce and the environment. The radiation protection principles and criteria adopted in the UK and applied by the regulatory bodies are designed to ensure that there are no unacceptable risks associated with radioactive waste management. In defining these principles and criteria and in their application by the regulators, it is recognised that a point is reached where additional costs of further reductions in risk exceed the benefits arising from the improvements in safety achieved and that the level of safety, and the resources required to achieve it, should not be inconsistent with those accepted in other spheres of human activity.

L2.3. Within the approach outlined in the foregoing two paragraphs:

a. The Government will maintain and continue to develop a policy and regulatory framework which ensure that:

i. radioactive wastes are not unnecessarily created;

ii. such wastes as are created are safely and appropriately managed and treated;

iii. they are then safely disposed of at appropriate times and in appropriate ways;

so as to safeguard the interests of existing and future generations and the wider environment, and in a manner that commands public confidence and takes due account of costs;

L2.4. The regulators have a duty to ensure that the framework described above is properly implemented in accordance with their statutory powers.

L2.5. Within that framework, the producers and owners of radioactive waste are responsible for developing their own waste management strategies, consulting the Government, regulatory bodies and disposal organizations as appropriate. They should ensure 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 (i.e. the waste is immobilized and the need for maintenance, monitoring and other human intervention is minimised) in order to facilitate safe management and disposal;

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. These programmes should be acceptable to the regulators and discussed with them in advance.

L2.6. The producers and owners of radioactive waste are responsible for bearing the cost of managing and disposing of the waste, including the costs of regulation and those of related research undertaken both by themselves and by the regulatory bodies. They should cost radioactive waste management and disposal liabilities before these are incurred and make appropriate financial provisions for meeting them. They should regularly review the adequacy of these provisions.

L2.7. Policy on the management of very low level waste (VLLW) and low level waste (LLW) is also covered by *'Review of Radioactive Waste Management Policy – Final Conclusions' (*Cm2919)[17]. (An explanation of the categorisation of the levels of waste is given in paragraphs B-12 and Table B1). Cm2919 states that VLLW can be disposed of alongside ordinary household refuse because of the minimal amounts of radioactivity it contains. However, LLW can only be disposed of currently at one site, NDA's site at Drigg in the northwest of England. In the past LLW was also disposed of at the United Kingdom Atomic Energy Authority's (UKAEA) site at Dounreay in the north of Scotland. Future policy for VLLW and LLW disposal is the subject of a UK Government consultation due to report in 2006.

L2.8. In the UK, the policy on the regulation of radioactive waste discharges and disposals is governed by two optimisation concepts: Best Practicable Environmental Option (BPEO) and Best Practicable Means (BPM). If BPEO and BPM are applied to a set of processes, facilities and methods of operation, then it is considered that radiation risks to the public and the environment will conform to the International Commission on Radiological Protection (ICRP) principle of being as low as reasonably achievable (ALARA). BPEO is about global optimisation (for example, of an entire facility) with respect to its environmental impact, whereas BPM is about optimising individual waste streams. In conjunction with Scottish and Northern Ireland Forum for Environmental Research (SNIFFER), the Scottish Environment Protection Agency, (SEPA), the Environment Agency (EA) and the Environment and Heritage Service (EHS) published a review of BPM in 2005; UKRSR05: BPM for the Management of Radioactive Waste.[18] This document:

a. clarifies how the UK environment agencies (the 'Agencies') interpret BPM as applied to the control of radioactive substances and

b. provides advice for Agency staff when assessing an operator's application of BPM. In 2004, SEPA and EA jointly published a guidance document entitled 'Guidance for the Environment Agencies Assessment of Best Practicable Environmental Option Studies at Nuclear Sites'[19] to support the Agencies assessment of BPEO studies relating to the authorisation of radioactive waste disposal at nuclear sites.

L2.9. It is the UK 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 are controlled and has been a feature of UK policy since 1993. Through the effective application of BPM, radioactive discharges (and particularly discharges of the most radiotoxic radionuclides) in the UK have been reduced very considerably.

L2.10. Discharges of liquid and airborne radioactive wastes into the environment are closely regulated and are only permitted under the terms of authorisations granted by the regulatory authorities.

L2.11. Policy on the long-term management of long-lived radioactive waste in the UK is currently under review (see paragraph B-20). These wastes, as they arise, are being safely stored and vigorously monitored on site, whilst Defra and the Devolved Administrations[13] work towards finding a policy which has widespread public support and which is scientifically and technically feasible.

Definition of radioactive waste

L2.12. 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, i.e. radioactive waste is "*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*"

L2.13. One of the more self-contained definitions is in the transfrontier shipment of radioactive waste regulations[16], which define radioactive waste as "*any material which contains or is contaminated by radionuclides and for which no use is foreseen"*

Categorisation of radioactive waste

L2.14. Radioactive Waste in the UK is currently classified into four categories – Very Low Level Waste (VLLW), Low Level Waste (LLW), Intermediate Level Waste (ILW) and High Level Waste (HLW) as shown in Table B1.

L2.15. The UK categorisation of radioactive waste does not contain categories for transitional waste that will decay within a short period of storage to unrestricted clearance levels, or for the division of ILW and LLW classifications into short-lived and long-lived LILW (Low and Intermediate Level Waste). Such a system would, theoretically, have the advantage of making it easier to identify appropriate management routes. However, although in principle it should be possible to construct and operate a system that makes allowance for reductions in radioactivity over time, most UK wastes contain a mixture of radionuclides of different half-lives

[13] There are Devolved Administrations for Scotland, Wales and Northern Ireland with responsibilities for radioactive waste management policies.

making the operation of such a system problematic. Additionally, the dose resulting from contact with radionuclides is not related to their half-life and the toxicities of radionuclides of similar half-lives are not necessarily the same. Therefore, in the UK, the management of radioactive wastes is determined by the actual characteristics of the waste rather than by its classification.

L2.16. At the present time, the classification systems for radioactive waste in use across the European Union (EU) vary widely in approach and application. Some are used purely for communication purposes, while most are dictated by the available management routes or by activity concentration. However, an EU Classification system has been proposed (to be used in conjunction with National systems, not replace them), following a meeting of EU representatives in January 1998 in Brussels. The system is based on the International Atomic Energy Agency (IAEA) classification scheme, with some modifications. It is to be used for transmitting data to the European Commission for the compilation of a European waste inventory.

Consideration whether to regulate radioactive materials as radioactive waste

L2.17. 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 radioactive waste.

L2.18. The UK 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.

L2.19. 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. The Government is currently undertaking a study of the possible options for the future management of UK owned civil stock and will want to consider the results of that exercise before reaching its own conclusions on this issue. More generally, the UK 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.

L2.20. The 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. The 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 it owners in line with the UK's substitution policy. The first such returns are planned for 2008.

Decommissioning policy

L2.21. In September 2004 the Government issued a statement of policy[14] on the decommissioning of nuclear facilities updating and replacing the previous statement contained in paragraphs 120-131 of Cm2919. Key points of this policy are noted below.

[14] The statement is published on the Department of Trade and Industry (DTI) website at http://www.dti.gov.uk/consultations/files/publication-1365.pdf

Objectives of decommissioning

L2.22. The objective of decommissioning is to remove the hazard the facility poses progressively. Decommissioning operations should be carried out as soon as reasonably practicable, taking all relevant factors into account.

Decommissioning strategies

L2.23. 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, 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(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.

L2.24. 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.

L2.25. Strategies should:

a. harness the general benefits of radioactive decay while the problems to which it may give rise in certain areas should be avoided,

b. seek to avoid the creation of radioactive wastes in forms which may foreclose options for safe and effective long-term waste management.

c. should minimise (by the use of BPM) the volumes of radioactive wastes which are created, particularly the volume of ILW.

L2.26. 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 paragraph B-44).

L2.27. 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.

L2.28. Operators should review their strategies when changes in circumstances, including relevant Government policies, make this necessary.

Funding of decommissioning operations

L2.29. The Government expects that all operators will take the steps necessary to ensure that their decommissioning work is adequately funded.

Regulation

L2.30. 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

L2.31. Operators should maintain the knowledge base, records and skills necessary to their decommissioning operations and management of associated wastes.

Designing new nuclear facilities to take account of decommissioning

L2.32. 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

L2.33. 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) in environmental legislation.

Determining that risk has been reduced ALARP

L2.34. 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.

a. REDUCING RISKS PROTECTING PEOPLE [63] explains the basis for HSE’s decisions regarding the degree and form of regulatory control of risk from occupational hazards,

b. PRINCIPLES AND GUIDELINES TO ASSIST HSE IN ITS JUDGEMENTS THAT DUTY-HOLDERS HAVE REDUCED RISK AS LOW AS REASONABLY PRACTICABLE[64] sets out in plain terms what HSE believes the law requires.

c. ASSESSING COMPLIANCE WITH THE LAW IN INDIVIDUAL CASES AND THE USE OF GOOD PRACTICE[65] defines what HSE means by good practice.

d. POLICY AND GUIDANCE ON REDUCING RISKS AS LOW AS REASONABLY PRACTICABLE IN DESIGN [66] recognises the importance of taking account of health and safety in design.

e. DEMONSTRATION OF ALARP [67] is produced by HSE’s Nuclear Safety Directorate as guidance to its inspectors on how to apply the principle of ALARP to nuclear facilities and operations.

L2.35. 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 the qualitative features such as the deterministic engineering principles may be sufficient in making a case.

L2.36. However, HSE requires a Probabilistic Safety Assessment (PSA) 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.

L2.37. 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 HSE may have accepted, as relevant good practice, an option adopted elsewhere and its existence would provide a strong indication in other situations.

L2.38. The following represent principles which are likely to need addressing in most cases:

a. The application of ALARP can only be to risks that the licensee controls. (e.g. it is not a requirement to consider other forms of electrical generation or to include the risks arising from the production elsewhere of equipment used by the plant).

b. Affordability, i.e. whether a company is in a position to spend the costs, is not a legitimate factor in an ALARP argument, though the costs themselves are.

c. Simplistic application of ALARP should not be used to argue against meeting relevant laws or regulations, or declared Government Policy such as Cm2919.

d. ALARP demonstrations ought to consider the various options that could improve the level of safety, and implement option or combination of options that achieves the lowest level of residual risk provided it is reasonably practicable. It is not adequate to start with the cheapest option first and the more expensive options only considered for the additional marginal improvement they would give. The timescale for implementation may be a factor in choice of options.

e. Options may include partial implementation and implementation of more than one measure as appropriate. It is not valid to argue that a solution requires only whole or single measures.

f. For an existing plant, the need is to compare the plant with modern standards, consider the importance of any shortfalls and what options exist for improvement, again starting with the safest and then consider the reasonable practicability of implementing them. Older plants may meet the ALARP requirement at higher risks than new ones.

g. Surrogate criteria, e.g. engineering standards, may be used in determining the need for an ALARP demonstration. In these cases to make the demonstration may need to consider the detriments directly, in terms of deaths/injuries, food bans etc so that they can be compared with the sacrifice entailed by implementation of any measures. This does not imply a CBA but it

does require consideration of the costs in relation to the effects of an accident.

h. The ALARP case should be fit for purpose. If the risks were high then a demonstration of ALARP would need to be more rigorous than if the risk is low. The degree of rigour should also depend on the consequence level. For higher consequence situations the consequences weigh more heavily than the frequency estimates. Furthermore thought should be given to the robustness of the conclusions with respect to uncertainties and to any assumptions employed in the demonstration.

Comparison of costs and risk reduction

L2.39. 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.

L2.40. 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.

L2.41. 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).

L2.42. 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

L2.43. 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.

L2.44. 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

L2.45. 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.

L2.46. 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.

L2.47. 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.

L2.48. 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.

L2.49. 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.

'Tolerability of Risk' (TOR)

L2.50. The guidance outlined above is used in conjunction with the philosophy given in the HSE document 'Tolerability of Risk' (TOR)[44], which 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: an unacceptable region; the as low as reasonably practicable region (ALARP); and a broadly acceptable region.

L2.51. 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.

L2.52. 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.

L2.53. In the broadly acceptable region, risks are low and are 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. Risks must always be balanced against the benefits arising from the activity. These concepts of 'unacceptable', 'tolerable' and 'broadly acceptable' levels of risk are embedded in the SAPs The SAPs are written as guidance for HSE nuclear installation inspectors to use when carrying out assessment but they are available to licensees and the public. Apart from the few that embody statutory limits, they do not place mandatory requirements on licensees. If a proposed plant design satisfies the principles, licensing is quite 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.

HSE SAFETY ASSESSMENT PRINCIPLES (SAPs)

L2.54. The SAPs[68] were developed against the background of the legal requirements and the TOR philosophy as described above and contain engineering and operational principles, safety analysis requirements and numerical risk criteria, the latter in terms of annual likelihoods of specific outcomes. The need to demonstrate ALARP is an overriding and all embracing requirement. All of the principles in SAPs "should be met as far as is reasonably practicable". Indeed SAPs paragraph 7 says that "the expression could have been written, at the risk of being tediously repetitive, into almost every SAP". SAPs expect that a safety case should provide an analysis of: normal operation, fault analysis covering Design Basis Analysis, Severe Accidents and a Probabilistic Safety Analysis, and analysis of the engineering design and operations.

L2.55. The TOR philosophy has been translated in certain specific cases into numerical values in the form of Basic Safety Limits (BSLs) and Basic Safety Objectives (BSOs). It is however, essential that these are applied against a background of good engineering and operational practices. The BSOs represent broadly acceptable levels below which regulatory resources will not be used to seek further improvements. This is a pragmatic approach to enable better use of HSE resources, it is not a green light for duty holders to forgo ALARP considerations at such levels. If BSLs are not met then the plant is likely to be deemed intolerable and, except in exceptional circumstances, cannot be operated. HSE will concentrate on assessment of ALARP where the risks are above BSOs.

L2.56. For SAPs dealing with PSA based risk estimates or numerical dose estimates, the range in which NSD would wish to see an ALARP demonstration is clear. For deterministic analysis, within the Design Basis, the success criteria are quantitative and are given in relation to barriers, public dose and worker dose.

L2.57. The Engineering SAPs represent HSE's views of relevant good practice and are not generally set out in absolute terms. If the relevant SAP is evidently well satisfied then the installation is meeting the equivalent of the TOR broadly acceptable

criterion on that particular point and, therefore, there is no need for further NSD assessment against ALARP. It is expected that non-conformance with design principles would be explicitly referenced and justified in a safety case.

L2.58. Of particular value in contrasting the options for improvement is the hierarchy of the nature of safety measures. Essentially these are: avoid the hazard, maintain safe conditions by passive means if possible rather than active systems and initiate protection automatically in preference to manually.

L2.59. The SAPs are now over 13 years old and a project is under way to review them with the following objectives:

i. Undertake a review of the SAPs and associated guidance by benchmarking against IAEA Standards to identify whether the relevant safety principles, requirements and good practice, set out in IAEA Safety Fundamentals, Requirements and Guides, have an equivalence in the SAPs and guidance; and vice versa;

ii. Manage the revision of the NII SAPs in order to meet the needs of the future radioactive waste management, remediation and decommissioning activities of the industry and taking account of the results of the benchmarking, consulting internally and externally as necessary.

L2.60. The review is being carried out in consultation with stakeholders and progress is reported on the HSE website at http://www.hse.gov.uk/nuclear/saps/index.htm. Target completion is March 2006 for a SAPs document suitable for public consultation.

Environment Agencies' guidance on BPEO and BPM

L2.61. In conjunction with Scottish and Northern Ireland Forum for Environmental Research (SNIFFER), SEPA, EA and EHS published a review of BPM in 2005; '*UKRSR05: BPM for the Management of Radioactive Waste*'[18]. This document

- clarifies how the UK environmental agencies (the 'Agencies') interpret BPM as applied to the control of radioactive substances, and
- provides advice for Agency staff when assessing an operators application of BPM.

L2.62. In 2004, SEPA and EA jointly published a guidance document entitled 'Guidance for the Environment Agencies Assessment of Best Practicable Environmental Option Studies at Nuclear Sites'[19] to support the Agencies assessment of BPEO studies relating to the authorisation of radioactive waste disposal at nuclear sites.

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, Calder Hall and Drigg

L2.63. The BNFL waste treatment and conditioning facilities at Sellafield comprise:

Waste Treatment Complex (WTC)

L2.64. WTC processes Plutonium Contaminated Material (PCM), both historic, stored wastes and also new ongoing arisings. Drums of PCM are compacted and typically up to 5 of the resulting compacted "pucks" are placed in larger, 500l stainless steel drums, which are then in-filled with a cement grout.

Magnox Encapsulation Plant (MEP)

L2.65. This plant receives the cladding material de-canned from metal Magnox fuel. It has also received retrieved cladding material, which had been stored in bulk, underwater, in large silos. Both types of cladding are tipped into 500 litre stainless steel drums, which are then in-filled with a cement matrix.

Waste Encapsulation Plant (WEP)

L2.66. WEP encapsulates LWR, BWR 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)

L2.67. 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 drum design.

Engineered storage for conditioned wastes

L2.68. This consists of a modern series of stores designed to store Plutonium Contaminated Material (PCM) waste, miscellaneous solids, encapsulated Magnox swarf and sludges, and encapsulated waste from effluent treatment plant. Additions to this series of stores will be provided as required.

L2.69. In April 2004 there were 9239 m^3 of fuel element cladding, 3998 m^3 of solids from liquid effluent treatment, 6841 m^3 of items too contaminated for LLW and 455 m^3 of PCM.

Interim PCM drum storage, raw waste

L2.70. This consists of a series of old buildings and temporary stores in which PCM has been accumulated in the past. A programme of work is in hand to retrieve this

waste, condition it in a waste treatment plant and then store it in the engineered drum stores described above.

L2.71. In April 2004 there were 10150 m^3 of PCM.

Ponds (excluding) fuel storage

L2.72. The older fuel ponds at Sellafield contain, in addition to any remaining fuel, 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.

L2.73. In April 2004 there were 1463 m^3 of fuel element cladding, 1275 m^3 of items too contaminated for LLW.

ILW silos

L2.74. 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.

L2.75. In April 2004 there were 13083 m^3 of fuel element cladding of items too contaminated for LLW.

ILW tanks

L2.76. 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.

L2.77. In April 2004 there were 9105 m^3 of solids from liquid effluent treatment, 1095 m^3 of items too contaminated for LLW.

Miscellaneous stores

L2.78. There are a number of storage locations around the site not fitting into any of the above categories. The wastes range from used filters to fuel element cladding to waste from the dismantling of the prototype AGR reactor.

L2.79. In April 2004 there were 881 m^3 of fuel element cladding, and 2760 m^3 of items too contaminated for LLW.

Magnox Power Stations (Operational and Decommissioning)

L2.80. Across Magnox sites the principal waste storage facilities are as follows:

Underground vaults;

Above ground vaults;

Reactor voids;

Tanks.

L2.81. 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.

L2.82. 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

Waste type	Waste conditioned	New conditioning facility required?	New store required?
Liquid (raffinates)	No	No	No
Cemented raffinates	Yes	----	No
Slurry	No	Yes	No
Solvents	No	Yes	No
PCM	No	UKAEA are considering options for dealing with this waste	
Wet solid	No	Yes	Yes
Dry solid	No	Yes	Yes

Harwell

Waste type	Waste conditioned	Conditioning facility required?	New store required?
Liquid, sludges	No	Yes	No
Solid	No	Yes	No
PCM	No	UKAEA are considering options foe dealing with this waste	
Sea-disposal packages	No	Yes	Yes

Windscale

Waste type	Waste conditioned	
Solid	No	This ILW is to be treated with the decommissioning wastes fro WAGR

Winfrith

Waste type	Waste conditioned?	Conditioning facility required?	New store required?
Sludges	No	Yes	No, unused store available
Solid	No	To be processed with Stage 2 decommissioning waste	
Solid	No	To be transferred to Harwell	
Sea-disposal packages	No	To be stored at Harwell, following sorting/ conditioning, starting 2002	
PCM	No	UKAEA is considering options for dealing with this waste	

British Energy (BE)

L2.83. Across British Energy (BE) sites the principal waste storage facilities are as follows.

Voids - Integral to 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

L2.84. The wastes on BE sites are of the following general types.

Fuel stringer debris (FSD) - 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 FSD, but are still likely to remain ILW for many decades.

Resins and sludges - Ion exchange resins are used at all BE 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 of as LLW to Drigg. 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 EA) or store it on site alongside the other encapsulated wastes.

GE Healthcare

L2.85. 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.

L2.86. 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.

L2.87. 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 Drigg 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.

L2.88. 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.*

Dounreay

Facility	Date of closure	State of decommissioning
Materials testing reactor	1969	Stage 1 decommissioning complete and part way through Stage 2. Currently in care and maintenance.
Experimental fast breeder reactor	1977	Stage 1 continues with the treatment of liquid metal coolants, development of techniques for removal of sodium residues from the internal surfaces of equipment and definition of methods to remove the Breeder Fuel.
Prototype fast reactor	1994	Stage 1 decommissioning in progress. The PFR Sodium Disposal Plant has been commissioned.
Range of analytical and metallurgical laboratories and fuel examination facilities	Part operational (subject to HSE Direction)	Redundant facilities in care and maintenance with limited post operation clean-out and decommissioning being carried out for safety and economic reasons on a staged basis.
Facility for handling and examination of irradiated fuel	Part operational (subject to HSE Direction)	Stage 1 and 2 decommissioning being carried out to bring the plant into a safe condition ready for long-term passive care and maintenance.
Post Irradiated Examination (PIE) facility	Part operational (subject to HSE Direction)	Facility in care and maintenance.
Plutonium-handling building	1963	Decommissioning, essentially to Stage 2, completed in 1993/4. Work has been restarted. Post operation clean-out of criticality cell and some Stage 2 work, required in response to HSE Safety Audit, being undertaken.
Shaft & Silo Disused ILW storage facilities	1977 and 1999 respectively	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	Decommissioning has started.

Harwell

Facility	Date of Closure	State of decommissioning
Low energy, graphite reactor.	1990	Stage 2 decommissioning complete. Reactor in care and maintenance. Final decommissioning planned for completion by 2005.
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. Full decommissioning operations to start when current operations cease in the building in 2004.
PIE concrete-shielded cells.	Operational	Stage 1 decommissioning complete. Facility has returned to operational mode for dismantling and repacking of a range of waste items.
PIE lead-shielded cells.	Progressive closure completed in 1995.	Stage 2 decommissioning essentially complete. Final decommissioning and demolition planned for 2003.

Windscale

Facility	Date of Closure	State of decommissioning
Air-cooled, graphite reactor.	1957	Work in progress to dismantle and remove the Pile 1 core.
Air-cooled, graphite reactor.	1957	Safety case being prepared to put Pile 2 in long-term care and maintenance.
Prototype for commercial Advanced Gas-Cooled reactor.	1982	Demonstration project to prove the feasibility of dismantling a power reactor safely and economically. Stage 2 decommissioning in progress.
Fuel examination facility.	1995	Stage 1 decommissioning complete. The facility is now being put into a 'passive safety' condition in preparation for a long-term period of care and maintenance.
Lead shielded cells, used for PIE of fuel.	Part operational	Redundant facilities decommissioned to Stage 1 and in care and maintenance. The other facilities are still operational.

Winfrith

Facility	Date of closure	State of decommissioning
Experimental high temperature helium-cooled power reactor	1976	Stage 1 decommissioning complete. Reactor complex in care and maintenance. Fuel has been repacked in new containers for continued storage. Transfer of the fuel to Harwell is underway.
Zero energy reactor to support fast reactor core physics.	1982	Stage 1 decommissioning complete. Stage 2 decommissioning started in 2002.
Prototype power generating reactor; heavy water moderated, light water cooled.	1990	Stage 1 decommissioning complete and reactor in care and maintenance.
PIE facility.	2001	Stage 1 decommissioning started in 2002].

Magnox power stations

The decommissioning strategy being implemented at each site comprises three stages:

i 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.

ii Stage 2: Care and Maintenance Period (Safestore), in which the reactors will be maintained in a safe enclosure whilst radioactive decay occurs.

iii 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 Drigg.

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 preparations are in hand for decontamination of the pond structure. 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 will involve cutting the boilers in half and storing the boiler sections within the reactor buildings for the Stage 2 period. An application for the necessary planning permissions has been submitted. Outcome of the planning inquiry is awaited.
Hunterston A	1990	All fuel has been removed and despatched to Sellafield for reprocessing. Much of the conventional plant has been dismantled. The turbine hall has been demolished. The main cooling water (CW) pumps have been removed and CW culverts sealed at each end. The reactor has been sealed, and gas circulators removed. Deplanting of ancillary systems is underway, and ancillary pipework in boiler houses is being removed. 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 sludges, fuel element debris and activated components. The fuel cooling pond remains filled with water whilst plans are developed for the removal and treatment of the fuel storage skips.
Bradwell	2002	Currently undergoing defuelling
Hinkley Point A	2000	Currently undergoing defuelling

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;*

L2.89. A summary of the UK radioactive waste inventory as of 2004 is in Tables L2.1 to L2.3.

Table L2.1

Radioactive Wastes from all sources in stocks from 2004 inventory
Conditioned and uncontrolled volumes (m^3)

Stocks	***HLW***	***ILW***	***LLW***
Not yet conditioned	1,430	66,100	19,000
Already conditioned	456	16,400	1,870
Total	**1,890**	**82,500**	**20,900**
When all conditioned	955	81,600	24,000

Source: 2004 UK Radioactive Waste Inventory[15]

Table L2.2

Expected total volumes of conditioned waste (m^3) from existing UK facilities to end of life

	Stocks	**Arisings**	**Total**
LLW	24,000	2,010,000	2,040,000
ILW	81,600	160,000	242,000
HLW	935	407	1,340
Totals	**107,000**	**2,170,000**	**2,280,000**

Source: Summary document of 2004 UK Radioactive Waste Inventory [15]:

Table L2.3

Annual disposals of LLW 1991-2000

Year	**Total volume (m^3)**
1991	25,100
1992	25,400
1993	23,200
1994	26.300
1995	12,700
1996	10.300
1997	9,200
1998	12,600
1999	8,000
2000	8,400
2001	16,100
2002	10,800
2003	11,400

Notes: Up to and including 1993 figures are net waste volumes, and from 1994 are packaged waste volumes. Supercompaction was introduced in 1995 for all wastes sent to Drigg. This has significantly reduced volumes disposed of.

Source: 2004 UK Radioactive Waste Inventory [15]

Figure L2.1: HSE STRUCTURE RELEVANT TO THE JOINT CONVENTION

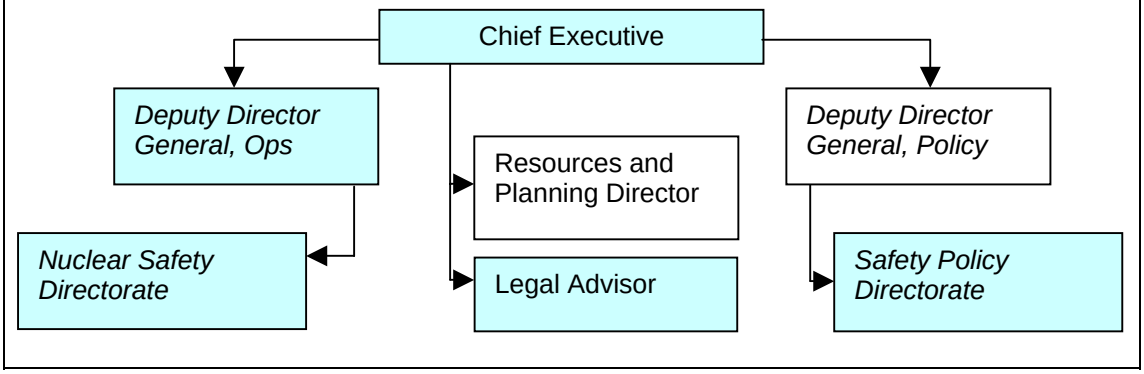


Figure L2.2: ORGANISATION OF NII

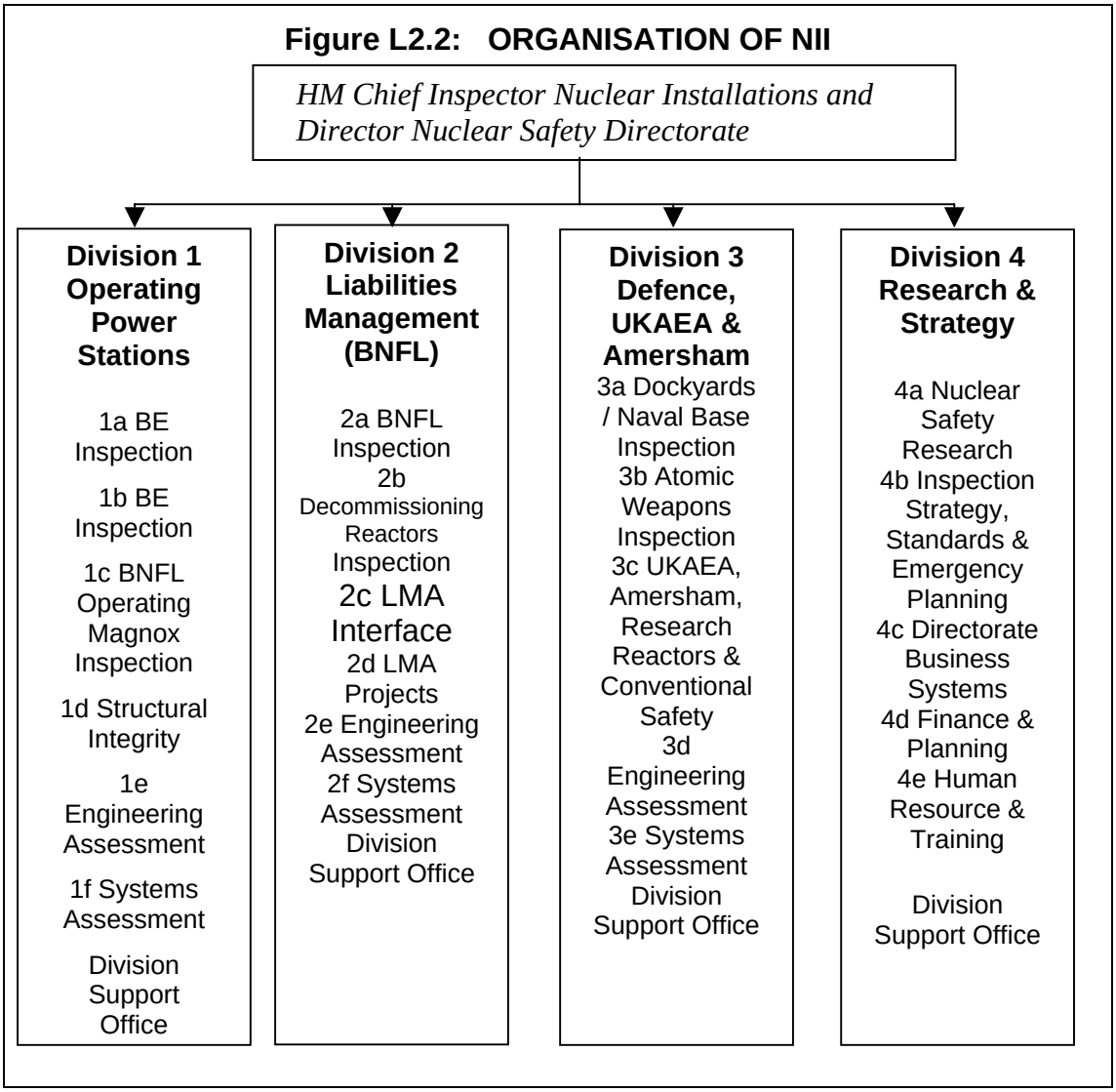


TABLE L3: Health and Safety at Work etc Act 1974 Section 33			
Offences		Penalties	
		Summary Conviction	Conviction on Indictment
1(a)	to fail to discharge a duty to which he is subject by virtue of sections 2 to 7;	A fine not exceeding £20,000;	A fine. (unlimited)
1(b)	to contravene section 8 or 9;	A fine not exceeding [the prescribed sum];	A fine. (unlimited)
1(c)	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);	A fine not exceeding [the prescribed sum];	For not having a licence when required or contravening terms, conditions or restrictions attached to any such licence Imprisonment for a term not exceeding two years, or a fine, or both; Otherwise a fine. (unlimited)
1(d)	to contravene any requirement imposed by or under regulations under section 14 or intentionally to obstruct any person in the exercise of his powers under that section;	A fine not exceeding [level 5 on the standard scale].	N/A
1(e)	to contravene any requirement imposed by an inspector under section 20 or 25;	A fine not exceeding [the prescribed sum];	A fine. (not limited)
1(f)	to prevent or attempt to prevent any other person from appearing before an inspector or from answering any question to which an inspector may by virtue of section 20(2) require an answer;	A fine not exceeding [level 5 on the standard scale].	N/A
1(g)	to contravene any requirement or prohibition imposed by an improvement notice or a prohibition notice (including any such notice as modified on appeal);	Imprisonment for a term not exceeding six months, or a fine not exceeding £20,000, or both	Imprisonment for a term not exceeding two years, or a fine, or both.
1(h)	intentionally to obstruct an inspector in the exercise or performance of his powers or duties [or to obstruct a customs officer in the exercise of his powers under section 25A];	A fine not exceeding [level 5 on the standard scale].	N/A
1(i)	to contravene any requirement imposed by a notice under section 27(1);	A fine not exceeding [the prescribed sum];	A fine. (Not limited)
1(j)	to use or disclose any information in contravention of section 27(4) or 28;	A fine not exceeding [the prescribed sum];	A fine. (Not limited)

1(k)	to make a statement which he knows to be false or recklessly to make a statement which is false where the statement is made— (i) in purported compliance with a requirement to furnish any information imposed by or under any of the relevant statutory provisions; or (ii) for the purpose of obtaining the issue of a document under any of the relevant statutory provisions to himself or another person;	A fine not exceeding [the prescribed sum];	A fine. (Not limited)
1(l)	intentionally to make a false entry in any register, book, notice or other document required by or under any of the relevant statutory provisions to be kept, served or given or, with intent to deceive, to made use of any such entry which he knows to be false;	A fine not exceeding [the prescribed sum];	A fine. (Not limited)
1(m)	with intent to deceive, to . . . use a document issued or authorised to be issued under any of the relevant statutory provisions or required for any purpose thereunder or to make or have in his possession a document so closely resembling any such document as to be calculated to deceive;	A fine not exceeding [the prescribed sum];	A fine. (Not limited)
1(n)	falsely to pretend to be an inspector;	A fine not exceeding [level 5 on the standard scale].	N/A
1(o)	to fail to comply with an order made by a court under section 42.	Imprisonment for a term not exceeding six months, or a fine not exceeding £20,000, or both;	Imprisonment for a term not exceeding two years, or a fine, or both.
NOTE: *Health and safety offences are either (a) triable summarily (i.e. without jury before the magistrates), or (b) triable summarily and on indictment (i.e. triable either way), or (c) triable only on indictment (i.e. before a jury in a Crown Court). Most health and safety offences, however, fall into categories (a) and (b). Those triable only summarily have N/A in the 'indictment' column above.*			

Figure F1 – Emergency Arrangements Structure

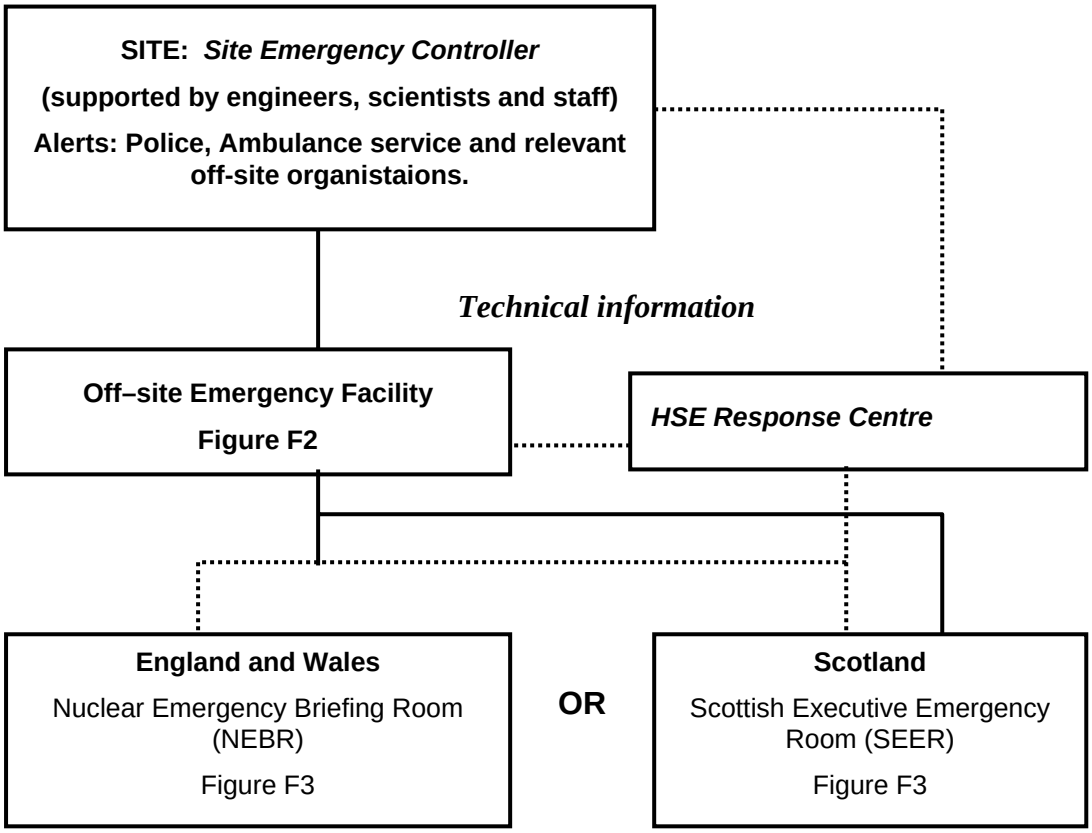


Figure F2 - Off-Site Facility representatives

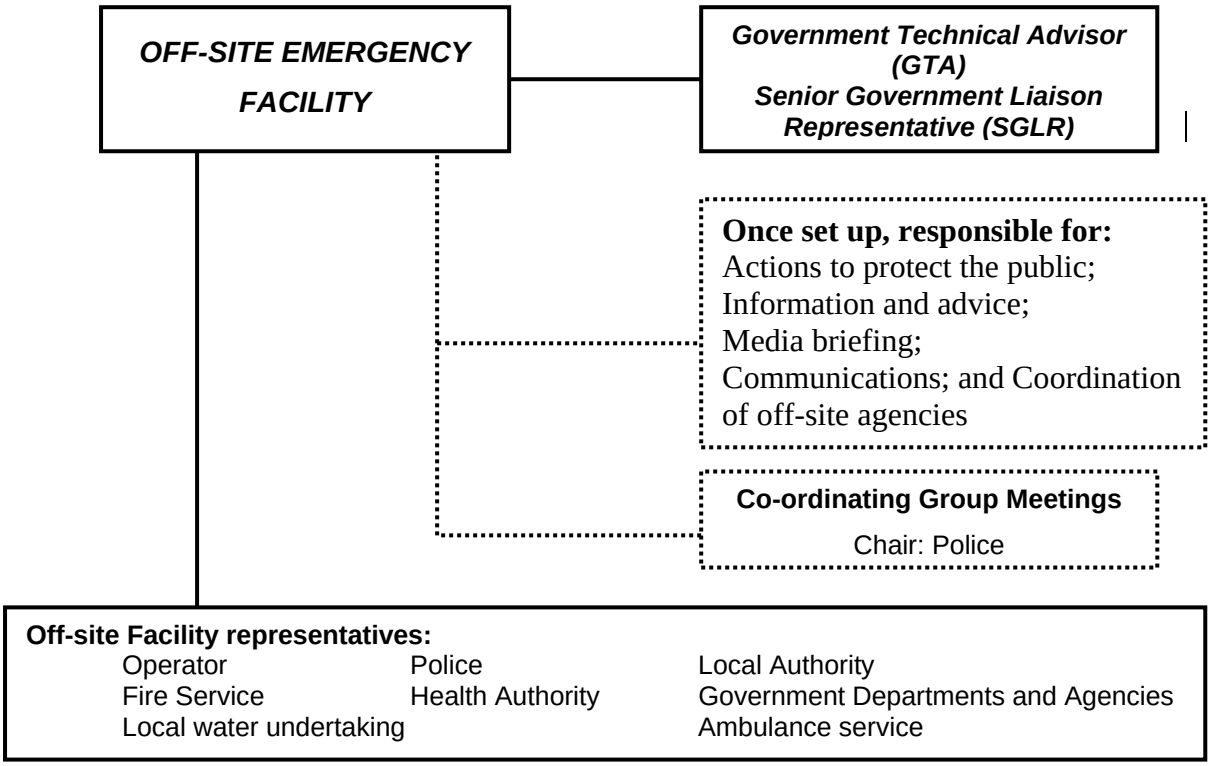
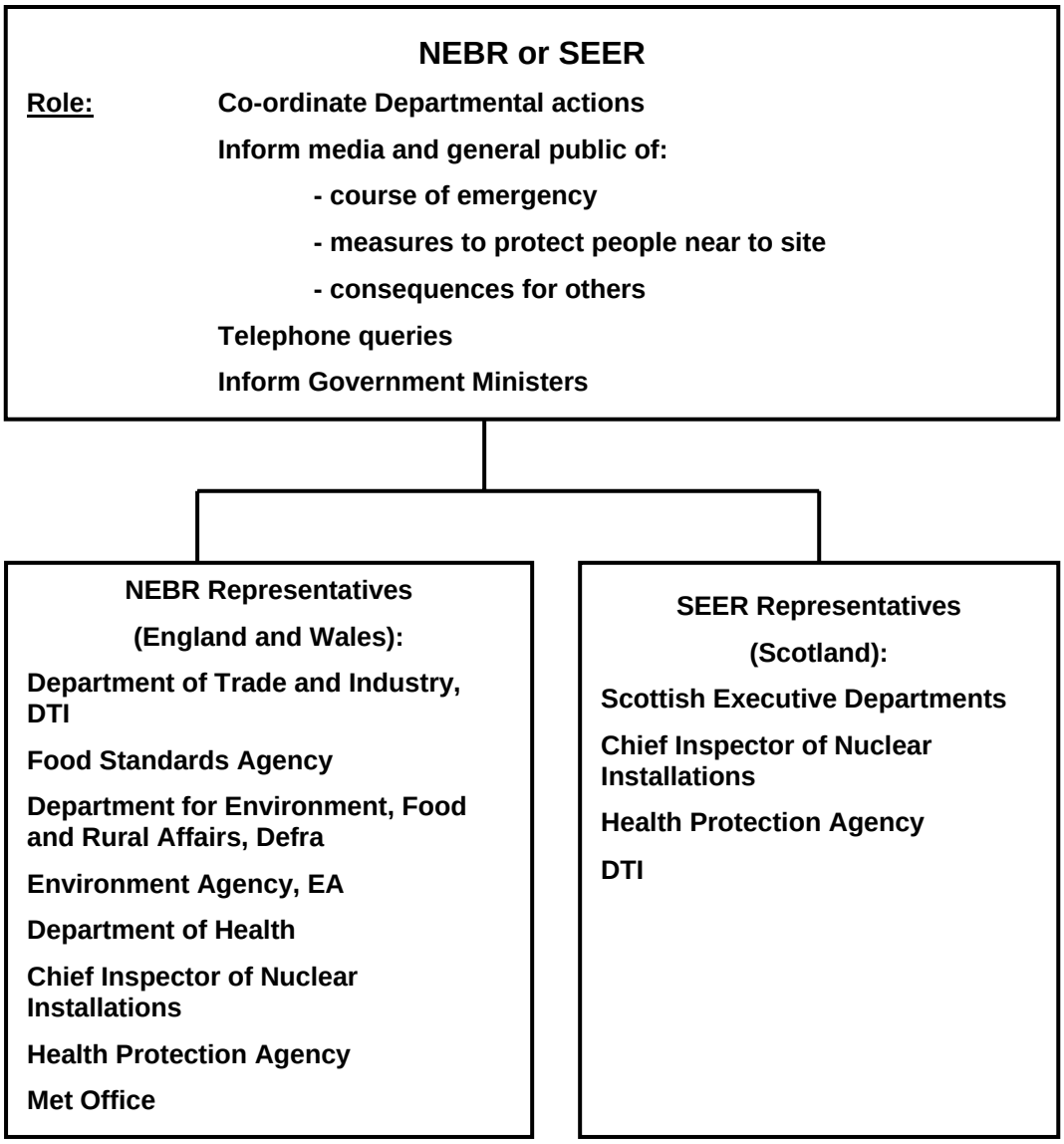


Figure F3: Nuclear Emergency Briefing Room (NEBR) and Scottish Executive Emergency Room representation (SEER)



ANNEX A

IAEA Requirements

In the UK report it is the intention to indicate how, in meeting the requirements of the 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. REQUIREMENTS
WS-R-2 Predisposal Management of Radioactive Waste, Including Decommissioning SAFETY REQUIREMENTS

The UK report to the Convention does not address this on a point for point basis. 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)**
	WS-R-2 6.7.	
G6	**Interdependencies in the management of radioactive waste shall be taken into account**	**Section GH (Articles 4&11)**
	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.	

References

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Glossary

AGR	Advanced Gas-cooled Reactor
ALARA	As Low as Reasonably Achievable
ALARP	As Low as Reasonably Practicable
BE	British Energy
BNFL	British Nuclear Fuels plc
BNGSL	British Nuclear Group Sellafield Ltd
BPEO	Best Practicable Environmental Option
BPM	Best Practicable Means
BSL	Basic Safety Limit
BSO	Basic Safety Objective
BSS	Basic Safety Standards
CIDI	(HSE's) Central Index of Dose Information
COMARE	Committee on Medical Aspects of Radiation in the Environment
CoRWM	Committee on Radioactive Waste Management
COSHH	Control of Substances Hazardous to Health Regulations
DBA	Design Basis Accidents
Defra	Department for Environment, Food and Rural Affairs
DEPZ	Detailed Emergency Planning Zone
DFR	Demonstration Fast Reactor
DfT	Department for Transport
DHSSPS	Department of Health, Social Services and Public Safety
DOENI	Department of the Environment in Northern Ireland
DOH	Department of Health
DRAGON	High temperature gas-cooled reactor
DTI	Department of Trade and Industry
DWP	Department of Work and Pensions
EA	Environment Agency
EA95	Environment Agency Act 1995
EHS	Environment and Heritage Service (Northern Ireland)
EIA	Environmental Impact Assessments
EU	European Union
FHP	Fuel Handling Plant
FSA	Food Standards Agency
FSD	Fuel Stringer Debris
GLEEP	Graphite Low Energy Experimental Pile
GTA	Government Technical Advisor
HLW	High Level Waste
HPA	Health Protection Agency
HSC	Health and Safety Commission
HSE	Health and Safety Executive
HSWA74	Health and Safety at Work etc Act 1974
IAEA	International Atomic Energy Agency

ICRP	International Commission on Radiological Protection
ILW	Intermediate Level Waste
INES	International Nuclear Event Scale
IRR99	Ionising Radiation Regulations 1999
IRS	Incident Reporting System
LC	Licence Condition
LLW	Low Level Waste
LoA	Letter of Advice
LoC	Letter of Compliance
LPA	Local Planning Authority
LWR	Light Water Reactor
MEBs	Multi-Element Bottles
MEP	Magnox Encapsulation Plant
MoU	Memorandum of Understanding
NDA	Nuclear Decommissioning Authority
NEBR	Nuclear Emergency Briefing Room
NEPLG	Nuclear Emergency Planning Liaison Group
NII	Nuclear Installations Inspectorate
NIA65	Nuclear Installations Act 1965 (as amended)
NRPB	National Radiological Protection Board
NSD	Nuclear Safety Directorate
NSG	Nuclear Suppliers Group
NuSAC	Nuclear Safety Advisory Committee
OECD	Organisation for Economic Co-operation and Development
ORs	Operating Rules
PCM	Plutonium Contaminated Material
PFR	Prototype Fast Reactor
PIE	Post-Irradiation Examination
PSA	Probabilistic Safety Assessment
PSE	Public and Stakeholder Engagement
PSR	Periodic Safety Review
PWR	Pressurised Water Reactor
QA	Quality Assurance
QQR	Quinquennial (five yearly) Review
REPPIR	Radiation (Emergency Preparedness and Public Information) Regulations 2001
RIFE	Radioactivity in Food and the Environment
RIMNET	Radiation Incident Monitoring Network
RMTD	Radioactive Materials Transport Division (DfT)
RSA93	Radioactive Substances Act 1993
RWMAC	Radioactive Waste Management Advisory Committee
SAPs	(HSE's) Safety Assessment Principles
SE	Scottish Executive
SEC	Site Emergency Controller
SEER	Scottish Executive Emergency Room

SEERAD	Scottish Executive Environment and Rural Affairs Department
SEPA	Scottish Environment Protection Agency
SGHWR	Steam Generating Heavy Water Reactor
SGLR	Senior Government Liaison Representative
SNIFFER	Scotland and Northern Ireland Forum for Environmental Research
TCP Act	Town and Country Planning Act 1990
THORP	Thermal Oxide Reprocessing Plant
TOR	Tolerability of Risk
UK	United Kingdom
UKAEA	United Kingdom Atomic Energy Authority
VLLW	Very Low Level Waste
WAG	Welsh Assembly Government
WAGR	Windscale Advanced Gas-cooled Reactor
WEP	Waste Encapsulation Plant
WPEP	Waste Processing and Encapsulation Plant
WTC	Waste Treatment Complex
ZEBRA	Zero Energy Breeder Reactor Assembly