DSG(2009)C092

Scotland: Bulk Quantities and Licensing of Disposal: HSE Nuclear Directorate pre-consultation stakeholder workshop. Edinburgh 2 December 2009

Dear Colleague

Please find attached:

- an invitation from the HSE's Nuclear Directorate (ND) to attend the above half-day workshop
- an outline agenda for the workshop
- a summary document, a technical background paper and a list of key questions for consideration.

The workshop is being organised and facilitated by RKCL on behalf of the ND. Please could you reply to the following address: admin@raykempconsulting.com

I hope to meet you in December.

Yours faithfully

Prof. Ray Kemp
Managing Director
RKCL

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2 November 2009
By email
Please reply to:
admin@raykempconsulting.com

Dear Colleague

Bulk Quantities Pre-Consultation Stakeholder Workshop
09.00 – 14.00 hrs, 2 December 2009, Hilton Hotel, Edinburgh Airport

The nuclear site licensing regime currently applies to a set of defined activities, which includes the storage of bulk quantities of radioactive materials, but does not include radioactive waste disposal. There is no clear definition of what constitutes 'bulk quantities' of radioactive materials, the storage of which would need to be licensed. At the same time, current Government policy on the disposal

of higher activity wastes is that a geological disposal facility (GDF) should be licensed in accordance with the Nuclear Installations Act 1965.

For these reasons, action is required to take forward legislative change:

i. to implement the Government's expectation of licensing of the GDF; and
ii. to clarify the position for any other planned disposal facilities.

HSE's Nuclear Directorate therefore intends to hold two pre-consultation stakeholder workshops in December in preparation for formal public consultation early in 2010 on proposals to alter some aspects of the existing arrangements for licensing of the storage and disposal of radioactive wastes in the UK.

The Nuclear Directorate wishes to invite your organisation to send a representative to the above stakeholder workshop. A draft agenda is enclosed along with a background technical document.

Please could you confirm whether your organisation will be represented at the workshop and if so, by whom, by replying to our workshop facilitator Professor Ray Kemp at admin@raykempconsulting.com

Yours faithfully

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HSE Nuclear Directorate
Bulk Quantities Pre-Consultation Stakeholder Workshop
2 December 2009, Hilton Hotel, Edinburgh Airport
Draft Agenda

09.00 – 09.30	**Arrivals & Coffee**
09.30 – 09.50	**1. Introductory Remarks** • Welcome, Frans Boydon (HSE ND) t.b.c. • Introductions, Purpose and Structure of the Stakeholder Workshop (Prof. Ray Kemp)
09.50 – 10.25	**2. Background (Mick Bacon HSE ND)** • The Need for Amendment to the NIR (1971) • Options for Consideration
10.25 – 11.00	**3. Clarifications (Facilitator Prof. Ray Kemp)** • Questions and Clarification • Identifying key issues
11. 00 – 11.30	Coffee break
11.30 - 12.45	**4. Plenary Discussion (Facilitator Prof. Ray Kemp)** • Key issues arising • Stakeholder discussion of issues, options and their likely impacts
12.45 – 13.00	**5. Summary Remarks and Close (Prof. Ray Kemp)** • Summary of Key Points • Next steps • Thank you and close of Workshop, Frans Boydon (HSE ND) t.b.c.
13. 00 – 14.00	Lunch

Proposals to alter some aspects of the existing arrangements for licensing of the storage and disposal of radioactive wastes.

HSE Nuclear Directorate, October 2009.

Summary Document

Proposals

1 The UK intend to introduce legislation to prescribe, under the Nuclear Installations Act 1965 (as amended), facilities designed or adapted for the disposal of bulk quantities of radioactive matter. The effect of this will be to require such facilities to be subject to nuclear licensing and the provision of insurance for an absolute liability for damage caused by ionising radiation.

2 The UK intend to exempt facilities for the disposal of Low Level Waste (LLW) from the above provision.

3 The UK intend to exempt the storage of sealed sources from the existing licensing/liability requirements relating to facilities designed or adapted for the storage of bulk quantities of radioactive matter.

4 In parallel the regulator (Health and Safety Executive (HSE)) will publish a policy statement on how they intend to interpret the phrase “bulk quantities” for application to both storage and disposal facilities.

The need for legislation

5 The UK Government’s White Paper *Managing Radioactive Waste Safely* (MRWS) published in June 2008 proposed to manage higher activity radioactive waste through a new geological disposal facility (GDF). The White Paper[1] envisages that this facility will require a licence under the Nuclear Installations Act 1965 (NIA), and recognises that this may require legislative change. Other facilities specifically for disposal are also in prospect. Action is required to take forward legislative change to implement the Government’s expectation of licensing for the GDF and to clarify the position for any other planned disposal facilities.

Proportionality for disposal of LLW

6 The UK’s approach to such legislation is that it should be risk based and proportionate. Government and devolved administrations desire to see progress in the application of their LLW policy using a risk-based approach to disposal options.

7 Licensing of LLW disposal facilities could be a disproportionate obstacle to effectively passive operations involving low concentrations of activity. The UK believes that the small extent of the risks involved warrants the exclusion of LLW disposal facilities from the requirements of NIA65 and hence from the application of the Paris Convention

8 The simplest and clearest way of expressing this would be to prescribe disposal and exclude low level waste facilities.

[1] http://www.defra.gov.uk/environment/radioactivity/mrws/pdf/white-paper-final.pdf (paras 5.10 - 5.12)

Storage of Sealed Sources

9 During the process of developing our proposals it became clear that some institutions such as hospitals with teletherapy sources would be caught by the definitions being proposed. We believe it was never the intention of the Act to cover such installations, and given that the design of such sealed sources is such that widespread dispersal of radioactivity from such sources is highly unlikely, we therefore propose to make a specific exclusion for sealed sources in relation to storage.

The way forward

10 The following will be taken forward in 2010:

a. Amendments to NIR1971 to prescribe disposal of “bulk quantities” of radioactive matter excluding low level waste.

b. Amendments to NIR71 to exclude sealed sources in relation to the storage of radioactive matter

c. A Policy Statement explaining how HSE will interpret the phrase “bulk quantities”.

October 2009

Proposals to alter some aspects of the existing arrangements for licensing of the storage and disposal of radioactive wastes in the UK. HSE Nuclear Directorate, October 2009. Technical Background Document

1 Introduction

This document provides background information relevant to planned pre-consultation stakeholder engagement and future public consultation on proposals to alter some aspects of the existing arrangements for licensing of the storage and disposal of radioactive wastes in the UK.
Section 2 outlines the current legislative and regulatory position and Section 3 describes the need for change. Section 4 outlines the principles underpinning the HSE Nuclear Directorate's approach to regulation while Section 5 describes the options identified for consideration. Section 6 summarises the proposed changes and Section 7 identifies a number of questions for consideration and discussion.

2 The Current Position

This section outlines the current legislative and regulatory position for licensing of the storage and disposal of radioactive wastes in the UK. The following sub-sections:

- Provide accepted definitions for the various radioactive materials and wastes discussed in this document;
- Highlight key points from current government policy on, and proposals for, the long-term management of radioactive wastes;
- Summarise relevant aspects of existing arrangements for licensing nuclear sites and the related nuclear liability regime;
- Identify links between the nuclear site licence and safety; and
- Identify relevant associated arrangements for the regulation of radioactive materials and wastes.

2.1 Definitions

Sealed sources. A *source* is an apparatus, a radioactive substance or an installation capable of emitting ionizing radiation or radioactive substances (Council Directive 96/29/*EURATOM*). A *sealed source* means a source containing any radioactive substance whose structure is such as to prevent, under normal conditions of use, any dispersion of radioactive substances into the environment, but it does not include any radioactive substance inside a nuclear reactor or any nuclear fuel element (The Ionising Radiations Regulations 1999, IRR99).

Low-level waste (LLW) is defined in the UK as radioactive waste having a radioactive content not exceeding 4 GigaBecquerels per tonne (GBq/te) of alpha or 12 GBq/te of beta/gamma activity. Within this definition various sub-categories are recognised, including low-volume and high-volume very low level waste (VLLW) – Section 2.2.2.

Intermediate-level waste (ILW) is defined in the UK as radioactive waste exceeding the upper activity boundaries for LLW, but which do not need heat to be taken into account in the design of storage or disposal facilities.
High-level waste (HLW) is defined in the UK as radioactive wastes in which the temperature may rise significantly as a result of their radioactivity, so this factor has to be taken into account in the design of storage or disposal facilities.

'Higher activity radioactive wastes' include HLW, ILW, and a small fraction of LLW having relatively high concentrations of specific radionuclides.

2.2 Government Policy on Long-Term Management of Radioactive Waste

2.2.1 Policy on Higher Activity Radioactive Wastes

The UK Government's framework for managing higher activity radioactive waste in the long-term was published in June 2008 as a white paper entitled, 'Managing Radioactive Waste Safely: A Framework for Implementing Geological Disposal'.

The policy involves safe and secure interim storage of the wastes followed by their disposal in a geological disposal facility. A programme of research and development is ongoing to support the optimised implementation of geological disposal.

The UK Government sees no case for having more than one geological disposal facility if one facility can be developed to provide suitable, safe containment for the baseline waste inventory.

According to the white paper, a geological disposal facility will require a Nuclear Site Licence under the Nuclear Installations Act 1965 (NIA65).

2.2.2 Policy on Low-Level Wastes

Policy for the long-term management of solid LLW waste in the UK was published by Government and the devolved administrations in March 2007.
There is a wide range of material types and levels of radioactivity within the LLW category, and one of the particular features of the new LLW policy is recognition of the need to be able to deal flexibly with the various different wastes, particularly the large volumes of low activity wastes that are likely to arise from nuclear power plant decommissioning and site restoration.

Options for the disposal of LLW include:

- Disposal to geological disposal facilities (when available), where this is deemed to be necessary. In practice, some LLW that falls within the definition of LLW may have to be managed along with ILW because of its content of specific radionuclides, or its physical/chemical properties.

- Disposal to near-surface facilities of the kind employed at the Low-Level Waste Repository (LLWR) near Drigg, where disposal currently involves grouting and placement in a concrete vault.

- Disposal to specific areas of, or adjacent to, nuclear licensed sites (e.g. the current landfill-type disposal at Sellafield) or to disposal facilities that might, in future, be constructed at, or adjacent to, nuclear sites.

- *In-situ* disposal; that is, burial at the point of arising.

- Disposal at specified landfill sites for LLW and high volume VLLW, including the practice of 'controlled burial', providing that this meets specified regulatory requirements.

- General disposal of low volume VLLW to unspecified destinations, together with municipal, commercial or industry wastes.

- Incineration. Incineration is sometimes regarded as a disposal option for the disposal of combustible LLW because it reduces the volume of the waste. However, ash and other active residues from the incineration process may still require disposal to landfill. Incineration may, therefore, be a method of waste treatment, or disposal, or both.

Importantly, the LLW policy framework (Figure 1) allows for the development of LLW disposal arrangements and facilities on a case-by-case basis as long as they provide safe, environmentally acceptable and cost effective management solutions and reflect the nature of the LLW concerned.

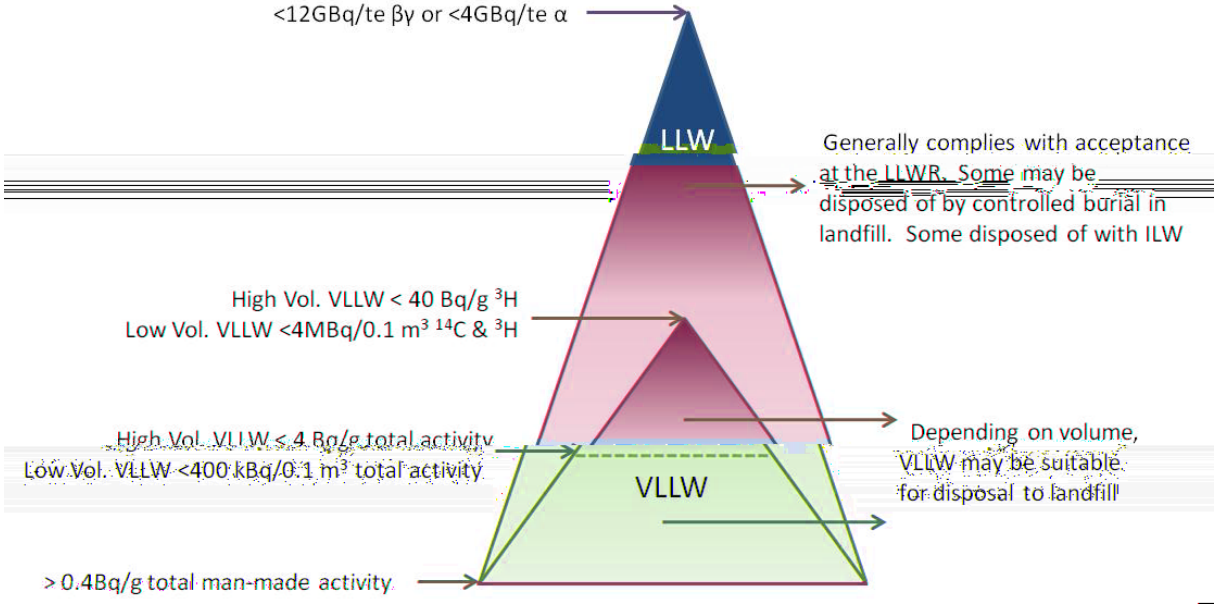

Figure 1 Illustration of UK LLW classification and policy on disposal.

2.3 Licensing of Nuclear Sites

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 (HSW74) and associated statutory provisions, which include the NIA65 (as amended). NIA65 provides a system of regulatory control in which a licence is granted to a corporate body to use a site for specified activities.

The scope of the NIA65 licensing regime encompasses various types of activity. Specifically, NIA65, together with the Nuclear Installations

Regulations 1971 (NIR71), requires that a Nuclear Site Licence is in force before a site may be used for the purpose of installing or operating any nuclear reactor (excluding a reactor used in a means of transport) or any other installation which may be '*prescribed*'. In addition to nuclear power stations, installations currently prescribed in the NIR71 are those used for:

- Manufacturing fuel elements from enriched uranium or plutonium.
- Producing alloys or chemical compounds from enriched uranium or plutonium.
- Processing irradiated nuclear fuel except where this is just for assay or similar purposes.
- Storage of:
  - Fuel elements containing enriched uranium or plutonium.
  - Irradiated nuclear fuel.
  - Bulk quantities of radioactive material which has been produced or irradiated in the course of the production or use of nuclear fuel.
- Extraction of plutonium or uranium from irradiated materials, or for enriching uranium.
- Production of isotopes from irradiated material for industrial, chemical and other purposes.
- Manufacturing rigs incorporating enriched uranium or plutonium for subsequent irradiation in a reactor.
- Installing a sub-critical nuclear assembly in which a neutron chain reaction can be maintained.

Subsequent sections of this document discuss (i) the possible extension of this list to include the *disposal* of certain radioactive wastes (those requiring geological disposal), and (ii) the interpretation of storage of *bulk quantities*, which is not defined in NIA65 or NIR71.

2.4 Nuclear Liabilities

NIA65 implements the provisions of the 1960 Paris Convention on Nuclear Third Party Liability in the Field of Nuclear Energy and the 1963 Brussels Convention Supplementary to the Paris Convention (Figure 2). NIA65 places an absolute liability upon licensees as regards injury to persons or damage to property arising from a nuclear occurrence without proof of fault on the licensee's part.

A licensee must ensure that sufficient funds are available, by insurance or other approved means, to meet third-party claims within the limits prescribed in NIA65. Two liability limits are established in NIA65; a higher limit and a lower limit for certain prescribed sites.

The Nuclear Installations (Prescribed Sites) Regulations 1983 prescribe the sites to which the lower limit of liability applies. Essentially, the sites prescribed are the sites of small installations. They are prescribed by reference to the type and designed thermal output of any nuclear reactor with its associated fuel, and by reference to the activity of other radionuclides which may also be present. The regulations provide for cases where nuclear material of different levels of activity is present, as well as for overall limits for mass of fissile material.

NIA65 was amended by the Energy Act 1983 to, amongst other things, take account of two Protocols that amend the Conventions and increase the amounts of the liability limits to £20 million and £140 million for the two types of sites.

Extending the nuclear licensing regime to additional types of sites and/or facilities would bring with it significant real costs for operators.

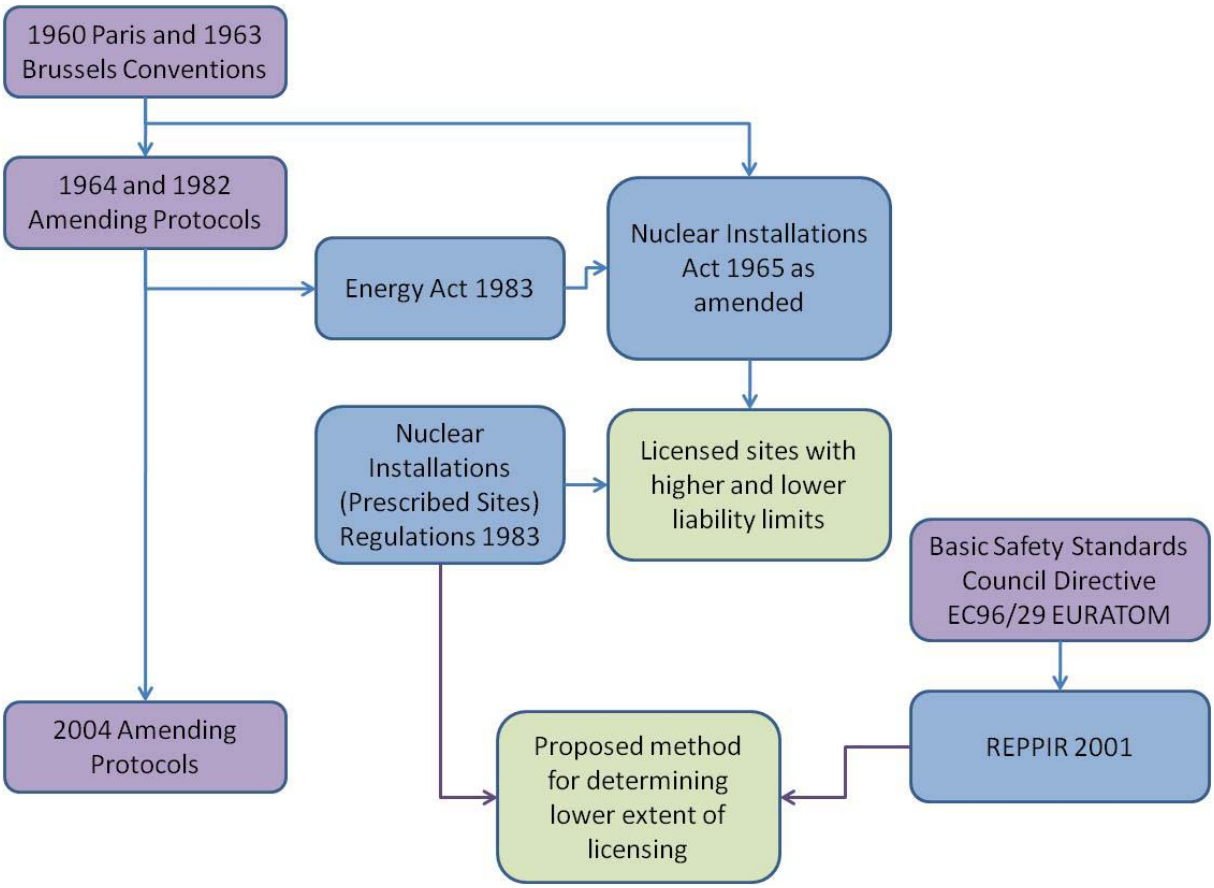

Figure 2 **Relationships between relevant international conventions and directives (purple) and UK legislation (blue). The figure also illustrates the possible use of information from existing UK legislation in a method for determining the lower extent of licensing under NIA65 (Section 3).**

2.5 Nuclear Safety

The licensing of nuclear sites is the responsibility of the Health and Safety Executive's (HSE's) Nuclear Directorate (ND). The ND's primary goal is to ensure that those it regulates have no major nuclear accidents.

NIA65 allows the HSE to attach conditions to nuclear site licences as necessary or desirable in the interests of safety, or with respect to the handling, treatment or disposal of nuclear materials.

The licence conditions are non-prescriptive and set goals that the licensee is responsible for meeting, amongst other things by applying detailed safety standards and safe procedures for the facility.

HSE's assessors establish whether a licensee has demonstrated that it understands the hazards associated with its activities and how to control them adequately. This is based on, amongst other things, the licensee's safety case.

The safety case is the totality of documented information and arguments developed by the licensee that substantiate the safety of the facility, activity, operation or modification in question. The safety case provides a written demonstration that relevant standards have been met and that risks have been reduced to a level that is as low as reasonably practicable. The safety case is not a one-off series of documents prepared to obtain a Nuclear Site Licence, but is an holistic, living framework that underpins all safety related decisions made by the licensee.

The link between the nuclear license and nuclear safety represents the primary benefit of the licensing regime.

2.7 Other Relevant Legislation and Regulatory Regimes

2.7.1 REPPIR

Other legislation of relevance includes the Radiation (Emergency Preparedness and Public Information) Regulations 2001 (REPPIR). REPPIR applies to work with ionising radiation which involves having on any premises a radioactive substance containing more than specified quantities of radionuclides or fissile materials.

For nuclear licensed sites, REPPIR establishes a framework of emergency preparedness measures to ensure that the population local to the site is:

- Informed and prepared, in advance, about what to do in the unlikely event of a radiation emergency occurring; and
- Provided with information if a radiation emergency actually occurs.

REPPIR obliges the licensee to produce an emergency plan for dealing with any reasonably foreseeable radiation emergency, and to provide information to the population around the site. REPPIR also places duties on the local authority to prepare (and if necessary, implement) an off-site emergency plan for dealing with the consequences of any reasonably foreseeable radiation emergency in an area determined by the HSE.

The proposals considered here will not affect the issues addressed by REPPIR, but some of the information contained in REPPIR on the amounts of relevant radionuclides may be useful in considering the proposed changes discussed below.

2.7.2 Security

The Office for Civil Nuclear Security (OCNS) is a division of the HSE that regulates security arrangements in the civil nuclear industry, including the security of nuclear material in transit. OCNS conducts its regulatory activities on behalf of the Secretary of State for Business, Enterprise and Regulatory Reform (BERR) under the authority of the Nuclear Industries Security Regulations 2003.

The proposals considered here will not affect issues of nuclear security or their regulation.

2.7.3 Environmental Protection

The Environment Agency is responsible in England and Wales for the enforcement of environmental protection legislation in the context of sustainable development. The equivalent body in Scotland is the Scottish Environment Protection Agency and in Northern Ireland this function is carried out by the Environment and Heritage Service within the Department of the Environment.

In particular, these environment agencies authorise and regulate discharges and disposals of radioactive wastes in accordance with the RSA93 as amended.

The proposals considered here will not affect the authorisation and regulation of discharges and disposals of radioactive wastes by the environment agencies.

3 The Need for Change

Based on the preceding sections it can be seen that the safety of nuclear operations is ensured through a system of licensing. The nuclear site licensing regime applies to a set of defined activities, which includes the storage of bulk quantities of radioactive materials, but does not include radioactive waste disposal.

Currently, however, it is not clear what constitutes 'bulk quantities' of radioactive materials, the storage of which would need to be licensed. Furthermore, current Government policy on the disposal of higher activity wastes is that a geological disposal facility (GDF) should be licensed in accordance with NIA65.

For these reasons action is required to take forward legislative change to implement the Government's expectation of licensing of the GDF and to clarify the position for any other planned disposal facilities. This document identifies possible ways of extending and clarifying the nuclear licensing regime and invites comment on a number of considerations which follow.

4 Principles Governing ND's Actions

In developing proposals and implementing any changes regarding the nuclear licensing regime, the ND will act in accordance with a set of principles and aims, including:

- Transparency – The ND's aim is to develop a transparent, logical, coherent, and self-consistent approach for regulating the use, storage and

disposal of radioactive materials that can be readily communicated and understood.

- Proportionate Regulation – The ND wants to ensure that appropriate facilities are licensed, but does not want to impose NIA65-type licensing restrictions or other regulatory burdens on facility operators where they are not needed. The ND will also seek to ensure that any change to the regulatory framework involves the smallest possible additional regulatory burden and the lowest level of additional effort from the regulators.

- Risk-Based Regulation – The ND ensures safety by acting to put downwards pressure on risks. In doing so ND will focus on the 'high risk' facilities and activities.

- Better Regulation – The ND does not want introduce measures that would either duplicate or be inconsistent with related regulatory regimes, such as those that stem from RSA93 or IRR99.

These principles will be used as part of the process of weighing the various advantages and disadvantages of the possible options to be considered (Section 5).

5 Options for Consideration

By considering the wording and intentions of NIA65, and taking note of the contents of the Paris Convention, the ND has identified three options for determining whether the storage of particular quantities of radioactive materials would require licensing under NIA65. These options are described in sub-sections 5.3 to 5.5. All of the options are offered for discussion with stakeholders as part of the process of developing HSE's policy on this question.

5.1 Exclusions

Common to all of the options described below are the following exclusions that already exist in the wording of NIR71:

- Materials which have not been produced or irradiated in the course of the production of nuclear fuel (e.g., naturally-occurring radioactive material).

- Materials in storage incidental to carriage.

Additionally we are proposing to exclude sealed sources managed in such a way as their integrity continues to be assured from the requirement for licensing of storage.

5.2 Defining 'Bulk Quantities'

Before setting out options for approaches to determining where licensing under NIA65 should apply, it is appropriate to consider the possibilities for defining bulk quantities:

- *Volume*: One approach would be to define bulk quantities in terms of the volume of material. A common sense view might be that, for example,

anything less than a 200 litre drum would be considered to be less than a bulk quantity, while anything of the size of a half-height ISO container (such containers are used for the accumulation and transport of LLW and for its disposal at the LLWR) or more would be considered to be a bulk quantity. A problem with considering volume alone, however, is that some radioactive wastes possess very little radioactivity and even very large volumes of such wastes may in terms of NIA65 pose '*no danger*'. The Health and Safety Commission has published advice on what constitutes no danger under NIA65 (HSE 2005), and this advice could be used to exclude from licensing the storage of volumes of such low activity radioactive materials above a certain level (e.g., 200 litres).

- *Radioactivity*: An alternative approach would be to use the radioactivity of the material (e.g., in Bq) for defining what constitutes a bulk quantity. Within this approach there could be consideration of the total radioactivity of the materials, or of the radioactivity of individual radionuclides, or of the radioactivity of groups of radionuclides.

- *Risk / potential dose*: A further alternative approach would be to use the risk (or potential dose) associated with the radioactive content of the materials as the basis for defining what constitutes a bulk quantity. In this case we would use the legal dose limit for members of the public of 1 mSv as set in IRR99. If, as a result of any reasonably foreseeable event, a member of the public could receive a dose in excess of 1mSv, then the storage of such material would need to be on a site that was licensed in accordance with NIA65, and appropriate controls would have to be put in place. This would be generally in line with REPPIR, which sets a threshold invoking the need for offsite emergency arrangements of an off-site dose of ~5 mSv. However, a problem with using risk or potential dose is that they are not directly measurable quantities in the same sense as, for example, volume or radioactivity, and arguments might arise over the conduct of the risk and dose assessments, and over any determinations of the need for licensing made on the basis of such quantities.

5.3 Option 1

This option may be characterised by the fact that as a starting point it would distinguish between the nuclear industry and the non-nuclear industry, and would treat those sectors differently.

Under this option, the ND would continue to use the nuclear licensing regime of NIA65 to regulate activities associated with nuclear reactors or the nuclear fuel cycle. ND would impose the standard licence conditions to require the operator to make arrangements to secure high standards of radioactive materials and waste management, but would make clear that the operator's compliance arrangements should be proportionate to the level of hazard posed by the radioactive materials and waste.

In considering proportionality under this option, bulk quantities would be defined using either the volume or risk criteria discussed above. We would issue guidance explaining our approach, and this would make clear that the

licensing regime was aimed only at 'nuclear' activities. Under this option HSE would not require application of the nuclear licensing regime to sites for the legitimate use or storage of radioactive materials by the non-nuclear industries, universities, hospitals or other small users.

The advantage of this option is that it could be made to fulfil ND's objectives from a technical perspective. However, we recognise that treating nuclear industry as a special case might be questioned and that the option might not provide a consistent regulatory approach for all waste producers.

5.4 Option 2

This option would treat all industrial sectors in the same way and would involve determining whether a particular storage facility requires licensing under NIA65 by comparing its content of radioactivity (in Bq) with a pre-defined criterion value based on data in existing legislation.

ND suggests that subject to the exclusions referred to above, the storage of radioactive material in quantities exceeding 100 times the levels set out in Schedule 2 of REPPIR should be subject to the nuclear licensing regime. The basis on which this figure is proposed is set out in Annex A. We would issue guidance explaining our approach.

This option would have the advantage of (relative) simplicity and consistency across all industrial sectors. It should be easy for an operator to understand whether the storage of its wastes would require licensing, and for the ND to make and support such determinations. However, the use of radioactivity as the criterion does not equate directly to the risk associated with the materials and, in particular, does not take into account the form of the radioactive material, which can be an important consideration when assessing risk.

Trial studies made so far suggest that a criterion set at 100 times the levels set out in Schedule 2 of REPPIR would not require any existing non-nuclear activities to be licensed. However, it is not clear that all nuclear activities that the ND might expect to be licensed would actually require licensing at this level.

5.2 Option 3

This option would treat all industrial sectors in the same way. Under this option rather than using a single value criterion as in Option 2, a range of values would be specified, with an upper level above which licensing would, in most cases, be required and a lower level below which licensing would, in most cases, not be required.

A range of between 10 and 100 times the REPPIR Schedule 2 values is proposed. Between these two levels the volume and radioactivity of the materials and the associated risks would be taken into account, as well issues such as the form of the material. This option would, thus, be structured in a way similar to the way in which the HSE considers the Tolerability of Risk (TOR) principle (HSE 1992; 2001) (Figure 3).

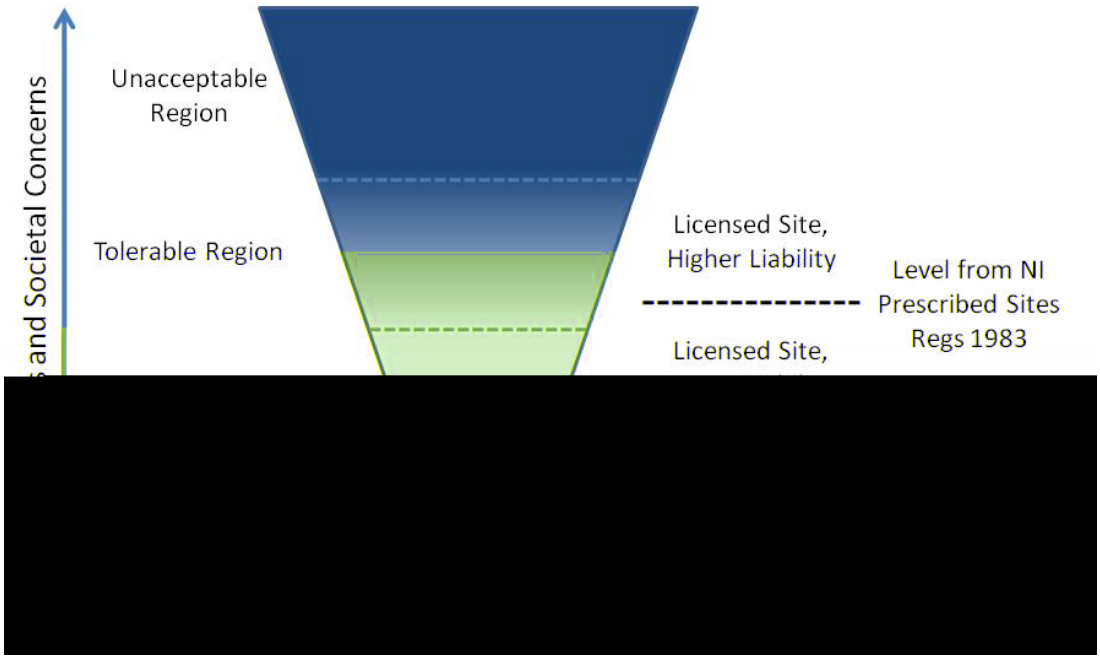

Figure 3 **Tolerability of risk framework (left) and a possible approach to determining which sites require licensing (right).**

This option would have advantages in terms of consistency across all industrial sectors, better links to risk, and greater regulatory flexibility, but this would come at the cost of increased complexity and possibly reduced transparency. We would issue guidance explaining our approach.

6 Proposed Changes

In summary we intend to issue a public consultation document in 2010 around the following proposals:

- To make amendments to the Nuclear Installations Regulations 1971 to enable licensing of a geological disposal facility under NIA65.
- To issue guidance on how the HSE's ND will interpret the term 'bulk quantities' and, therefore, determine which sites and facilities for the storage of radioactive materials will require licensing under NIA65.
- To assess the impacts of the proposed changes.

It has always been envisaged that a geological disposal facility would be licensed under NIA65; this is consistent with Government Policy and international practice. For example, the Paris and Brussels Conventions have been amended to include radioactive waste disposal facilities. Hence, this part of the proposed changes does not really represent a change.

In the UK, near-surface disposal of LLW is not currently licensed and we do not propose to change this[2]. The ND believes that the exclusion from licensing of near-surface LLW disposal can be justified on the basis that off-

site risks to members of the public associated with reasonably foreseeable events at such facilities are acceptably low.

We are not proposing to introduce a requirement for licensing of sites where sealed sources are stored or used. Similarly, we are not proposing to license sites for the storage of naturally occurring radioactive materials, or sites where radioactive materials are in storage incidental to carriage.

7 References

1960 Paris Convention on Nuclear Third Party Liability.

1963 Brussels Supplementary Convention on Nuclear Third Party Liability.

2004 Protocol to Amend the Brussels Supplementary Convention on Third Party Liability.

2004 Protocol to Amend the Paris Convention on Nuclear Third Party Liability. Defra, BERR and the Devolved Administrations for Wales and Northern Ireland, 2008. Managing Radioactive Waste Safely: A Framework for Implementing Geological Disposal, Cm 7386.

Defra, DTI and the Devolved Administrations, 2007. Policy for the Long Term Management of Solid Low Level Radioactive Waste in the United Kingdom Energy Act 1983.

Energy Act 2004.

European Commission, 1996. Laying down Basic Safety Standards for the Protection of the Health of Workers and the General Public against the Dangers Arising from Ionizing Radiation. Council Directive 96/29/EURATOM. Health and Safety at Work etc Act 1974.

HSE (1992) The Tolerability of Risk from Nuclear Power Stations. Sudbury, UK: HSE Books.

HSE (2001) Reducing Risks, Protecting People (2nd ed.). Sudbury, UK: HSE Books.

HSE (2005) Criterion for De-licensing Nuclear Sites. Nuclear Industries Security Regulations 2003. Statutory Instrument 2003 No. 403,

Nuclear Installations (Increase of Operators' Limits of Liability) Order 1994. Statutory Instrument 1994 No. 909.

Nuclear Installations (Prescribed Sites) Regulations 1983. Statutory Instrument 1983, No. 919.

[2] The Low-Level Waste Repository (LLWR) near the village of Drigg in Cumbria is a nuclear licensed site, but the LLWR licence was issued because of nuclear materials on the site and not because of LLW disposal.

Nuclear Installations Regulations 1971, Statutory Instrument 1971 No. 381.
Radiation (Emergency Preparedness and Public Information) Regulations 2001. Statutory Instrument 2001 No. 2975.

Radioactive Substances Act 1993.

The Ionising Radiations Regulations 1999. Statutory Instrument 1999 No. 3232.

The Nuclear Installations Act 1965.

Annex A Derivation of a Numerical Criterion for Interpreting 'Bulk Quantities'

Nuclear Installations (Prescribed Sites) Regulations 1983

Some indication of which sites should be included within the scope of the NIA65 licensing regime may be derived from The Nuclear Installations (Prescribed Sites) Regulations 1983. These prescribe the sites (through the quantity of radioactive material present) for which the lower limit of liability per incident under Section 16(1) of NIA65 applies. It could therefore be deduced that sites with more than these quantities should be subject to NIA65. This cannot, however, be used as a simple 'cut off' since sites with lower inventories can be subject to NIA65, albeit with a lower liability requirement.

These quantities are:

TABLE 1

Group definition	Typical isotopes	Sealed Sources	Other Forms
Radionuclides with A2[3] values not exceeding 0.01 Ci	plutonium alpha emitters and americium.	200 Ci (~ 7 TBq)	20 Ci (~0.7 TBq)
Radionuclides with A2 values between 0.01 and 1 Ci	enriched uranium, Plutonium 241 and some radium and thorium isotopes	2000 Ci (~70 TBq)	200 Ci (~7 TBq)
Radionuclides with A2 values between 1 and 100 Ci	Most fission products	50,000 Ci (~1800 TBq)	5000 Ci (~180 TBq)
Radionuclides with A2 values greater than 100 Ci	Iron 55,Tritium, Iodine129	500,000 Ci (~18000 TBq)	50,000 Ci (~1800 TBq)

Proposals for Numerical Criteria

[3] A2 values are the values in Curies specified for single radionuclides in paragraphs 403 to 405 of the Regulations for the Safe Transport of Radioactive Materials published by IAEA (1973 edition) and for mixtures of radionuclides in paragraphs 406 - 411 of those Regulations.

The levels in the Nuclear Installations (Prescribed Sites) Regulations 1983 set the boundary for the lower level / upper level of liability provision. It is clear that there is an intention that sites with lower inventories should be licensed, albeit with a reduced requirement for liability provision – hence for screening purposes we can take a figure an order of magnitude lower – i.e. 20TBq (to 1 significant figure).

To start the process of distilling the above into some form of criteria one can start by taking Caesium-137 as a typical isotope. This comes into group (iii) under the

Nuclear Installations (Prescribed Sites) Regulations 1983 and the cut-off value is ~180 TBq (5000Ci) for sources other than sealed sources.

A starting point for the definition of 'bulk quantities' could therefore be:

TABLE 2

Group definition	Typical isotopes	Sealed Sources	Other Forms
1. Radionuclides with A2 values < 0.01 Ci	plutonium alpha emitters and americium.	1 TBq	0.1 TBq
2. Radionuclides with A2 values 0.01 - 1 Ci	enriched uranium, Plutonium 241 and some radium and thorium isotopes	10 TBq	1 TBq
3. Radionuclides with A2 values 1 - 100 Ci	Most fission products	200 TBq	20 TBq
4. Radionuclides with A2 values >100 Ci	Iron 55,Tritium, Iodine129	2000 TBq	200 TBq

REPPIR

Grouping of radionuclides as above can lead to some anomalous results in terms of risk. Modern legislation sets figures for each radioisotope. REPPIR sets out requirements for assessment of risks and emergency preparedness where there may be off-site impact from radioactive material (i.e. a risk, though not necessarily exceptional, to the public at large). Schedule 2 of REPPIR gives amounts of radioisotopes above which REPPIR will apply. Common sense would indicate that licensing should only be considered in cases well above where REPPIR should 'just apply' i.e. we should expect a Licensing/REPPIR (L/R) ratio of much greater than 1.
Taking the 'other forms' column in Table 2 as 'L' and REPPIR Schedule 2 levels as 'R', over half of isotopes (56%) have a L/R ratio in the range 10 – 100, with a further 19% in the range 100 – 1000 and 16% in the range 1 - 10. This could be construed to be consistent with an assumption that the threshold for licensing should be substantially higher than that for the application of REPPIR.

This still leaves 9% of isotopes outside this range.

There are a group of 19 isotopes (5% of total) with a L/R ratio of less than 1 – implying licensing without the application of REPPIR. These include all the isotopes of noble gases Argon, Krypton and Xenon as well as Ge71, W178, Br77, Ru97, Rh103m and Re187. Other than the noble gases, none of these isotopes figure prominently in routine operations at sites – Re187 is a naturally occurring isotope and would generally, therefore, be excluded from consideration.

There is also a group of 11 isotopes (3% of total) with a L/R of >1000 implying that the licensing cut off may not be strict enough. These include the transuranics Cf250, Cm248, Pu236, Cf254 and Cm244, and the naturally occurring isotopes Th288, Ac227, Ra224, Th230 and Sm147.

Of more interest is the position in such a comparison of the key isotopes that regularly feature significantly in nuclear type safety cases.

TABLE 3

Isotope	Ratio	Isotope	Ratio	Isotope	Ratio
H-3	2.9	Mn-54	67	U-235	333
C-14	6.7	Ru-106	67	U-238	333
Cl-36	10	S-35	100	Co-60	333
Ru-103	10	Cs-137	200	Tc-99	400
Fe-55	25	I-131	222	Pu-239	500
Zr-95	25	Sr-90	250	Ag-110m	667
Ce-144	67	Cs-134	286		

Conclusions

The above analysis suggests that a level of around 100 times REPPIR Schedule 2 would be a reasonable screening criterion as to whether an inventory should be considered as ‘bulk quantities’.

Proposals to alter some aspects of the existing arrangements for licensing of the storage and disposal of radioactive wastes.

HSE Nuclear Directorate, October 2009.

Seeking Your Views and Opinions

We are seeking people's views on these proposals through a process of pre-consultation engagement and formal public consultation.

Questions for Consideration and Discussion

1. Do you agree with the proposed exclusion from licensing under NIA65 of sites for the storage of (i) sealed sources, (ii) naturally-occurring radioactive materials, and (iii) radioactive materials incidental to carriage?

2. What is your view of whether 'bulk quantities' should be defined in terms of volume (m^3), activity (Bq), dose (Sv), risk of death (y^{-1}), or some other measure? Would it be appropriate to apply the HSE concept of 'no danger' as part of the definition of bulk quantities?

3. What is your view (e.g., from practical experience) as to what constitutes a bulk quantity of radioactive materials?

4. Should all sectors be treated equally or could special treatment of the nuclear industry be justified in this instance? Is the distinction between the nuclear and non-nuclear sectors sufficiently clear?

5. Is the basis for using values derived from the Nuclear Installations (Prescribed Sites) Regulations 1983 and REPPIR to help determine the requirement for licensing under NIA65 clear? Would the use of such values be an acceptable approach?

6. Have we set out the options sufficiently clearly?

7. Are there other options that should be considered – if so what are they?

8. What is your preferred option?

9. Do you agree with the proposed exclusion from licensing under NIA65 of sites used for near-surface (i.e., non-geological) disposal of LLW?

10. What do you consider to be the key impacts of the proposed changes? Do you have any comments?

11. Do you have any comments on the proposed approach to consultation?

12. Do you have any other comments?