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Legal protection in the UK of people and the environment from the harmful effects of radiation

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In addition to the benefits that nuclear energy brings, it also poses risks to the health and safety of people and to the environment. Legislation must therefore acknowledge both the risks and the benefits associated with the defining feature of the technology: ionising radiation.

The objectives of international nuclear safety law are to provide a legal framework for conducting activities relating to nuclear energy and ionising radiation in a manner which meets the IAEA Fundamental Safety Objective: the protection of people and the environment from harmful effects of ionising radiation [1, p4]; and to recognise and address the liability associated with nuclear operations from both an international and national perspective.

This article discusses the role, characteristics and authority of international nuclear safety law and the implementation of its fundamental principles within the UK, in relation to the issues of responsibility for safety, and the provision of an effective compensation framework.

The method of implementation of international nuclear safety law in the UK strengthens the licensee's responsibility for safety

The Nuclear Installations Act, 1965 ("NIA65") is the primary legislation providing for the licensing and regulation of the UK's nuclear facilities and activities: it integrates international nuclear-specific law with our legal system. Since 1965, international influences in the form of International Atomic Energy Agency ("IAEA") standards, international conventions and European law have required amendments to NIA65 and related instruments. NIA65 however remains the backbone of nuclear safety law within the UK by: establishing an authorised regulator; establishing the licensing regime and the fundamental duties of the licensee; and setting out nuclear liability insurance requirements. The Energy Act 2013 has strengthened UK nuclear law further, particularly regarding the independence of our nuclear regulator.

The principal international convention for nuclear safety is the Convention on Nuclear Safety ("CNS") [2] adopted on 17 June 1994. The objectives of this Convention focus on safety of nuclear installations; defence against potential radiological hazards; and accident prevention. The Convention also seeks to reduce the impact of the consequences of a nuclear accident and is supported by a number of other IAEA international treaties. The Convention's Articles are related to the IAEA Fundamental Safety Objective. The IAEA has developed safety standards to assist states to apply the Safety Conventions and Codes of Conduct, including: Safety Fundamentals, Safety Requirements and Safety Guides, providing coverage of all civil nuclear facilities and activities. The IAEA also provide an Integrated Regulatory Review Service ("IRRS") which is entirely voluntary. An example of how the IRRS assists member States can be seen in relation to the UK where three reviews of the regulatory framework for nuclear and radiation safety have been completed in 2006, 2009 and 2013. An important outcome from the reviews is an explicit demonstration by member states that they are aligned with the obligations of the CNS, in addition to identifying areas where there is potential to strengthen the regulatory regime.

Law is incorporated in the UK through Acts (primary legislation) and Regulations (secondary legislation), by Government as well as through the decisions, directives and regulations issued from Europe. Many of the fundamental requirements of the IAEA Safety Standards Series are embedded within the instruments of law applicable to facilities in the UK.

Critically, nuclear safety law is incorporated within the national health and safety system through the assignment within NIA65 of the Health and Safety Executive as responsible for the policies under which nuclear safety is regulated. The Health and Safety and Work, etc Act 1974 ("HSWA") sets out the duties of **all** employers (importantly regarding their duty to reduce risks to As Low As Reasonably Practicable ("ALARP") [3]), which nuclear site licence holders are required to meet **in parallel** to any special nuclear requirements. It therefore informs the relationship between the regulator and the licensee. Through the adoption of a goal-setting approach to regulation (i.e. setting out the licensee's duty or goal but allowing the licensee to determine how best to achieve it) HSWA enforces the prime responsibility for safety on the licensee. The 2006 IRRS mission recorded this characteristic as a particular strength of the UK system [4] although many other countries (e.g. the USA) follow a prescriptive approach to regulation.

The UK stands unique in having only a single-step licence covering the lifetime of the installation [5, pp12-13]. While a multi-step process may permit a smooth passage within each step (by identifying their different characteristics and using an efficient approach for each, so providing an applicant with the confidence of being able to achieve new build milestones earlier than otherwise may be the case) a one-step process requires the licensee to consider competent safety management throughout the life-cycle of the installation. The licensee must demonstrate a *controlling mind* organisation upon license application [5, pp13-15]. A single non-transferable licence, with conditions enduring post relinquishment, enforces an holistic approach to the protection of people and the

environment throughout its life. The licensee is required to consider the implications on the future of its actions in the present, from a commercial as well as regulatory basis.

A one-step process also requires a regulator to set out clear and enforceable approval points where required, reinforcing the licensee's responsibility for safety. The licensee's justification of how they have met the safety goals at each point is then assessed by the regulator against the ALARP principle, meeting GSR-1 Requirement 6: Compliance with regulations and responsibility for safety [6], before granting authorisation to proceed. Recognising the practical requirement for the licensee to contract out services to third parties from time to time, justification also requires demonstration of an *intelligent customer* capability within the licensee.

Recent changes to UK regulation further promote licensee responsibility

Europe adds an additional dimension to UK nuclear safety law through the Euratom treaty. IAEA Fundamental Safety Principles [1] cascade through European law and into the UK. In particular, the Nuclear Safety Directive (2009/71/Euratom) ("NSD") established a community framework for safety by writing IAEA Fundamental Safety Standards into European law. Being a directive, member states remained able to choose how best to implement its requirements into their national law: as an example, NSD was implemented in the UK through the variation of two licence conditions [7]. Any EC Directive fully consistent with IAEA Safety Standards should require only a straightforward implementation within UK law. IAEA standards should ensure compatibility with the UK's approach and the ONR itself has the authority to amend licence conditions as required. EC regulations on nuclear safety however would prove difficult, as they become directly enforceable, requiring no further enabling legislation and allowing little flexibility in application.

Alternative approaches to nuclear safety regulation within the UK are achievable, but would set the principles of nuclear regulation and safety management juxtaposed to our overarching principles of safety at work. For a licensee, this would be challenging (for example when engaging sub-contractors to work under a fundamentally different safety system); from a legal perspective, it would be inefficient and complex; and from a regulatory perspective, the regulator would risk sharing some responsibility for setting the safety standards. As it stands, the UK system is clear in its allocation of responsibility for safety.

Energy Act 2013 has incorporated an independent regulator with a budget and resourcing function, delivering the recommendations of the 2006 IRRS mission, meeting the standards set out in IAEA document GSR-1 [6] and maintaining its competent global reputation in nuclear regulation.

ONR is now **the** nuclear regulator, channelling all aspects of regulation to it. Through the requirement to demonstrate a thorough understanding of the

hazards, risks, safety measures and functions required to protect people, the prime responsibility of the licensee for safety is subtly strengthened by this arrangement.

Liability insurance frameworks promote international compliance to established safety standards

The second component of the IAEA framework recognises and addresses the potential risk of damage associated with nuclear operations from both an international and national perspective. Operators of nuclear power plants are liable for any damage caused by them and are therefore required to take out insurance to cover this liability. This requires national legislation, however there are potential cross boundary and external territorial implications of a nuclear accident, therefore international conventions are also required. Liability is limited by both international convention and national legislation, therefore individual states must underwrite claims over these limits. Regulation and safety provision acts as a natural insurance against compensation payments by preventing accidents.

The UK is a signatory to the Paris Convention on Third Party Liability in the Field of Nuclear Energy (1960), as well as the Brussels Supplementary Convention, both of which have been amended and are currently undergoing further review. The UK's obligations from these Conventions are contained within NIA65, mirroring the convention's liability and channeling provisions. Further changes [8] will be put into effect through amendments to NIA65 by the Energy Act 2013. The ONR also oversees a licensee's ability to meet its liability obligations, although there is no specific SLC addressing this important area.

The international framework consists of three instruments (Paris/Brussels; Vienna; and the Convention on Supplementary Compensation) each differing in the extent of liability of a participating state. Inconsistent ratification across multiple amendments has resulted in commitments widely differing across the globe. Although it should be noted that there are many common elements between the various instruments, including strict and exclusive liability of the operator, addressing this problem will be a significant challenge to the international community.

The lack of consensus and consistency associated with this important cross border issue does indicate a serious weakness which merits attention: this international framework remains untested from a regulatory (and thankfully - operational) perspective. For third party insurance, due to the importance of achieving a workable consensus, insurers from around the world formed the Nuclear Pools Forum, bringing a valuable and consistent global approach. the Forum has an extensive list of members including most nuclear operators, and provides guidance [9] on strategic issues, supported by reference to international standards and insurance specific criteria. In a number of respects the Forum goes further than international frameworks, for example by addressing fire and

machinery breakdown risks, both of which have potential implications for nuclear safety. The IAEA continues to consider the problem but has not found a solution to date [10].

In conclusion

UK nuclear safety law is a good example of how the IAEA's Fundamental Safety Principles and the fundamentals of international nuclear safety law have been incorporated into an existing national legal system in a stable yet responsive manner, a view substantiated by the principal findings of the 2006 and subsequent IRRS missions. Protection of the licensing system from external influence (ie through regulatory independence) ensures that licensee assumes and maintains full responsibility for safety.

It is far from primary legislation, through the 36 Site Licence Conditions attached to each site licence [11], and the Safety Assessment Principles ("SAPs") [12] that many IAEA Safety Standards applicable to licensees are delivered and met in the UK. This characteristic protects the system of licensing as standards evolve through research and experience, and is consistent with both IAEA philosophies and our national approach to regulation of safety in the workplace.

There is no bijective mapping from IAEA document to UK condition: the standards and guides have been read, digested and implemented into the UK system in a way which provides consistency at the framework level, and requires technical knowledge and competence at the detailed level. By incorporating detailed standards into the SAPs, the regulator ensures that the licensee absorbs established international best practices and interprets them within their own safety designs, documentation and practices. The prime responsibility of the licensee for safety and the justification of safety management as ALARP is evident in the regulatory approach.

Further, it is of note that both the IAEA and the EU explicitly acknowledge that whilst the obligations for meeting the fundamental principals of safety are expected of signatories and members:

> National responsibility of Member States for the safety of nuclear installations is the fundamental principle on which nuclear safety regulation has been developed at the international level, as endorsed by the Convention on Nuclear Safety. [13]

This means that the UK, assisted by the IAEA safety standards, requirements and guides, should remain free maintain its own national, regulatory and organisational framework for nuclear safety. Energy Act 2013 firmly establishes the ONR as an independent statutory body, providing it with the authority and resources to regulate and enforce all aspects of nuclear activity in the UK, including nuclear safety, nuclear site health and safety, nuclear security, nuclear safeguards and transport of nuclear materials. This consolidates the UK's "3SL" regulatory framework developed and encouraged by the IAEA as being standard for the regulation of civil nuclear programmes.

The current Achilles heel of the international framework is in relation to third party liabilities because there is no instrument enforcing states with nuclear activities to meet their global obligations should a severe accident occur, potentially leaving neighbours both near and far to bear the costs.

In summary, the lack of international consensus and, in some cases commitment at state level, on this issue is probably the most significant challenge to be addressed in the future. In contrast to the challenges of achieving an international consensus, the EU has the potential to legislate membership states to adopt a consistent approach towards third party liability obligations [14]; however whilst this would bring alignment in Europe, it would not address the global nature of the problem. A wider solution, however, appears to be some way off.

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