



Regional, National and International Security Requirements for the Transport of Nuclear Cargo by Sea.

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1. Introduction

Since the beginning of the nuclear age in the 1940's, the world has focused on the immense possibilities of nuclear power with both its destructive and productive capabilities. The civil nuclear industry in the UK, as in most nuclear weapons states, grew from the military facilities built in the post war years under the political climate of the Cold War.

In the early years of the industry, civil and defence nuclear facilities were inextricably linked both in public perceptions and the regulatory infrastructure under which they operated. The nuclear arms race and the spread of communism overshadowed people's perceptions of there being two separate uses of nuclear material. This was a double edged sword which initially allowed the industry to develop largely unhindered by public concerns but latterly meant the industry could not break away from its roots and to many is still perceived as a dangerous and destructive force.

Regulatory frameworks governing all aspects of the industry have developed both nationally and internationally driven by valid public concerns, political agendas and an international consensus that the unregulated use of nuclear material has catastrophic possibilities on an international scale.

With the internationalisation of the civil nuclear industry and the costs associated with developing facilities to fully support each stage of the fuel cycle, from enrichment, fuel manufacturing, reprocessing and waste remediation, it became inevitable that a transport infrastructure would develop to make best use of the facilities.

Regulations, both national and international are implicit in ensuring the security of nuclear material in transit. Due to the physical size of many of the irradiated fuel packages and implications of the changes to transport safety regulations, international transports of nuclear material, other than within mainland Europe, is predominantly carried out by sea.

2. The Need for Security

Prior to the events of 11 September 2001, it was generally considered that the main threat to nuclear installations and transport operations and that which the protection measures were designed to address, was theft and any adversary would have the intention of obtaining the material to manufacture a nuclear explosive device. Analysis of the threat considered the need for unlawfully obtained material to be processed to some extent prior to it being able to be used for this purpose and therefore would need a capable support infrastructure.

Although the US Navy had experienced the suicide attack on the USS Cole in 2000, this was seen, along with other suicide attacks, as peculiar to the Middle-East and Horn of Africa and it was rarely envisaged that organised groups of extremists were prepared to kill themselves in the process of large-scale terrorist events in the Western world.

Following the attacks on the World Trade Centre the rulebooks had to be rewritten. It took a while for knee jerk reactions to the events to die down and considered approaches to be allowed to formulate changes to best practice and regulations. Physical security measures that previously focused mainly on preventing the unlawful removal of material now had to address the fact that a terrorist may not be looking for an escape route and an infrastructure through which to proliferate nuclear material.

When looking at the headline events that cause the security to come to the fore we must be careful not to take our eyes off the previously perceived threats.

INFCIRC/225 acknowledges that "*The transport of nuclear material is probably the operation most vulnerable to an attempted act of unauthorised removal of nuclear material or sabotage.*" All the protective layers of security available when at a permanent fixed location could never be physically mirrored when material is in transit although compensatory measures can be justified against the threats.

Protecting access to information on transport operations is a major part of the security regime; the benefits of good information security should not be underestimated. It is harder to attack a moving target if you don't know what is being moved, when it is being moved, where it is moving to and how it is being moved.

When considering maritime security, it would be wrong to focus solely on the cargo as being the prime objective of any adversary. Security needs to address the diverse threats, that unhindered, could contribute to the proliferation of terrorist capabilities, piracy, people trafficking or contraband smuggling all which have with links to organised crime. What ever the threat to a vessel or type of compromise to security whether it be opportunistic or planned, if it ultimately results in either the loss of a ship or its cargo or the unhindered movement of terrorists this would result in an increase in the global terrorist threat.

Any vessel containing dangerous goods, whether carrying petrochemical or nuclear cargoes could be used as a weapon in the wrong hands.

To these ends the security of vessels (over 500 tonnes) and port facilities used for international trade have, since July 2004, been obliged to operate under the IMO (International Maritime Organisation) International Ship and Port Facilities Security Code (ISPS). (See Below).

In relation to nuclear cargo, INFCIRC/225 rev 4 requires that member states utilise a Design Basis Threat (DBT) in order to establish comparable standards of physical protection. In the UK this is used to assess the medium term security threats. The document is based on intelligence on the motives, intentions and capabilities of terrorist groups and other potential adversaries. Its intention is to provide a definitive statement of the possible scale and methods of attack that could be faced at civil nuclear sites, or when nuclear material is being transported. The DBT takes account of the availability of countermeasures and contingency arrangements provided by the police, the Ministry of Defence and other agencies. It makes clear which forms of possible attack the nuclear operating companies are expected to guard against, which types of attack remain the responsibility of the Government and whether, in the latter case, the companies are required to take mitigating or preventative measures. The DBT was revised following the events of September 2001.

In addition to the DBT, vessels operated by BNFL / PNTL make reference to the UK Maritime Threat Assessment when planning routes. The Maritime Threat Assessment is distributed to industry from the UK Security Service and details the source of and levels of threat to British interests in the UK and overseas. Although not specifically designed to establish a threat to British Maritime activities, the threat can be postulated by regions and coastal states included in the assessment.

In a similar vein the International Chamber of Commerce Maritime Bureau web site provides weekly updates on incidents of piracy and lists piracy black-spots. Piracy is a major threat to world shipping, fortunately not prevalent on routes used by BNFL / PNTL vessels. The main threats from piracy relate to boarding a vessel to obtain the contents of the ships safe, bonded stores and crew possessions. They are normally opportunistic and not normally based on advance notice of the ships cargo (which may or may not be valuable to the pirates). Recent months have seen the rise of pirates boarding to specifically kidnap ship's officers and crews followed by ransom demands.

3. International Ship and Port facilities Security Code

Like the Convention on Physical Protection of Nuclear Material the ISPS Code has been developed to establish a framework for co-operation between governments, agencies and authorities as well as port industries in order to detect security threats and develop preventative measures to deal with security threats that could effect ships or port facilities involved in international trade.

The ISPS code establishes roles and accountabilities which, within the UK are undertaken by TRANSEC and the Maritime Coast Guard Agency via the Department for Transport and Security Officers appointed for ships and ports.

The code also establishes agreed routes for the collection and exchange of security related information both nationally and internationally.

Under the ISPS Code, both ships and ports are required to have an approved security plan which states how security is achieved and how each of the three agreed threat levels operate to:-

- Prevent unauthorised access to ships, port facilities and restricted areas.
- Prevent the unauthorised introduction of weapons, incendiary devices or explosives to ships or port facilities.
- Provide means for raising the alarm in reaction to security threats or incidents.
- Require training and drills / exercises to ensure familiarity with security and contingency plans.

Using intelligence, National Governments establish which threat level its ports and vessels under its jurisdiction operate to. These can be summarised as:-

- Level 1, Normal.
- Level 2, Heightened.
- Level 3, Exceptional (probable or imminent risk of a security incident).

When entering a port a Master is now aware of what action must be taken to ensure compliance with the security requirements of the port depending on the threat state the port is operating to.

4. Categories of Nuclear Material

The fundamental basis of understanding why security is required in any aspect of life is understanding the value of what you have and its desirability to those who may wish to obtain it. Until 1972 when the IAEA published INFCIRC/225 (The Physical Protection of Nuclear Material and Nuclear Facilities), there had been no consensus on how to grade the varying types of nuclear material in line with its potential for theft.

INFCIRC/225 established the categories based on amounts of fissile material, be they uranium or plutonium and in the case of uranium, the percentage enrichment that existed.

Once the category could be established it was then easier to define protection measures. Although these measures were included in INFCIRC/225, they were not underpinned by international agreements or laws. In 1979 things started to change with the drafting and subsequent ratification of "The Convention on the Physical Protection of Nuclear Material", (INFCIRC/274). This Convention established the principles that *"each State Party shall take appropriate steps within the framework of its national law and consistent with international law to ensure as far as practicable that, during international nuclear transport, nuclear material within its territory, or on board a ship or aircraft under its jurisdiction insofar as such ship or aircraft is engaged in the transport to or from that state, is protected at the levels described in Annex 1."* (Article 3). The ground rules for a consistent approach were therefore established and each signatory country to the Convention was tasked to ensure the required national laws were established.

- Categories of Nuclear Material

The table below is reproduced for indicative purposes from the INFCIRC/225 and provides a simple overview of which material and amount falls within which category.

Material	Form	Category		
		I	II	III
1. Plutonium	Unirradiated	2kg or more	Less than 2kg but more than 500gm	500gm or less but more than 15gm
2. Uranium 235	Unirradiated	5kg or more	Less than 5kg but more than 1kg	1kg or less but more than 15gm
	Uranium enriched to 20% U ²³⁵ or more		10kg or more	Less than 10kg but more than 1kg
	Uranium enriched to 10% U ²³⁵ but less than 20%			10kg or more
Uranium enriched above natural, but less than 10% U ²³⁵				
3. Uranium 233	Unirradiated	2kg or more	Less than 2kg but more than 500kg	500gm or less but more than 15gm
4. Irradiated fuel			Depleted or natural uranium, thorium or low-enriched fuel (less than 10% fissile content)	

Note: This table is not to be used or interpreted independently of the text of the entire document (INFCIRC/225) or without further reference to national regulations.

5. UK Security Regulations

The previously disparate and often conflicting nuclear security regulations in the UK have now been revised and embodied into one Statutory Instrument as the "Nuclear Industries Security Regulations 2003" (NISR 2003) administered and enforced by the Department of Trade and Industry (DTI) – Office for Civil Nuclear Security (OCNS).

Since September 2003 the regulations have applied to all transport operations within the UK, in UK territorial waters and on British registered ships world wide.

It was not common knowledge that the nuclear security regulations in existence prior to 2003 did not cover companies other than those licensed to run nuclear sites. This loop hole has since been closed and now a more consistent regime exists.

The effects of the NISR 2003 on maritime and port operations within the UK ensure compliance with INFCIRC/274 and require the following:-

5.1 Approval of Carriers

All road and rail carriers and UK registered ship operators wishing to transport nuclear material, are to be approved as either Class B carriers (Category III material) or Class A carriers (all Category material). Non-UK registered vessels are not required to gain approved carrier status from OCNS however certain aspects of the regulations still apply to them when carrying nuclear material within UK territorial waters. The regulations place a requirement that

only vessels flagged to states as signatories of the Convention on the Physical Protection of Nuclear Material are used within UK waters, as the flag state is therefore responsible for approving the security regime under which they operate.

This UK approval is achieved by the submission of a Transport Security Statement (TSS) to OCNS. The TSS lays down the generic controls and procedures under which the company operates to ensure the reliability and integrity of personnel and information management and the physical measures and contingency plans employed to secure nuclear material.

5.2 Personnel Security

There are defined minimum security clearance levels for those people with direct responsibility for the transport and protection of nuclear material and also those with access to the material and information relating to the transport operations. These measures establish as far as practicable, the integrity and reliability of those with an influence over the security of nuclear material transports.

5.3 Information Security

As previously stated one of the fundamental back bones of a security system is the protection of information. For a terrorist organisation, wishing to obtain nuclear material, to commit their resources to an attack they need to know:-

- There is something to gain from doing so,
- the protection measures they need to overcome,
- where they will have the opportunity
- and when that opportunity will arise.

Without detailed knowledge of each of these criteria they run the risk of failure due to requiring a protracted state of readiness, greater offensive capabilities and a larger support network, therefore giving more time for their activities to be monitored and countered.

When transporting internationally, there are many areas where information can be compromised. Shipping operations, irrespective of the cargo, require a large supporting infrastructure. Port facilities need to be booked, agents appointed, bunkering (fuelling) and provisions ordered, pilots, stevedores, Customs & Immigration informed. All of these are potential areas for information, useful to an adversary, to be compromised.

For many years within the UK, people have been subject to laws governing the unauthorised release of classified information, irrespective of whether they had an official use for that information. The particular laws (Official Secrets Act 1911 to 1989) have been in force in various revisions since 1911. In recent years this has proved hard to enforce in a court of law and therefore has had minimal effect as a deterrent.

The UK Governments Anti-terrorism, Crime and Security Act 2001 which came into force 31 May 2002, has specific provision and penalties for the deliberate or reckless release of information relating to nuclear material. The act covers any person on UK territory or on a UK registered vessel and any UK citizen abroad.

These laws satisfy the UK's obligation under INFCIRC/274 (Article 6) to have a national framework in place for the confidentiality of information however, where ignorance of the value of information exists, state boundaries crossed and different laws apply; uncertainties as to the security of information will remain.

To minimise the possibilities for compromise it is necessary to ensure that, where contracts exist, the obligation on both Commercially sensitive and classified information are passed on. Where notifications are required in law, agreements are reached with the applicable authorities to minimise notification periods. People are made aware of the vulnerabilities in the use of the internet when planning shipments and are only told the information they need to perform their function.

5.4 Transport Security Plans

Each shipment of nuclear material needs to be covered by a Transport Security Plan (TSP). The TSP identifies the Consignor, Consignee, carriers and agents involved, as well as the assets and conveyances being used. It also establishes the physical security measures and contingency plans that will be in place during the shipment, at transshipment points and defines the point of hand-over of these responsibilities.

All UK carriers involved in a shipment are responsible for their own TSP and where interfaces are required with other carriers and port authorities, such as security hand-over, these must be consistent. The TSP requires OCNS approval for Cat I and II shipments.

For international Category I & II shipments there are requirements for inter-governmental agreements on points of hand-over when state boundaries and territorial waters are entered. These relate to physical protection measures and contingency responses and the point that these change.

Non-UK registered vessels carrying Category III nuclear material are not required to prepare a TSP however the requirement is in place for Categories I & II.

5.6 Movement Notifications

OCNS requires that they be notified of each individual movement at least 7 days in advance of the commencement of the operation. A notification is required from each UK carrier involved in the transport of nuclear material within UK territory or globally on UK registered vessels. The requirement extends to foreign flagged vessels whether or not they are required to be approved carriers under the UK regulations.

The notification includes the details of the consignor, consignee the carrier, route and details of the consignment and packages used. It also lists who and where the consignment is to be handed to and where security responsibilities will be transferred. All this is related to the dates the operation will take place.

Ro-Ro ferries are not covered by this requirement as the notification of the road carrier address' the requirements.

The notifications are used by the regulator to assess any threat or intelligence received that may be directed at the shipment or indirectly affect the security of the material being carried. Considerations include civil / political unrest and natural / humanitarian disasters on route all of which could adversely effect the successful, secure and timely completion of the transport operation.

6. Public Perception

British Nuclear Fuels has been involved in the transport of nuclear cargoes by sea since the early 1960's. Regardless of the number of shipments that have been safely undertaken since this time, public perception on the whole remains unchanged in thinking this business is dangerous and unnecessary. This has been largely fuelled by the unceasing efforts of those dedicated to try and halt the nuclear business in its entirety. Due to the requirements of the above security regulations, it is not difficult to appreciate that openness in all matters relating to the nuclear transport business is not always desirable or possible. It has been our aim to be as transparent as possible in our operations however any holding back on information, as required under the regulations, has sometimes been construed as a deficiency and exploited by our opponents.

It is hoped that in the age we live in, there may at last be a better understanding and acceptance of the need for a degree of secrecy and it is nothing more than common sense which requires that some things need to remain "behind closed doors".

7. Conclusion

For many years the nuclear industry in the UK has had to plan security to counter not only the perceived threat of unlawful removal of nuclear material but also the realistic threat of sabotage from active terrorist groups on the UK mainland. It is reassuring to note that with regard to BNFL transport operations the regulatory changes following September 2001 have been mainly administrative to base the operations on a statutory footing. The minimal changes to the physical security measures brought about by the introduction of the Nuclear Industry Security Regulations 2003 and the revisions to the Design Basis Threat have shown the resilience of the security provisions that have been worked to for many years.

The exacting safety standards to which the BNFL/PNTL vessels operate such as the International Maritime Organisation's INF Code (*International Code for the Safe Carriage of Packaged Irradiated Nuclear Fuel, Plutonium and High-Level Radioactive Wastes on board Ships*) not only provide the necessary safety provision but by virtue of their multiple levels of redundant equipment and impact durability there is also a substantial benefit to security.

The ISPS Code will have the effect of bringing the general shipping industry up to a common security standard globally with all the associated advantages. Again the impact on BNFL operations has been mainly administrative as the actions required at each alert state are below those required by the more onerous nuclear regulations.

It can be seen from the above that the regulations governing not only the safety, but also the security of the transport of radioactive materials by sea are more than adequate. All United Kingdom, Regional and National regulations are based on the requirements laid down in these Internationally adopted Conventions so ensuring that the transport of nuclear materials by sea remains one of the most highly regulated safe and secure means of transport available.

References:

- Convention for Physical Protection of Nuclear Material - INFCIRC 274
- Recommendations for the Protection of Nuclear Material - INFCIRC 225 Rev 4
- Nuclear Industry Security Regulations 2003 - NISR 2003
- International Ship and Port facility Security Code - ISPS Code – IMO
- The state of Security in the Civil Nuclear Industry and the Effectiveness of Security Regulation - OCNS