Title:- Security and Communication Issues for International Radioactive Materials Transport

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Abstract

In recent years the international sea transport of nuclear materials has been the subject of opposition from coastal states (seeking prior notification) and anti-nuclear groups seeking to constrain the nuclear industry's operations by disrupting the transport chain. Shipments of High Level Vitrified Waste (HLW), Mixed Oxide Fuel (MOX), Plutonium and Spent Fuel for reprocessing ("Radioactive Materials Transport") have all been targeted by pressure groups. This opposition has taken the form of campaigns designed to influence public and political opinion, direct action and legal action. This paper is primarily concerned with the Industry response to the first two of these three forms of opposition.

The events of September 11th 2001 in New York and Washington (9/11) have increased media, government and public concern over terrorist attacks in general and attacks on transport systems in particular. Opposition groups have increasingly sought to use this increased public fear to suit their ends by making unsubstantiated claims about the terrorist threat to Radioactive Materials Transport and the consequences of such a threat being realised. At the same time, the security regulations relating to Nuclear Materials Transport have been reviewed and tightened since 9/11. These changes have in some cases restricted the information that can be made publicly available.

It is against this background that the Industry must operate and seek to inform the public through its communications activities. These activities must necessarily provide sufficient information to counter the incorrect claims made by opponents, allay fears of the public as far as possible and provide factual and scientifically rigorous data without compromising security.

This paper draws on the recent (British Nuclear Group Sellafield) International Transport experiences to explore the issues associated with communications programmes in support of International Radioactive Materials Transport by sea.

Introduction

For many years, Anti-Nuclear groups have targeted international Radioactive Materials Transport by providing Governments, Media and the public with misleading information on the safety of transport. Since the terrorist attacks of September 11th 2001 in New York and Washington (9/11) these groups have increasingly made unsubstantiated claims about the terrorist threat to Radioactive Materials Transport and the consequences of such a threat being realised. This has played on increased government, public and media concern over terrorist attacks in general and attacks on transport systems in particular. At the same time, the international and national security regulations relating to Nuclear

Materials Transport have been reviewed and tightened since 9/11. These changes have in some cases restricted the information that can be made publicly available.

It is against this background that the Industry must operate and seek to inform the public through its communications activities whilst remaining within the framework of security regulations. These activities must necessarily provide sufficient information to counter the incorrect claims made by opponents, allay fears of the public as far as possible and provide factual and scientifically rigorous data without compromising security.

Background

Nuclear materials have been safely and securely transported around the world for over 40 years. In 1961, the international community through the United Nations body the International Atomic Energy Agency (IAEA), established a set of standards which has lead to this impressive record of safety. These standards have been reviewed and revised over the intervening period to reflect advances in technology to ensure that the safety record is maintained. The most recent update in Regulations for the Safe Transport of Radioactive Material [1] took place in 2003 and updating continues with a two-year review cycle.

The safety of transport is fundamentally based on a system in which safety is ensured by the package. For the transport of significant quantities of radioactive materials, this has resulted in the development of extremely robust packages (type B) able to withstand severe accident scenarios. This robust package design also provides significant protection against terrorist attack. This approach is not without its public perception problems, however, as it contrasts with the experiences of the general public [2]. Protection of people and cargoes in planes, trains and ships is normally provided by the transport vehicle and all too often the failure of this approach is seen in the aftermath of accidents. The overwhelming success of the IAEA regulations in ensuring the safety of radioactive materials means that thankfully there is no nuclear transport accident to use as a yardstick to measure comparative risk. This can be contrasted graphically with oil tanker spills, which all too often appear on TV news bulletins.

Similarly, the need to ensure the security of nuclear materials has also been recognised by the international community with the IAEA publishing its first “Recommendations for the Physical Protection of Nuclear Materials” in 1972. This has also been updated over the years with the last update taking place in 1998 including a title change to “The Physical Protection of Nuclear Materials and Nuclear Facilities” [3]. In addition, the Convention on the Physical Protection of Nuclear Material [4] was opened for signature by member states on 3 March 1980.

Within these regimes, spent nuclear fuel has been transported in the UK by rail since 1962, covering more than 8 million miles without a single incident resulting in the release of radioactivity. Internationally over 2000 flasks of nuclear material have been safely and securely transported between Japan and Europe by Pacific Nuclear Transport Limited (PNTL), owned by British Nuclear Group Sellafield Limited (formerly called British Nuclear Fuels plc), Cogema and the Japanese Utilities. It has an exemplary safety record, having covered over 5 million miles in nearly 40 years without a single incident resulting in the release of radioactivity.

Safety and Security

Many of the measures taken to assure the safety of radioactive cargoes in type B packages also go a considerable way to providing security. Typical type B flasks used to transport spent fuel, high level waste (HLW) and Mixed Oxide Fuel (MOX) are heavy (around 100Te) and would not be easy for a terrorist organisation to steal. In addition the robust design of the flasks to meet the strict IAEA test criteria also give a degree of protection against direct attack. Where lighter weight packages are used for road transport, these still meet the robust safety criteria and, for MOX and plutonium, are transported in high security vehicles.

From a safety point of view, there are multiple barriers protecting the environment from the radioactive materials. The materials themselves are in an insoluble form (ceramic fuel pellets or vitrified HLW). For example taking the incredible scenario where the HLW glass becomes directly exposed to the sea, the results of an environmental impact assessment performed for the Japanese Science and Technology Agency [5] show that the effect would be negligible. The exposure rate to the most affected person would be less than one thousandth of the naturally occurring radioactivity they receive annually.

The materials are of course protected from this scenario by multiple barriers. Taking the example of MOX fuel, the ceramic fuel pellets are sealed in fuel pins designed to withstand the extremes of a reactor core. These in turn are held securely within a type B package, either a heavy sea transport flask or a lighter package contained within a security vehicle. The IAEA regulations are such that the package itself gives sufficient safety protection in the event of an accident, however for sea transport, the packages are loaded on vessels which comply with the International Code for the Safe Carriage of Packaged Irradiated Nuclear Fuel, Plutonium and High-Level Radioactive Wastes on Board Ships (INF code).

The PNTL vessels used for transport between Europe and Japan have a range of safety features far in excess of those found on conventional cargo vessels: double hulls to withstand collision damage; enhanced buoyancy to prevent the ship sinking even in extreme circumstances; dual navigation, communication and cargo cooling systems; and additional fire fighting equipment. Similar ships are operated to safely transport nuclear material within Europe.

Considering security, there are again multiple systems to protect the material. These consist of the physical protection offered by heavy flasks and high security vehicles, locks and alarms, the escort teams (who may be armed, depending on the category of nuclear material) and equally important, the protection offered by intelligence, information security and route selection.

For relatively short transport operations through northern Europe, route considerations are perhaps less important than for the longer voyages between Europe and Japan because the material is being transported for a much shorter period of time. The principles remain similar however. Transport routes are chosen to avoid areas of known terrorist activity or piracy, areas of civil unrest and remain out of coastal waters as far as practicable. Route and timing decisions are also influenced by intelligence gathering activities.

Protest, Pressure Groups and their Tactics

For the first 20 years of spent fuel transport between Japan and Europe and across other regions, there was no incident or protest, despite the fact that the transports were a matter of public record. Since the 1960's however, there has been a growing trend of pressure groups covering almost every conceivable issue. To begin with, their activities mainly targeted nuclear facilities. Later they widened their

strategy and began to target the transportation of radioactive materials and the associated "en route" states.

Many of these groups are campaigning bodies which recruit members who support their goals and energetically lobby local and international political institutions. They could even be considered to be true multinationals operating both locally and internationally with annual budgets of hundreds of millions of pounds.

Pressure groups have a close dependency on the media. They provide stories and controversy while the media coverage provides exposure for the pressure group, enhancing their fund raising abilities. The media usually presents activists as experts, even those who may not have appropriate academic or professional expertise. This is easy for them to do when there is no nuclear expert in local villages and countries en-route and even in European countries where the media are often sympathetic to sensational scare stories. Often they are seen as an essential part of the democratic process, holding business interests to account, however there may be little or no accountability within their organisation to their memberships or supporters.

In the past, we have encountered a series of common fears about the safety of the transport activities: that the material is in liquid form encased in glass containers; that the ships present the only barrier preventing a release to the environment and that the shipments present a far higher hazard to the environment than oil, gas and a wide range of other hazardous cargoes. Since 9/11 fears over terrorist attack has been added to this list.

A typical tactic for opponents of our transports is to present what appears to be an independent academic paper which raises apparent technical doubts over the safety or legitimacy of a shipment. This was the case prior to the first two shipments of HLW to Japan when two purportedly authoritative papers were released to the media and political groups in en-route states [6], [7]. These were taken at face value despite not being peer reviewed and despite the fact that the author was neither a nuclear engineer nor an expert in risk. The approach of these papers is to promote worst case scenarios as a means of indicating the hazard of an activity. Risk however is defined as a combination of consequence and likelihood. It is clearly unreasonable when evaluating the risks of any activity to assume that all safety measures simultaneously fail through a series of unconnected occurrences without taking into account how plausible or implausible this may be. These papers are still being cited by pressure groups today, including using them to highlight the risks from terrorist attack. Indeed the same author now presents himself as an expert on nuclear security. Since 9/11, the rationale for this approach has become that it could all happen in a terrorist attack. This is despite the paper having been reviewed by the IAEA from a safety perspective and found to be "fundamentally flawed and can be easily misleading" [8]. Furthermore, the IAEA has completed a co-ordinated research project on "Severity, probability and risk of accidents during maritime transport of radioactive material" [9] and concluded that "the risks of transporting RAM (radioactive material), for example irradiated fuel and VHLW (vitrified HLW), in type B packages are very small". It should be noted that when this review paper was introduced into the International Maritime Organisation's meeting a Pacific Island country's representative who was promoting the 'concern' of en-route countries said 'I am not a nuclear expert, so I don't know whether this review is correct or not.' The same degree of scepticism does not appear to be applied to the anti-nuclear papers.

A similar tactic has been used to overstate the risk from terrorist attack on land transports of Plutonium powder in high security vehicles [10]. This report was used to heighten media interest in the transport

of Plutonium powder from the US to France in support of the US weapons disposition programme. The arrival of this material in Cherbourg on board the PNTL vessel Pacific Pintail provides an interesting case study in the tactics of the anti-nuclear groups. Firstly there was the publication of a pseudo-scientific paper presenting a doomsday scenario from a postulated terrorist attack. Secondly protest flotillas were arranged in the English Channel and in Cherbourg harbour with celebrity figures and media attention. Thirdly the media were informed by the protestors the date of arrival (as they believed it). In fact the planned arrival date was some days later. This gave PNTL as operator the advantage of surprise in avoiding any confrontation with protestors and damaged their credibility with the media. Unfortunately it also had the effect of prolonging the coverage of the protest. In such circumstances it may be best to confer with the relevant regulators and advise the media that they will be informed of the approximate arrival in sufficient time (eg 12 hours before) to ensure they can get their coverage. Such action needs to be addressed on a case by case basis.

Industry Response

Although they may have been raised by false messages, the concerns of the media and politicians are genuine and need to be addressed by industry. They are however rational people who wish to be reassured, either by cessation of the activities which they perceive to be too dangerous to be allowed to continue or by being persuaded that the shipments are responsible, justified and of very low risk. It is only by challenging the misinformation and presenting the facts that we can influence the perceptions of the media and politicians and reduce their concerns.

Industry has addressed this through taking the time to visit en-route countries and inviting key politicians and media personnel and officials from organisations such as the IAEA and IMO to visit and see for themselves the safety and security precautions which are taken. From a safety point of view this is a relatively straight forward task. Presentations can be made, people can be shown round ships and nuclear facilities to see for themselves the size and strength of the flasks or the distance between the inner and outer hull of the ship. When it comes to security matters however, this communication process is much more difficult.

Firstly it is not easy to second guess a terrorist intent. At some levels this can be done – their aims are to create panic, confusion and economic damage in addition to the immediate deaths and destruction of their attacks. For this to be effective, they also need media exposure. For example compare the likely impact of a cruise ship attacked in the Mediterranean Sea or an INF vessel carrying HLW attacked in the Pacific. In the former case, there would be immediate concern over the attack and loss of life coupled with an ongoing effect on the tourist trade and the economy. In the latter, although there would be immediate concern over the loss of life and worries over pollution, as time goes on and it is shown that there is little or no radioactive release, this concern could be expected to quickly fade. The publicity and consequences of an attack on a cruise ship would therefore be much greater than an attack on an INF vessel, making it a more likely target.

Secondly it is not possible to predict exactly what type of attack may be mounted. It could range from an attempt to hi-jack a transport vehicle (lorry or ship) to try to obtain nuclear material, through trying to create a “dirty bomb” to just sinking the ship or even minor acts of piracy not specifically connected to the cargo. What can be said however is that the packages are robust and would not easily be ruptured by direct attack or by fire. The ships are designed to be strong and have extra buoyancy which would reduce the chance of sinking and in the case of category 1 material (Plutonium or MOX) which could conceivably be targeted for its nuclear material there are additional armed protections in place.

In addition the transports are all tracked enabling a prompt response to be mounted should there be any attempt at diversion.

Thirdly the information which can be released is often constrained by security concerns. A bank would not be expected to divulge the detailed security plans for its vaults or bullion wagons but is expected to provide a secure place for money and valuables. Similarly the security precautions and features applying to radioactive material transport cannot be divulged in detail. This is not just a matter of common sense, but in many cases is demanded by legislation.

In the face of this, industry must continue to give reassurance, provide as much information as can be released and put the risk in perspective. Although the threat of a terrorist attack on a radioactive materials transport operation must be taken seriously and appropriate counter-measures put in place, there are a large number of softer targets available. As transporters, we need to work with the security regulators and security services to protect the transports and also continue to publicly demonstrate as far as possible that security of transports is tight.

The Regulatory Framework

In the UK, there are two recent pieces of legislation which restrict the amount and detail of information which can be released on security grounds. Firstly there is the Anti Terrorism, Crime and Security Act 2001 section 79 (1) [11] which specifically creates an offence of disclosing information which might prejudice the security of any nuclear site or of any nuclear material … or being reckless as to whether that disclosure may prejudice that security. Secondly the Nuclear Industry Security Regulations 2003 [12] require all transporters to be approved, to have approved Transport Security Statements and approved security plans for transport operations.

The main restrictions placed on operators by these regulations are to prevent the divulging of information pertaining to: quantities of materials, detailed routes, detailed timings and physical protection measures taken to protect the material. As an example, the PNTL vessels Pacific Teal and Pacific Pintail which are used to transport MOX fuel between Europe and Japan are equipped with naval canon and other protective systems. As the canons can clearly be viewed, their existence can be acknowledged. Details of the operational procedures, other weapons, security systems and communication systems however are not in the public domain and cannot be divulged. From a communications point of view this is restrictive, however general statements of reassurance that these systems exist can be made as well as reference to the fact that the vessels and transport systems are approved by the relevant Government security regulators in the consignee, consignor and transporter's flag state.

The UK regulator, the Office of Nuclear Security (OCNS), publish an annual report on the state of security in the civil nuclear industry, including transport [13]. This confirmed that there were no security incidents related to transports to or within the UK in 2003 and that "security arrangements applied within the nuclear companies and bodies regulated by OCNS are comprehensive, well-managed and effective". The report for 2004 has just been published [14] and again confirmed that there were "no significant incidents with security implications". Contingency arrangements were however tested as a result of severe weather causing disruption to rail services and the implementation of the contingency plans was "exemplary". In addition the regulators themselves recognise the need to strike an appropriate balance in providing information to reassure the public, media and politicians. Indeed OCNS have published guidance on this (with particular regard to releasing information under the

Freedom of Information Act) [15]. Within this guidance, they recognise that 'neither total openness nor total security are viable options'.

Conclusions

The key driver for most pressure groups who oppose radioactive materials transport is to stop the nuclear industry by targeting a key aspect of the nuclear fuel cycle – Transport. In doing so, they are able to promote misleading information on both safety and security matters. Unfortunately they are not truly accountable for the claims they make whilst the industry needs to be able to justify and demonstrate its position. In addition the security regulations can sometimes make it difficult to answer the challenges on security matters.

It is frustrating that the genuine concerns on matters of safety and security felt in some areas are fuelled by misinformation in this way; nevertheless our core messages remain very simple:

- Transportation of nuclear materials is governed by international regulations which provide strict requirements for both safety and security and we comply with or exceed all of them

- These are routine shipments, and for nearly 40 years and more than 5 million miles travelled by sea alone there has not been a single incident involving the release of radiation

- No one cares more about the safety and security of our business and the environment than we do – unless we ensure it, we have no business.

It is important for the industry to maintain an open dialogue with interested stakeholders to put the risks from our operations in their proper perspective. Properly founded scientific argument can be deployed to counter the claims on safety. While the regulations on security can constrain the messages, the very fact that those regulations exist and that transports are approved by security regulators is a positive reassurance on security. We must continue to present the facts on all these matters to those politicians, officials and journalists who are interested in the shipments. In addition we need to listen to the feedback from those people when engaging in dialogue and continue to address their concerns whether they are based on safety, security or public perception.

It is in industry's best interest to ensure there is an ongoing rational discussion about the shipments where scientific facts are considered and risk is put in perspective. Only in this way can the scare tactics of our opponents be countered.

References

[1] Regulations for the Safe Transport of Radioactive Material – 1996 Edition (Revised) - Requirements *Safety Standards Series No. TS-R-1 (ST-1, Rev.)*

[2] The Return of Vitrified Residues to Japan – A Joint Experience, Baba, Carter & Tissot-Colle, PATRAM 1998

[3] The Physical Protection of Nuclear Material and Nuclear Facilities, IAEA, INFCIRC/225/Rev.4 (Corrected)

[4] The Convention on the Physical Protection of Nuclear Material, IAEA, INFCIRC/274/Rev.1 May 1980

[5] Study on Method of Environmental Impact Assessment During Sea Transportation of Radioactive Materials, D Tsumune, N Watabe, S Hode, Y Kohno, T Saegusa, S Ozaki, H Ohnuma. Central Research Institute of Electric Power Industry. 1995

[6] The Sea Transport of Vitrified High-Level Radioactive Wastes: Unresolved Safety Issues, E S Lyman. Nuclear Control Institute. 1996

[7] Safety Issues in the Sea Transport of High-Level Radioactive Wastes from France to Japan: E S Lyman. 1994. Commissioned by the Nuclear Control Institute, Greenpeace International and Citizen's Nuclear Information Center

[8] Comments on MEPC39/INF 15, International Atomic Energy Agency. 1997

[9] Severity, probability and risk of accidents during maritime transport of radioactive material. IAEA-TECDOC-1231. Final report of a co-ordinated research project 1995-1999, IAEA, July 2001.

[10] Potential Radiological Impact and Consequences Arising From Incidents Involving a Consignment of Plutonium Dioxide under Transit from OGEMA La Hague to Marcoule / Caderache – Road Accident and Terrorist Attack Considered for the Localities of Paris and Lyon. J Large, Large and Associates 2004. Commissioned by Greenpeace International

[11] Anti Terrorism, Crime and Security Act 2001, UK

[12] Atomic Energy and Radioactive Substances. The Nuclear Industries Security Regulations 2003, UK

[13] The State of Security in the Civil Nuclear Industry and the Effectiveness of Security Regulation April 2003 – March 2004, Director of Civil Nuclear Security, UK

[14] The State of Security in the Civil Nuclear Industry and the Effectiveness of Security Regulation April 2004 – March 2005, Director of Civil Nuclear Security, UK

[15] Finding a Balance – Guidance on the Sensitivity of Nuclear and Related Information and its Disclosure – Issue 2 – April 2005, Office of Civil Nuclear Security, UK