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International Certification in Transport Security Management for Nuclear and other Radioactive Material

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Abstract

In the nuclear industry, many engineers and safety professionals belong to chartered institutes that certify their members' competence on an ongoing basis. The same cannot be said, however, for many professionals with managerial responsibilities relating to nuclear transport security. To help fill this gap, the World Institute for Nuclear Security (WINS) has launched an International Certification Programme in Transport Security Management through the WINS Academy, the world's first international certification programme for nuclear security. The development and production of the transport certification programme was financially supported by the U.S. Department of Defense. Argonne National Laboratory provided subject matter expertise with the support of the U.S. Department of Energy. WINS also collaborated with the World Nuclear Transport Institute, International Nuclear Services, and Oak Ridge National Laboratory in the development of the certification.

The WINS Academy Certification consists of a core Foundation Module and a Transport Security Management Module. The Foundation Module presents security as a strategic programme to be implemented across the organisation and as a fundamental aspect of risk management and corporate reputation. The Transport Security Management Module addresses the key issues that organisations face when planning and implementing the transport of nuclear and other radioactive material. In doing so, it recognises that circumstances will vary from State to State. The content is based upon subject matter expertise, practical experience, research and best practice as identified from WINS' broad membership of over 3,300 members in 112 countries.

The target audience for the certification consists of individuals employed by organisations with responsibilities for the safe, secure shipment of nuclear or other radioactive material. This includes producers, suppliers, distributors, carriers, receivers, consignees, and escort and guard force personnel, among others. The training programme can be completed entirely online, and candidates can sit for their certification exams at more than 5,100 accredited test centres in 180 countries. Potential enhancement of the programme in the future includes generic and country-specific tabletop exercises administered online, and support for the development of an international in-person training course to complement the online certification programme.

Introduction

Thousands of shipments of nuclear and other radioactive material take place every day around the world via road, rail, air, inland waterway and sea. In fact, more than 20 million consignments of radioactive material used for medical, industrial and research purposes are transported every year. The vast majority of these are unrelated to the nuclear fuel cycle, and only a small percentage requires high levels of protection for both safety and security reasons. For those nuclear and other radioactive materials that require a higher level of protection, they are typically transported from the protected facilities where they are placed into highly robust containers to the protected facilities where they will be put to use. Radioactive sources may also be transported on a daily basis between the facility where they are stored and the industrial or mining sites where they are used. Once nuclear and radioactive materials reach the end of their lifecycle, they must be transported yet again to a protected treatment, storage or disposal facility.

Because transport occurs outside the confines of a fixed location that is typically protected against potential adversaries, it poses different radiological safety and security risks should an incident, accident or security event occur. These risks need to be taken into account and properly managed to ensure that employees, the public and the environment remain safe.
Risks that need to be taken into account during the design and planning stage, and during the transport operations include:

Insider Threat

The term *insider threat* is used to describe individuals with authorised access to a facility, transport operation or sensitive computer and communications systems who use their trusted position for unauthorised purposes. Unauthorised purposes can range from a conventional crime, such as financial fraud, to the sabotage and theft of nuclear or other radioactive material. When it comes to transport, an organisation's employees and contractors, as well as the carriers, port facilities, response forces, and customs and border crossing personnel involved in the transport all have the potential to become "insiders" because they have special knowledge about the shipment. If they should have malicious intent, such knowledge could make them a particularly powerful threat.

Anti-Nuclear Activists

Anti-nuclear activists have found that staging a demonstration at a location through which nuclear material is transiting can be an effective political tool. Even if they have no intention of sabotaging or diverting the shipment, they can block the transportation route using people, equipment and/or material, not only effectively disrupting and stalling a shipment, but also increasing shipment costs and timeframes.

For example, on 23 November 2011, a train carrying 11 casks of highly radioactive nuclear waste left Normandy, France. It was bound for a temporary storage facility in a former salt mine near Gorleben, Germany. The waste had originally come from German reactors years before and been processed in France for storage by Areva. The 750-mile trip took far longer and cost a great deal more than anticipated because thousands of protesters caused disruptions along the way. They staged sit-ins, chained themselves to the rails, sabotaged the railway, and loudly denounced the transport of dangerous materials through populated areas. It took approximately 20,000 police along the German portion of the route to remove thousands of mostly German demonstrators from railroads and streets.[1]

Theft

Numerous examples exist of incidents in which primarily radioactive materials have been stolen while in transit. The 2015 Annual Report from the Center for Nonproliferation Studies (CNS) Global Incident and Trafficking Database states that:[2]

> *The 2015 dataset reinforces the finding in previous reports that these materials and devices are particularly vulnerable during transport… As in 2014, nearly half of all documented incidents in 2015 involved material in transit. Of the 133 thefts recorded in the database cumulatively, more than twice as many incidents occurred while in transit (74) as did from a fixed location (35). Further, in nearly 60 percent of thefts during transit, the material was unattended when the theft occurred. Unsurprisingly, the majority of radioactive sources stolen or lost during transit are contained within small, portable devices such as radiography cameras (typically Category 2 sources) and moisture density gauges (typically Category 3 and below). These devices are commonly used at temporary job sites, and therefore require frequent transport by operators between designated storage locations.*

Thefts while in transport often share several common features, including location and timing. They can take place during pick-up and delivery, and have often taken place in distribution centres, ports, airports and associated customs warehouses, and involve land-based transport. Some common modes of theft include armed hijackings and robbery, deceptive pick-ups, trailer and container theft, warehouse and container burglary, and insider diversions. Many thefts are opportunistic rather than highly organised.

Inadvertent Theft

Not all thefts of nuclear and other radioactive material are intentional. In fact, many publicly documented incidents have been perpetrated by people whose intention is to steal a vehicle or obtain scrap metal to sell and who do not know anything about the cargo itself. Should they attempt to open a source out of ignorance or curiosity, they (and those with whom they come in contact) can be exposed to dangerous levels of radiation. Thieves sometimes discard the material, leaving it alongside roadways or in other areas where unsuspecting members of the public can be exposed to radiation.

For example, on 2 December 2013, the driver of a cargo truck carrying a dangerous quantity of radioactive material to a waste disposal site near Mexico City arrived at the facility and was not expected, so he stopped at a gas station and fell asleep. The next thing he knew, he was being accosted by two armed men, who tied his hands and feet, left him in a vacant lot, and drove off with the truck. Inside the truck was a used Co-60 teletherapy unit with an activity of 3,000 Curies. The IAEA classifies such sources as Category I radioactive material, meaning they are extremely dangerous and can cause serious injury or death within minutes of exposure. The truck was found abandoned two days later close to where it had been stolen. The teletherapy unit and the source were both found as well; they had been abandoned in a field about a mile away from the truck. The thieves had removed the source from its protective covering, but the source itself was still intact.[3]

All evidence in the case described indicates that the thieves simply intended to steal the truck, not its cargo.

The Need for Competence in Transport Security Management

The severity and modalities vary by world region, but a concern is that in certain regions the transportation industry can be slow to engage law enforcement when items go missing. Another concern is that the threat is constantly changing.

Mitigating these risks requires well-trained and well-qualified personnel with responsibility for the transport of nuclear and other radioactive sources. However, the people involved in transport operations are diverse and generally come from different companies and organisations, which makes training a complex task. As a result, the majority of incidents result from avoidable human negligence, According to CNS: [4]

> *Over half of the incidents reported in the 2015 database occurred due to human negligence. Primarily associated with cases involving lost radioactive material, negligence also contributed to 35 percent of the cases of theft. The high percentage of incidents in which human negligence is a factor indicates the necessity for the establishment of a stronger security culture, reinforced by improved training.*

Figure 1, which comes from CNS' 2014 Report,[5] demonstrates these statistics.

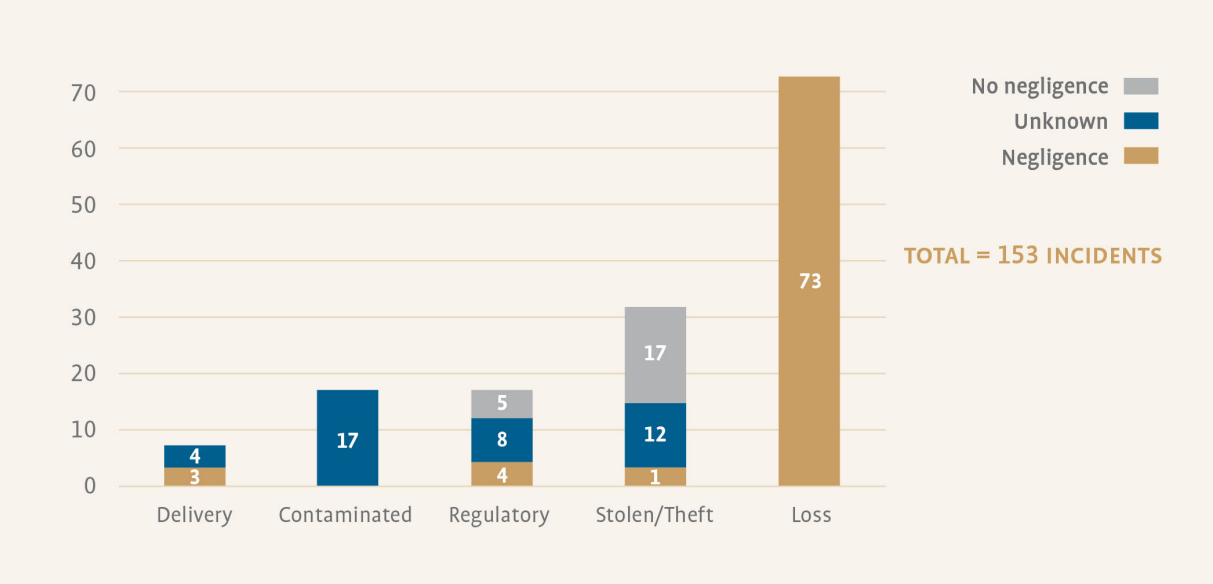

Figure 1 Incidents linked to negligence

Such statistics help to underscore the fact that, at a minimum, consignors, carriers and consignees should ensure that all personnel involved in the transport arrangements and provision of security are suitably trained and qualified, commensurate with their roles and responsibilities. In some States and for some positions (such as a Ship's Security Officer), regulatory requirements exist for relevant staff to be certified to hold positions of security and managerial accountability. In the event of an incident and subsequent inquiry, investigators are likely to require evidence relating to training records (this is especially common in aviation incidents); therefore, it is essential that all personnel be demonstrably competent.

Examples of Stakeholders with responsibilities for transport security, and who require competent personnel to execute those responsibilities, are outlined in Table 1.

Table 1: Stakeholders Responsible for Transport Security

Stakeholder	Responsibilities
Source Producers/ Suppliers (Consignors)	– Vet new customers and conduct initial license review – Initiate export or transfer authorisation process – Identify transport route, usually with support from freight forwarder when dealing internationally – Properly train and establish trustworthiness of involved consignor personnel – Deliver source to carrier – Ensure domestic transport security measures are implemented
Carriers	– Provide equipment specified by consignor – Properly train and establish trustworthiness of involved carrier personnel – Ensure specified routes are followed
Freight Forwarders	– Provide logistical support by identifying routes and carriers helping with customs clearance
Customs	– Ensure that all goods entering and exiting the country comply with all applicable laws and regulations – Provide border security
Distributors	– Liaise between supplier and end user and between end user and field service provider
End Users (Consignees)	– Initiate import or receipt authorisation process – Coordinate with distributor to determine delivery date – Coordinate with customs/customs brokers to clear shipment – Ensure compliance with domestic transport security requirements – Arrange for return of disused source to source provider
Regulators	– Evaluate requests for imports/exports as part of government-to-government request process – Check legitimacy of company background – Issue licenses or authorisations to proceed with the transfer of radioactive material between supplier and end user

In addition to the above organisations, training must be provided for response forces. Forces may be employed by, or under contract to, an operator (consignor, carrier, etc.); there may also be local law enforcement officers or trained emergency response personnel located along a transport route. Response forces must be equipped, trained, tested, and demonstrably proficient. They must be willing to carry out their responsibilities and be periodically retrained and tested, including physical evaluations of their skills so weaknesses can be identified and appropriate corrective actions taken.

The methods for coordination between response force personnel and escort/guard force personnel need to be established, exercised and assessed as well. If the response forces come from various governmental agencies located along a shipment route, such coordination becomes extremely important. As with armed escorts or guards, all response force personnel need to clearly understand rules of engagement, including how and when to use lethal force and how and when to use less-than-lethal options. The latter becomes significant when personnel are required to deal with unarmed protesters.

International Support for Demonstrable Competence

They need for competent personnel during transport operations is demonstrably clear, and States are accountable for ensuring that there is an effective transport security regime within their State. Explicit in these accountabilities is that sufficient professional development opportunities are available within the State to provide and sustain the necessary level and quality of personnel with accountabilities for transport security. As noted in IAEA Nuclear Security Series No. 20 (NSS20): Objective and Essential Elements of a State's Nuclear Security Regime:[6]

> *A nuclear security regime ensures that each competent authority and authorized person and other organizations with nuclear security responsibilities contribute to the sustainability of the regime by:*
>
> *(d) Allocating sufficient human, financial and technical resources to carry out the organization's nuclear security responsibilities on a continuing basis using a risk informed approach*

In order to help address these accountabilities, a number of States have established programmes to develop human resources through the implementation of training programmes, provide technical and scientific support, and respond to nuclear security events within a country. With that in mind, there have been a number of important developments over the past few years that impact the future of the training for transport security.

1. In 8 May 2016, the Amendment to the CPPNM entered into force after ratification by two-thirds of the States Parties of the Convention. 103 States are currently party to the Amendment. As the only legally binding international instrument in the area of physical protection of nuclear material, the Amendment to the CPPNM obligates States Parties to protect nuclear facilities and material in peaceful domestic use, storage and transport.[7]

2. At the 2014 Nuclear Security Summit (and the associated Nuclear Industry Summit), 35 States (and industry) took a step beyond the Amendment to the CPPNM, and in a *Joint Statement on Strengthening Nuclear Security Implementation* committed to meet the intent of the essential elements of a nuclear security regime and ensure the effective and sustainable principle therein. The *Joint Statement* was subsequently submitted by the Netherlands to the IAEA as INFCIRC/869.[8] As an Information Circular, the *Joint Statement* is open for all IAEA Member States to join, and in November 2015, Jordan became the first State to subscribe outside of the Summit process. Subsequently, China and India have also joined the initiative.[9]

   One of the four key commitments in INFCIRC/869 is to ensure that management and personnel with accountability for nuclear security are "demonstrably competent". And the INFIRC outlines two ways in which States can support the training of effective and competent managers for nuclear materials and related facilities:
   - Maintaining and continuously improving domestic or regional training through education, certification and/or qualification activities; and
   - Supporting or participating in the development of World Institute for Nuclear Security (WINS) best practice guides and training activities.

3. To further support INFCIRC/869, on 5 April 2016, twelve States released a Joint Statement on Certified Training for Nuclear Security Management.[10] By committing to support the WINS Academy in the Joint Statement, Canada, Finland, Hungary, Indonesia, Kazakhstan, Mexico, the Netherlands, New Zealand, Norway, Thailand, the United Kingdom, and the United States recognised that the challenges associated with managing nuclear and other radiological materials are varied and complex, and that effective security relies upon the competence of management and personnel who are responsible for this work. The States listed plan to promote cooperative efforts between the WINS Academy and the IAEA, and encourage other States, supported by industry and civil society, to provide a tangible commitment in support of the WINS Academy and certified professional development for nuclear security.

4. Also at the 2014 and 2016 NSS, nine States issued a Joint Statement to express their commitment to work together to further improve security in the transport of nuclear and other radioactive materials.[11] In the Joint Statement, the participating states of the Gift Basket expressed their intention to conduct tabletop exercises for all transport modes and produced four good practices guides for air, rail, road, and sea transport modes.

What do these commitments mean for States and training programmes establishes in each State? How can States demonstrate that they have taken action in a coherent way to improve the professionalism of transport security management across the State and to maintain these standards in perpetuity?

Demonstrating Competence through Certification

At the March 2012 Nuclear Industry Summit in Seoul, the World Institute for Nuclear Security (WINS) proposed an idea to develop an international certification programme for nuclear security, similar to the certification programmes that exist for a variety of professions such as IT security, aviation security, and maritime shipping security. The idea took form at the March 2014 Nuclear Industry Summit (NIS) in Amsterdam, when WINS announced the launch of the WINS Academy Nuclear Security Management Certification Programme.
Since the launch, WINS has drafted ten comprehensive training modules that comprise a complete programme curriculum.

The target audience for the modules is a multi-disciplinary group of professionals with management responsibilities for nuclear security, including board members, executive managers, security directors, scientists/technicians/engineers, offsite incident responders and regulators. As an overall framework, the programme uses ISO standard 29990:2010, in which WINS received certification in 2014. After completing modules, participants have the opportunity to take a proctored exam at one of more than 5,100 accredited test centres in 180 countries. If they pass, they are certified by WINS as a Certified Nuclear Security Professional (CNSP).

The certification programme consists of a core Foundation Module and an elective module such as the Transport Security Management Module. All participants begin with the Foundation Module that sets out security as a fundamental aspect of risk management and corporate reputation, as well as a strategic, operational activity that needs to be implemented organisation-wide. If they so choose, participants can then take the Transport Security

Management Module which has been developed to address the roles that stakeholders have in properly preparing for and/or undertaking secure transport of nuclear and other radioactive material. By the end of the course, participants should understand the types of materials that may be transported; the risks posed by these materials during transport which require specific security actions; how to plan, develop and implement a sound security system following a graded approach based on the risks; and how to ensure emergency response capabilities are adequate over the transport route to be followed.

The target audience can all be viewed as practitioners of transport in the sense that they belong to an organisation that carries out some function or functions related to a shipment of nuclear or other radioactive material, and are accountable in their respective roles for ensuring not only safe, but secure transport. These practitioners include:

- Consignors (anyone preparing a shipment of the material for transport, sometimes known as a shipper),
- Carriers (anyone undertaking the carriage of the material by any means of transport),
- Consignee (anyone taking delivery of a shipment of the material, sometimes known as a receiver),
- Operational support personnel who may be involved in the shipment including escort and guard force personnel,
- Response force personnel, and
- Managers of any of the above.

The production of the Transport Security Management Module was financially supported by the U.S. Department of Defense. The development of the course would not have been possible without the support of an extensive range of people and organisations, including those specialists who shared their expertise at WINS workshops that specifically dealt with nuclear and radioactive source transport security management. Argonne National Laboratory (ANL) in particular provided subject matter expertise with the support of the U.S. Department of Energy. WINS also collaborated and relied on the expertise of the World Nuclear Transport Institute (WNTI), along with International Nuclear Services and Oak Ridge National Laboratory.

CONCLUSION

Successfully responding to even minor incidents has become increasingly important in the modern age. The internet, social media, and smartphones have democratised the news, turning eyewitnesses into citizen journalists who can report on an event and send it racing across the social media sphere in minutes. It has also given individuals the power to express their thoughts and opinions—which might not be factual, valid, or accurate—and potentially reach an international audience of millions. This puts organisations' reputation and ability to conduct business at serious risk.

Therefore, the collaboratively developed module addresses some of the special considerations posed by nuclear transport security and discussed best practices that comes from real-life experiences. Understanding potential threats and how to develop and implement a graded approach using internationally agreed categorisation methods and appropriate security measures is critical for successful transport operations.

As a next step for taking the work forward, WINS will be partnering with ANL and WNTI to develop an in-person training course that complements the online module through the provision of lectures and discussions, generic and country-specific tabletop exercises, field exercises, and exams. The course will build on ANL's extensive experience delivering training courses on nuclear and other radioactive materials transport security, and WNTI's experience developing tabletop exercises and sharing good practices with the international transport community.

A number of international organisations work to help mitigate the risk of something going wrong during transport, including WNTI, IAEA, ICAO, and IMO, among others. As the world continues to become increasingly interconnected, it is important that all of us work together and with the industry to form cooperative networks that develop and deliver harmonised certification and training approaches.

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