EMERGENCY RESPONSE WITHOUT BORDERS

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ABSTRACT

The IAEA Safety Guide TS-G-1.2 (ST3) provides guidance to the many organisations, including consignors and transporters, on the subject of planning and preparing for Emergency Response to transport accidents involving radioactive material.

The guide details responsibilities for both the consignor and the carrier for preparedness, assistance, provision of information and the alerting of appropriate authorities of an event.

The Emergency Response function of International Nuclear Services is part of a fully integrated emergency management system. The six building blocks of this approach are Mitigation, Prevention, Preparedness, Response, Recovery and Review.

The transport activities of International Nuclear Services are carried out across the globe and this in itself introduces challenges to the Emergency Response function which are not usually encountered by the emergency agencies that operate only within the borders of their host nation.

Some of these challenges include time differences, language barriers, country specific special laws, coastal state concerns and expectations, training and exercising, contracting services, response times and the demonstration of this planning and preparedness to both regulators and stakeholders.

The object of this paper will be to review and discuss these challenges and detail how the solutions to these have been integrated into the Emergency Response function whilst meeting the responsibilities laid out in the guide (ST3).

One of the most crucial parts of the International Nuclear Services' Emergency Response capability is to have personnel and equipment ready to deploy within and outside of the UK 24hrs a day, 365 days per year to deal with the unlikely occurrence of an event during its transport activities. During August 2009 International Nuclear Services undertook a live exercise to deploy two teams and associated equipment overseas utilising the full range of resources and services that were both internal and external to the organisation. This paper will review the results of this exercise and highlight recommendations for the further development and improvement of the Emergency Response function.

INTRODUCTION

For over 40 years International Nuclear Services (INS) has been transporting nuclear materials such as spent fuel, mixed oxide fuel (MOX) and vitrified high-level waste internationally for an

extensive list of customers. The transport function of INS is co-ordination of many separate disciplines, working together to meet the requirements of UK and International regulations without which INS would not be able to transport nuclear material.

The Emergency Response department is an integral part of this transport function. The aim of the Emergency Response department is to ensure that 'International Nuclear Services may respond to any transport related Incident or Emergency in a swift and combined manner'.

One of the most crucial parts of the International Nuclear Services' Emergency Response capability is to have personnel and equipment ready to deploy within and outside of the UK 24hrs a day, 365 days per year to deal with the unlikely occurrence of an event during its transport activities. The global nature of INS's transport business presents some unique challenges in meeting this aim above the usual challenges which are not usually encountered by the emergency agencies that operate only within the borders of their host nation.

Some of these challenges include significant time differences, language barriers, country specific special laws, coastal state concerns and expectations, training and exercising, contracting services, response times and the demonstration of this planning and preparedness to both regulators and stakeholders.

REGULATIONS

IAEA TS-G-1.2 (ST-3) Safety Guide - Planning and Preparing for Emergency Response to Transport Accidents involving Radioactive Material provides specific guidance to many parties including those of the consignor and carrier, the following references provide an overview of the planning and preparation responsibilities;

'…both the carrier and consignor should be prepared to respond to an accident and provide the appropriate technical assistance to emergency responders.' (3.11 p10)

'The carrier should ensure that proper emergency instructions are carried on board the transport unit.' (3.14 p11)

'Although the carrier and consignor and the national, provincial and local government organisations may all have a role in the response, the primary responsibility, in principle, should rest with the consignor and the carrier to ensure the adequate arrangements are available to deal effectively with accidents involving radioactive material' (5.2 p15)

The International Maritime Dangerous Goods (IMDG) Code was developed as a uniform international code for the transport of dangerous goods by sea and adopted by the fourth IMO Assembly in 1965 (IMO 2002a), the code became mandatory under SOLAS 1974 and entered into force on the 1st of Jan 2004. (IMO 2002b). IMDG paragraph 7.3.4.3, references IAEA ST-3 as the appropriate guidelines to be used for the special provisions for incidents involving radioactive materials. (IMDG 2008 p449).

In 1993 the IMO established the 'International Code for the Safe Carriage of Packaged Irradiated Nuclear Fuel, Plutonium and High-Level Radioactive Wastes on board ships',(INF Code). This International Code became mandatory under SOLAS 1974 and entered into force 1st January 2001.

(IMO 2002c). Paragraph 10.1 of the INF Code states that 'every ship carrying INF cargo shall carry on board a shipboard emergency plan (INF 2006 p249).

The INS/PNTL fleet complies with the rules of the International Maritime Dangerous Goods (IMDG) and INF Codes.

INTEGRATED EMERGENCY MANAGEMENT

The basis of emergency planning and response system INS has adopted is known as 'Integrated Emergency Management' (IEM). Under the principles of integrated emergency management, the response to an emergency should concentrate on the effects rather than the cause of the disaster and, wherever possible, should be planned and undertaken as an extension of normal day to day activities. The underlying aim of the planning process should be to develop flexible arrangements which will enable those involved to deal with any crisis, whether foreseen or unforeseen.

The six stages of IEM are Mitigation, Prevention, Preparedness, Response, Recovery and Review. The mitigation stage starts long before a transport begins, this can be as early as contract appraisal when consideration is given to the risks associated with the transport or by incorporating better design to remove or reduce the potential for incidents to occur, i.e. reducing the number of orifice points on a package, thus reducing the number of potential leakage paths. Should it not be possible to mitigate a risk, it is necessary to put in place preventative measures to further reduce the possibility of the potential becoming realised, scheduled maintenance of a system is a good example of this.

The stages of preparedness and response are distinctly different; preparedness is the planning before the event, the identifying of hazards, the identifying and acquiring of the resources, establishing the framework for emergency response decision making and the development of training and the exercising of the structure (Perry 2007). Whereas the response is seen as the operations undertaken after an event to prevent further escalation, the deployment of resources and the control of the hazards. Although different the two must be linked to improve the chances of successfully managing an incident.

Although INS has a shipboard emergency plan (SMEP) for each vessel, the emergency response structure's focus is to have the right people with the right equipment and the right skills in the right place at the right time.

THE INS STRUCTURE

DOCUMENTATION

To satisfy the relevant national and international regulations/requirements, INS/PNTL has, over many years developed a comprehensive Emergency Response System activated through a dedicated 24hr Emergency Control Centre.

The system is supported by only a small number of "Top Level" documents to cover transport related incidents and these cover:

- Shipboard Marine Emergency Plan. (SMEP)

- Emergency Response Documentation.

These materials relate to the generic potential risks and incident scenarios and are kept permanently up to date. Specific scenarios for individual transports are incorporated in supplements which are only valid for the duration of the transport.

The purpose of the SMEP as the lead document for sea related incidents deserves further explanation. Of all the emergency response documentation, the SMEP is the only one whose content is dictated by the INF Code and requires approval by an appropriate Governmental Regulator (UK-MCA on behalf of the UK DfT).

In accordance with paragraph 27 of the code, the Plan contains:

- Procedures to be followed by the Master or other persons having charge of the ship in reporting an incident involving INF Code materials.

- A list of authorities or persons to be contacted in the event of an incident involving INF Code materials.

- A detailed description of the action to be taken immediately by persons on board to prevent, reduce or control the release, and mitigate the consequences of the loss, of INF Code Materials following an incident.

- The procedures and point of contact on the ship for co-ordinating action with local and national authorities.

ON-CALL PERSONNEL

INS has as part of its structure, teams of on-call personnel available 24/7 to respond to any transport related incident. Each role within the team has a defined set of responsibilities and requires each member to undertake vigorous training and to be suitably qualified and experienced. These roles include INS Duty Director, Incident Manager and Emergency Response Manager along with specialists in Package Approvals and Technical / Engineering.

Should the emergency response structure be initiated for any radiological or potential radiological incident, the initial deployed team would consist of, but not be limited to, all of the following disciplines; Senior Management, Flask Management, Health Physicists, Flask Operations Personnel, Marine Engineers and Press officers. Each member of the deployed team has been provided with necessary personal equipment to allow for rapid departure.

EQUIPMENT AND INFRASTRUCTURE

To enable the appropriate response to an incident, it is necessary to have dedicated emergency response equipment separate from that used for day to day operations. In providing this equipment it can be ensured that suitable equipment is available to the emergency responders. Due to the worldwide nature of INS business, equipment centres have been located at strategic geographic locations. In total, INS has eight of these centres plus three in the UK. Supporting these centres, each vessel also has dedicated response equipment on-board for the deployed teams above that

emergency equipment carried for the crew to use in the event of an incident. The movement of equipment is one of the challenges to response times and the use of these centres is crucial in reducing these times.

INS has three Incident Control Centres which can be utilised to manage the incident, dependant on the type of incident and location; the most appropriate centre will be used to provide the best combination of resource availability and communication.

CONTRACTED ON-CALL SERVICES

A number of contracted services are available as part of the INS emergency response structure. These services are integral to structure and provide INS with specialist resources which are either not available in-house or intended to supplement the on-call teams.

To enable the rapid deployment of the teams, contracted transport services are available 24/7 to provide land and air resource, whether this is transport to the airport, hire of an aircraft or helicopter support to the vessel.

INS has a longstanding contractual agreement with one of the world's leading salvors in SMIT to provide salvage consultancy and additional equipment onboard vessels to aid recovery, righting and towage. As part of the ongoing contractual arrangement a Salvage and Recovery Advisory Team has been established with the salvor which provides regular up to date technical information.

Nuclear Services Company (NSC) Japan provides invaluable engineering and health physics support to INS. The service is intended to operate within the EEZ of Japan and provide the initial response at the incident scene under the management of INS and the Master until the INS response teams arrive. At this point NSC will continue to support INS in responding to the incident.

All the contracted support to INS is audited routinely and as part of the contract must participate with INS exercises on an annual basis as a minimum. To develop and strengthen relationships, the transfer of learning and good practice is actively encouraged.

REPORTING

Reporting of incident or events poses particular challenges to INS due to the number of communication routes and expectations. The requirement for reporting can be regulatory, customer requirement, coastal state, INES, stakeholder management, at governmental request or by special law such as the Japanese Koku Kaisa 402-2.

Typical of a regulatory need is the reporting requirements of regulation VII/7-1 of the SOLAS Convention which applies both to the loss or likely loss of INF cargo overboard and to any incident involving a release or probable release of INF cargo, whatever the reason for such loss or release, including for the purpose of securing the safety of the ship or saving life at sea.

To meet this, a list of authorities or persons to be contacted in the event of an incident involving INF cargo is contained within the Shipboard Marine Emergency Plan (SMEP). A report shall also be made in the event of damage, failure or breakdown of a ship carrying INF cargo which affects the safety of the ship, including but not limited to, collision, grounding, fire, explosion, structural

failure, flooding and cargo shifting; or results in the impairment of the safety of navigation, including the failure or breakdown of steering gear, propulsion system, electrical generating system, and essential ship-borne navigational aids.

TRAINING & EXERCISING

Emergency exercising and training are an integral parts of any Emergency Response System. INS has developed training matrices for each emergency response role. Although each on-call member is selected due to their core role skills and experience, the training matrices identify the additional skills an individual requires to fulfil their responsibilities, an example of this is helicopter underwater escape training which is required by law for personnel travelling over water as part of their job role. Each year an exercise schedule is approved as part of the INS management system. The schedule looks at all aspects of exercising from desk-top, single team or through to multi-agency exercising and identifies the number and frequency.

Several large scale emergency exercises are held each year both in the UK and Japan which form part of the continuous training process for our Emergency Response Teams.

Training provides the tools to allow an individual to be effective during an incident whereas as exercising provides a means for the testing and continuous improvement of:

- Procedures
- Communications
- Equipment
- Personnel (>70)

An example of one such emergency exercise was held on the 19th of Sept 2007 - IAEA Emergency Response Desktop Logistics Exercise during the Maritime Meeting in Vienna. The exercise was based on getting a team of 7 people from two UK sites to locations chosen on the day by the New Zealand delegation in real time. The exercise demonstrated both the ability of INS to respond to an incident overseas and the ability of the transport services provider to organise resource and provide travel itineraries. The arrival times for the two locations are shown below:

Fiji
Total travel time: 28hr 25min
Time from first receipt of call to arrival Fiji: 31hr 35min.

Kiribati
Total travel time: 38hr 50min
Time from first receipt of call to arrival Kiribati: 42hr

Although the total time from call to the arrival of the team was impressive, it was found the arrival of the team at Kiribati can be further improved by relocating onward transfer aircraft during the

initial air-time. By undertaking this activity the response time was further reduced by nearly 6hrs for the arrival time at Kiribati. The accelerated arrival time is detailed below:

Kiribati
Total travel time: 35hr 10min
Time from first receipt of call to arrival Kiribati: 36hr 20min

As a desktop exercise, it provided a very useful method of demonstrating INS's structure and capability; it was limited to purely a paper exercise whereas a full live scale exercise would also test the physical side of deploying a team to an incident.

As part of the rolling INS exercise schedule. A further full live-scale exercise has since been undertaken. The exercise was designed to test full deployment, rather than the desktop exercise undertaken at IAEA. The exercise's aim was to test the effectiveness of the INS emergency response arrangements for an incident involving the transport of a radioactive package through the INS Marine Terminal, Dunkirk utilising the full spectrum of the INS emergency response service providers.

The exercise was designated as no-notification. The exercise provided assurance in the INS emergency response arrangements and a high level of confidence that should an incident occur, INS can dispatch a full team of suitably experienced and trained personnel in a swift and combined manner.

Initial callout to dispatch:	Team 1 – 1hr 20mins	Team 2 – 1hr 55mins
Initial callout to take off:	Team 1 – 6hr 25mins	Team 2 – 3hr 55mins

Note: The need to relocate an aircraft to a local airport for team 1 increased the departure time. The alternative option involved the land transfer of team 1 to a regional airport, when considering this option the total time exceeded the time involved to relocate the aircraft.

The exercise highlighted the need for careful preparation, equipment and service provider selection. The recommendations from the exercise were to investigate whether more suitable communication equipment is available which could provide faster information delivery to the incident room and also to consider how electrical / electronic equipment could be maintained in a usable condition on a protracted incident.

SUMMARY / CONCLUSION

International Nuclear Services is the world's leading global shipper of nuclear materials. It has a world-class safety record having operated for more than 40 years and traveled more than five million miles without any incident involving the release of radioactivity. This safety record is one that INS can be proud of. It would be easy to become complacent regarding its Emergency Response responsibilities.

This paper demonstrates through INS's investment in its emergency response structure and personnel that it doesn't take its responsibilities lightly and continues to provide a service that meets the expectations of its customers, stakeholders and regulators.

The continual challenge for emergency response is to further improve this level of expertise and assurance whilst also adapting to meet the change in the business's transport activities.

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