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MOX TRANSPORT BY ROAD AND SEA

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ABSTRACT

Transporting fresh MOX fuel and other category 1 cargoes from the United Kingdom to Continental Europe presents some significant geographical challenges. Specifically there is a sea transport element to be considered between the two land transport segments. As a consequence, preparations to receive the MOX on board a ship need to be made at the departure port. Generally speaking some of these preparations will be visible leading to public communication expectations which are potentially in conflict with security requirements. Management of these conflicting requirements needs to be handled carefully to ensure compliance with regulations while meeting the legitimate communication expectations of stakeholder groups.

Shipping operations also tend to be more weather dependent than land transport and this needs to be factored into contingency plans to ensure the transport system is sufficiently resilient to withstand minor delays. Such planning considerations need to be addressed at an early stage to ensure that the resilience is contained within the operational plans of all organisations involved in the transport.

The arrival of the ship into the receiving country's territorial waters and ultimately into the port requires careful co-ordination between governments and industry. These arrangements need to be put in place well in advance to ensure a common understanding of the hand-over of security as well as the practical logistics of delivering the cargo.

Throughout the execution of the transport operation, communications between the various organisations involved in the transport and security must be clear and well defined. Inevitably issues will arise requiring the planned contingencies to be brought into play. These might be driven by weather considerations, mechanical breakdown, safety or security considerations. Whatever the cause, the key to success lies in clear contingency plans, agreed lines of communication and prompt decision making based on good information.

Successful MOX (and other category 1) transport by road and sea results from extensive operational planning, contingency planning, good communications and co-operation between all the agencies involved to ensure customer expectations of on-time, safe and secure delivery of the material.

INTRODUCTION – THE CHALLENGE

Transporting fresh MOX fuel and other category 1 cargoes from the United Kingdom to Continental Europe presents some significant geographical challenges. Specifically there is a sea transport element to be considered between the two land transport segments. The link between these elements is the port activities for departure from the UK and the port activities on arrival in Continental Europe. These activities generally take place in a commercial port and while access can be and is restricted for security reasons; elements of the operation, such as some of the more visible security measures, may be observed without restriction.

Furthermore, preparations to receive the MOX on board a ship need to be made at the departure port. Generally speaking some of these preparations will also be visible leading to public communication expectations which are potentially in conflict with security requirements.

Shipping operations also tend to be more weather dependent than land transport and this needs to be factored into contingency plans to ensure the transport system is sufficiently resilient to withstand minor delays.

The arrival of the ship into the receiving country's territorial waters and ultimately into the port requires careful co-ordination between governments and industry. There is effectively a two stage hand over – firstly on entry to territorial waters and secondly as the vehicle leaves the vessel. This is a more complex and time consuming arrangement than simply crossing a land border in a vehicle.

This paper considers the following aspects of successfully addressing this challenge:
a) Regulatory Framework.
b) Interagency planning
c) Port considerations
d) Operations
e) Communications
f) Emergency Arrangements
and draws conclusions from the experience of International Nuclear Services(INS) in carrying out MOX transports by road and sea.

REGULATORY FRAMEWORK

In common with all transports of radioactive material, these transports need to comply with the requirements of the IAEA safety regulatory framework [1] as encompassed in national legislation and the modal regulations. Similarly, while in the UK, or on UK flagged vessels, the security needs to meet the requirements of the Nuclear Industry Security Regulations 2003 [2]. The NISR enacts into UK law the requirements and recommendations of the Convention on Physical Protection of Nuclear Material [3]. As these shipments are of category 1 quantities of materials however, the requirements of NISR are significant and impact on other aspects of the transport operation in a fundamental way. This paper therefore concentrates on the impact of security regulations rather than the more commonly applied and understood transport safety regulations.

Due to the long land transport elements involved in these transports, European security regulation (based on the requirements of INFCIRC/225 rev 4 [4]) mandate the use of road transport rather than rail. The primary reason for this is that there is more contingency available (re routing, turning back etc) in a road journey than a rail journey. In turn this restriction limits the amount of material which can be transported making an INF 2 class [5] roll-on, roll-off vessel the most appropriate choice to meet all of the operational, security and safety regulatory requirements. This is in contrast to shipments between Europe and Japan where the long sea transport element dominates the requirements for operational, safety and security reasons. This results in a choice of larger capacity heavy flasks which are more suited to rail transport (for the relatively short journey to or from the port). The larger cargoes result in INF 3 lift-on, lift-off vessels being appropriate for the quantity of material. The resulting different transport system is not considered further in this paper.

INTER AGENCY PLANNING AND CONTINGENCIES

Any transport operation of this type clearly involves a number of agencies. In the case of MOX fuel transports carried out by INS from Sellafield through the port of Workington, the key agencies involved are:

INS in planning and executing the transport.
Subcontractors such as the road transport company or ship managers.
The Civil Nuclear Constabulary (CNC), who in the UK are responsible for the armed escort of category 1 shipments.
The vessel Master and Crew.
Cumbria Constabulary, the local police force.
Other emergency services.
Port authorities.
The Office of Civil Nuclear Security (OCNS) who approve the security plans.
The Department for Transport who approve the shipment.
The Nuclear Decommissioning Authority who own the vessel.
The Foreign and Commonwealth Office and
the Department for Business Enterprise and Regulatory Reform.

All of these need to be involved in the planning and in developing contingency arrangements to cover foreseeable eventualities such as breakdowns, weather delays, and safety or security considerations. These contingency plans also need to be exercised, either in the form of desk top exercises which can consider a number of scenarios or as control-post or live scale scenarios which are more realistic, but more limited in the extent of scenarios to be exercised. It is important that all of the agencies involved, particularly those with an active part in the actual transport, build sufficient resilience into their plans to deal with the consequences of delays requiring extended security personnel deployment for example.

All this planning needs to be agreed and documented such that each agency knows and understands its remit and also so that the overall plan can be approved by the security regulator. In the case of transports in the UK or on UK flagged vessels, the regulator is OCNS.

Arrival in a foreign port necessitates the hand over of security to the authorities of the receiving country. Clearly the hand over of security of transport from one armed guard force to another needs to be carefully planned and executed. In the case of arrival in a port, the situation is complicated by the status of the vessel itself and the waters in which it is sailing. For example, on arrival into France, French responsibility starts at French territorial waters. The vessel itself however is still under UK jurisdiction and a further handover is required as the vehicle leaves the vessel and lands on French soil. The exact arrangements for this handover will be agreed in advance between the Governments of France and the UK with the support of INS as transporter, CNC as the on board security team and their counterparts from France. Similar arrangements are required for any other arrival country.

DEPARTURE PORT CONSIDERATIONS

The choice of departure port will be made based on a number of criteria, including proximity to the MOX fabrication plant, security, safety, berth availability and access. Depending on the port, there may be tidal considerations which affect matters such as when the vehicle can be loaded to the vessel and when the vessel can depart from the port. All of these factors, together with any local policing issues need to be taken into account when planning the exact timing of any operation.

Once the port and timing of the shipment are decided, it is necessary to plan all of the other preparatory work. This will include such matters as making the vessel ready to receive the vehicle, ensuring the vessel is up to date with maintenance, has adequate fuel supplies and provisions and is generally fully seaworthy. Part of this preparation may include a full test of the ships systems, including any security systems. Most of this work can be accomplished without any outward signs that the vessel is preparing to undertake a category 1 shipment.

At some stage however, it becomes necessary to begin the more overt security operations such as having the security team join the vessel, and making the berth secure. At this stage, it is possible that an observant member of the public could realise that a high security shipment is planned. It is therefore necessary to have clear and agreed communication lines to take in the event of any enquiries. For security reasons, these communications will not be able to confirm exactly what is happening, but should include sufficient general statements on the safety and security of transport operations to provide reassurance.

Other routine ship preparations are also required such as booking pilots and tugs. Generally this needs to be done in such a way that the minimal information necessary is given regarding the nature of the cargo, however it is impossible to avoid divulging some sensitive information such as sailing times and care needs to be taken to ensure subcontractors protect the information adequately.

TRANSPORT OPERATIONS

Once the vehicle has left the MOX facility, again it may be evident to observant members of the public that a high security transport is under way. This is really unavoidable as the vehicle will have an armed escort and will be displaying the appropriate placards and labels for a radioactive

material transport. Again clear and agreed communication lines are necessary and in this case the need to confirm that a transport is under way, without disclosing information on the future progress (for example sailing times or arrival port) since to offer no comment or worse deny the shipment in the face of such obvious evidence would cause reputation damage and potentially create suspicion about the efficacy of the shipment itself.

COMMUNICATIONS

The importance of having a clear communication plan is obviously key to having agreed clear statements to use at each stage of the transport operation. This plan needs to be put together well in advance of the transport taking place. The plan needs to balance the requirements of briefing legitimate local stakeholders such as local councils, the media and the public with the need to protect security information regarding the shipment. What is required is a clear plan of who will be briefed, when they will be briefed and what messages will be communicated. In the case of public statements made to the media, these should be written and cleared in advance. Expected questions and answers need to be provided to all company spokespersons, together with clear guidelines on what can be said publicly at each stage of the transport. This ensures that the information communicated is consistent and accurate and is in line with security requirements. This communications plan then needs to be agreed with the regulator to ensure the balance between openness and security is appropriate [6]. On the day of transport, a suitable company spokesperson must be made available.

As well as the public communication, any operation involving many agencies needs to have clear protocols established for inter-agency communication and for command and control of the operation. In the case of shipments from Sellafield through Workington, although INS has overall responsibility for the transport including security, in the event of any incident, the local police force (Cumbria Constabulary) would take primacy and be in overall charge of the response to the incident. For this reason, command and control is typically coordinated through a police communications centre.

Other communication requirements are between the vessel and shore based coordination centres. Clearly open ships radio which can be intercepted by anyone with simple radio equipment is not suitable for the purpose of exchanging security sensitive information and therefore more complex and secure methods need to be employed. The same considerations apply on arrival into the arrival country's territorial waters where contact with the receiving security forces is necessary to arrange hand over. Again appropriate arrangements need to be put in place to ensure the security of information.

ARRIVAL PORT CONSIDERATIONS

Many of the considerations for a departure port also apply to the arrival port. There are some considerations however which are unique to it. The fact that the vessel has departed and that a category 1 shipment is under way may be public knowledge well before the vessel arrives. Nevertheless it should not be necessary to divulge either the arrival port name or the time of arrival. Preparations will include securing the berth, but typically this can be done a very short time before the vessel arrives. There is perhaps less therefore at the arrival port which would signal an impending operation to a casual observer.

Planning for the security forces deployment at the arrival port will however revolve around a specific time for the operation to commence. This in turn necessitates a timed arrival by the vessel at the port. To accommodate this and to allow for any delays due to weather for example, sufficient contingency needs to be allowed in the voyage plan. This is a subject for careful consideration and agreement with the regulator to balance the need for contingency to ensure the certainty of arrival at the due time with the need to minimise unnecessary time in transit.

EMERGENCY ARRANGEMENTS

In common with all radioactive materials transport, it is necessary to have well developed emergency response plans. These plans then need to be tested and exercised. The only additional requirement for MOX transport is to consider the security aspects of 'conventional' incidents and to include provision for a response to security incidents.

CONCLUSIONS

MOX transport by road and sea can only be successfully achieved by careful planning by all of the agencies involved. Due to the high public profile of anything to do with plutonium, the smooth execution of these transports is particularly important. Without the careful planning and coordination described in this paper, this would not be possible.

INS have recently completed deliveries of MOX by road and sea to the first customer of the Sellafield MOX Plant and as such have a unique experience base. The success of these transports could not have been achieved however without the input and support of all the other agencies involved.

Arguably the most important factor in successful MOX transport by road and sea is teamwork.

REFERENCES

[1] Regulations for the Safe Transport of Radioactive Material, 2005 Edition Safety Requirements (Safety Standards Series Number: TS-R-1, IAEA)
[2] Nuclear Industries Security Regulations 2003, (Statutory Instrument 2003 no. 403, UK Government)
[3] The Convention on Physical Protection of Nuclear Material (INFCIRC/274/Rev1, 1980, IAEA)
[4] The Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Rev4, 1998, IAEA)
[5] International Code for the Safe Carriage of Packaged Irradiated Nuclear Fuel, Plutonium and High-Level Radioactive Wastes on board Ships (INF Code, 2000, IMO)
[6] Finding a Balance, Guidance on the Sensitivity of Nuclear and Related Information and Its Disclosure, (Office of Civil Nuclear Security, Issue 2, April 2005)