

Class 7 – The Mystery Class

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Demystifying Radioactive Materials

To begin, I take no credit for the title of this presentation—"Class 7-The Mystery Class". But so taken was I by the proposed title, that I could not resist the opportunity to speak to it, and hopefully, help to demystify the mystery. First of all, there is no mystery or special significance attached to the Class 7 designation. When the UN experts in their wisdom were coming up with their nine classes of dangerous goods, they might equally have designated radioactive materials as Class 1 or Class 9; in the event they placed them in Class 7. That does not mean that radioactive materials are relegated to the seventh degree of sin in hell, or stand a full seventh place out of nine from the bottom; they simply are Class 7, which does not by itself suggest they are any more or less dangerous than the other eight classes.

I will admit, however, that radioactive materials have had an image problem. To illustrate, you know the old game, seemingly favoured by psychologists and party organisers, where you respond to a prompt with the first word that comes into your head. For example, the mention of "mother" might prompt the reply "love" or "apple pie". But what about the word "radioactive" – it might prompt the reply "X-ray" or equally, "dirty-bomb". To mention "nuclear" prompts even wider response – "family" perhaps, or, as likely, "bomb". You see, the mention of radioactive or nuclear conjures up a mix of emotions and responses from the benign to the scary. There is not one clear image. Radioactive and nuclear can signify everything from a mushroom cloud to a smoke detector; from clean energy to Chernobyl. That then is the nuclear industry's first problem – a confusion of images – both positive and negative.

But then it gets more complicated still – and here's the mystery part. You can't smell radioactivity, you can't taste or see it – but in particular circumstances it can help heal you or

it can kill you. In reality more people are killed by being struck by a bolt of lightning than by any transport event involving Class 7 materials. Do you remember, a few years ago, just before Christmas, the papers were full of warnings that excessive use of mobile phones could endanger health, especially for children. A few months later those same papers reported that the largest single gift item for children that past Christmas was the mobile phone. That touches on the perception of risk – parents obviously were prepared to accept the risk in that case. Or consider the risks of drowning – each summer many people sadly lose their lives in the water; but no one has proposed a ban on swimming. Despite the nuclear industry's good safety record, however, there are those who would like to ban it.

A further image problem is that "nuclear" sounds mysterious – it conjures up images of Einstein and complicated physics and incomprehensible equations. $E=MC^2$ sounds simple enough; but what does it really all mean? It's a mystery to most of us. We all can get our minds around the concept of a windmill to produce energy or burning coal or gas to create steam to generate electricity. An anagram for "nuclear", if you reverse the order of the first and second letters, is "unclear". But do any more people understand the internal workings of the microchip or even, nowadays, how the computer systems in a car work? We are selective in the mysteries we are content to live with. At its simplest, nuclear fuel in a power plant creates heat, which causes water to boil, creating steam to turn turbines to generate electricity. No difference really from a steam engine; just different fuel and you can't see it burning. Nuclear and radioactivity are not alchemy – they are science; they just seem mysterious to that great majority of us who have not managed to get our heads around the ideas and properties of the atom with its neutrons and protons and electrons, and how atoms interact with each other under certain conditions.

Conference paper

Just what constitutes a Class 7, radioactive material? Natural uranium ore as it comes out of the ground, refined and processed natural materials to create fuel for nuclear power plants, the spent fuel from those plants, fuel produced through the reprocessing of the spent fuel from the power plants, and yes, residues or waste products. Class 7 materials include radioactive sources, used for the sterilisation of medical instruments and supplies, and used in the food and other industries. Class 7 materials include radiopharmaceuticals used in diagnostics and treatment in medicine.

The packaging and transport of Class 7 materials is tailored by regulation to the specific properties of the materials – from the so-called excepted package, which typically could be a small cardboard box, to so-called Type B, huge cylinders, of over 100 tonnes in weight, for highly radioactive materials such as spent fuel, or reprocessed Mixed Oxide fuel.

Transport is not a side-issue when it comes to Class 7; the materials are of no use if they can't be got to those who rely on them, and that means transport. To take one notable example – the so-called nuclear fuel cycle. Transport is what makes the fuel cycle go around. This is a typical depiction of the fuel cycle; beginning at the uranium mine site, the arrows carry the eye around the circle from refinement, conversion, enrichment, reconversion and fabrication facilities to reactor site. There are off-ramps to the cycle, carrying radioactive residues away for treatment, storage and disposal.

The nuclear transport industry has an excellent safety record, with no incident of substantial damage to health or the environment in over forty years. There are two reasons for this, first is the fact that no transport sector is more highly regulated. Class 7 transport is subject to a stringent international transport safety regulatory regime of international, regional, modal and national regulations. But that excellent safety record is due also to the professionalism of the industry. Industry takes its responsibilities seriously; after all industry is on the front-line when it comes to safety.

Yet despite this excellent safety record, a worrisome trend for global supply is that some shipping companies, air carriers, ports and countries have instituted policies of not accepting radioactive materials. Many things can affect the willingness of carriers to accept Class 7 consignments – maybe the operators are unsure about insurance implications. Perhaps they worry about the perception of other customers whose goods they want to carry. Maybe they think special handling procedures, or reporting requirements are too complicated, or too onerous. Perhaps they are put off by problems with ports or terminals which themselves are not prepared to accept Class 7 cargoes. In short, the carriage of Class 7 goods may simply not look like it's worth the bother.

Denial and Delay of Shipments

While reasons for carriers and ports to deny shipments are many, they can be grouped loosely, I suggest, into three categories – “fear, “image” and “perception”. Once again we are back to the seeming mystery of it all.

So, fear of what? We have encountered among carriers a fear of accidents, a fear of repercussions from their regular clients, a fear of reactions from ports. Sometimes there is a fear of protests from anti-nuclear groups, and there is a fear of delays to other consignments because of perceived special handling procedures for radioactive materials.

When does “image” become a problem? Too often the real benefits of radioactive materials are lost in uninformed negative images of Chernobyl, of perceived health risks, of nuclear weapons; all of which can lead shipping companies to conclude that they don't need to be associated with these.

Then there are the “perceptions” or should I say “misperceptions”. Some shippers believe that Class 7 carriage represents too much work for not enough commercial return. Other shippers suggest that regulations are difficult and complex, requiring special training and handling, with all the associated additional costs.

The decisions taken by shipping companies are based on maximising profit. If the return from carrying Class 7 materials does not seem substantial enough, then why bother in face of the fears, image and perceptions? Experience in some regions has shown that service availability and acceptance levels have rapidly declined in recent years. Consignors increasingly confront departure, transit, trans-shipment and discharge port limitations and/or restrictions. It is difficult sometimes to get a clear understanding and therefore consistent interpretation of the regulations within and between jurisdictions. Shipping companies fear that the carriage of Class 7 cargo will result in unexpected delays with port clearance processes, or at worst, refusal to dock. And in some instances this is becoming a reality. There all too often is an evident general ignorance of the real facts within top-end shipping management at owner, financier and operator level.

Producer shippers accordingly are denied options for competitive choice of services. Shippers too often are met by a lack of standardisation in documentation. And of course, worst of all is when shipping lines deny or withdraw from services. This situation inevitably drives consignors to consider charter options; but this is not a panacea. Charters can mean reduced shipping schedules and a lack of delivery flexibility. This in turn results in increased overall inventory holdings, and increased total shipping and other related business costs. And of course, use of slower, smaller charter vessels increases the potential risk of security breaches by diverting cargoes away from mainstream access terminals to small ports or terminals, and the potential for piracy.

It's not all bad news. There still are carriers on many routes prepared to accept Class 7 consignments. But if denials and delays of shipments are to be overcome, then industry must work with other stakeholders, including national competent authorities, to demystify the apparent mystery of Class 7.

Responses to the Denial and Delay Problem

The shipment denial and delay issue has become serious enough to begin showing up on the international radar screen. The International Atomic Energy Agency (IAEA) hosted a major international conference on transport safety for Class 7 materials three years ago. At that conference a number of papers focused on the increasing difficulty consignors of radioactive materials for medical applications in particular, including those requiring urgent transport, were facing with denials and delays. The pressure was on for the international community, through the IAEA, to do something. I would note that the WNTI successfully drew attention to the fact that denial and delay problems were not specific or unique to non-fuel sectors of industry. Indeed well before the international conference, the WNTI already had created an industry-led Carriers Working Group to address the issue.

The IAEA subsequently set-up a Fact-Finding Forum to scope the dimensions of the problem as a basis for determining appropriate responses. One database submitted to the fact-finding forum showed about sixty per cent of incidents related to air transport and thirty per cent to sea transport. About twenty per cent of all denials had a bearing on regulatory burden or economic issues.

Based on its findings the IAEA then convened a small group of consultants, including a WNTI expert, to come up with recommendations for IAEA action. Specific proposals included possible development of a training programme addressing regional denial issues including port and airline authorities, the insurance sector and the transport industry, greater IAEA public information efforts underlining the importance of Class 7 transports, and measures to ease administrative burdens related to package approvals and compliance assurance.

Denial and delay similarly has been discussed in the International Maritime Organization (IMO). The IMO has confirmed that all shipments of Class 7 radioactive materials, when carried in compliance with the relevant regulations, should not be denied on grounds of safety and has urged public authorities, owners and operators to facilitate the movement of Class 7 materials.

Within the World Nuclear Transport Institute we constituted a Sustaining Shipments Industry Task Force to take up the subject in a pro-active and positive way. We prefer to call it a "Sustaining Shipments" Task Force rather than the more negative "Denial and Delay". We've already been doing quite a lot. First, and importantly, we have sought, on behalf of our industry members, to support international efforts to address the issues of denial and delay. We have participated in the IAEA fact-finding and consultancy processes, including the development of IAEA training materials.

WNTI has initiated exchanges with port authorities in a number of countries. We meet with the insurance industry, maritime authorities and liner services.

One of the initiatives we are pursuing within WNTI at the moment is the development of an industry knowledge base to assist our members in their dealings with potential or existing transport service providers. Such a knowledge base will include straight-forward, factual information on such subject areas as insurance requirements, the international nuclear liability regime as it applies to transport, the physical properties and packaging characteristics of Class 7 materials, radiation protection requirements, information regarding segregation distances on carriers, and so on. We want, for example, to assure potential service providers about insurance requirements and responsibilities before they are perceived by them as a possible problem; and similarly with regard to radiation protection requirements.

Sometimes our industry members find they are dealing with national authorities and requirements not directly a part of nuclear transport regulation. There are many government officials, not necessarily part of a nuclear regulatory body, whose responsibilities can have a major impact on Class 7 transports – they may be security, customs or health officials for example. It is apparent from industry experiences that I have heard, that there is a fairly widespread view among potential transport service providers that the transport safety regulatory regime is onerous or too complicated. Harmonised interpretation and application of internationally accepted standards and regulations help ensure safety and facilitate cost-efficient operations. It is the operator who experiences at first hand the differences of interpretation and approach from one national jurisdiction to another. Such differences can jeopardise safety and lead to confusion, duplication of effort, delays in obtaining approvals and inefficiencies for both industry and national authorities. Greater harmony and greater clarity and even, simplicity, in the iteration of the regulations, and their supporting guidance material, and their wider public dissemination among existing and potential service providers, in straight-forward language could help. WNTI strongly supports current efforts in a variety of fora to address greater harmony in the international transport safety regulatory regime. To the extent that domestic regulations can actually be a direct reference to international regulations, or repeat the language of international regulations, harmonisation can be enhanced, and thereby enhance clarity and increase understanding so that the regulatory regime does not appear too daunting to potential carriers.

I emphasise that industry for its part must accept its own share of responsibility for developing industry-wide standards; industry benefits when it is able to work together to resolve different approaches and agree on the criteria for such key issues as packaging, packing and handling procedures. This is one of the principal functions of the WNTI; to encourage the development of industry-wide standards and consolidated positions and also to explain and promote them to national competent authorities. If

industry can agree consolidated industry positions that are constructive, and be convincing to national competent authorities, it can enhance safety while helping to reduce delays and duplication of effort; and thereby improving efficiencies for all concerned.

To summarise then, here are some specific suggestions for addressing the issues of delays and denials:

- development by industry within WNTI of a common knowledge base for industry to equip companies in their dealings with potential or existing transport service providers;
- more regular exchanges between those whose job it is to develop the regulations and standards that have an impact on Class 7 transport, not just nuclear regulatory authorities, and those whose job it is to operate within the regulations and standards;
- designation within national governments of a centralised entry or access portal to the whole range of government interests when Class 7 transport issues arise; this might, for example, be an office designated within the national nuclear regulatory authority that would provide a centralised first access to customs, security and so on, depending on the particular issues, when a potential or actual denial or delay issue arises;
- an intensified effort to harmonise and clarify elements of the international transport safety regulatory regime;

- continued efforts to incorporate international regulations into domestic regulations by using the same language, or by direct reference;
- a more deliberate strategy to carry the messages out to potential service providers through fuller participation by regulators in industry sector conferences, and articles in trade journals outside the confines of the nuclear sector.

Summary

All of us have a shared interest in protecting and promoting cost-efficient and secure transport. Just as the Class 7 business becomes increasingly international, so too do the complexities of transport. And increasingly Class 7 transport is becoming an important part of the overall cost-equation. The availability of carriers on many routes, access to ports, differing regulatory and other requirements from one jurisdiction to another, differing interpretations of just what is required, a lack of harmonisation in standards; all of these create a sense of mystery with a direct and potentially costly impact on industry. Now more than ever it is important that industry at every step along the transport chain share its experiences and ideas, and collaborate in the development of consolidated positions. The World Nuclear Transport Institute is committed to that purpose.

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