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EMERGING ISSUES IN RADIOACTIVE MATERIAL TRANSPORT

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ABSTRACT

Nuclear power currently generates around 16 % of the world's electricity and is set to play an increasingly significant role in meeting the world's growing need for sustainable, clean and affordable electricity. As the industry expands, so too will the demand for fuel cycle services which inevitably places new and greater demands on transport.

The demand for other radioactive materials, for example, Cobalt-60 sources used for a range of important medical, humanitarian and industrial applications, is also likely to increase. These gamma sources are manufactured in very few countries and sea transport is therefore vital to distribute them to users worldwide.

A reliable transport infrastructure is essential to support all these industries and the challenge will be to ensure this can be maintained safely and securely in a changing world where security and other concerns have increased.

The sources of nuclear fuel cycle services often are remote from the demand centres. An essential question for nuclear power generation in the future surely must be: even if availability of fuel can be assured, how can transport to support such a programme be assured?

At the front end of the fuel cycle, could existing commercial liner services be relied upon; particularly in an environment where there already are increasing delays and denials of shipments? Indeed, is it possible to assure availability of transport in a commercial environment? More problematic still, where will the capacity to transport spent fuel, reprocessed fuel and residues in greater volumes and across expanded routes come from? More transport to areas potentially lacking in infrastructure, service providers and experience raises a variety of issues including compliance with regulation, harmonised standards, security and training. The US Global Nuclear Energy Partnership Strategic Plan says much about a government-industry partnership to build a nuclear fuel recycling centre and a prototype advanced recycling reactor. Is a similar partnership between government and industry conceivable for the transport of the assured supply?

Transport of radioactive materials cannot be taken for granted; it faces a variety of challenges, and there are a number of emerging issues in the wider nuclear industry that have important implications for transport.

INTRODUCTION

The intent of my remarks on emerging issues is neither to crystal ball gaze, nor to enter into a world of idle speculation. Instead, I want to cast a light on, and to raise some searching questions, about a real world that already is upon us.

It is a fact that we are today well and truly in an age of increasing demand for nuclear fuel services; the so-called nuclear renaissance is upon us. Nuclear energy increasingly is being recognised for its capacity to respond cost-effectively to the twin demands of carbon reduction, and energy security. There is a similar growth in demand for radioactive materials for use in healthcare, medicine and industry; Cobalt 60 for example. It is a remarkable age of rapidly developing supply centres to fuel this increased demand – some speak of a veritable 21st century uranium "gold rush".

And so, inevitably, because of the increased demand, and the new or expanded resources to meet it, in transport terms we confront a rapidly changing and complex world of new, extended and more complex supply lines. It is, too, a world of heightened public scrutiny, and a more dangerous one; a world in which we confront daunting challenges of unprecedented magnitude, from many quarters, including global threats to our environment, and threats from terrorism. In face of all this, I think we have the chance here for this Miami PATRAM conference to be remembered as the PATRAM that turned its sights, in a very determined way, to the future.

1. THE FUTURE CHALLENGE

It is clear that nuclear power will be called upon increasingly to satisfy the world's growing need for sustainable, clean and affordable electricity, and there will be a corresponding demand for fuel cycle services. This is apparent from current or planned new nuclear build in several countries around the world, notably in Asia, but elsewhere as well. These vital services must be maintained to allow nations to develop their nuclear programmes to meet their electricity needs and this will inevitably place new and greater demands on transport. There also will be a growing need for other radioactive materials- for example, large sources such as Cobalt 60 (Co60)-for a range of important healthcare, medical and industrial uses.

A reliable transport infrastructure is essential to support all these industries, and the challenge will be to ensure that this infrastructure can be maintained safely and securely in a changing world where hostility and public and political concerns about nuclear power have increased in some quarters.

2. SUPPLY AND DEMAND ISSUES

Increased demand for uranium concentrates has led to increased exploration and the development of mines in new locations. The media has been full of stories this year of a "Gold Rush" mentality in the exploration of new uranium reserves, and the price of yellowcake has sky-

rocketed. This is a classic supply-demand situation. And, increased demand inevitably implies more transport, sometimes in and from areas potentially lacking in well-developed transport infrastructure, good options for service providers, and experience. This in turn raises a variety of sustainability issues including the capacity to transport safely, compliance with regulation, harmonised standards and regulations, security, training, cost-effectiveness.

The sources of nuclear fuel cycle services often are remote from the demand centres. For example, a major issue affecting the volume of transport of uranium concentrates, is that the sources of supply are predominantly in Australia, Africa, North America and Eastern Europe while increasing demand is likely to be concentrated in largest part in the Far East and South Asia; so that demand centres often are geographically separated widely from the sources of supply.

A similar situation exists in the provision of other fuel cycle services, notably enrichment, recycling and, perhaps, in the future, waste management.

An obvious consequence of this apparent logistic mismatch between the sources of supply, and the demand centres, is that international transport of nuclear fuel cycle materials is essential, and this traffic will increase.

There has been much attention of late to the possibilities of developing a mechanism for assuring fuel supply, without the proliferation of sensitive nuclear technology such as that for uranium enrichment and recycling. The United States Department of Energy (DOE) Global Nuclear Energy Partnership (GNEP) Strategic Plan, published in January 2007, states as one of its principles, to establish supply arrangements among nations to provide reliable fuel services worldwide for generating nuclear energy, by providing nuclear fuel and taking back spent fuel for recycling, without spreading enrichment and reprocessing technologies. A number of states have shown interest in participating in developing a mechanism. There are several elements to current proposals- next generation nuclear reactors, an International Atomic Energy Agency (IAEA) nuclear fuel bank to create a reliable source of nuclear fuel for countries, should their traditional sources be interrupted, while eliminating the need for countries to develop their own uranium enrichment programmes. Russia, for its part, has launched an initiative to create an international uranium enrichment centre as part of a global nuclear energy infrastructure.

What should be clear, is that any such policy inevitably must address seriously, and, I would suggest, early on-even at the conceptual stage-the transport of supplies of uranium concentrates for processing and enrichment, transport of new fuel to reactor sites, spent fuel for recycling, and residues, as these initiatives move forward. No real account of the transport dimension was taken in the presentations at the Special Event on this subject during the IAEA Annual General Conference in September last year. Nor does it feature in the GNEP Strategic Plan; in fact, transport gets no consideration at all in the Strategic Plan, and the word “transportation” appears only once, and only in terms of a benefit to minimising terrorist threats, through development of an integrated recycling facility.

The result of GNEP would be to cap the number of supply centres, while recognising that the number of demand centres will increase. This, in turn, must increase the importance of transport, including the transport of back-end materials, to support nuclear power programmes, with demands for new transport routes for an expanded number of operations.

3. ISSUES AFFECTING TRANSPORT

Sustaining transport services

An essential question for nuclear power generation in the future surely must be: even if availability of fuel can be assured, how can transport to support such an expanded programme be assured? A nuclear renaissance-yes. But will we also need a renaissance in the transport of radioactive materials?

At the front end of the fuel cycle, could existing commercial liner services be relied upon to meet the increased demand; particularly in an environment where there already exist increasing delays to and denials of shipments? It already is a worrisome trend for global supply that some shipping companies, air carriers, ports and terminals, have instituted policies of not accepting radioactive materials. Maybe potential service providers are unsure about insurance implications. Perhaps they worry about the perception of other customers whose goods they want to carry. Some think special handling procedures or reporting requirements are too complicated, or too onerous. Some are put off by problems with countries, ports, or terminals, which themselves are not prepared to accept Class 7 cargoes, or which raise seemingly complex issues involving transit or trans-shipment. In short, the decisions taken by shipping companies are based in considerable part on maximising profit; if the return from carrying Class 7 materials does not seem substantial enough, then why bother?

This is a real and present matter for concern. Shippers tell us that in some regions service availability and acceptance levels have rapidly declined in recent years. Consignors and carriers increasingly confront departure, transit, trans-shipment, and discharge port limitations 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. Inevitably this can drive consignors to consider charter options; but this is not a panacea. Charters, for example, can mean reduced shipping schedules, and a lack of delivery flexibility. At least the problems of denial and delay have begun showing up on the international radar screen, and are being addressed in a variety of ways by several organisations including, importantly, the International Atomic Energy Agency (IAEA) and the International Maritime Organization (IMO). The World Nuclear Transport Institute (WNTI) has been working intensively on this issue. We have developed support materials and mechanisms for our industry members to obviate or to address concerns of potential transport service providers. We will hear more about such efforts later in the week.

We also must be attentive to the future needs for capacity to transport spent fuel, recycled fuel and residues, in greater volumes and across expanded routes, in the future. There is, of course, already a substantial body of operational experience with routine transports of this kind internationally that can be called upon.

Spent Fuel Management in the USA

Spent fuel management in the United States, including the possibility of recycling, and regional repositories in advance of an operational final repository, raises all manner of transport-related questions of great sensitivity to a host of American stakeholders. Here again, there is substantial

experience in other parts of the world with the safe, cost-efficient transport of spent and recycled fuel, residues, and with addressing issues of public acceptance.

Transport Security

There is increasing concern about the consequences of malicious acts, even though this risk is quite different from the accident risk. Increased emphasis on transport security, not only for Class 7 radioactive materials, but dangerous goods of several kinds, raises a variety of issues. International transport security standards have been and are being developed; for example, by the International Maritime Organization (IMO) with its International Ship and Port Facility Security (ISPS) Code, and by the IAEA with its security guidelines for Class 7 transport. In turn, international standards and requirements in some cases are being supplemented by national requirements. It is not apparent, however, that much effort has been devoted to harmonising requirements between national jurisdictions. Higher or different standards and requirements in one jurisdiction can lead to invidious comparisons. Differing requirements between national jurisdictions also can lead to greater complexity, with the potential for confusion and misinterpretation, and act as a potential disincentive to transport service providers.

Public Acceptability

Issues of denials and delays to shipments, transport safety and security are major challenges. Although transport operations can all be shown to have a low risk based on sound science, there still will be a major effort required to convince people. This will continue to be an important aspect of work by the World Nuclear Transport Institute. For example, from the point of view of safety, the IAEA test requirements for radioactive packages can be shown to be more severe than any accident scenario which can realistically be envisaged. The radiation risks to ships, docks and port workers, the public and the environment, from accidents are, therefore, very small.

In assessing the security risk, the physical properties of radioactive materials are important factors. Highly radioactive materials-spent fuel, HLW, cobalt sources etc.-are very refractory, and not easily dispersed. The packages also are robust to ensure safety under accident conditions. The same is true of Mixed Oxide (MOX) fuel. These factors combine to ensure that the risks due to radiation exposure following malicious acts are, therefore, not great.

However the perceived risks are great. And so, there is a continuing need to reassure the public that radioactive materials transport is a safe and secure operation, in order to alleviate, and to dispel, exaggerated fears. I have heard it said by some that it is important to reduce the level of “emotion” from the nuclear debate. There is, however, a contrary view-that to remove the ”emotion”, if by emotion one means “feeling”, from the debate may, in fact, create a barrier between the communicator and the audience. Trust cannot be built solely on the facts of the case, or on how convincing the technical expert may seem. Trust also is based on empathy, and on shared values.

When it comes to the transport of nuclear materials, issues of safety and security are those that one most often hears mentioned. In a way it may seem odd to many of us that safety should be such a generalized concern, in face of the outstanding safety record of nuclear transport over decades, with no radiological incident causing substantial damage to health or the environment. But those are the facts; what do people feel, and why? Is it surprising that people should feel

more personally threatened when transport carries nuclear materials out on to the highways, railways and sea lanes of the wider community?

You can give people all the facts you like about the actual low risk of packages being compromised, or of the likely small damage if such compromise occurred, but so long as that emotive word "radioactive" is attached, then the feelings and the attitudes can well up. If the balance between perceptions of benefit, and perceptions of risk, is to favour the nuclear industry, and transport in particular, we have a responsibility to frame the debate from the industry point of view, in its widest context of public good, and to communicate that point of view in ways that strike a responsive chord with sometimes skeptical audiences.

Along with the facts, I suggest that industry needs to participate in the debate in the way that people at large-the politicians, the media, our neighbours, our families as well as ourselves, process information-often through the bigger lens of beliefs, attitudes and feelings. Can it seriously be imagined that people in the industry are any less concerned about safety, and security, than anyone else? Aren't we every bit as much part of the local community, with our family and friends. Those opposed to nuclear power don't have a monopoly on virtue. It is at this level, I suggest, that industry needs to modulate its messages.

And we do have compelling messages of which we can be proud. The industry we represent ultimately is about people. The packaging and transport of radioactive materials is about a better life for individuals. Cleaner air through reduced carbon emissions; reliable energy supply to meet growing demand; diagnosis and treatment of illness, sterilization in the healthcare, medical, and industrial sectors. Transport security is essential; so too is security of supply; so too is assured timely, cost-effective transport of radioactive materials where they are needed the world over.

To be convincing, we have to be every bit as professional in communications as those groups who are opposed to nuclear power, or to transport. Correct misinformation, acknowledge limitations, be transparent. And trust in the common sense of the community; we only ask that the case for nuclear be heard; we have confidence that it will hold its own in the wider public debate.

CONCLUSION

We don't want our industry to be treated as, somehow, different or more problematic. We want it to be regarded where it is, and properly belongs – as part of the mainstream of economy and society. Ours is a powerful message – one of which we can be proud. This industry we represent, in its various sectors, provides essential services for the benefit of people the world over. We can be proud of the industry's safety record over several decades with no transport incident causing significant damage to health or the environment.

We are presented with great opportunities at this PATRAM conference. Competent authorities, international organizations, and industry, sharing experiences and ideas. The chance for all of us here to make progress on harmonizing operations, regulations and standards, all in the interest of safe, cost-effective and reliable packaging and transport. A nuclear industry challenged by growing demand for fuel services; other sectors similarly facing growing demand; all of which putting pressure on packaging and transport options. It must be better to confront the challenges

of growth, than otherwise. The great opportunity for us here this week is to set the industry's face forward, to embrace with confidence, the challenges of the emerging future.