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WNTI WORKING GROUP ON SSR-6 REGULATION

TRANSPORT REGULATORY CHALLENGES FOR THE FUTURE.

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Abstract

Even with an outstanding safety record spanning over more than five decades, the industry of transporting radioactive material must not be complacent.

Regulations are constantly evolving for increased protection of persons, property and the environment as the nuclear power industry evolves.

There are emerging challenges to the nuclear industry as it enters into a new cycle linked to end-of-operating-life issues of existing installations. These challenges include the dismantling of nuclear facilities including the necessity to transport large components, and the transport of spent nuclear fuel and wastes from facilities after long-term storage.

The nuclear transport industry addresses these new challenges through dedicated Working Groups as well as in cooperation with Competent Authorities. The WNTI, short after its foundation, implemented an Industry Working Group dedicated to follow the development of the IAEA Regulations for the Safe Transport of Radioactive Material, today known as SSR-6. This working group aims to consolidate industry positions to present to the IAEA Transport Safety Standards Committee (TRANSSC) on the IAEA Regulations for the Safe Transport of Radioactive Material. The WNTI participates actively in dedicated Consultants Meetings (CM) and Technical Meetings (TM) established by the IAEA Transport Safety Unit in order to bring up an industry perspective to specific developments of the SSR-6. This paper describes the ways the industry deals with these new challenges.

Introduction

Nuclear power plant operation is more than 60 years old and it is entering into a new era: the end of operating life for nuclear installations. This new phase of life in the nuclear cycle drives important consequences on transport and package activities. Indeed, the nuclear and other radioactive materials transport industry has to adapt with these new challenges coming from decommissioning. Very large and contaminated equipment has to be transported, and in some countries, the question of the transport of used fuel after long-term storage on site is a concern.

The international transport of radioactive material is framed by the International Atomic Energy Agency (IAEA) Regulations for the Safe Transport of Radioactive Material Edition 2012 [1]. The IAEA, in 2015, launched a review cycle of SSR-6 and accompanying Safety Guides. The principal topic that subsequently justified a revision and a new edition of the IAEA Transport Regulations is the new category of Surface Contaminated Objects (SCO-III), and special consideration was given to the transport after long-term storage.

The World Nuclear Transport Institute (WNTI), representing the transport industry has participated in the review and revision cycle, and through the IAEA Transport Safety Standards Committee (TRANSSC) provides its feedback and expertise from operation experience.

The objective of this paper is to present these new challenges for the Nuclear Transport Industry, the work done by the Industry Members of the WNTI, and the necessary dialogue between the Industry Representatives and the Competent Authorities to address the challenges.

I – The Transportation challenges linked to the end of operating life for nuclear installations

The two following major developments come up in this new era scope:

- Large contaminated equipment have to be transported from the installations to recycling facility or disposal,
- Used fuel which has not been reprocessed and has been stored on site has to be transported to a repository or a reprocessing plant.

Transport of Large Contaminated Objects

According to the IAEA glossary, decommissioning is defined by actions taken to allow the removal of some or all of the regulatory controls from a facility. Decommissioning actions are taken at the end of the operating life of a facility to retire it from service with due regard to the health and safety of workers and members of the public as well as the protection of the environment.

In a nuclear power plant, various parts of equipment are activated and/or contaminated. These have to be treated, stored and discharged for disposal or recycling. Among the equipment, Large Contaminated Objects will require special attention to guarantee a maximum protection of the workers on site from exposure and to limit the risk of release of radioactivity. In some instances, industry has decided to transport these large objects and massive pieces directly to disposal or recycling facilities without on-site dismantling or size reduction. This kind of equipment is categorised either as Low Specific Activity Material (LSA) or Surface Contaminated Objects (SCO).

There is an increasing demand in many countries for transporting large radioactive objects, such as equipment from decommissioning or refurbishment activities at nuclear facilities (steam generators, pressurisers, reactor pressure vessels and heads, coolant pumps, etc.). However, many nuclear reactor components are difficult to package because of their large size and weight, making it challenging or impractical to meet standard packaging requirements. This often requires them to be shipped under special arrangement.

Over a hundred shipments of these types of components from replacement or dismantlement of nuclear facilities have been conducted under special arrangement around the world. The advisory material SSG-26 [2] from the IAEA Regulations includes specific guidance for the transport of large components under special arrangement. However, as experience with this type of transport has grown and is becoming more routine, specific regulatory requirements were needed to allow the movement of large radioactive objects without the need for special arrangement. For that purpose, regular provisions for the transport of large objects as surface contaminated objects (new SCO-III category), based on the IAEA performance standard depending upon the hazard of the radioactive contents, have been developed for incorporation into the new editions of the Regulations SSR-6 and the Advisory Material SSG-26.

However, the proposed provisions do not include components such as reactor vessels at this time, due to the more limited experience and greater radioactivity levels. LSA or SCO large object provisions may be proposed in the future to cover such components.

Transport after storage

Spent nuclear fuel is generated from the operation of nuclear reactors and needs to be safely managed following its removal from reactor cores. The reactor pool capacities were designed based on the assumption that the fuel would be removed after a certain period of time either for reprocessing, storage or disposal elsewhere. As a result of delays in decision on spent fuel disposition, the volume of spent fuel discharged from reactors which needs to be stored is increasing. Therefore, additional storage capacity is needed. Options for additional storage include wet storage in pools or dry storage. One option for dry storage is to place the spent fuel in casks designed for both storage and transport, which are defined as Dual Purpose Casks (DPC). Many countries require this option. The management of spent fuel using DPC involves storage of spent fuel as well as on-site and off-site transport before and after storage.

Safety assessment and approval or licensing have to consider the differences between the two DPC configurations, i.e., the DPC package design for transport and the DPC package design for storage. The criteria for a DPC will be defined in the new edition of the IAEA transport regulations SSR-6. However, the DPC transport package also needs to be designed so that it can be transported after several decades of storage. Thus, the design of a DPC needs to take aging consideration into account.

The criteria for the DPC storage package are specific for on-site activities including storage and on-site transport, and they are different from requirements in the 2012 edition of the SSR-6. Therefore, demonstration of compliance of a DPC package with transport regulations as well as with storage requirements is necessary.

The establishment of a joint international working group was recommended by the IAEA International Conference on Management of Spent Fuel from Nuclear Power Reactors, to provide guidance to Member States for integrating the safety case for storage and transport of spent fuel in DPC. A working group was established by the IAEA consisting of representatives from Competent Authorities and experts from industry, including the WNTI. As a result, proposals have been made to the latest review and subsequent revision of the IAEA transport regulations SSR-6 which will lead to regulations concerning the aging management of packages that have been stored for long-term periods.

II – The SSR-6 Industry Working Group works to address these challenges

Shortly after its foundation, the WNTI implemented an Industry Working Group dedicated to follow the development of the IAEA Regulations for the Safe Transport of Radioactive Material SSR-6. It aims to consolidate industry positions to present to the IAEA Transport Safety Standards Committee

(TRANSSC) responsible for the review and revision of the IAEA transport regulations. The WNTI SSR-6 Working Group participates actively in dedicated Consultants Meetings (CM) and Technical Meetings (TM) established by the IAEA Transport Safety Unit in order to bring up the feedback from industry experience and expertise in terms of package design and transport operations.

Prior to each IAEA TRANSSC meeting, the WNTI SSR-6 Industry Working Group members discuss the proposals for change for the IAEA transport regulations. From their conclusions, WNTI proposals are then submitted to the IAEA TRANSSC.

Some of the main issues which this WG has raised at the IAEA over the past three years are, for example:

- Aging management and how this affects non-competent authority approved packages. In particular:
 - Analysis required for single use packages?
 - Single use compared to reusing packages considering they are inspected prior to use?

WNTI is working with the Competent Authority and the IAEA to draft advisory material for SSG-26 [2] to provide recommendations on how aging management should be addressed for non-competent authority approved packages as well as competent authority approved packages.

- Unintended consequences of changing the regulations.

There have been multiple changes to the regulations which have brought in unintended consequences which were not considered during the revision of the regulations. The regulations should not be revised simply to be technically accurate, to address a compliance issue or to prevent shipments, they should be modified for safety reason which is often not the case. For example:

- The introduction of toxic label to UF6 shipment caused issues for the transport of UF6 samples for safeguard purposes by air. No safety issue had been identified, this was simply a technical accurate change.
- The change with regards to exclusive use shipments, “only when so required,” has resulted in shipments which previously were declared as exclusive use, even though this was not required by the regulations to no longer be declared exclusive use shipments. This has resulted in the unintended consequence of not requiring orange panels.

Again, no safety issue had been identified.

On the contrary, now there is another proposal to change the regulations to address a new issue caused by this change to the regulation.

III – The necessary dialogue between Industry and Competent Authorities

The dialogue between Competent Authorities and Industry has never been as useful as today and the feedback from the Industry regarding the application of the regulation is valued by Competent Authorities.

Transporting safely and securely nuclear and other radioactive material remains the priority for both, Competent Authorities and Industry. The operational feedback and lessons learned from industry operators on the application of the regulation is essential. Thanks to their operational activities, the practicability of the regulatory framework is validated by the experience.

Beyond Safety, remaining the cornerstone of their actions, the Industry is motivated by innovation in order to answer to the national energy policies, driven by economic logic and public perception. And for their part, Competent Authorities have also to integrate social, environmental, and political objectives as well as public concerns. These are not contradictory but rather complementary.

All starts with a dialogue. A better understanding of the mutual constraints is the key factor of success. Talking about dialogue, is talking about sharing more information. Talking about information, is talking about better mutual knowledge with a better understanding of the respective constraints. When the misunderstanding is reduced step by step, the perspective of a common work appears.

On the premise of an enhanced dialogue, the WNTI has developed a range of dedicated actions between the Industry and Competent Authorities. Within the WNTI, the SSR-6 Industry Working Group (WG) dedicated to the transport safety regulations has been active for a long time. This WG gathers Industry experts with the aim to develop common views and positions from the Transport Industry on the IAEA regulations for the Safe Transport of Radioactive Material (SSR-6). The WG was created to support WNTI members to ensure that the excellent safety record of the nuclear transport industry is shared by a common understanding of the regulatory framework and therefore for the efficiency of the transports.

The WNTI good practice guides have been developed to ensure that the operational experience from the transport industry supports the regulatory developments. Sometime, the lack of harmonisation between states presents additional challenges to the transport industry. The use of WNTI Industry Standards brings confidence to all parties involved, from Authorities to service providers and stakeholders.

Conclusion

The end of operating life for Nuclear Installations introduces new challenges for the Nuclear Transport Industry and subsequently changes to the IAEA Regulations for the Safe Transport of Radioactive Material. The future evolution of the transport regulations will require close cooperation between the Industry, the IAEA, and the regulatory bodies.

The WNTI SSR-6 Industry Working Group was formed to develop industry positions in the interest of ensuring that the transport requirements are well understood. The SSR-6 Industry Working Group will continue to address SSR-6 review and revision, as it remains committed to safe, efficient and reliable transport of radioactive material.

References

- [1] Regulations for the Safe Transport of Radioactive Material , 2012 Edition Specific Safety Requirements No. SSR-6,, International Atomic Energy Agency,
- [2] Advisory Material for the IAEA Regulations for the Safe Transport of Radioactaive Material (2012 Edition), Specific Safety Guide No. SSG-26.