



ONSITE TRANSPORT REGULATIONS: HOW TO ADAPT INTERNATIONAL REGULATIONS

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ABSTRACT

Onsite transports of radioactive materials are usually performed using specific rules approved site by site by the competent authority. They are necessary to transfer radioactive materials from one building to another during the different phases of a transformation process.

The French competent authorities have asked the largest nuclear operators in France to set up a working group in charge of writing draft regulations to be approved by the regulators before coming into force on the different French nuclear sites: RTIR (Regulations for onsite transport of radioactive materials).

The transport being performed onsite, it is easier to characterize the different transport conditions according to the usual categories:

Routines conditions

Transports are no longer than a few kilometres. It is therefore easier for the driver to acquire a good knowledge of the path. This enables also to easily guarantee, except for potential very sudden storm or hail storm, the weather and traffic conditions during the transport. It is also possible to identify all possible hazards, including co-activity and traffic along the path.

As concerns radiation protection and contamination, the exposure for public (visitors) is limited in time and minimized by the fact that people are well aware of the risks when visiting a nuclear site.

Thus, the operator can precisely define the conditions of performance of the transport. This leads to introduce in the regulations the possibility to exempt the package designs from non relevant testing, or to limit the number of prescriptions for the transport.

Incident and accident conditions

On each nuclear site, health physics specialists are available with a good knowledge of the specific hazards inherent to the materials transported. Thus, in case of incident or accident, those specialists are available to rapidly make a diagnosis and take all relevant measures to limit the possible consequences.

Thus specific rules can be established for the design of the packaging as well as for operational conditions of transport.



INTRODUCTION

Onsite transports are necessary to transfer radioactive materials or equipments from one building/area to another, during the different phases of a transformation, or decommissioning process.

International transport regulations only apply in the public domain. Nevertheless, the onsite transports must be performed with an equivalent safety level. Since 1999 several French nuclear sites have defined specific onsite transport rules. In order to harmonize the different rules, the French Nuclear safety authorities asked the three major French nuclear operators (AREVA, CEA and EDF) to set up a working group with the mission to write a common reference for onsite transport rules.

THE FRENCH REGULATORY BACKGROUND

According to the French regulations [1], the international regulations for the safe transport of radioactive materials only applies in the public domain. Up to now, no specific national regulations for onsite transport of radioactive materials has been issued in France: each nuclear operator has to demonstrate the safety of its onsite transports, based on a risk analysis consistent with the safety assessment performed for the facility activities. Since 1999 several sites have issued internal rules for the transport of radioactive materials, validated by the French nuclear safety authorities, on a site by site basis.

However, today a few nuclear operators still have not defined their internal rules and get approval on a case by case basis.

In year 2006, the French Parliament issued the “Loi TSN “, law for Transparency and Nuclear Safety [2]. This law leads to a complete rebuilding of the French regulations for nuclear activities, facility operations mostly, but also transport operations. Deriving from this law, different new technical regulations are to be issued, and the following principles will apply: either the nuclear operator complies with transport regulations for the public domain (IAEA Regulations TS-R-1), or it must set up internal rules with an equivalent safety level.

WHAT IS ONSITE TRANSPORT?

Before proposing a new set of rules for onsite transport, a clear definition of “onsite transport” is needed.

Onsite refers to any closed area where the public domain transport regulations do not apply. It should be noted that this closed area may contain one or several facilities, operated by one or several operators (fig. 1).

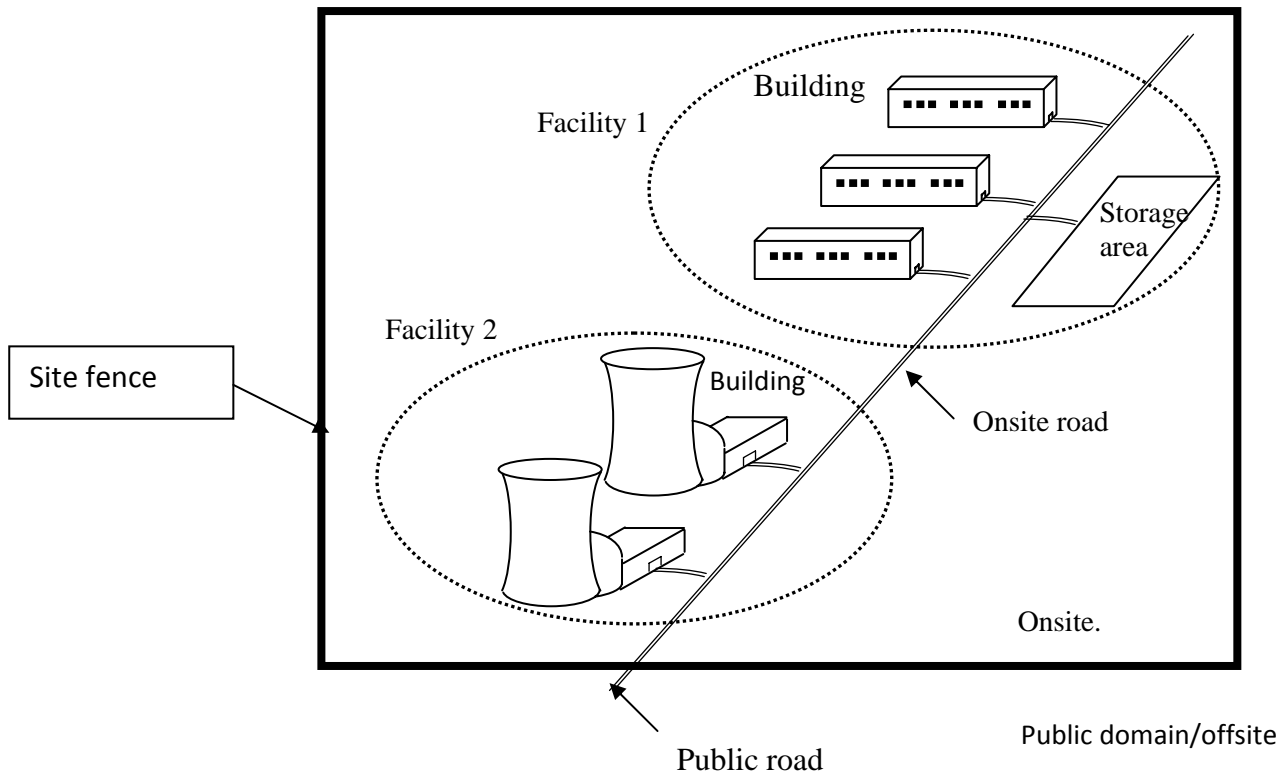


Figure 1. Onsite roads/public roads

Onsite transport refers to any transfer from one building/area to another, when using onsite roads/rails. Moving packages inside a building or within a closed storage area will not be considered as an onsite transport, but as a handling operation. The corresponding safety assessment is part of the facility safety report, without referring to the onsite transport rules

Onsite transport may be performed by means of:

- standard vehicles such as cars or trucks,
- specific vehicles designed to interface with the facility (fig 2).
- handling systems, such as cranes or fork-lift trucks,
- walking transports, for light sources.

The new set of rules for onsite radioactive transport will address transport performed with any of these means.



Figure 2. Specific equipment for onsite transport

WHY AN ONSITE TRANSPORT NEW SET OF RULES?

Many facilities were designed with specific packages and vehicles to operate. The design rules were risk based and used site specific assumptions. The safety demonstration for those transports often rely on a combination of packages and vehicle designs features as well as operating conditions and rules. Furthermore, these packages are designed to interface with the facility, and it appears clearly that a change in the design of these transport systems would lead to heavy modifications in the design of the facility itself. Therefore, it is necessary to elaborate a new set of rules that allows the operator to demonstrate the safety of its onsite transports, taking into account the site specific risks on nuclear sites which are quite different from the offsite transport risks.

Also it is not easy to compare deterministic regulations (IAEA Transport Regulations) to site regulations, which are a combination of deterministic and probabilistic approach, the rules for onsite transport must provide the same safety level as for transport performed in the public domain.

Thus, referring to TS-R-1 2009 Edition § 104, the rules will set requirements that must be satisfied to ensure safety and to protect persons, property and the environment from the effect of radiation in the transport of radioactive material. This protection is achieved by requiring:

- (a) Containment of the radioactive content,
- (b) Control of external radiation level,
- (c) Prevention of criticality,

ONSITE VS PUBLIC DOMAIN

Onsite risks can be identified more precisely than risks that can be encountered in the public domain. The main characteristics of a road transport, which induce potential risks for the conveyance, are summarized below, and the differences between onsite and offsite are underlined.



Compliance of shipment

On the public domain, as a consignor, the operator is responsible for the compliance of the shipment with the regulations. The same requirement applies for onsite transports. For onsite transport, this includes the compliance of the packaging, of its contents, of the conveyance, and of the documentation.

Travel length / Duration of transport

Road transports lengths may vary from a few meters, to thousands kilometers. It is clear that the risk level of the shipment depends strongly on the transport length and duration.

The international regulations take into account long duration transports, whereas onsite transports are very short, generally less than a few kilometers, and performed most of the time in few minutes.

Traffic / co-activity

Road traffic is a strong source of risks on the public domain, since many accidents involve several vehicles. Onsite, it is possible to manage the traffic and the co-activity, for example by limiting the access of the roads when a radioactive transport is performed.

Furthermore, onsite traffic depends on the site configuration and organization. Some sites allow the use of private cars, while others do not.

Speed limit

The speed of the conveyance has an influence on the probability of occurrence of an accident, as well as on the gravity of the accident. The vehicles used onsite often have their speed self-limited, sometime down to walk speed. If not, the speed limit is any case, limited to a low value onsite.

This speed limit also applies to other vehicles onsite.

Other dangerous goods

The presence of other dangerous goods along a radioactive transport can be predicted and limited onsite.

Weather

Whereas the prediction of the weather along long travels is difficult and uncertain, it is much easier for an onsite transport, and it is always possible to stop any transport activity on a site when a sudden change of the weather arises.

Water / Criticality Moderation

The presence of water on site can be dealt with, by choosing a pathway.

Emergency means

Emergency response organizations, including firemen and health physics are available onsite rapidly.

Roads / Tunnels / Bridges

The operator is responsible of the maintenance of the roads within its site, and there is usually no tunnel or bridge. The drivers are well aware of the topography of the site.

People / Workers

On the public domain, the public is protected from the radioactive material by the packaging.

All people, workers and visitors onsite are well aware of the radiological risks. Within the facilities, and if necessary outside, a zoning system prevents the public/workers to approach the packages with significant dose rate at contact.

Figures 3 and 4 below summarize the main differences between onsite and offsite, as concerns the management of the various constraints by the operator.

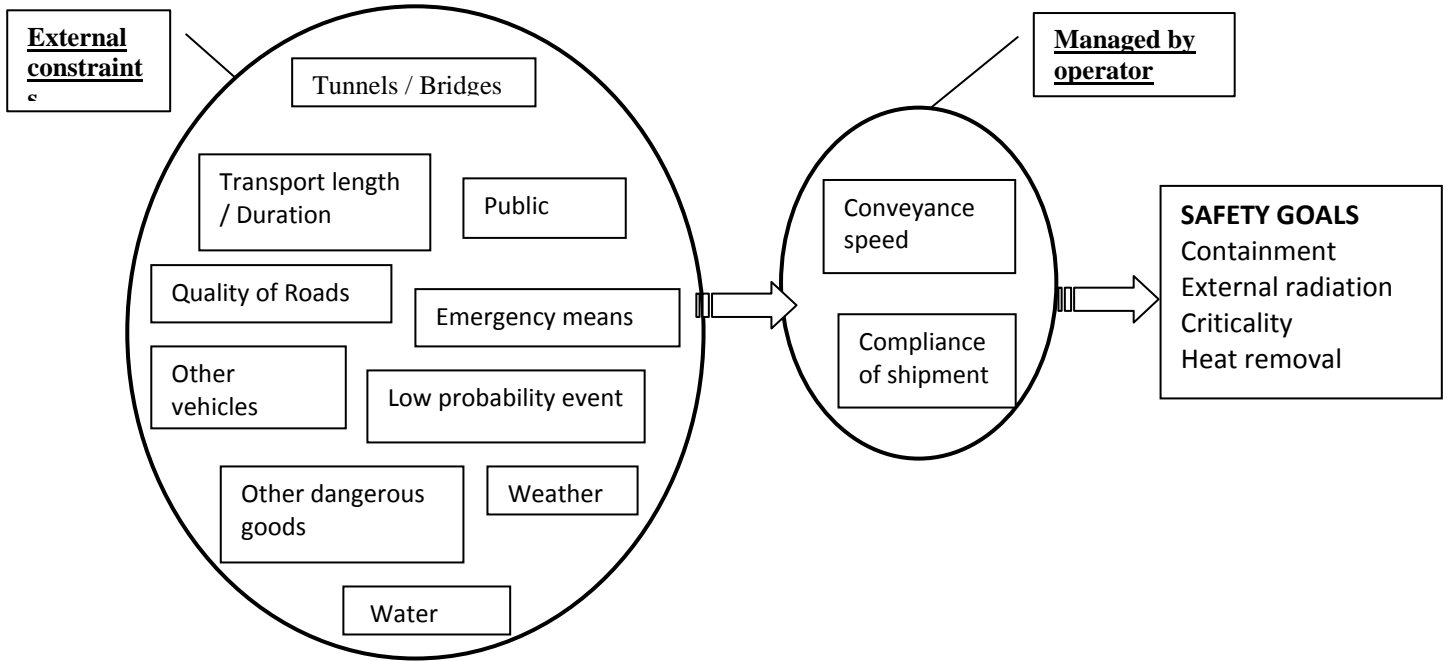


Figure 3: Offsite management of a transport on public roads

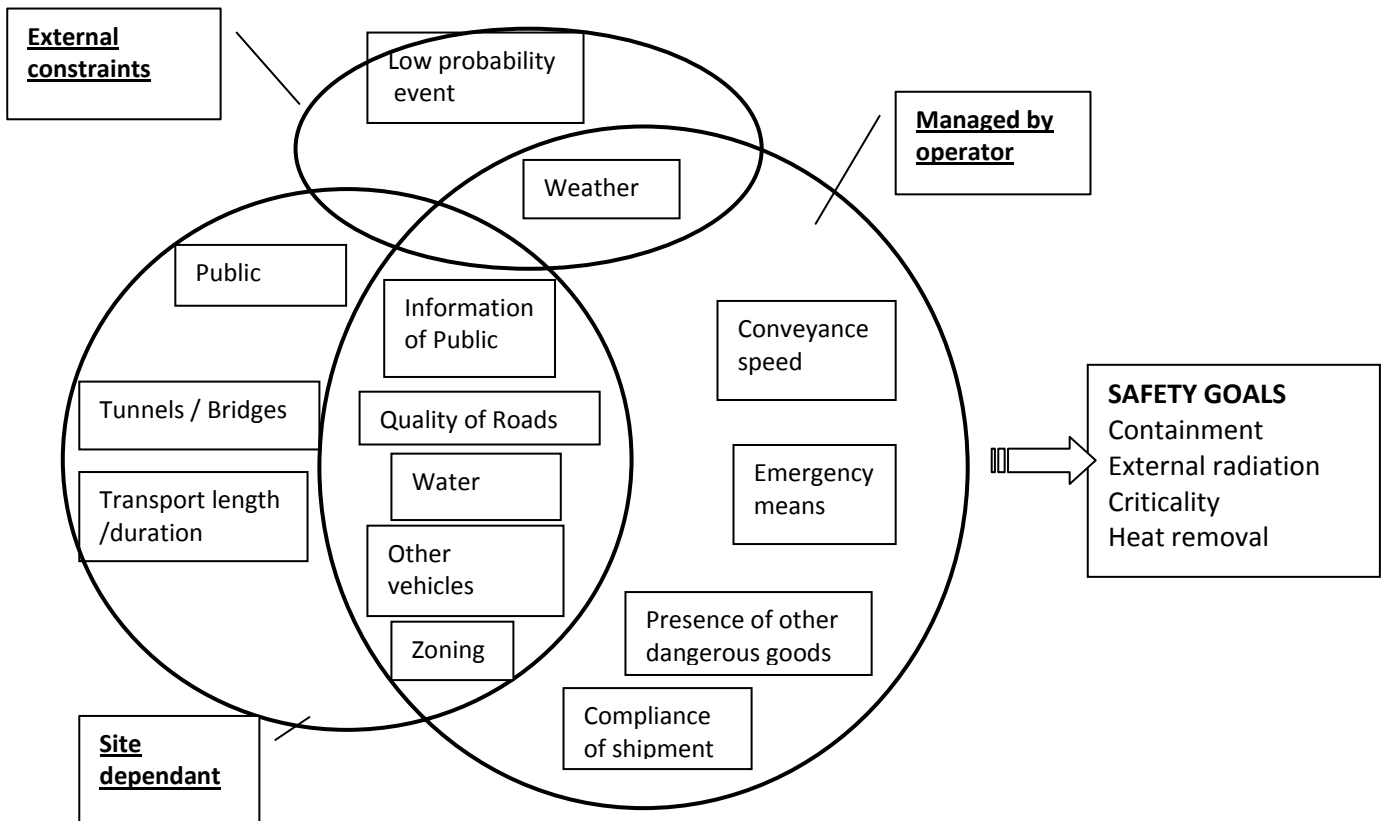


Figure 4: Onsite transport management

It is clear from those diagrams that the nuclear operator has several levers to address the safety assessment of onsite transports. The transport can be canceled at any time when the weather is not suitable. The operator can also reduce strongly the conveyance speed, avoid other vehicles or co-activity, etc. The operators may also take advantage of the specific site configuration, by avoiding water, or by restricting the access to the public and workers.

PRINCIPLES FOR THE COMMON REFERENCE FOR ONSITE TRANSPORTS

Those onsite specific conditions lead to redefine accordingly the principles of the new rules for onsite transport since the safety of the shipment relies on the package and vehicle design, as well as the operating conditions (site specific) and procedures.

This leads to the definition of four types of packages :

	General prescriptions	Incident conditions	Accident conditions
Type 1 < 1 A₂	X		
Type 2 < 100 A₂	X	X	
Type 3 >100 A₂	X	X	X
Fissile	X	X	X

Table 1 : Types of packages for onsite transport.

General prescriptions

General prescriptions apply for all packages. The packages must withstand routine conditions of transport, that are roughly the same onsite and offsite.

Labeling and documentation can be simplified and made consistent with the site radiation protection specific rules.

Incident Conditions

Packages containing more than A₂ (or A₁ for Special form radioactive material) or fissile materials must withstand incident conditions of transport. These conditions are minor incidents that are not severe enough to stop the transport operations. The incident conditions of transport are represented by the water spray test, the free drop test, the stacking test and the penetration test.

Package designs may be exempted from non relevant testing according to appropriate operating procedure and/or specific site conditions, that justify the adjustments of the package testing.



Accident Conditions

Packages containing more than 100 A₂ (or 100 A₁ for Special form radioactive material) or fissile materials must withstand accident conditions of transport. The accident conditions of transport are represented by the mechanical test, the thermal test and the water immersion test. Packages containing fissile materials must withstand an additional water leakage test.

Packages may be exempted from non relevant testing according to appropriate operating procedures and/or site specific site conditions that justify the modulation of the package testing. For example the immersion test is not required if no water is present along the path.

CONCLUSION

Up to now in France, a few sites have issued internal rules for the transport of radioactive materials, assessed by the French nuclear safety authorities, on a site by site basis.

To harmonize the rules for the different sites, a common reference is currently prepared by a working group composed of members from the three major French nuclear operators. Those rules will guarantee the same safety level as international regulations for transports, by taking into account site specific conditions as well as safety assessment of the facilities for which they are performed.

REFERENCES

- [1] Arrêté du 29 mai 2009 relatif aux transports de marchandises dangereuses par voies terrestres (dit « arrêté TMD »)
- [2] Loi n° 2006-686 du 13 juin 2006 relative à la transparence et à la sécurité des matières nucléaires.