The French Nuclear Safety Authority's Experience with radioactive transport inspection

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Abstract

About 300,000 radioactive material packages are transported annually in France. Most consist of radioisotopes for medical, pharmaceutical or industrial use. On the other hand, the nuclear industry deals with the transport of fuel cycle materials (uranium, fuel assemblies, etc.) and waste from power plants, reprocessing plants and research centers. France is also a transit country for shipments such as spent fuel packages from Switzerland or Germany, which are bound for Sellafield in Great Britain. The French nuclear safety authority (DGSNR: Directorate General for Nuclear Safety and Radioprotection) has been responsible since 1997 for the safety of radioactive material transport. This paper presents DGNSR's experience with transport inspection: a feedback of key points based on 300 inspections achieved during the past five years is given.

1. Introduction

The Directorate-general for Nuclear Safety and Radiation Protection (DGSNR) is the French nuclear safety authority responsible in the field of transport for:

- preparing and implementing all steps concerning the safe transport of radioactive and fissile materials for civilian use, and in particular, together with the services of the Minister for transport, by drafting the corresponding technical regulations and monitoring their application;
- managing the authorization process, such as approval of package designs;
- organizing safety inspections for basic nuclear installations and, together with the competent services of the Minister for Transport, for the transport of radioactive and fissile materials for civilian use;
- participation in emergency preparedness;
- information of the public.

The DGSNR manages a inspection programme consistent with the large French nuclear programme. The transport inspections represent approximately 10 per cent of all inspections performed at nuclear facilities. Given that the user has the primary responsibility for safety, and that it is not possible to inspect all shipments, the DGSNR programme focuses on reviewing a sample of users selected each year, especially the consignors.

2. DGSNR 's organization for transport inspection

The DGSNR plans every year an inspection program based on the feed back from both previous inspections and incidents that occurred in the field of radioactive transport. Usually, two or three main topics are selected for a year. In order to facilitate a national approach, specific inspection guides are therefore written. In the scope of those guidelines, inspectors give special attention on the selected topics, so that substantial feed back can be achieved at the end of the year.

The DGSNR conducts an average of 60 transport inspections per year that includes designers, manufacturers, maintainers, and consignors of transport packages, subcontractors to these groups, as well as inspections of road, rail, air, and sea carriers and transports.

All inspectors complete a formal, written qualification program that includes training and job experience before their certification as inspectors.

The transport inspections are carried out with regard to the modal regulations:

- for road shipments, the United Nations Economic Commission for Europe's (UNECE) European Agreement on the Transport of Dangerous Goods by Road (ADR) ;
- for rail shipments, the Intergovernmental Organization for International Carriage by Rail's (OTIF) Regulations concerning the International Carriage of Dangerous goods by Rail (RID) ;
- for air shipments, the International Civil Aviation Organization's (ICAO) Technical Instructions for the Safe Transport of Dangerous Goods by Air ;
- for sea shipments, the International Maritime Organization's (IMO) International Maritime Dangerous Goods (IMDG).

A normal inspection involves 1 or 2 days on-site, with one week for preparation, inspection, and documentation. Each inspection team consists usually of 3 or 4 persons:

- an inspector from DGSNR;
- an inspector from the relevant regional office called DSNR (Division for Nuclear Safety and Radiation Protection within DRIRE, the Regional Directorates for Industry, Research and the Environment);
- an engineer for technical support from the Institute for Radioprotection and Nuclear Safety (IRSN);
- an inspector from the Directorate-general for Civil Aviation (DGAC) during inspections on airport or from a Ship Safety Center (CSN) depending on the Directorate for Maritime Affairs (DAMGM) during inspections on board vessels transporting radioactive materials.

In fact, the DGSNR has developed, documented, and implemented cooperative inspection protocols for air and sea transport of radioactive materials with the DGAC and the DAMGM.

The areas of competence of the DGAC concern the air carrier, transport authorizations, handling, storage in the airport, flight conditions, separation of radioactive material from other dangerous goods and stowage on board the aircraft. DGSNR's inspectors along with DGAC inspectors check packages and radiation protection programme.

Concerning inspection with DAMGM, visits on-board vessels transporting radioactive material are organized by the Ship Safety Centres. The DGSNR's inspectors may, along with Ship and Maritime Works Safety inspectors, take part in visits to these ships with the aim of checking the packages and the radiation protection measures.

3. Main stages of a transport inspection

The inspectors team meets two or three weeks before the planned inspection, in order to prepare the detailed agenda. Preparation is considered as the main part of inspection: the inspector's efficiency depends basically on it. Preparation takes into account possible previous inspection reports, transport incidents analyses and, of course, specific inspection guides related to the selected topics of the year (such as the safety advisor tasks or implementation of radiation protection programme for instance). If an approved package is likely to be present during the inspection, the corresponding approval certificate is looked at carefully to draw out relevant prescriptions to be controlled. The inspectors use this meeting opportunity to adjust technical details such as the necessity of measurement equipment for instance. Finally, a detailed inspection agenda is written.

Inspections can be announced or unannounced. When announced, an official letter is generally sent to the company two weeks before the inspection.

The inspection usually takes place in the offices of the controlled company. At the beginning, the pilot inspector gives the detailed agenda to the director of the company or to its representatives. The company is then charged to collect the requested documents to the inspectors' disposal all day long.

Generally, half the inspection is devoted to document assessment. The company first presents the transport organization. Emphasis is placed on documentation of the quality assurance required in transport of radioactive material.

The inspectors expect a clearly defined and documented organizational structure with functional responsibilities. Moreover, special attention is given about training of personnel involved in transport operations. Inspectors make sure that all personnel responsible for performing transport operations are suitably trained and qualified to perform their own tasks.

The transport operations are to be considered as a process that has to be accomplished by documented procedures. Therefore, inspectors analyze dedicated procedures when applicable: control of package contents, packaging, handling, labelling, carriage, maintenance, etc.

The annual report of the safety advisor is consulted for road shipments.

After the document assessment is completed, the inspectors carry out controls of an effective transport, to ensure that requirements specified in the regulations are met in the field. Inspectors verify the marking, labelling, placarding, the content adequacy and general information required in the transport document. Some radioactive measurements are performed by the inspectors, such as non-contamination control and radiation level at contact or 2 meters from the vehicle.

If the company uses an approved package, inspectors ensure that all requirements specified in the approval certificate are satisfied.

When the agenda has been covered, the inspectors consult each other over the production of an insufficiencies summary with regards to the regulations. An official statement document is then established with the summary and signed by the inspectors. The company director or its representative has to sign this statement document after reading the inadequacies pointed out.

After the inspection, a report is written and documented and forwarded by an official letter. This letter sum up the inspection, asks for corrective action if necessary, and often asks for complementary information. When signed and transmitted to the inspected company, this letter is placed on the DGSNR web site (www.asn.gouv.fr), and is publicly available.

The company has to reply within 2 months in order to explain the detailed corrective action plan if necessary. If answers are acceptable to DGSNR after assessment, no other letter is addressed. Still, an inspection will be made in the future to ensure that the corrective actions are effective.

A synthesis of all inspection findings is created by the DGSNR each year and summaries of the main findings are published in the DGSNR annual report on safety.

4. Transport inspections performed during the past five years

About 300 inspections on radioactive transport have been achieved during the five past years.

Most inspections are dedicated to consignors since before each shipment it shall be ensured that all the requirements specified to the radioactive package (type of package, identification and control of contents, maintenance, marking, labelling, stowage) and the vehicle (mandatory equipment, placarding) are satisfied, including monitoring of leaktightness, radiation and contamination measures. The prime responsibility for safe shipping is with the consignor.

In the following table, we sum up the different kind of inspections achieved:

Type of inspection	Number of inspections performed during the 5 past years
Consignor	200
Carrier by road or rail	17
Carrier by sea	13
Carrier by air	24
Manufacturer	12
Other (Maintenance, Designer, etc.)	22

5. Main findings from 300 transport inspections

About 1000 inadequacies or insufficiencies were found within the 300 inspections performed by DGSNR.

Consignors

Most inadequacies in the consignor companies concern quality assurance. Organizational structures are not always clearly defined. Moreover, documents essential to the performance of the transport activities, such as instructions and procedures, are incomplete. Criteria for determining that transport operations have been satisfactory accomplished are missing or should be updated. Control of the transport operation is sometimes not accomplished by documented procedures or quality plans. Consequently, records and traceability are not appropriate or sufficiently detailed. Distribution of revised documents is often not timely. Otherwise, care is sometimes not taken to ensure that out of date documents are destroyed or clearly marked as such to prevent further use. Even if personnel are usually trained and qualified, there is no procedure for the identification of training needs and more generally training programs. Finally, internal audits are rarely carried out to verify all aspects of the quality assurance.

Otherwise, the consignors are generally not able to demonstrate strictly the compliance to the regulatory requirements for non-competent approved package design (such as type A and IP packages). Consignors usually base their shipping control on a certificate of type A or IP compliance from the package owner or from the designer. It is not acceptable since the authorised content considered for the design is never mentioned on that kind of certificate. On the other hand, when the consignor owns the package or is the designer, the demonstration of compliance is generally incomplete.

Moreover, the safety advisor for transport by road does not fulfil all his duties such as:
- monitoring compliance with the requirements governing the carriage of dangerous goods;
- implementation of proper emergency procedures in the event of any accident that may affect safety during the carriage, the loading or unloading of radioactive material.

Consequently, safety advisor's annual reports appear generally insufficient.

Carrier by road or rail

Such as the consignors, carriers use type A and IP packages without a complete demonstration of the compliance of the package design to the regulatory requirements.

Carriers conduct their activities with a radiation protection program, which is not well documented, especially concerning dose assessment.

General safety measures related to the carrier obligations (ascertain that the prescribed documentation is on board, ascertain visually that the vehicles and loads have no obvious defects, verify that the vehicles are not overloaded, etc.) are usually not accomplished by documented procedures. Consequently, records and traceability are not sufficiently detailed.

Carrier by sea

Inspectors stated a general lack of justification about the good condition of use of handling machines in seaports.

Carrier by air

In-transit storage operations are usually not achieved with sufficient quality in airports. Inspectors stated a lack of systematic method described with documented procedures.

Packages are often moved without stowage from the storage area to the plane.

Moreover, the radiation protection programme is generally not documented and workers did not receive appropriate training concerning the radiation hazards involved and the precautions to be observed. At least, in-transit storage companies should count the class 7 packages and transport index per year to estimate the rough doses on persons.

In the event of an incident or accident, no proper emergency documented instructions are given to personnel even if they usually know the need to call the police and fireman. Sometimes, there is no dedicated area for the in-transit storage of radioactive packages, and therefore no segregation distance.

Manufacturer

It happens that procurement control measures are not documented enough. Purchasing documents do not always contain data clearly describing the product.

A simple classification of the 1000 inadequacies pointed out by the inspectors is given in the following table:

Type of inadequacies	Average percentage of inadequacies
Quality insurance	60%
Radiation protection programme	20%
Safety advisor	10%
Other (maintenance, manufacture, stowage…)	10%

6. Conclusion

The DGSNR performed 300 inspections during the past five years to ensure that radioactive material is transported in compliance with the modal regulations (ADR, RID, IMDG, and OACI). Most inspections (200) were dedicated to consignors, but also to road and rail carriers (17). Together with the competent services of the Minister for Transport (DGAC for the air and DAMGM for the sea), 24 companies have been controlled at airports and 13 in seaports. The DGSNR conducted also inspections of manufacturers (12) and other companies (20) such as designers and maintainers of transport packages.

Inspection reports are documented, forwarded by letter for corrective action if necessary, placed on the DGSNR web site (www.asn.gouv.fr), and are publicly available. A synthesis of all inspection findings is created by the DGSNR each year, and summaries of the main findings are published in the DGSNR annual report on safety.

The provisions of transport regulations are globally met in practice. Inspectors did not observe any huge deviation. Anyhow, inspections are really to monitor the degree of compliance with the regulations by users. In this way, improvement can easily be made to keep a high level of safety.

Most findings in the transport of radioactive packages are related to quality assurance. The DGSNR will therefore place emphasis on quality assurance programmes for corrective action by the user.

Moreover, inspections pointed out that the compliance demonstration of type A or IP packages requirements are usually incomplete. The DGSNR will consequently define an appropriate review programme for non-competent approved package design.

Finally, the DGSNR has decided to intensify inspection at airports with the DGAC. In-transit storage companies at airports will have to provide measures for ensuring that those participating in a radioactive transport activity use appropriate and up to date documents for performing their activity and for emergency response. A well-documented radiation programme will be required.