

## 1 WHAT IS AT STAKE ?

Lessons learned by IRSN from its analysis of significant events involving the transport of radioactive materials for civilian purposes in France. This report is published every two years and covers events reported during 2014 and 2015.



**980,000**

PACKAGES OF RADIOACTIVE MATERIALS FOR CIVILIAN USE TRANSPORTED EACH YEAR IN FRANCE



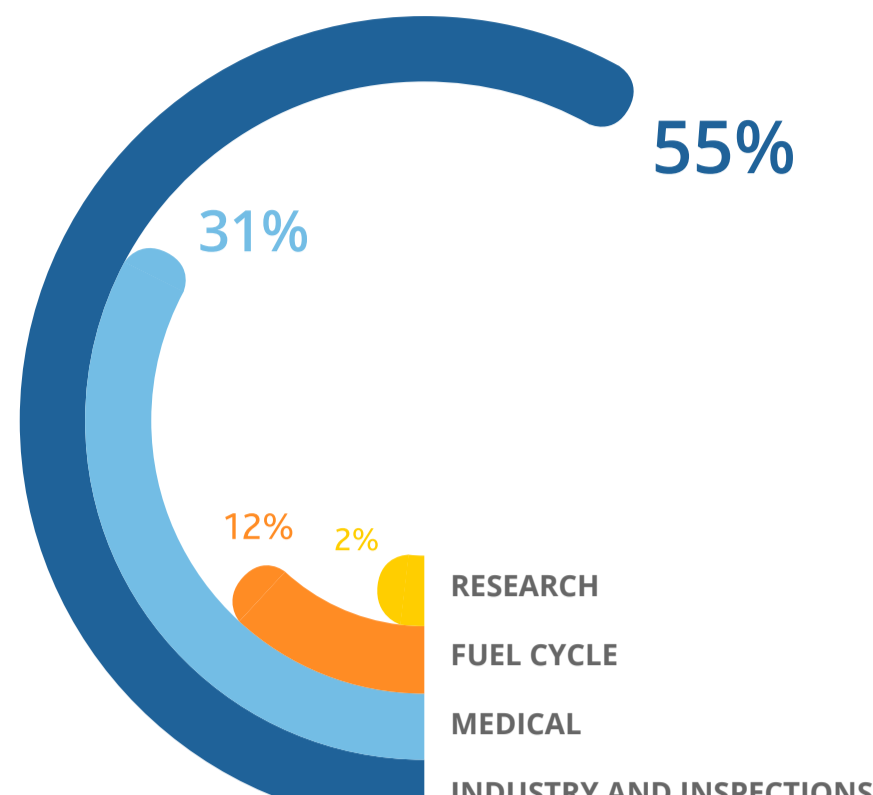
**15 MILLIONS**

HAZARDOUS MATERIAL PACKAGES TRANSPORTED EACH YEAR IN FRANCE

All transport operations of radioactive materials for civilian use are covered by international regulations that are implemented in the form of regulatory mechanisms specific to each mode of transport: road, railway, inland waterway, sea or air.

The transport involves a wide variety of substances, physical and chemical forms, radioactivity quantities and types of packaging. A package can range from 10 centimetres to 8 metres in length and its weight can vary between a few kilogrammes and more than 100 tonnes.

SHIPMENTS BY SECTOR OF ACTIVITY



## FACTORS TAKEN INTO ACCOUNT BY IRSN TO ACHIEVE ITS OVERALL ASSESSMENT

Assessment is performed using data of 'significant events' that consignors of packages containing radioactive materials are required to report to the French Nuclear Safety Authority (ASN). These events, that occurred during the course of the transport itself or during the loading, unloading or inspections of packages before and after transport on public roads, are classified on the "International Nuclear and radiological Events Scale" (INES) which consists of 7 levels.

### NOTIFICATION CRITERIA

#### SIGNIFICANT EVENTS

Transport-related events covered by one of the 13 criteria defined by ASN in the guide for the reporting of significant events.

#### SAFETY-RELEVANT EVENTS

Some operators declare events to ASN that are not covered by criteria. They are referred to as "safety-relevant" events.

### LEVEL ON INES SCALE

#### LEVELS 0 AND 1

**Deviations and anomalies**  
In France, about fifty events each year. The number of anomalies (Level 1) has decreased since the beginning of the 2000s.

#### LEVEL 2

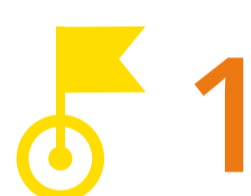
**Incidents**  
In France, two cases recorded in the last 15 years.

#### LEVELS 3-7

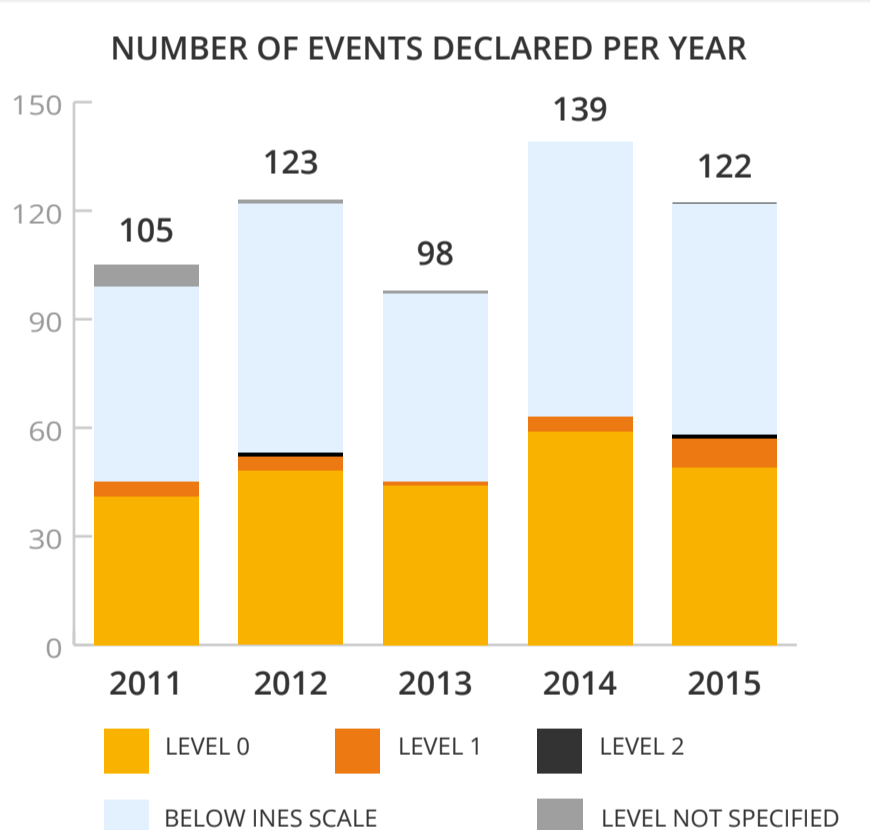
**Serious incidents and accidents**  
In France, only one serious incident (Level 3) in 2001.

## 2 ANALYSIS OF TRANSPORT-RELATED EVENTS IN 2014 AND 2015

The analysis of significant events reported in 2014 and 2015 did not find evidence of degradation of the safety of the transport of radioactive materials for civilian use in France. None of these events had significant radiological consequences for the workers, the population or the environment.



**1** EVENT DECLARED ON AVERAGE PER 7,500 PACKAGES TRANSPORTED



In 2014 and 2015, on average, there was:

- 1 event per 1,400 packages transported in the fuel cycle sector,
- 1 per 4,400 packages in the research sector,
- 1 per 10,300 packages in the medical sector,
- 1 per 41,600 packages in the industry and technical inspections sector.

### EVENTS IN 2014 AND 2015

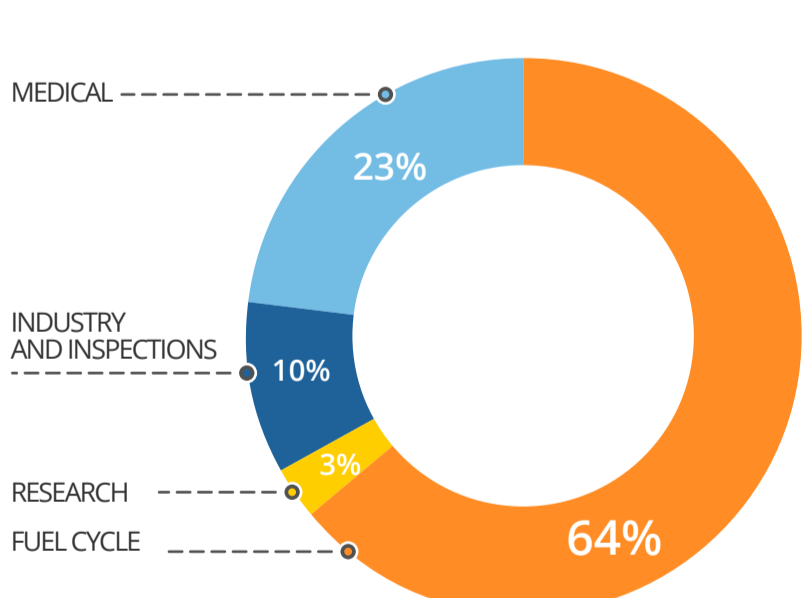
In 2014 and 2015, respectively, 139 and 122 events were reported, a significant increase compared to 2013.

This trend can't be considered as a degradation of the safety of transport of radioactive materials. It is mostly explained by a better detection of "minor" safety events (below INES scale).

Events related to locking defects of the radioactive source in gamma radiography devices and defects of the tying down of packages on their means of transport appeared as remarkable events (3 events classified at Level 1 and 1 at Level 2).

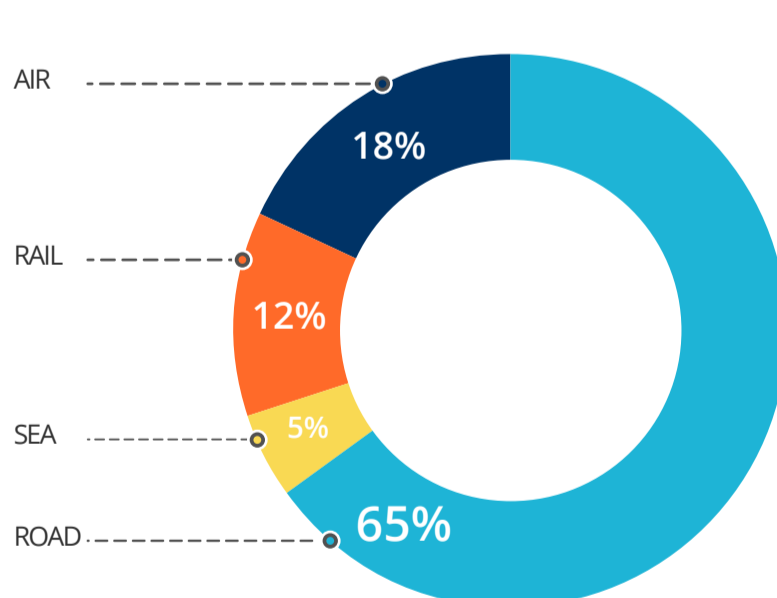
### DISTRIBUTION OF EVENTS IN 2014 AND 2015

DISTRIBUTION OF EVENTS BY SECTOR OF ACTIVITY



The overrepresentation of the fuel cycle industry is marked primarily for events relating to "non-compliant content".

DISTRIBUTION OF EVENTS BY MEANS OF TRANSPORT

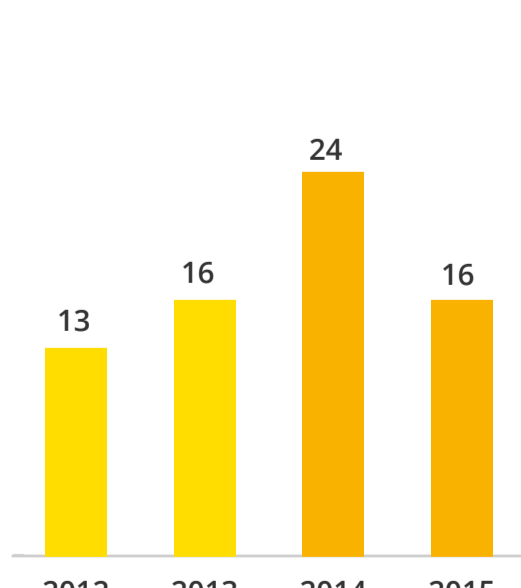


In transportation solely by road, 70 % of events reported in 2014 and 2015 concerned the fuel cycle activities.

## PROPOSALS FOR IMPROVEMENTS

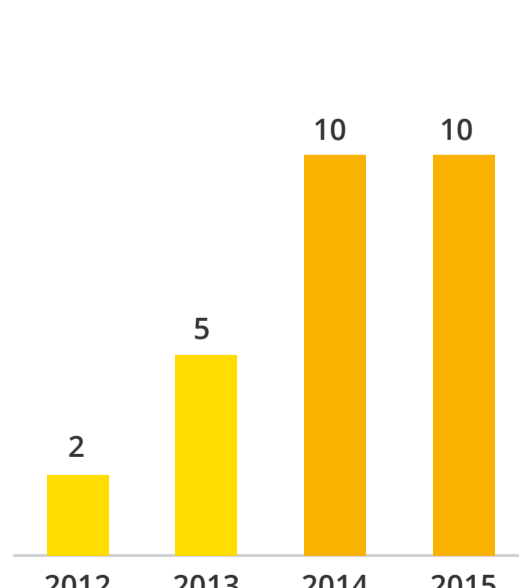
This in-depth analysis by IRSN is critical to identifying the possible recurring or generic causes of the events and to defining more relevant corrective actions that can improve safety. The lessons learned provide IRSN with additional feedback that increases transport safety by improving the casks, operating practices or regulations.

### EVENTS OF A RADIOLOGICAL NATURE



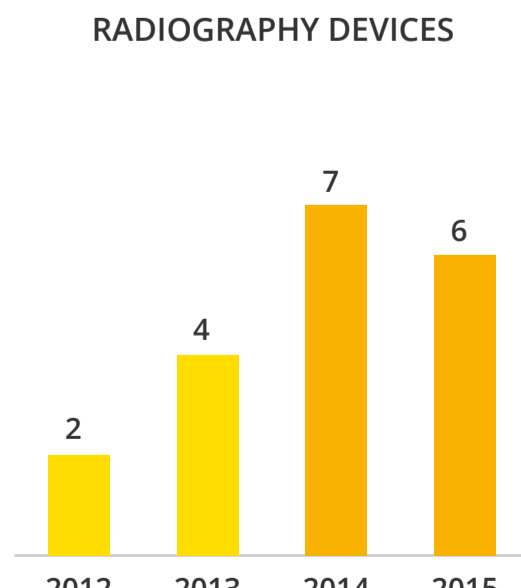
Enhance checks for the filing and the locking of drums used for the supply of uranium ore shipped from mines operated in foreign countries.

### PACKAGE TIE-DOWN DEFECTS



Strengthen training of package consignors and carriers to ensure reliable tie-down of packages and objects transported.

### EVENTS RELATED TO GAMMA RADIOGRAPHY DEVICES



Ensure compliance with requirements relating to the shipment of gamma radiography devices, particularly those regarding locking and tie-down configurations.

