

 Report from a French incident**Rupture of a package containing Iodine-131****Description of the incident**

The incident took place following the fall and damage of a parcel causing the dispersion of 5 GBq of Iodine-131 on the internal roads of an airport.

The type A package contained capsules of I-131, radiopharmaceuticals used in the treatment of thyroid cancers, in the form of powder inside capsules. During transport, the capsule is placed in a vial protected by a lead container placed in a metal box with a sealed lid, all packaged in a carton.

When being dispatched from the warehouse towards the aircraft, the package in question fell from the vehicle, undoubtedly because of a lack of secure stowage. The package then was crushed by vehicles using this road which ruptured the containment and led to the dispersion of radioactivity on the road and surrounding surfaces.

The damaged package was discovered by a law enforcement patrol which, ignoring the nature of the product, moved it to the side in order to free the road. It is while handling it that the officers saw the warning symbol indicating the presence of radioactivity (its initial position was not visible). They established a security perimeter and alerted firemen specialised in radiological interventions who, after arriving at the scene of the incident, undertook the first measurements.

**Radiological consequences**

The first measurements undertaken detected two surface contamination spots (some distance apart) with a contact dose rate of 100 to 200  $\mu\text{Sv/hr}$ , and an equivalent dose rate of about 10  $\mu\text{Sv/hr}$  at 50 cm. Body monitoring and urine tests performed the same day showed that the four persons involved in the monitoring had an intake of less than 100 Bq of Iodine-131, which corresponds to a thyroid dose of less than 0.05 mGy.

**Estimation of the dose received by the most exposed group (officers), who arrived on the scene of the incident first**

- Internal exposure by inhalation: an activity of 250 Bq has been measured by gamma body monitoring, which represents a committed effective dose of 2  $\mu\text{Sv}$ .
- External Exposure: The presence time at the level of the contaminated area was estimated at 2 hours and 45 minutes. Two exposure scenarios may be held: the most realistic (taking into account the actual positions and time the officers were present), represents 2 hours 45 minutes of exposure, and gives an effective dose of less than 5  $\mu\text{Sv}$ . The most pessimistic estimate gives a total estimated effective dose of 65  $\mu\text{Sv}$ .

The regulatory authority classifies radioactive material transport accidents or incidents in five categories:

1. Non-compliance of packaging/content with the general regulations or the requirements of the package design approval.
2. Event during the handling of the package.

3. Incident or accident during transport itself.
4. Loss of package.
5. Failure of the safety demonstration that led to the issuance of an approval.

The incident described above may be classified in categories 2 or 3.

#### **Lessons to be learned from the incident**

- It should be ensured that all persons responsible for the handling of packages in airports understand the meaning of the radiation warning symbol.
- Packages containing radioactive material must be securely stowed during movement, transport and other warehousing operations, and this stowage must be checked and periodically verified.
- Procedures relating to the handling and stowage of packages containing radioactive material should be drawn up by the operators and made available to staff.
- It is important to remember that the labeling of packages must be on two opposite sides.
- It is necessary to periodically inform and train persons responsible for package handling about the risks of exposure and the precautions to take during handling or in the case of accidents. ADR specifies that any person whose functions are related to the transport of dangerous goods by road must have received appropriate training on the provisions governing transport.
- Suitable PPE (e.g. gloves) should be provided for handling any suspicious package.
- In case of accident or incident during the transportation of radioactive materials, the radiation protection authority must be informed within appropriate timelines, respecting the declaration criteria whether there have been radiological consequences or not.