

 Report from a French incident**Contamination of persons and equipment by damaged level gauge source in food factory****Description of incident**

To measure the vat fill level, an agro-food processing plant had a level gauge containing a 37 MBq caesium-137 source. The gauge was not working, and a new engineer from the company that supplied the equipment (the only one authorised to work on this gauge), sawed through the pencil containing the radioactive source believing that he was shortening the shutter. He was not familiar with the type of equipment he was working on.

After the maintenance work, the system was still not operational which led the engineer to suspect an electronic board failure. After the installation of the new electronic board (2 days later), the test of the control device was not conclusive. The supplier of the source was alerted to this situation during a telephone conversation with the engineer. During this conversation, the company realized that their employee was working on the gauge thinking that it was another model.

The same evening, the establishment called in a specialized company to check for radioactive contamination.

The plant management warned the local authorities and was contacted immediately by the radiation protection authority.

**Radiological consequences**

It was suspected that the engineer and two brewery employees who worked directly on the source received an external radiation exposure, as well as internal and external contamination.

These people were medically cared for by the radiation protection technical support organisation, with the assistance of a nuclear facility and firemen specialized in radiological incidents.

Three contaminated areas were identified in the establishment:

- A mechanical workshop in which the source had been placed in a vice and sawed with a hacksaw. The dose rate in contact with the floor was between 40 and 50  $\mu\text{Sv/hr}$ .
- In a foreman's office, the contamination of two carpets was identified (probably transported by the soles of shoes).
- The gauge area had a few spots of contamination

The results of the measurements regarding potentially exposed personnel revealed no internal contamination and therefore did not require further medical attention.

The activity level of the damaged source was 37 MBq. The radiological consequences could have been more serious had the activity been higher : some gauges on the market contain sources up to several hundred GBq.

### **Regulatory requirements relevant to this incident**

The source is subject to notification and authorization, which required the holder to produce a justification file which includes general information on the premises, the radiation protection qualification of the personnel responsible for handling the sources, detailed information regarding the radioactive sources, information on the manufacturer and supplier, and arrangements for the recovery of sources.

The head of the establishment must arrange for a technical inspection of the radiation protection of sources, any safety and warning devices, and monitoring instruments used. This technical inspection includes:

- A verification upon reception at the company;
- A verification before first use;
- A verification when the conditions of use are amended;
- A periodic inspection of sources;
- Periodic testing of the monitoring instruments used for these verifications.

The periodic inspections must be carried out at least once a year.

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

The source was notified and authorized, and the relevant periodic verifications had been performed. Consequently, no failure to comply with the regulations was assigned to the operator. Instead, the equipment supplier (and the only body authorised to maintain the gauge) was deemed to have sole responsibility for the incident.

Nevertheless, there was no final inspection of the site carried out by the operator which could have prevented the dispersion of the contamination throughout the workshop.

The lack of proper training of staff within the supplier company is thought to be the main cause of the incident. Various measures, that would have helped avoid the incident, are listed below:

- To draw up an instruction manual for engineers, to clearly identify the different parts of the equipment. In the incident, the engineer confused the shutter with the source holder.
- To include practical modules on equipment maintenance in the radiation protection training provided.
- To ensure that engineers always have a suitable radiation monitoring instrument (dore rate monitor). In this case, it would have allowed the operator to quickly realize his error at an early stage.