



Laboratory contaminated with Carbon-14 due to cleaner moving drums

Description of the incident

A cleaner in a laboratory was required to move a (non-compliant) 50 L drum filled with aqueous effluents marked with C-14 (unknown activity). During the handling, the two handles of the drum broke off suddenly and it fell to the ground. With the impact, the drum broke and a significant amount of liquid (estimated at 25 L) spread over the ground and splashed onto the cleaner.

The cleaner immediately notified the head of the laboratory. The director of the laboratory took the cleaner to the hospital where she was reassured and showered.

The qualified person in charge of radiation protection, after discussion with the regulatory authorities, proceeded with the removal of the liquid by means of a ground siphon provided for this purpose and connected to a storage tank.

The laboratory was sealed off during the entire first decontamination procedure which was performed by the laboratory's volunteer staff with the assistance of a team of firefighters, specialized in the detection of radioactivity.

The contaminated surface had been marked while awaiting the in-depth decontamination (which was performed within a very short time) by a specialized company.

Radiological consequences

The cleaner underwent urine sampling whose results were negative.

The contaminated area was significant. Indeed, the liquid had infiltrated into the many cracks on the floor of the laboratory ; which made the decontamination more difficult.

Two maps of the contaminated premises, before the first decontamination and after the second decontamination were carried out. After the second decontamination, there remained a surface activity varying between 2 and 200 Bq/cm². The "hottest" spots being located at the position of the workbench feet and of the joints between the ground and the walls.

Lessons to be learned from the incident

This incident poses the problem of the storage of the long half-life radioisotopes used in research. The regulations required the storage of these radioisotopes in 30 L drums, stored in a marked location, before removal by a waste disposal contractor. Specific lessons include:

- The drum containing the solution of carbon-14 should have been clearly labelled, so as to be easily identifiable by all staff.

- Radioactive liquids should not be stored in the general laboratory, and should be handled by a limited number of people, trained in the related risks.
- This incident highlights the need to ensure that work surfaces are smooth and in good condition, including the floor and workbenches, in laboratories handling unsealed radioisotopes. In this incident, the poor surfaces did not allow for effective decontamination of the joints between the ground and the walls. Rounded and “ungrooved” baseboards would have allowed for better decontamination of the location.
- Any facility using unsealed radioisotopes should have a decontamination system (shower and eye-wash station) to deal with any staff contamination in the shortest possible time.
- It is necessary to recall that wearing individual personal protective protection (glasses, laboratory coat, gloves) should be worn by any individual working in a laboratory.
- Finally, we must not forget the other risks (biological, chemical) that laboratory waste can present.