Report from a French incident

Detached source with automated gamma NDT exposure equipment

Description of the incident

The incident occurred during gamma radiography using a projection container with automated exposure controls, at around 10:30 pm, on a construction site. When initiating an exposure, using a 9.8 TBq (260 Ci) iridum-192 source, the source did not extend fully and did not reach the collimator and its irradiation position. The sequence of events was as follows:

- Radiographer A uses the device for the first time in its new configuration. He docked the remote control block to the container, without realizing that the end of the Teleflex cable was not attached to the source (the operation is usually performed by the day team).
- After unlocking the projector, radiographer B attempted to expose the source by pressing the corresponding button.
- The source emerges from the container (a new generation device) but does not reach the irradiation position for exposing films, and the working position indicator does not activate on the control panel.
- B notes the anomaly and attempts to return the source by pressing on the push button provided for this purpose. The Teleflex cable goes into its sheath and the source remains in the projection tube – the non-return is indicated at the control box, and by the presence of significant dose rates.
- It is decided to manually reel in the Teleflex cable by removing the remote control.

A technical investigation has determined the following facts:

- After recovery of the source, and examination of the cable and source connections, no mechanical anomaly was determined that could have led to the separation of the cable and the source under the aforementioned operating conditions.
- The new remote control used enabled the coupling of the exposure mechanism to the container by freeing the rear safety support of the source holder in the storage position: the operator must have forgotten to connect this to the Teleflex cable.
- The new remote control was not submitted to the competent authorities for approval and was therefore not approved at the time of the incident.
- The operators were not aware of the instructions for using this new equipment and only brief training was offered to them on its use. Furthermore, the modification of the device was not accompanied by a user's guide, hence, the absence of any procedures.

There were two problems, independent of each other, which occurred:

- The remote control cable was not long enough to push the source holder to its working position. It is to be noted that it was a new, untested remote control device.
- There had been an uncoupling, between the cable and the source holder, in the projection tube.

This uncoupling may have occurred when hooking up of the device's remote control cable, or when the source was extended out of the container. Two possible reasons for the uncoupling are:

- The coupling ball is too small, the projection tube is constricted (e.g. too tight a curve), and the ball uncouples.
- The rear of the source holder unscrews. This would suggest a manufacturing defect (e.g. absence of a locking key). This could also occur during the recall of the source holder (which has occurred at least once).

Radiological Consequences

The radiation exposures received by the radiographers were very low - below 0.2 mSv.

This was a high activity radiography source, and the low doses received are a result of immediately recognising a fault and taking appropriate corrective actions.

Lessons to be learned from the incident

- The use of non-compliant or non-approved equipment should be prohibited.
- Instruction sheets should always be provided for equipment, and these should be updated whenever equipment is modified.
- Do not consider general radiation protection training as sufficient. Specific training on equipment should be provided, since a specialist should be aware of all the subtleties of the device, which may be unknown to others.
- Operators' ability to work with such equipment should be periodically verified, and refresher training sessions provided.