Report from a UK incident

Poorly maintained industrial radiography container – workers exposed

Description of the incident

During night-time site radiography in the boiler house of a power station a radiographer (A) slipped on a stairway whilst carrying the source container in one hand and a cardboard box of loose items in the other.

The source container housed a 65.2 GBq iridium-192 source and had the guide tubes connected to the container with the shutter-locking key left in the lock. A second radiographer (B) came to the aid of the first. He removed the guide tubes from the source container and placed them and the scattered items back in the box.

Two other persons (C and D) arrived on the scene to attend to the radiographer's injury. None of these people were wearing personal alarm dosemeters, although they had been available to the radiographers, who were wearing personal dosmeters.

When a third radiographer arrived 1.5 hours later to take over from the injured man (A) his personal alarm dosemeter sounded. Using radiation monitors they discovered that the source had slid out of the container in the fall and was now lying unshielded in the cardboard box. As a consequence of the incident, all four persons (A, B, C and D) had been exposed to the unshielded radiation source.

Investigations found that a very loose shutter mechanism and dust inside the source pigtail retaining mechanism undoubtedly contributed to the accident. The shutter-locking key was found to be bent and the lock in the unlocked position. The source container and associated equipment had not been examined for some time prior to the incident for signs of wear and damage. It was also concluded that the radiographers had not received specific instructions on the operating procedures for the equipment they were using.

Radiological consequences

Estimates of the doses received by the two radiographers (A and B) came from the personal dosemeters they were wearing at the time. The doses to C and D were calculated following a reconstruction of the incident. Fortunately, the source appears not to have been directly handled.

Worker	A	B	C	D
Whole body dose (mSv)	1.8	9.2	0.8	0.8
Skin dose (mSv)	0.0	11.3	–	–

Lessons learned

- Radiography source containers and guide tubes must be properly maintained and serviced in accordance with the manufacturer's recommendations. In addition, they must be regularly examined by the user for signs of wear and damage.

- Source containers should never be transported with the guide-tubes connected. The shutter mechanism must be locked closed and the key removed.

- When carrying source containers, care must be taken to reduce the risk of it being dropped; it is not advisable for a person carrying a source container to carry other bulky items. Site radiography may involve work in locations where access is difficult, for example where ladders have to be climbed. The working environment should be considered before the work starts – normally in consultation with the site owners. Where source containers have to be taken up ladders, etc. appropriate arrangements should be made to safely move the container to and from the required location.

- If the radiographers had been wearing personal dose rate alarms then they would have been immediately alerted to the exposed source. Alarm dosemeters should always be switched on whenever in the vicinity of a radiography source, **including** times when radiography is not being directly carried out such as during transport and setting up controlled areas.

- Radiographers must receive adequate instruction in the use of the equipment to ensure that safety procedures are followed.