



Deterministic injuries to radiographers hand

Description of the incident

An industrial radiographer placed his fingers over the window of an X-ray tube operating at 160 kV, not realising that it was generating X-rays. His fingers were exposed to the primary beam for about 7–10 seconds before a colleague noticed that the X-ray set was switched on and they were able to isolate it from the power supply.

Several days later the radiographer suffered blistering to the skin of his fingers. The incident happened because the radiographer, who was an appointed Radiation Protection Supervisor, did not follow local rules including the need to isolate the X-ray set after each exposure and to use a radiation dose rate monitor on entering the controlled area. However, important contributing factors were:

1. the pre-exposure warning signal was practically inaudible because it had been taped over to reduce the noise level,
2. the visual exposure duration warning signal has failed at some time.

Both of these suggest that adequate checks were not being carried out on the functioning of these warning devices, and the system whereby radiographers were expected to report defects was not followed. The company carried out yearly maintenance of the equipment but apparently performed no other checks. A senior RPS did visit site occasionally, but appears not to have monitored working practices.



An example of a radiographer setting up an industrial x-ray set

Radiological consequences

It was estimated by tissue biopsy that the radiographer received approximately 60 Sv to the hands.

Lessons learned

1. Periodic checks of warning devices and safety devices are necessary to ensure that these remain operational. Also, management must have suitable means for monitoring working procedures to make sure these remain consistent with local rules.
2. Even where there are installed safety systems, there is a need for monitoring. The wearing of a personal radiation alarm monitor and/or the use of a portable radiation monitor could have prevented this incident.
3. Regular communications from management, together with refresher training where necessary, should be used to help radiographers understand the potential radiation hazard and the importance of complying with the local rules.

Similar incidents

A less serious incident occurred when a radiographer received an overexposure due to the failure of automated windout system. The 1.1 TBq iridium-192 source was left in an unshielded position but this went un-noticed and the radiographer was exposed to 43 mSv whole body/51 mSv skin dose.

In this case there were a number of procedural failures, such as:

1. The automated windout system did not operate correctly and the source was left in an unshielded position between the collimator and the source container. Warning lights indicated a fault condition, but this was not seen or acted on by staff.
2. The radiation monitor used on entry to the compound had flat batteries so the presence of gamma radiation was not detected.
3. The radiographer was not wearing a personal alarm dosimeter which would have provided an indication that an area of high dose rate had been entered.