

## STUDY CASE N° 4: INCIDENT IN INDUSTRIAL RADIOGRAPHY

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### □ Description of the incident<sup>1</sup>

One type of industrial radiography exposure equipment uses a pneumatic system to transfer the radioactive source from the shielded container to the exposure position. These systems are installed in purpose built radiography facilities with interlocks on the access doors that are linked to installed gamma alarm monitors. Over a two-year period two very similar incidents occurred in the same facility. They involved an iridium-192 source of about 7 TBq giving a dose rate of approximately  $0.9 \text{ Sv}\cdot\text{h}^{-1}$  at 1 m. In both incidents the source became stuck in the pneumatic exposure tube. In the first incident the end cap of the tube had been slightly deformed due to repeated impact from the source and it eventually jammed the source when it was exposed. It was noted that there was a lack of routine maintenance. In the second incident a piece of metal swarf in the tube jammed the source. In both incidents the safety systems worked and prevented uncontrolled access. At this point it is worth comparing how the sources were actually recovered and the safety culture that would have been applied in the nuclear industry. In the latter case there would have been detailed planning, written procedures would have been produced, portable shielding used and probably some sophisticated handling equipment made available. In reality the source recoveries were treated as simple engineering problems that needed to be resolved quickly but with only limited consideration of radiation protection aspects. Long handling tongs were used to ensure the hand doses were not excessive, but control of the whole body doses was less successful; the doses being 29 and 40 mSv from the first incident and 16 and 52 mSv from the second incident.

### □ Lessons learned

- 1) Routine inspections of equipment before use and a programme of routine maintenance can significantly reduce the probability of sources becoming stuck in an exposed position.
- 2) The incidents display the value of installed safety systems, including a gamma alarm monitor interlocked to access routes. Without these, such incidents would have probably resulted in radiation burns and possibly fatalities.
- 3) The design of the facility and equipment should have taken into account means for the recovery of a source that is stuck or cannot be returned by the normal means. For example after the second incident a mechanical means of pushing the source back to the shielded position, that could be operated from outside the facility, was installed.
- 4) The planning of source recoveries is essential to implementing ALARA. Industrial radiography could benefit from learning from the safety culture of the nuclear industry.

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<sup>1</sup> Incident taken from IRID (Ionising Radiations Incident Database)