



## Industrial radiography guide tube damaged during use led to high exposure

### Description of the incident

Night-time radiography work was being carried out using a 370 GBq iridium-192 source in a remote exposure container when the wind blew a steel bar over on to the guide tube. The source was in the exposed position at the time and the bar slightly crushed the tube from the shielded container such that when retraction of the source was attempted, the source became lodged near the crushed section. One of the radiographers received a radiation overdose during a badly executed recovery of the source. The radiographer attempted to reshape the guide tube by lightly hammering the flattened section until the source could be withdrawn into the shielded container.

A bag of lead shot was used to try to shield the source during the hammering, but unfortunately this was incorrectly positioned and had little or no effect in reducing dose rates. The recovery operation is alleged to have taken less than five minutes although the subsequent investigation casts some doubt on this.

The incident was not reported at the time and only came to light following the routine assessment of the radiographer's dosimeter. The whole recovery operation was ill-conceived and demonstrated a lack of contingency planning and understanding of the situation.

### Radiological consequences

The doses recorded on the radiographer's TLD were:

Whole body:	370 mSv
Skin:	2660 mSv

Chromosome aberration analysis of a blood sample gave an estimated whole body dose of:

130 mSv (95% confidence interval 20–340 mSv)

The investigation concluded that the TLD doses should remain on the dose record. No reliable assessment of his hand dose could be made, but it was almost certainly much greater than the whole body dose.

### Lessons learned

1. Attempts to forcibly retract a stuck source through a crushed guide tube will, almost inevitably, result in the worst possible situation, with the unshielded source becoming lodged at the damaged part of the tube.
2. The recommended recovery option at this point is to CLEARLY IDENTIFY the position of the stuck source, apply local shielding, then cut out the portion of the guide tube containing the source and deposit it in a suitably shielded emergency container.
3. Contingency plans should require the presence of a suitable emergency container on site, together with long handled tools, as the lack of access to such a container will

severely limit the safe recovery options. These plans should be rehearsed so radiographers are practised in the necessary procedures if an emergency should arise.

4. Instruction and training of radiographers and others who work with powerful sources should make clear the hazard of the very high dose rates present at small distances from the source and the need to avoid close contact with such a source.



**An example of a radiographer rehearsing the recovery of a source in a typical working situation**



**An example of an industrial radiographer checking his emergency kit. Long tongs, lead shielding, bolt cutters and a spare container should always be carried**