



Report from a UK incident

## Scrap metal with radioactive contamination - 3 examples

### Description of the incidents

There have been many reported cases of radioactivity being detected in scrap metal. A small but significant number of cases have involved high activity “orphan” sources, and have had very serious radiological consequences. Given below is a small selection of incidents involving lower activity/contamination levels, which occur much more frequently.

1. A consignment of scrap stainless steel pipes triggered a radiation detector at a recycling plant. The pipes were subsequently found to be contaminated, mainly internally, by a thin layer of radioactive scale, arising from a mineral processing plant. The scale (consisting of radium-226 and radium-228 plus daughter products) was formed when minerals containing natural uranium or thorium were being processed chemically in a slurry form.

Dose rates were generally less than 5  $\mu\text{Sv/h}$ , although up to 500  $\mu\text{Sv/h}$  was measured in one location. The consignment was returned to the suppliers.

2. Radioactivity was detected in an imported consignment of scrap copper-nickel – but only after the material had been processed. The final product was not found to contain any radioactive material, but by-products were found to be contaminated with caesium-137 and caesium-134, as was the storage area.

Dose rates around the by-product materials were generally less than 0.5  $\mu\text{Sv/h}$ . The waste materials were disposed of to authorised landfill sites at significant cost.

3. A foreign consignment of scrap metal activated a drive-through radiation detector system installed at the entrance to a scrap metal trader. Using a hand-held radiation monitor, the owner identified five contaminated articles, and sought assistance from the **Radiation Protection Expert**. Analysis of samples of the loose contamination from the articles indicated the presence of uranium-238 at an activity concentration of 80 Bq/g.

Contact dose rates were up to 70  $\mu\text{Sv/h}$ . The five pieces were segregated, bagged and labelled, and disposed of via an authorised route. .

### Radiological consequences

In all these incidents the exposure of employees at the sites where the radioactivity was detected is estimated to be very low. Although localised dose rates were relatively high in some incidents, the time spent in close contact with the contaminated items was very low.

It is quite likely that employees of the suppliers (ie who were not aware of the radioactivity) could have received more significant doses, especially where items such as steel pipes were cut into smaller pieces prior to shipping.

**Lessons Learned**

- The benefits of radiation detectors at metal recycling facilities are now widely recognised. There are a range of sources of radioactivity that could potentially be present in scrap metal, with enhanced levels of natural radioactivity (eg in NORM scale) being relatively common.
- These incidents highlight the importance of the early detection of radioactivity (ideally upon arrival) – to minimise the radiation exposure of employees, and to prevent the inadvertent processing of contaminated material.
- It is important to have procedures in place for separating, storing, and returning or disposing of contaminated materials. Scrap and recycling companies should also have access to specialist radiation protection advice.