



Strål
säkerhets
myndigheten

Swedish Radiation Safety Authority

Experience in Sweden

Management of incidents with contaminated scrap metal

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Outline of presentation

- ➔ Monitoring at steel mills and scrap yards
- ➔ Incidents with melted radiation sources
- ➔ Radioactive material found at scrap yards
- ➔ Imported contaminated steel products
- ➔ Lessons learned

Monitoring at steel mills and scrap yards

- Joint cooperation – to secure that all radioactive material is detected before it enters any processing equipment
- All shipments of scrap metal to the steel industry must be free from radioactive material (scrap specifications)
- Monitoring equipment: ~40 portal monitors. Numerous hand-held detectors
- Guidelines on monitoring (1996) → documented routines
- Provide education and information for employees
- Steal heats, off-gas dust and slag are analyzed for radionuclides

Joint insurance

- In case of failing to detect a radioactive source, the steel and recycling industry has a joint insurance.
- Valid for incidents with contaminated scrap metal not detected by the companies' monitoring systems, and where the material thus enters any processing equipment (e.g. shredders or melt down furnaces).
- Covers direct clean up costs, loss of production, indirect clean up and damage costs claimed by third party, personal injury for employees and claims from third party.

Incidents with melted radiation sources (1/3)

- 1996 – 100 MBq Co-60 source contaminated 150 tonnes of steel (0.7 Bq/g)
- 1998 – 9 GBq Ir-192 source contaminated 100 tonnes of steel (90 Bq/g)
- Contaminated material immediately put aside
- Monitoring on site by the authorities
- No harmful consequences to humans or the environment
- Unknown origin of the sources
- Recommendation: to keep the material on site to allow for decaying

Incidents with melted radiation sources (2/3)

- 2001 – 80 MBq Am-241 source contaminated in total 10 tonnes of slag (11 Bq/g and 5 Bq/g)
- 2005 – 10–20 MBq Am-241 source contaminated 10 tonnes of slag (1-1.5 Bq/g)
- 2005 – 1.5 GBq Am-241 source contaminated 5 tonnes of slag (300 Bq/g) and 5 tonnes of off-gas dust (5 Bq/g)
- Contaminated material immediately put aside
- Monitoring on site by the authorities, monitoring for internal dose (1.5 GBq source)
- No harmful consequences to humans or the environment

Incidents with melted radiation sources (3/3)

- It has not been possible to establish the origin of any of the three Am-241 sources
- The contaminated material is still kept at the three sites, awaiting decision on final storage

Radioactive material found at scrap yards

- A few examples: Airplane instrument panels, laboratory balances, smoke alarms, jet engines, NORM (scale)
- Voluntary reporting of found radioactive material
- If the owner is unknown – responsibility of the scrap yard operator
- Can apply for money from the authorities to finance the costs for the final disposal of the material
- Uncertainty whether all found contaminated material can be managed and finally disposed of
- Contaminated material is stored at the scrap suppliers

Imported contaminated steel products (1/2)

- October 2008 - a company trading in products for oil and offshore industry warned by their shipping agent
- Steel flanges imported from India might be radioactively contaminated
- Monitoring team confirmed Co-60 the same day
- Less than a dozen items, dose rate 4–5 microsievert per hour, specific activity < 40 Bq/g.
- All other potentially affected companies were tracked down by the authorities and their products monitored
- A few contaminated products were found at one other company

Imported contaminated steel products (2/2)

- ➔ Information from France on Co-60 contaminated push-buttons for elevators with Indian origin, made the authorities send out the monitoring teams again, no contaminated push-buttons were found
- ➔ The authorities decided that all contaminated products should be sent back to the supplier abroad
- ➔ The Customs have listed five foreign companies that might ship products coming from the Indian firm in order to avoid further import of contaminated goods

Lessons learned

- ➔ An efficient national reporting system needs to be developed
- ➔ Information and guidance to activities normally not involving radiation needed
- ➔ Some sort of surveillance of the Swedish border is needed
- ➔ Exchange of information between countries needs to be improved