



Authority for Nuclear Safety and  
Radiation Protection



## Security of radioactive material and metal recycling in The Netherlands

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# Risk analysis of metal recycling in The Netherlands

## Graded approach

- radiation risk to workers, in transport, and to population
- size & capabilities of companies, incl. pyramid effect

## Equivalent quantities of scrap containing radioactivity

- 20,000 tons ferro
- 1,000 tons aluminium
- 500 tons stainless steel

## Major types of contamination in stainless steel

- NORM, source holders, instruments (aviation), flow meters
- occasionally sources, lightning conductors (Ra-226, Am-241)



## Since 2003 new regulation of metal recycling

### Prevention of contamination in metal cycle

- public & political attention after incidents
  - measures for safety & radiation protection (security secondary)
- metal recycling companies obligation to detect
  - portal monitors, crane detectors
  - investment cost & operations cost (including remediation; disposal at national central waste repository COVRA)
- in case of alarm: report immediately to regulator (ANVS)
  - results of portal measurements (and, if available, results from hand held detection on outside of cargo)
  - details origin of shipment
  - type of cargo
- ANVS interpretes report and may issue instructions







## Stainless steel recycling in The Netherlands

### Lower end of trade pyramid: scrap metal collection

- some 100 small collectors (incl. transborder trade)
- portal detectors (road), crane detectors (ports)
- localisation within cargo is allowed, but not separation
- some 200 reports/y

### Top of trade pyramid: (high value) stainless steel

- two major traders (each > 250,000 t/y in Rotterdam)
- large portal detectors (8 plates each), crane detectors
- after separation, repeated check: elimination of contamination
- some 150 – 200 reports/y
- large suppliers often well informed & supply clean scrap





## Principles for regulation and enforcement

### Sources within The Netherlands: prevent

- unused radioactive sources are collected and sent to COVRA

### Radioactive material in metal scrap in The NL

- companies are responsible for detection (self regulation)
- detection is 1<sup>st</sup> step proper handling & elimination by experts
- two large companies hold license for separation & disposal
- financial drivers strengthen awareness & the system
- CAVE: level playing field AND safety/security risks

### Metal scrap coming from outside of The Netherlands

- requirement for international cooperation (cf. recent incidents)



## 2014 Integrated Regulatory Review Service in The NL

### A good practice in metal scrap handling

“The specific and comprehensive regulatory provisions in place allow for effective control of contaminated scrap metal and safe management of the contaminated material”







## Recent incidents with orphan radioactive sources

### Nine highly active Co-60 sources

- in containers with scrap stainless steel
- shipped from a country in Africa to Rotterdam
- on three occasions (November 2018 – March 2019)
- similar incident in port of Hamburg, Germany (one source)
- reported to USIE, ECURIE, ITDB and INES
- IAEA: no similar sources reported over the past ten years
- source geometry matches irradiator geometry (several dozens, up to 100 – 200 source bars)
- concerns that other sources may still circulate





## Three sources found in Rotterdam, January 28, 2019



Dimensions: 10 cm long and diameter approximately 1.5 cm;  
total activity  $\sim 25$  GBq per source





## Follow up after the incidents

### International cooperation with IAEA

- Germany, the Netherlands and country of shipment
  - establish origin of sources
  - bring potential other sources under regulatory control
- country of shipment requested IAEA assistance mission
  - review of regulatory framework
  - detection capabilities
  - strategies to prevent future contamination



## Requirement for international technical cooperation

### IAEA to improve radiation safety and security

- conduct network analysis of suppliers, traders and melters
- stimulate coalition of willing member states
- exchange good practices and perform advisory missions
  - regulatory framework
  - radiological and illicit trafficking detection
  - inspection strategies
  - international reporting
- follow up the 2019 Nuclear and Radiation Safety Resolution
  - assist member states with orphan sources
- re-open discussion on Metal Recycling Code of Conduct

