Search for Non-registered Radioactive Sources - an Important Part of the National Inspection Programme

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Introduction

- The non-registered sources pose a threat because as a rule no safety measures are in place when handling them.

As a rule labelling of a source is missing.

- Sources outside the regulatory control can be easily lost or abandoned.
- Such sources can be

  - transferred, melted or destroyed,

  - used in malevolent acts.

Introduction

- The non-registered sources can cause
  - exposure to human beings
  - contamination of the environment
  - huge financial burden, e.g. related to emergency preparedness, restoration in a case of an accident.

- Events concerning non-registered sources are reported on daily bases.

  An example:

  In the IAEA Illicit Trafficking Database more than 2160 reported events exist from the period 1993-2011 (December 2011).

  http://www-ns.iaea.org/security/itdb.asp

Introduction

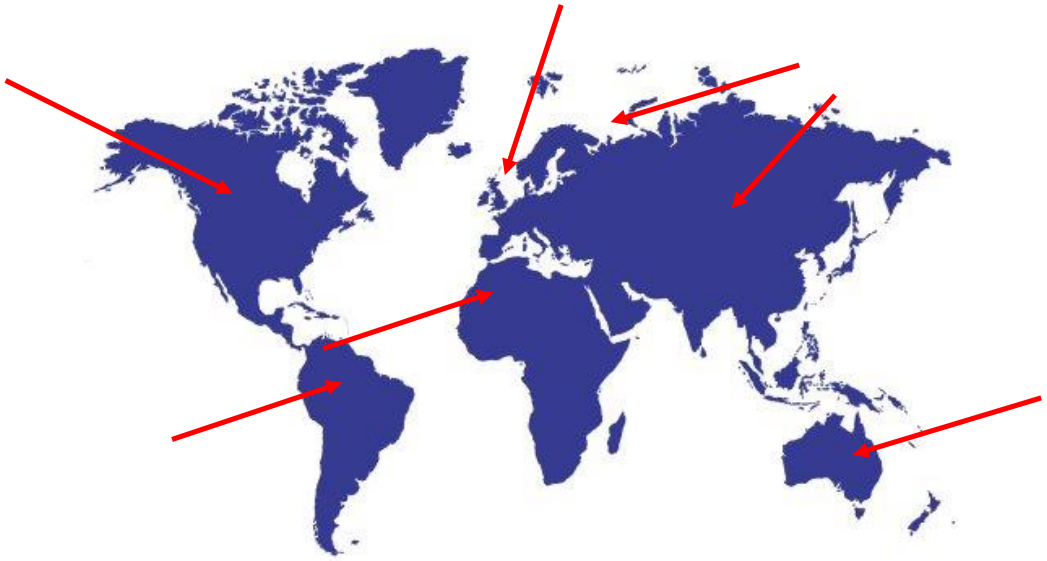
- International and national programmes focused on prevention of non-registered sources started more than a decade ago.
- The combat resulted in extensive programs.

- Examples:

- EU HASS directive (Control of High-activity Sealed Radioactive Sources and Orphan Sources, Directive 2003/122/Euratom)
- IAEA, Non-binding Instrument on the Transboundary Movement of Scrap Metal that may Inadvertently Contain Radioactive Material (under preparation, 2012)
- Decree on Checking the Radioactivity of Shipments of Scrap Metal (Slovenia, 2007)

Introduction

- Non-registered sources are related to
  - control of state borders and
  - "nuclear legacy", i.e. sources used in past activities.
- "Nuclear legacy" is present in many countries.
- A lack of user´s knowledge is very often present.



Search for Non-registered Sources

- The inspection department of the SNSA conducted the extensive campaign in order to find all non-registered sources in the state.
- Around 100 inspections were performed in the period 2004 - 2010.

Type of Institution	No. of Inspections
Research institutions	43
Educational institutions	21
Defence and civil protection institutions	19
Museum collections	8

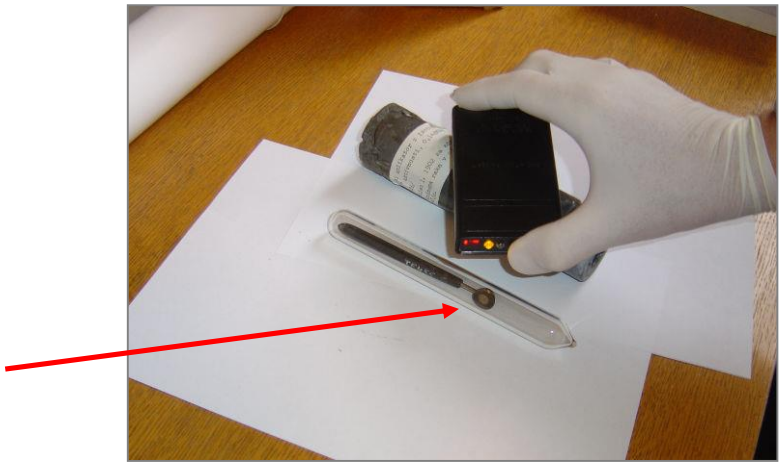
The majority of inspections were related to research institutions where handling of non-registered sources was a practice for decades.

Search for Non-registered Sources

- Around thousand of various sources or radioactive waste items were identified.
  - A whole spectrum of well known radioisotopes was identified from ^{3}H to uranium compounds of very different radio-toxicities ranging from the group I to the group V.
  - The physical state of sources or waste included all possible states, i.e. solid, liquid or gaseous. Contamination was identified during some of inspections.
- Furthermore, in some institutions inspected an accumulation of sources was identified, e.g. in the storage of the military facility.
- Some of the man-made non-registered sources identified are not available on the market today.
  - The full information regarding the non-registered sources was very seldom available.

Typical Non-registered Sources

Abandoned non-registered source used in medicine



The oldest man-made source used in Slovenia was ^{226}Ra source of 0.15 MBq produced in 1902 and used in ophthalmology. Later it was lost for decades. In 2007 it was found in an abandoned storage during the SNSA inspection programme of finding non-registered sources in the state.

Typical Non-registered Sources

Uranium compounds used in research or analysis

Uranium compounds found at the research institute (left) as well as a new shielded non-registered source identified at an inspection of a research laboratory (right).

Typical Non-registered Sources

Abandoned non-registered sources used in educational institution

Unconventional non-registered sources of unknown origin identified at the faculty of physics which were not used for years (left). An abandoned LSC used at the faculty of medicine in the past which includes ^{226}Ra (right).

Typical Non-registered Sources

Non-registered sources used in military institutions

Two types of non-registered sources, namely ^{226}Ra radioactive paint used in an old instrument causing a dose rate more than 9 μSv/h (left) and a new instrument with 6 MBq ^{241}Am installed in a ChemPro gas analyser (right).

Typical Non-registered Sources

Abandoned non-registered sources used in military institutions

A typical old military item with non-registered ^{226}Ra source inside it. No label related to radioactivity was used at the time the equipment was acquired.

Typical Non-registered Sources

Non-registered items in museum collections

A small part of non-registered radioactive minerals at the faculty of natural science (left), radium emanator produced before the Second World War (right, photo customs 2011).

Conclusion

- Strict control of all radiation sources and radioactive waste in the state is one of the main tasks of the regulatory authority.
- Control of is a comprehensive task due to the fact that very often numerous applications disappear with time and new emerge.
- Each country is responsible to identify sources which can pose a threat on its territory as well as outside it.
- A focused state campaign in order to identify all non-registered sources is a first step in order to clean the territory of a state and to put the safety measures in place.