



Atomic detectives

Combating illicit trafficking in nuclear materials and associated environmental issues led to the development of a new discipline: nuclear forensic science. The European Commission's Joint Research Centre (JRC) is a key contributor to European efforts in this field. Recognised as a centre of excellence by national and international policing bodies, the JRC has developed various methods that allow identification of the origin of intercepted material and the probable intended application. This needs to be done in a prompt manner, thus first results can be delivered to the appropriate authorities within 24 hours of a sample arriving at the JRC.

The JRC undertakes many tasks in the fight against illicit nuclear trafficking. It identifies the nature of seized materials and assesses the immediate associated risks. In addition, it determines the original source of a sample and offers an opinion on the probable intended use. The JRC also maintains an extensive database of commercial nuclear materials, together with

information on seized illicit materials. Experts at the JRC Institute of Transuranium Elements (ITU) in Karlsruhe, Germany develop and use a wide range of forensic science methods to address areas of concern related to illegal handling of nuclear materials and accidentally released nuclear materials.

Numerous successes

Since 1992 over 30 cases of seized nuclear materials have been analysed at ITU.

In 2003 radioactive material was detected in a scrap metal shipment in Rotterdam Harbour, The Netherlands. ITU was able to identify the material being an intermediate product from uranium processing, so-called "yellow cake" and likely originating from the Middle East.

Another case of radioactive scrap metal appeared in 2006, when a piece of metal contaminated with highly enriched uranium was found in Henningsdorf, Germany. The investigations were able to reveal the intended use (research reactor fuel) and origin (Russia) of the material.

As these two cases clearly indicate, the trade of contaminated scrap metal is a relevant current problem in illicit trafficking.

In 2007 ITU received 14 uranium pellets that had been hidden in a garden in Lauenförde, Germany. An unambiguous source attribution (Hanau in Germany) was obtained based on the comparison of the analysis results and the information in the nuclear materials database.

ITU has also examined small radioactive 'hotspots' about 1 mm in size that are occasionally discovered on the seabed and the beaches around Dounreay in Scotland – site of three reactors now being decommissioned by the UK Atomic Energy Authority. ITU showed the particles were an aluminium-uranium matrix fuel used in a materials test reactor at the nuclear facility and they were dated to originate from 1960's.

International collaboration

ITU is co-chairing the International Technical Working Group (ITWG) on Nuclear Smuggling. ITWG is a forum for experts combining different domains, including regulatory authorities, law enforcement and research institutes.

Together with the ITWG a Model Action Plan was developed for dealing with seized nuclear materials.

The concept of the Model Action Plan was taken over by the IAEA and put on a broader basis to serve as a framework for developing national response plans. This has been tested in several demonstration exercises involving security services, custom officers, nuclear expert centres and a high political representation at the borders of new EU member states.

Of necessity, the JRC maintains close contacts with national and international law enforcement and customs agencies. ITU is recognized as a centre of excellence by Europol, keeps close contacts with Interpol and works closely with the German federal criminal police (BKA) and the Federal Ministry for Environment (BMU), seeking to correlate standard forensic procedures with the special requirements of the nuclear scientist. Taking fingerprints from radioactively contaminated items is a challenge which was addressed jointly with the BKA, resulting in the design and construction of a dedicated glove-box.

For more than a decade JRC has been cooperating with Russia in the area of safeguards and nuclear forensics in the framework of the TACIS programme. Lately, the cooperation was broadened to cover also other former Soviet Union Countries, including Ukraine, Georgia, Moldova and Azerbaijan. This multi-country project involves advice and training, as well as the supply of appropriate equipment.

The vast experience acquired from the seized material analysis and response activities is exploited in organising training courses. ITU has elaborated a comprehensive training scheme for first responders, measurement expert support teams and nuclear forensic experts comprising practical and table-top exercises.

With these efforts, ITU contributes to enhanced nuclear security and to an improved security of the European Citizen in general.

Contact

Gabriele Tamborini
 Press and Public Relations
 European Commission -Joint Research Centre
 Institute for Transuranium Elements
 Postbox 2340
 76125 Karlsruhe, Germany
 Tel.: +49 7247 951 275
 Fax: +49 7247 951 591
 E-mail: gabriele.tamborini@ec.europa.eu

Web: <http://itu.jrc.ec.europa.eu>