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EU efforts to strengthen nuclear security

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Executive summary

Nuclear safety and security have always been absolute priorities for the European Union (EU). Historically, the EU Member States have identified these topics to be the cornerstone of all the Euratom work programmes since its establishment in 1958. The recent nuclear accident at Fukushima in 2011 has brought nuclear energy into the public spotlight and has triggered worldwide new activities in the area of nuclear safety, nuclear security and emergency preparedness.

In view of the upcoming 2014 Nuclear Security Summit in The Hague, the present Staff Working Document describes recent EU achievements and priorities in the above fields, in particular the main developments since 2012. In 2012, a Staff Working Document has been published at the occasion of the Seoul Nuclear Security Summit 2012¹.

The Euratom Treaty is the basis of the EU engagement in nuclear safety and security. Through Euratom, the EU operates an effective regional nuclear safeguards system, implementing inspections, reporting and providing technical and scientific support to its Member States in close partnership with the International Atomic Energy Agency (IAEA). This resulted in reaching full compliance with the Additional Protocols to Safeguard Agreements with the IAEA and in achieving integrated safeguards in all EU Non-Nuclear Weapon States having significant nuclear activities.

The Euratom Treaty can be used as a model of excellence by other regions worldwide interested in applying the concept of "neighbours checking neighbours". At the same time, the EU implements a system of assurance of supply through its Euratom Supply Agency. This model inspired the recent

¹ "EU efforts to strengthen nuclear security" Joint Staff Working Document SWD(2012)70 final

development of the "multilateral nuclear approach" concept.

The EU Common Foreign Security Policy, the European Security Strategy (2003), the EU Strategy Against Proliferation of Weapons of Mass Destruction (WMD), the EU Counter Terrorism Strategy (2005) and the New Lines for Action in Combating the Proliferation of WMD and their Delivery Systems endorsed in 2008, all together reinforce the EU commitment to nuclear security. In line with the Resolution 1540 of the United Nations Security Council (UNSCR 1540)² and its WMD strategy, the EU requires the insertion of non-proliferation clauses in all its agreements with third countries. The accession of Euratom to the amended Convention on the Physical Protection of Nuclear Material (CPPNM)³ was approved by the Council in 2007, and ratification is expected to be completed soon by all Member States and Euratom.

In the area of combating illicit trafficking of nuclear and radiological materials, significant progress has been made in recent years, both through the implementation of an EU-internal action plan on chemical, biological, radiological and nuclear security⁴ and by outreach activities of the EU under its Instrument for Pre-Accession, Instrument of Nuclear Safety Cooperation, and Instrument for Stability under the recently created CBRN Centres of

² See <http://www.un.org/sc/1540/>

³ See <http://www.iaea.org/Publications/Documents/Conventions/cppnm.html>

⁴ Communication from the Commission to the European Parliament and the Council on Strengthening Chemical, Biological, Radiological and Nuclear Security in the European Union – an EU CBRN Action Plan - COM(2009) 273 final (24.6.2009)

Excellence⁵. These activities are in line with the recent conclusions of the IAEA Conference⁶.

The EU has developed particular expertise in forensic analysis of nuclear and radioactive materials, and implemented training programmes for first front-line responders and national experts in the detection and identification of nuclear materials. Special mention should be made on the EU-US collaboration in the areas of testing and validation of detection equipment (ITRAP +10 project), the enhancement of border security and related training efforts through the Border Monitoring Working Group (BMWG) and the progress in the area of nuclear forensics, including the Nuclear Forensics International Technical Working Group (ITWG).

Export control of dual use items is indirectly related to nuclear security in the sense that it contributes to non-proliferation of nuclear weapons and their means of delivery. The EU has continued to develop its common regulatory framework, in the form of its *EU Dual Use Regulation*⁷, and to enhance its implementation.

The EU supports the international dimension of nuclear security through enhanced co-operation with the IAEA, and continues its support to the G8 Global Partnership programmes, as well as the implementation of the UNSCR 1540. The EU contributes actively to the Global Initiative to Combat Nuclear Terrorism (GICNT), including the working groups of the Implementation Assessment Group. Cooperation in the field of nuclear

security has also been enhanced with our major partners.

Following the Fukushima Nuclear Accident in 2011, the European Council underlined the need to fully draw the possible lessons to be learned from it⁸. The EU has therefore launched a comprehensive reassessment programme (called "stress tests") of all of its nuclear power reactors to ensure that they are not at risk from similar extreme events. The EU stress tests have both a safety and a security track⁹. The assessments were carried out between 2011 and 2012 in the Member States that operate nuclear power plants and also, on voluntary basis, in EU neighbouring countries operating, owning or planning to build nuclear power plants. The output from these stress tests yielded important lessons in the prevention and management of these types of severe accidents and all countries committed to an action plan to implement upgrading measures in the domain of both nuclear safety and nuclear security. Consequently, the EU nuclear safety directive of 2009¹⁰ is currently being discussed in the EU Council, in view of its amendment to include improvements in: independence of national regulators; nuclear safety objectives; topical peer reviews; transparency; and provisions for on-site emergency preparedness and response.

Synergies between safety and security applicable to existing installations are possible

⁵ See <http://www.cbrn-coe.eu/>

⁶ International Conference on Nuclear Security: Enhancing Global Efforts; Vienna, Austria, 1–5 July 2013

⁷ Council Regulation (EC) No 428/2009 of 5 May 2009 setting up a Community regime for the control of exports, transfer, brokering and transit of dual-use items (OJ L 2009:134/1)

⁸ Conclusions of the European Council (24/25 March 2011) - EUCO 10/1/11 REV 1 (http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/ec/120296.pdf)

⁹ See for instance the Communication from the Commission to the European Parliament and the Council on the interim report on the comprehensive risk and safety assessments ("stress tests") of nuclear power plants in the European Union - COM(2011) 784 final (24.11.2011)

¹⁰ Council Directive 2009/71/Euratom of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations (OJ L 2009:172/18)

in particular in the area of emergency preparedness and risk mitigation. Currently, this activity is focused on assessment techniques. For future installations, it will be important to address safety and security concerns from the start, at conception and design phase to provide robust response to both types of threats.

A specific topic, already faced in nuclear safety, that received significant attention during the stress tests, due to the potential severity of its effects, was the impact of aircraft crashes on nuclear installations; a specific workshop on this issue was held in 2012.

The Euratom Treaty addresses the need to protect the health of workers and the general public against the dangers arising from ionizing radiations with a comprehensive set of directives, regulations, recommendations and decisions. The new revised EU Basic Safety Standards¹¹ will consolidate five existing EU Directives, including the High-Activity Sealed Sources (HASS) Directive. The aim is to align the EU HASS provisions with the IAEA Code of Conduct, particularly in what concerns to the EU definition of high-activity sealed sources to be harmonized with the IAEA source categorization system. In addition the new Directive includes requirements concerning the management of orphan sources and scrap metal contamination situations.

In the area of emergency preparedness the EU continues to rely upon its information exchange and reporting mechanisms -- European Community Urgent Radiological Information Exchange (ECURIE) and European Radiological Data Exchange Platform (EURDEP) -- The data standards developed for EURDEP have been taken over

¹¹ Council Directive 2013/59/EURATOM of laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom

by IAEA to now serve as worldwide reporting mechanisms.

The Union Civil Protection Mechanism¹² continues to facilitate the expression of practical European solidarity towards countries affected by a disaster overwhelming their response capacity, including radiological and a nuclear incidents. Reinforced in December 2013, the Mechanism now involves the Emergency Response Coordination Centre (ERCC) and the European Emergency Response Capacity (EERC) which can effectively contribute to supporting increased preparedness at European level as regards consequence management of radiological incidents or nuclear accidents.

Recognizing this progress, the EU continues to strive for further enhancing nuclear security and this report serves to illustrate this commitment¹³.

¹² Decision No 1313/2013/EU of the European Parliament and of the Council of 17 December 2013 on a Union Civil Protection Mechanism (OJ L 347, 20.12.2013, p. 924).

¹³ Commission proposal for a Council Regulation laying down maximum permitted levels of radioactive contamination of food and feed following a nuclear accident or any other case of radiological emergency, COM (2013) 943 final adopted on 10.01.2014.

Nuclear security inside Europe

EU nuclear fuel cycle and the implementation of the Euratom Treaty

In the EU, the nuclear fuel cycle is fully represented. The nuclear facilities and their related activities, the stocks of nuclear materials and advanced technology represent an important task for the full implementation of security, including safeguards. The EU is unique in the world because:

- The EU has its own supranational safeguards system based on Chapter 7 of the Euratom Treaty which entrusts the European Commission, the executive body of the EU, with the responsibility to verify the management of nuclear materials and special fissile materials, including fully independent inspection capabilities. Euratom Safeguards are fully implemented in both EU Non-Nuclear Weapon States (NNWS) and EU Nuclear Weapon States (NWS), which co-exist in the Union.
- A number of nuclear cooperation agreements between Euratom and third states such as the USA, Canada, Japan and Australia cover the supply of nuclear materials and fuel cycle services, whilst ensuring that the supplies are covered by adequate safeguards, export controls and security measures.

Verification agreements have been established with the IAEA (INFCIRC/193 for all EU NNWS, INFCIRC/263 for the UK and INFCIRC/290 for France), allowing the IAEA to verify that all EU Member States comply with their commitments as contracting party to the Non-Proliferation Treaty.

- There is an independent Euratom Supply Agency.
- The EU has an extensive research and development programme that contributes to nuclear safeguards and nuclear security.

EU efforts related to research and development (R&D) in safeguards have been instrumental in fostering technological advances which have led to an increase in the effectiveness and efficiency of safeguards activities, in particular in reprocessing, mixed-oxide (MOX) fuel fabrication, gas centrifuge enrichment plants, and more recently also in final repositories for spent nuclear fuel. The EU was the first area in the world where such facilities have been commercially exploited and thus brought under Euratom Safeguards. This has led to the development of safeguards approaches specifically adapted to the concerned facilities. These safeguards approaches have been the basis for the implementation of international safeguards in similar facilities outside the EU. Close cooperation between the IAEA and Euratom Safeguards services within the European Commission have allowed the development and transfer of technology and methods (see below Chapter on EC support to IAEA – EC-SP).

Finally, it is important to mention the synergies between supervised systems of *nuclear material accounting and control (NMAC)* and nuclear security. The Euratom safeguards system supervises all the EU nuclear operators' NMAC providing a valuable assurance which complements nuclear security measures such as physical protection.

The EU chemical, biological, radiological and nuclear (CBRN) Action Plan

The EU CBRN Action Plan was adopted in December 2009 and aims to strengthen CBRN security throughout the EU. Based on an all-hazard approach, the Action Plan's overall goal is to reduce the threat of, and the potential damage from, CBRN incidents of accidental, natural and malevolent origin, including terrorist acts. The Action Plan contributes to the implementation of the EU Counter Terrorism Strategy.

The Action Plan provides for three main areas of CBRN security work:

- Prevention: ensuring that unauthorized access to CBRN materials of concern is as difficult as possible;
- Detection: having the capability to detect CBRN materials in order to prevent or respond to CBRN incidents;
- Preparedness and response: being able to efficiently respond to incidents involving CBRN materials and recover from them as quickly as possible.

A total of 124 actions are to be implemented by the EU Member States and the EU Institutions by the end of 2015. In addition to 25 actions relating to radiological and nuclear security, there are 32 actions covering biological or chemical security. A further 67 actions are horizontal, in the sense that they apply to more than one area.

In order to avoid duplication, any new EU measure in this field should be coherent with the existing national and international regulations and draw upon existing work in relevant international organisations.

The implementation of the Action Plan is guided by consultation with national authorities and other relevant stakeholders such as the private sector, the health care sector, and academic institutions. The IAEA, Interpol, and Europol are closely associated to the implementation of the EU CBRN Action Plan.

Examples of Radiological and Nuclear actions include:

- ensuring close coordination between law enforcement and facilities holding high risk radioactive sources;
- encouraging recovery programmes for disused high risk sources;
- examining the feasibility of setting up an electronic system to manage cross-border transfers of sources;
- examining how the IAEA Code of conduct and the accompanying guidance on import/export can best be implemented within the EU's single market;
- examining possible support to the IAEA to bring improvements to the IAEA's Illicit Trafficking Database;
- critically assessing existing rapid alert and information exchange systems;
- developing modelling tools adapted to the threat from radiological dispersion devices in an urban environment; and benchmarking existing computer codes which model dispersion of CBRN materials in the environment,
- supporting research and development projects addressing detection and response.

Examples of horizontal actions include:

- analysis of penal legislation concerning CBRN terrorism and acts of WMD proliferation by non-state actors,
- an EU-wide stocktaking on good practices on reporting of suspicious transactions in relation to CBRN materials,
- stocktaking of current practices in the security vetting of personnel involved in the

whole supply chain of explosives and CBRN materials.

Furthermore, establishment of Nuclear Security Training Centre has been completed by the inauguration of the training facility in Joint Research Centre/Karlsruhe site. This complements the existing training facility at Joint Research Centre/Ispra site (see below chapter on training).

A comprehensive progress report on the CBRN Action Plan was prepared and

presented by the Member States and stakeholders in May 2012.

Since there is a need for some adjustments and a change towards a more coherent approach to the protection of EU citizens, preparatory work aiming at reviewing the CBRN Action Plan has started.

Currently the European Commission is finalising a communication to be published in the first part of 2014, presenting new approach to the CBRN and explosive threats.

Europol activities in the area of CBRN

Europol is the European Union's law enforcement agency. The main aim of Europol is to support law enforcement agencies of the EU Member States in their fight against serious international crime and terrorism by gathering, analysing, disseminating intelligence and coordinating operations.

Europol is competent to deal with crime connected with nuclear and other radioactive materials, among other forms of serious crime, as foreseen in the Council Decision on establishing Europol.

Based on an all-hazards approach to the threat, Europol conducts several activities that aim at assisting the EU Member States in developing their capacity to prevent and respond to CBRN incidents.

Europol was also involved in the discussions to draw up the EU CBRN Action Plan and is also responsible for and a partner in the implementation of several actions within the Action Plan.

CBRN Working Group of the European Explosive Ordnance Disposal Network (EEODN)

The need for having a collaborative network of EOD specialists was identified by EU experts and formulated in the EU Action Plan on Enhancing the Security of Explosives (EU APESE). In this document Europol was tasked to create a European Explosive Ordnance Disposal Network (EEODN). The EEODN was created by Europol in May 2008 with the support of the European Commission and the EU Member States.

The subsequent approval of the EU CBRN Action Plan in November 2009 determined the creation of a CBRN Working Group within the existing EEODN. The main objectives of the EEODN are to facilitate cooperation, to share information among EU explosives and CBRN specialists and to organise joint trainings and exercises.

The network should facilitate the exchange of information and should help build trust, and this could be achieved by organising regular meetings available to all units dealing with explosives and CBRN in the EU MS. In order to ensure a wide audience, it was necessary to establish a funding scheme for EEODN activities, thus minimising the financial impact on the EU MS. Between 2008 and 2010, two annual conferences were hosted and funded by Europol and the MS. In 2010 and 2011, the EEODN started to be co-funded by the European Commission. Since the beginning of 2013, the European Police College (CEPOL) has been co-financing and participating in the coordination and management of the activities of the EEODN.

At present, Europol organises a two-day conference every six months in cooperation with CEPOL and the current EU Presidency. The first day of each conference is dedicated to explosives and the second day to CBRN-related matters. During these meetings, EU experts exchange information about recent explosives and CBRN related cases, recent activities, and latest developments in the sector such as new products, detection technologies and equipment to render explosives and CBRN materials safe. Furthermore, the EEODN organises two annual training courses or exercises, either on explosives or on CBRN. These training activities increase the level of awareness, knowledge and experience of all participants, in particular those coming from MS in which this type of incidents occurs rarely. In addition, the training activities allow the participants to compare their respective response protocols, the compatibility and complementarity of which are crucial in responding to incidents with cross-border implications or in receiving direct operational support from other countries.

European Union Bomb Data System (EBDS)

Europol is leading the development and maintenance of the EU Bomb Data System (EBDS) which contains information on

incidents, threats, reports and analysis in relation to explosives and CBRN. Since 2010, the system has been rendered available to all EU competent authorities from the EU MS and some Third Countries.

The EBDS was identified as a need by EU experts in explosives and CBRN. The creation of a centralised database guarantees the efficient, safe and structured distribution of information. Whenever an EOD/CBRN related incident occurs anywhere, specialised units across the EU start gathering the necessary technical intelligence and information on the incident.

The creation of the EBDS responded to the EU APESE, as did the EEODN, although the EU APESE simply called for a database on incidents involving explosives and improvised explosive devices. The initiative of the French Presidency of the EU in 2009, however, allowed Europol to include the CBRN component in the EBDS project.

The EBDS is a dual system which contains two powerful databases for explosives related incidents and CBRN, respectively. The EBDS has specialised libraries where users can upload and access intelligence files in the most common formats. The system also includes specialised discussion forums where experts can interact directly, ask questions and share their experience and best practices. The national experts are responsible for the uploading of their respective national contributions, while Europol's experts upload the data originating from third parties, be they non-EU States or relevant international organisations such as the IAEA.

Since its implementation, the EBDS has become an efficient platform for sharing information on explosives and CBRN incidents and it has been successfully used in support to several international investigations, not only in the EU but also in Third Countries.

CBRN threat assessment and monitoring

Europol conducts a permanent assessment and monitoring of CBRN threats. In order to carry out this task, Europol exchanges information with the competent authorities of

the EU Member States, some third States and relevant EU and international agencies. This inter-agency collaboration allows Europol to produce intelligence reports that bring together strategic intelligence from law enforcement and information from the technical or scientific domains.

Cooperation and consulting with IAEA

Europol and the IAEA maintain an informal relationship in the fields of nuclear safety and radiological emergencies. Initial cooperation was established in 2002 within the framework of the area of crime connected with nuclear and radioactive substances, the mandated area of EUROPOL. Since then, Europol has actively contributed in an advisory capacity to the review of manuals, guides and tools elaborated by the IAEA in the field of nuclear safety and the fight against illicit trafficking in nuclear and radioactive materials.

Through these contributions, Europol brings its experience and perspective to documentation developed by the IAEA specifically for the police community.

As a result of this cooperation with the IAEA, Europol has gained access to a number of tools which provide reliable information on nuclear and radiological incidents and threats and are very valuable for the production of Europol reports.

The IAEA tools to which Europol has access are:

- The Incident and Trafficking Database (ITDB),
- The International Catalogue of Sealed Radioactive Sources and Devices (ICSRs),
- The Unified System for Information Exchange on Incidents and Emergencies (USIE).

Europol is a member of the Inter-Agency Committee on Radiological and Nuclear

Emergencies (IACRNE), managed by IAEA¹⁴. Europol also contributes to the development of a document produced by the IACRNE on bi-annual basis, the Joint Radiation Emergency Plan of the International Organisations¹⁵.

EU Guide on CBRNE Units

The EU Guide on CBRNE Units contains information, including contact details, of all law enforcement agencies with a role in CBRNE security and response in the EU Member States. This guide is intended to be permanently updated. The current version was published in 2012 and includes the identification of individual competent authorities, their contact details, responsibilities, competences, structure and logos.

Europol's CBRN Glossary

In 2011, Europol published a glossary of CBRN terms in English. This glossary contains CBRN terms and definitions that have been structured in four different chapters covering chemical, biological, radiological/nuclear threats and other related concepts. Europol's CBRN glossary is a live document and is meant to be regularly updated. This document served as the basis for the "EU CBRN Glossary".

¹⁴ The aim of the IACRNE is to coordinate preparedness and response of relevant international and intergovernmental organisations to nuclear or radiological emergencies, either accidental or intentional, including sabotage and acts of terrorism. <http://www-ns.iaea.org/tech-areas/emergency/iacrna/login.asp>

¹⁵ The IACRNE Joint Plan describes the response objectives, the organisations involved in the response, their roles and responsibilities and the interfaces between them and their respective States Parties

The IACRNE regularly organises international exercises with various scenarios in order to assess the warning systems and response of the contact points in the States Parties and relevant international organisations.

EU CBRN resilience in civil protection

The European Commission is encouraging and facilitating Member States' cooperation in civil protection assistance interventions in the event of major emergencies. The target events are those which may require urgent response actions between the 32 States participating in the Union Civil Protection Mechanism-UCPM¹⁶ (the 28 EU Member States, Norway, Iceland and the Former Yugoslav Republic of Macedonia). The objective is to improve the effectiveness of emergency systems for responding to natural, technological or man-made disasters in Europe.

For this purpose, EU civil protection modules have been developed as pre-defined arrangements of response resources (teams and means). They are composed of mobile resources from Participating States, which are able to work independently, as well as integrated with other modules, to provide assistance inside and/or outside the EU. These modules, are self-sufficient, interoperable and can be dispatched at very short notice (generally within 12 hours following a request of assistance). Two of the 17 types of modules that have been defined at European level are CBRN specific: CBRN detection and sampling, and search and rescue in CBRN conditions.

These pre-defined response resources can be mobilised and deployed at the request of a country affected by a nuclear or radiological incident, overwhelming to its response capacity. Through the same Mechanism additional civil protection resources and expertise may also be requested and mobilised to support the overall response efforts of the authorities. If requested the

Commission may co-finance up to 55% of the transport costs.

As part of the implementation of the EU CBRN Action Plan, the European Commission launched a CBRN Resilience Programme in civil protection to support preparedness and enhance effective coordination in response to CBRN incidents. The main objectives of the EU CBRN Resilience Programme are streamlining in coherent way the different strands of work which can be undertaken under the UCPM, reviewing progress/gaps in the field of civil protection, defining priorities and modalities for the implementation of the proposed actions, as well as considering further work in this area in order to support and complement Member States' efforts. Upon Member States proposals large scale exercise are regularly organised with the support of the European Commission under the UCPM including for scenarios involving radiological or nuclear incidents. Exchange of experts in this area is also regularly organised.

The Emergency Response Coordination Centre (ERCC) was established by the European Commission in May 2013 as central hub for the UCPM. It aims to provide a more effective and faster EU response whenever and wherever a disaster strikes.

The Centre collects real-time information on disasters, monitors hazards, prepares plans for the deployment of resources (experts, teams and equipment), works with Participating States to map available assets and coordinates EU's disaster response efforts. It will also coordinate the European Emergency Response Capacity, a voluntary pool of pre-committed response capacities available to EU missions.

The Union's Civil Protection Mechanism also provides that Member States should develop risk assessments at national or appropriate sub-national level and make them available to the Commission by end December 2015 and make available every three years thereafter a

¹⁶ Decision No 1313/2013/EU of the European Parliament and of the Council of 17 December 2013 on a Union Civil Protection Mechanism (OJ L 347, 20.12.2013, p. 924).

summary of their risk assessments and an assessment of their risk management capability. It also further allows the Commission to promote and support the development and the implementation of Member States' risk management activity including through the sharing of good practices, and facilitate access to specific knowledge and expertise on issues of common interest. This process is likely to contribute to

increase off site preparedness for consequence management of radiological incidents or nuclear accidents.

EU customs play also an important role when it comes to radiation and nuclear detection

Since 9/11, and other terrorist attacks in Europe and elsewhere, security has become a top priority for European Customs.

The security of the EU, of the Member States and of citizens depends on each and every single point of entry of goods into the EU. If customs failed to act to tackle risks consistently along the EU's external border, the customs union and the EU single market would become unsustainable.

The fact that the EU customs is constantly present at the EU external borders and has a longstanding knowledge of the goods moved within the supply chain, makes it one of the primary authorities able to detect and prevent illicit and dangerous goods from entering into and leaving the EU.

EU custom officers operate Radiation Detection Portals in the main European ports participating in the Megaports initiative that started in 2003. The Megaports initiative is a key non-proliferation program of the U.S. Department of Energy's National Nuclear Security Administration (DOE/NSSA) One of the main objectives is to check as many containers as possible, regardless of their destination and with a minimal impact to port operations. These portals have been very useful to detect contaminated containers from Japan during the Fukushima crisis.

The Megaports initiative and the follow up of the Fukushima crisis have been a catalyst to include Radiation and Nuclear detection capability into the daily customs work. In order to enable EU customs officers to perform these kinds of controls it has been necessary to develop specific training programmes. While most administrations have their own national training programmes, training initiatives at EU and global levels are a big step forward, including the establishment of the EUSECTRA training facility at the Joint Research Centre (JRC) facilities in Ispra and Karlsruhe, the

IAEA E-learning course and international workshops and conferences. Constantly improvement of these trainings is needed including practical exercises.

European Commission services - JRC and TAXUD (Taxation and Customs Union) - are currently developing an advanced pilot training programme for EU customs officers on Radiation and Nuclear detection. This programme aims to be beneficial for all the EU customs administrations in terms of 'preparedness', detection and response as far as Radiation and Nuclear detection and safety issues are concerned.

DG TAXUD aims that adequate resources equipment and training of EU customs officers is available on an EU-wide basis, bearing in mind the shared responsibilities with other law enforcement agencies present at our external borders.

Many detections made by EU customs are related with products containing contaminated steel. So detection is not only an activity to deter, detect and intercept illicit trafficking of nuclear and radioactive materials but these detections also contribute to ensure the safety of the European Union and its citizens.

An EU detection technology expert group was created in January 2011, under the Customs 2013 Programme, to support and facilitate modern customs administrations to tackle the challenges of the rapidly changing 21st century operating environment. Amongst other this group will closely monitor the development of technologies and innovations and evaluate the benefits that customs administrations can extract from its usage.

DG TAXUD has a proactive approach towards the use of modern technologies and encourages EU customs administrations to participate as end users in relevant research projects for the purpose of advancing new emerging technology applications.

Export control on dual use goods in the European Union

The EU export control regime provides common EU control rules, a common EU control list and harmonised policies for implementation. The requirement for an export authorisation applies to:

- on decisions adopted by international export control regimes – the Australia Group (AG), the Nuclear Suppliers Group (NSG), the Wassenaar Arrangement and the Missile Technology Control Regime (MTCR).

- non-listed items may also be controlled under the so-called catch-all clause, under certain conditions, when there is reason to believe such items are intended for use in connection with a biological, chemical, nuclear weapons or ballistic missile weapons programme, or for use in violation of an arms embargo;

- EU Member States may exceptionally impose additional controls on non-listed dual-use items for reasons of public security or human rights consideration.

With regard to trade in nuclear material, the *EU Dual Use Regulation*¹⁷ contributes to goals of the European Atomic Energy Community (Euratom) and to the peaceful uses of nuclear energy including the prevention of proliferation of nuclear weapons and their means of delivery and thus contributes to nuclear security.

The EU is continuously updating its export control regime and has introduced an updated control list in April 2012. The EU has initiated a wide-ranging export control policy review with a view to adjusting the export control regime to evolving foreign and security policy, trade and economic as well as scientific and technological developments¹⁸.

The European Union also supports international export control activities. Since 2005 an EU Outreach programme for Export Control of Dual-Use Items was set up to work together with partner countries to enhance the effectiveness of export control systems of dual-use items, with a view to contributing to the fight against the proliferation of WMD and related materials, equipment and technologies. The cooperation aims at updating export control legislation and procedures by promoting today's standard of export control of dual-use items.

¹⁷ Council Regulation (EC) No 428/2009 of 5 May 2009 setting up a Community regime for the control of exports, transfer, brokering and transit of dual-use items - OJ L 2009:134/1

¹⁸ See SWD (2013)7 of 17 January 2013

Nuclear and radiological security R&D activities

The FP7 Security Research programme 2007-2013¹⁹

Under the Seventh Framework Security programme of the European Commission, a part of the funding is allocated to R&D projects in the field of CBRN security. There are around 60 CBRN projects being implemented in the framework of the FP7 for a total amount of about 200 million euro.

The projects cover large areas of CBRN security. As an example one can mention the following projects²⁰:

CATO: Toolbox for CBRN crisis management

COCAE: Handheld detector for radioactive sources

FRESP: Respiratory protection system for first responders

IMSK: Integrated CBRN mobile security kit for large events, common operational picture

MULTIBIODOSE: Bio-dosimetric tools for mass casualty radiation accident

PRACTICE: Preparedness and resilience against CBRN attack

EDEN: End-use driven Demo for CBRNE

SecurEau: Detection of contaminated water distribution system and decontamination

IF REACT: Improved first responder ensembles against CBRN terrorism

SLAM: Under negotiation - Standardisation of CBRN measurement

GIFT-CBRN: Under negotiation – Generic Integrated Forensic Toolbox for CBRN incidents

New projects are under evaluation and their implementation would be during the year 2012 and cover the following areas:

- A large CBRNE demonstration which aims at demonstrating the capabilities of preventing, detecting and response to CBRN events (system of systems).
- Improving drinking water security against CBRN-related contamination in major municipalities and securing food chains against CBRN contamination.

Horizon 2020

The Euratom Programme (Euratom Research and Training Programme) is a fundamental part of the Horizon 2020 – the Framework Programme for Research and Innovation for the years 2014-2020. The Euratom Programme covers research activities as well as education and training in nuclear energy (fusion and fission) and radiation protection. Some examples of Euratom R&D activities in the field of Nuclear Security are given further in this document.

¹⁹ Council Decision 2006/971/EC of 19 December 2006 concerning the Specific Programme Cooperation implementing the Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007 to 2013) – OJ L 2006:400/86

²⁰

http://cordis.europa.eu/fp7/security/projects_en.html

Towards EU CBRN Standardisation

In May 2011, the European Commission and the EFTA (European Free Trade Association) states launched Mandate M/487 to the European Standardisation Organisations: CEN, CENELEC and ETSI. The scope of the Mandate is the analysis of the current security standards landscape in Europe, taking into account the legislative background, issuing recommendations on the full range of standards needed and drawing a roadmap for standardisation in security. On this basis, a work programme for the definition of European standards and other standardisation deliverables in the area of security will be developed. The programme will take into account all aspects linked to the different specific products, systems, procedures and protocols that should be covered by security standards, to assist the EU in ensuring that security is consistently addressed in the different relevant areas. This Mandate is exclusively focused in civilian applications.

The Objectives of the Mandate are:

- Increasing the harmonisation of the European security market and reducing fragmentation, with the establishment of a set of comprehensive European standards,
- Enhancing secure interoperable communications and data management between the various security control centres, operators, public authorities and first responders,
- Developing common technical specifications (taking into account the already existing) concerning interoperability, quality or safety levels, including test methods and certification requirements,
- Providing interoperability and comparability of different solutions, which in turn facilitate competition and innovation,

- Developing methods for security vulnerability assessment by security system operators,
- Giving companies the opportunity to develop tailor-made and cost beneficial security measures in agreement with a global EU security strategy.

The Mandate has been accepted by the European Standardisation Organisations. The work has been allocated to CEN/TC 391 'Societal and Citizen Security' whose secretariat is provided by the Netherlands Standardisation Institute (NEN).

The Mandate consists of two phases. Phase 1 focused on obtaining an overview of the current security landscape and on listing the sectors for priority treatment to be agreed upon by the European Commission.

Phase 1 of the Mandate has been accomplished on 13 May 2012 and three selected priority sectors were defined:

- Chemical, Biological, Radiological, Nuclear and Explosives – minimum detection standards as well as sampling standards, including in the area of aviation security.
- Border security – common technical and interoperability standards for automated border control systems, as well as standards for biometric identifiers.
- Crises management/Civil protection – standards for communication interoperability, as well as interoperability of command and control, including organisational interoperability, as well as mass notification of the population.

The Commission has reviewed the study and selected the security sectors for priority treatment, after which phase 2 was launched. In Phase 2, for each selected sector, the

specific standardisation needs will be identified and comprehensive standardisation programmes with suitable and realistic roadmaps shall be prepared.

Phase 2 has been also accomplished and a draft report was issued in July 2013. The

roadmap with proposals for further standardisation will be prepared on a basis of separate mandates to European Standards Organizations, which will be issued by the European Commission.

Examples of R&D projects carried out by the European Commission Joint Research Centre

The Joint Research Centre of the European Commission provides technical and scientific support to the implementation of EU policies and places particular importance on efforts in the field of security. In the nuclear security field and through the Framework Programme of the European Atomic Energy Community for nuclear research and training activities²¹ and Horizon 2020 Euratom²², the JRC has developed significant expertise in various areas, such as the detection of undeclared activities, detection of the diversion of nuclear material or theft of radioactive sources associated with illicit trafficking of such material or sources, as well as related training.

Testing radiation detection equipment to be used in the fight against illicit trafficking

The European Commission and the US Department of Homeland Security (DHS-DNDO), in cooperation with the IAEA and the US Department of Energy (DoE), jointly implemented the Illicit Trafficking Radiation Assessment Program (ITRAP+10).

The ITRAP+10 supported a horizontal action of the EU CBRN Action Plan on "Establish trialing, testing and certification schemes for CBRN detection in the EU". The overall scope of this project was to assist Member State organizations in effectively detecting

radioactive materials crossing their borders illegally, whether importations, exportations or shipments in transit by developing recommendations on the technical and functional requirements for the selection of border monitoring equipment so that limited resources are deployed in an efficient way.

The ITRAP+10 project carried out an evaluation and comparison of the performance of available radiation detection equipment relevant to nuclear security. The results have provided an independent assessment of the available radiation detection equipment on the market. More than 70 instruments were tested under the ITRAP+10 project. The results will serve as a reference for regulatory and other EU Member State authorities to identify equipment and or families of equipment to address their particular needs, and help to ensure common standards at European and international level. In addition the manufacturers have received recommendations on how to improve performance, reliability and user-friendliness of the equipment.



View of the dynamic capabilities have been tested in the Dynamic ITRAP+10 lab

²¹ Council Decision of 19 December 2011 concerning the specific programme, to be carried out by means of direct actions by the Joint Research Centre, implementing the Framework Programme of the European Atomic Energy Community for nuclear research and training activities (2012-2013) (2012/95/Euratom) – OJ L 2012: 47/40

²² Council Regulation (EURATOM) No 1314/2013 of 16 December 2013 on the Research and Training Programme of the European Atomic Energy Community (2014-2018) complementing the Horizon 2020 Framework Programme for Research and Innovation

The ITRAP Phase 2 is a follow up project which started in January 2014 and that will, for the first time, access the possible integration of RN and explosive detection in the same device. Phase 2 ITRAP is also focused in helping Member State laboratories achieving accreditation in the RN detection field, evaluating new RN detection equipment and

enabling the definition of European or international standards based on the results of the Phase 1, in close collaboration with the Standardisation organisations.

EUSECTRA: a European Nuclear Forensic Signature Security Training centre for capacity building and Method Development

The success of the fight against illicit trafficking of nuclear and radioactive materials necessitates the mobilization and interaction of different competent authorities such as police, customs, border guards, regulators, radiation protection and expert scientists. Each of these authorities has a role and responsibilities during nuclear security incidents that require a close interagency cooperation and interdisciplinary skills and an understanding of the technicalities involved with the detection, handling and analysis of nuclear or other radioactive materials. Thus, non-experts in the radiological field, such as front line officers, need to be familiarized with radiation detection, radiation hazards, crime scene management, and measuring and relaying technical information obtained from

officer and the other competent authorities relative to their roles in the State's national nuclear security plan.

Along these lines, and to address increasing security concerns with respect to illicit trafficking of nuclear and other radioactive materials, the EU CBRN Action Plan was adopted by the European Council in December 2009. The importance of training at all levels for both EU internal and external nuclear security led therefore the Commission to consider the creation of a European training centre which is dedicated to nuclear security issues of EU28 and countries that benefit from the EU support under the instrument for pre-accession and the instrument of stability. The EC JRC consequently, in consultation with



instruments for subsequent analysis by the scientific experts. This complexity obviously calls for thorough training of the front line

Member States, carried out the implementation of the European Nuclear Security Training Centre (EUSECTRA). The part of the Centre,

which complements the existing training facility in Ispra, was inaugurated on 18 April 2013. EUSECTRA is to be considered as platform for knowledge transfer and for networking of experts. Based on the unique combination of scientific expertise, specific technical infrastructure and availability of a wide range of nuclear materials at the JRC, the facility offers unparalleled training opportunities.

The overarching goal of EUSECTRA is to improve Member States capabilities to address the threats associated with illicit incidents involving nuclear or other radioactive materials by providing hands-on training using real materials to front line officers, their

management, trainers and other experts in the field. EUSECTRA consolidates, modernises and enhances the training activities at JRC. It is based on the long-standing nuclear safeguards (first line of defence) training activities which are directed mainly to Euratom and IAEA inspectors and are based on the JRC's R&D and equipment development in the area of non-destructive analysis, chemical and isotopic analysis, mass-volume determinations, containment and surveillance and innovative safeguards approaches. The second component of the training focuses on combating illicit trafficking (second line of defence) including detection, response and nuclear forensic analysis.

EU nuclear security activities outside Europe

Nuclear Security projects within the instrument for stability

The European Union has adopted a series of policy decisions which focus on enhancing nuclear security and non-proliferation worldwide. These are closely connected to the European Union Common Foreign Security Policy and follow the international developments in this area (such as the “EU Strategy against proliferation of Weapons of Mass Destruction 2003”; Instrument for Stability, 2006, CBRN risk mitigation component”; “Major lines to combat the proliferation of WMD”, issued end of 2008, EU CBRN Action Plan and the review of the EU Dual Use Regulation 428/2009).

In line with these policies, a significant number of outreach, support and capacity building projects have been funded by the EU in the area of nuclear safeguards, non-proliferation and nuclear security.

In the early 90's, following the breakdown of the former Soviet Union, the European Commission (EC) initiated a Technical Assistance to the Commonwealth of Independent States (CIS). This was named the TACIS support program, which ran from 1994 to 2006, and included projects related to nuclear safeguards, enhancing border monitoring, improving measures to combat illicit trafficking and upgrading of nuclear forensic capabilities. The significant experience that the Joint Research Centre (JRC) has built up in measuring and controlling nuclear material through its involvement in the safeguards area has been made available and transferred to CIS countries through dedicated projects carried out in the framework of the TACIS. The follow-up programs went on taking into account new international threats while sustaining past initiatives within an enlarged international cooperation. These cooperative projects were launched in 2005 with initial

funding from TACIS and continued under two instruments: the Instrument for Stability (IfS²³) launched in 2006, which includes Chemical, Biological, Radiological and Nuclear (CBRN) security, and the Instrument for Nuclear Safety Cooperation (INSC²⁴) started in 2007, under which nuclear safeguards projects are also funded. In the field of security, the Instrument for Stability extended the geographical scope of the support worldwide. In addition to the CIS countries, South East Asia, the Mediterranean Basin and Central Asia and Central Africa became partner countries where projects are currently implemented. These projects are mostly dedicated to improve the capabilities to detect and respond to radioactive and nuclear material out of regulatory control and include the following activities:

- Conducting needs assessment missions in collaboration with the partner country national expert teams;
- Enhancing international cooperation in combating illicit nuclear and radioactive material trafficking at border check-points;
- Deploying and installing fixed and mobile detection equipment, insuring specific training on the use of instruments and short-term regular maintenance.

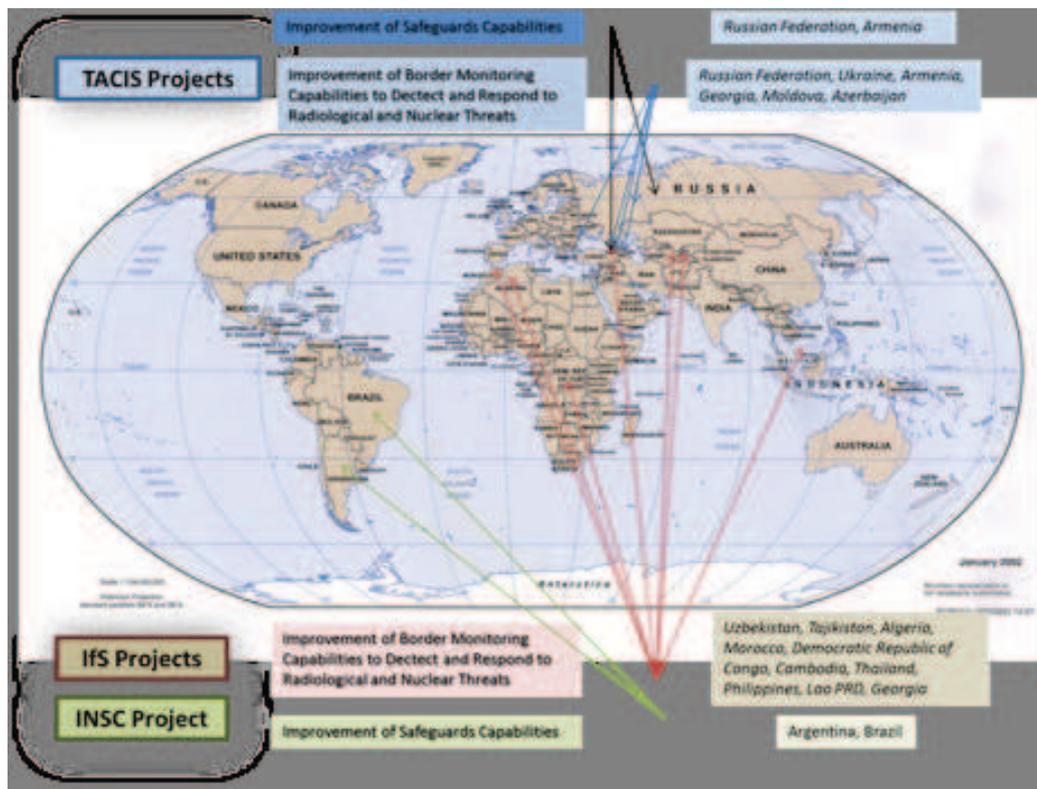
²³ Regulation (EC) no. 1717/2006 of the EU and the Council of 15 Nov 2006

²⁴ Council Regulation (Euratom) No 300/2007 of 19 February 2007 establishing an Instrument for Nuclear Safety Cooperation, OJ L 2007:81/1

- Implementing sustainable training (Train the Trainer concept) and facilitating expert exchange;
- Organising Table Top and Field exercises to test instruments and response procedures.
- Developing online Joint Platforms for training, seminars, workshops to share information and experience and to allow

networking of RN security stakeholders in partner countries.

All the projects related to nuclear and radiological security are since 2013 being implemented under the EU CBRN Centres of Excellence Initiative.



The EU CBRN Centres of Excellence Initiative

In 2010, the European Union launched the CBRN Centres of Excellence (CoE) Initiative on Chemical, Biological, Radiological and Nuclear Risk Mitigation²⁵, under the Instrument for Stability²⁶.

This CoE network involves today 44 partner countries in several strategic regions of the world: South East Europe, Southern Caucasus, Republic of Moldova and Ukraine; South East Asia; African Atlantic Façade; Middle East; North Africa; Central Asia, Eastern and Central Africa and the Gulf Cooperation Council Countries. Each country nominates a National Focal Point (main entry point to the country) and a CBRN team representing relevant national ministries and institutions concerned by CBRN issues.

The CoE initiative aims at implementing a coordinated regional strategy for the mitigation and preparedness against risks related to CBRN material and agents. It facilitates in particular the assessment of CBRN National Needs (gap analysis) and the establishment of National Action Plans in partner countries, on a voluntary basis. The origin of the risk can be malevolent (proliferation, theft, sabotage and illicit trafficking), accidental (industrial catastrophes, in particular chemical or nuclear, related to waste treatment and transport) or natural (mainly pandemics). Its comprehensive and all hazard approach provides a long-term response to priorities defined in the European Security Strategy.

The CBRN CoE initiative has a budget of €156 million for the period 2014-2020 and is

implemented by the EU (DG DEVCO, DG JRC) with the support of UNICRI (United Nations Interregional Crime and Justice Research Institute).

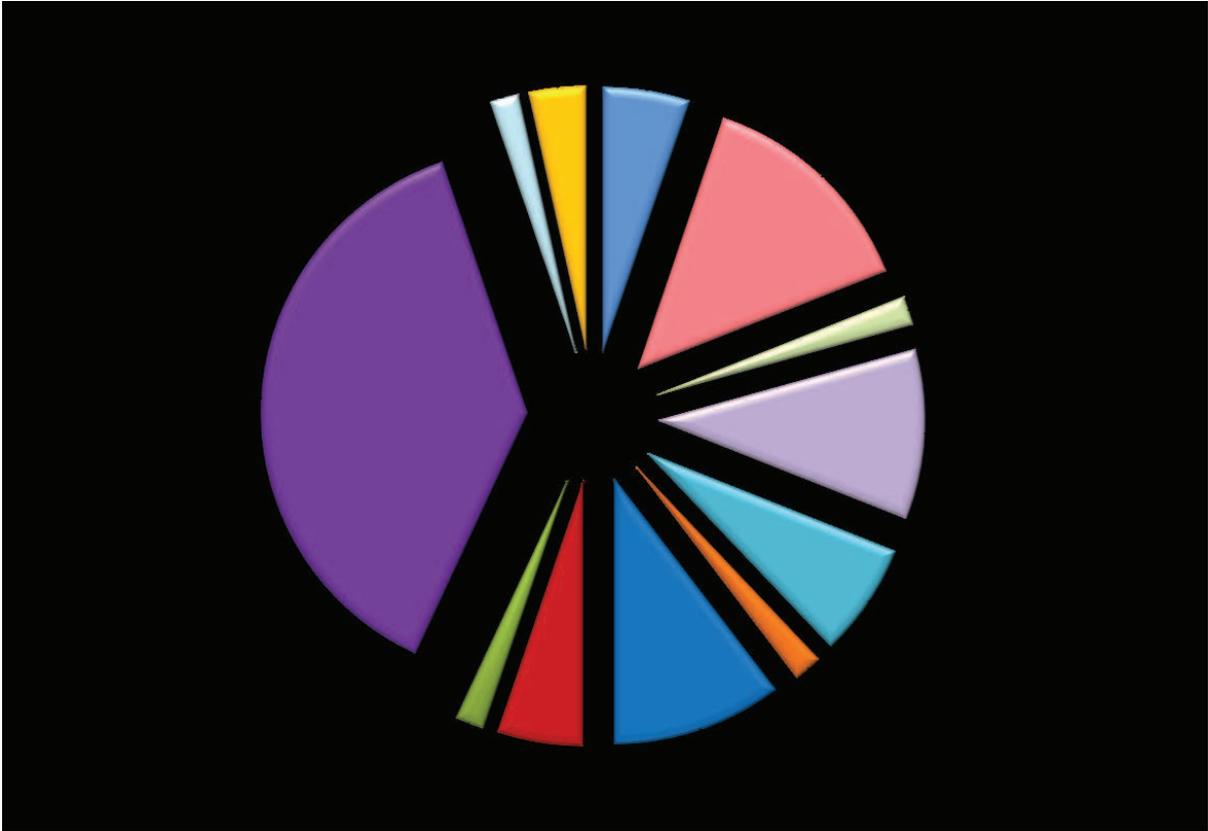
This Initiative is designed to use the EU's networking capabilities to bring together CBRN experts with the aim of strengthening a regional culture of safety and security.

The established CBRN Regional Secretariats play a major role, by ensuring there is a good level of cooperation and coordination with Partner Countries, through their National Focal Points and CBRN National Teams, and facilitate the implementation of CoE funded projects in the region. In particular, the Secretariats are responsible for coordinating the bottom-up formulation of project proposals of a regional concern, with the financing and technical support of the European Commission. Every six months the Regional Secretariats organise a round-table meeting for all National Focal Points to coordinate activities, exchange views and opinions and to ensure that the CoE network properly addresses legal, regulatory, control, scientific / technical, enforcement, judicial and organisational issues, aiming to adequately mitigate CBRN risk. At regional level, their activity contributes to strengthen existing networks and enhance cross-border cooperation.

A series of circa 40 CoE projects are currently implemented, including matters such as export control, illicit trafficking, border monitoring, bio-safety and bio-security. So far, the EU has committed around €130 M.

²⁵ See <http://www.cbrn-coe.eu>

²⁶ Regulation (EC) no. 1717/2006 of the EU and the Council of 15 Nov 2006



EU CBRN Centres of Excellence Projects under implementation, divided by technical area. Total number of on-going CBRN CoE projects in Dec. 2013: 36 (projects can cover more than one technical area).

Nuclear safeguards within TACIS, INSC and IFS

A strong engagement in nuclear safeguards activities and commitments has been secured in various TACIS (Technical Assistance to the Commonwealth of Independent States) projects and a number of these projects are still running with the main focus on safeguard actions in Russia. The projects are being implemented by the different JRC research institutes using their key expertise in the targeted nuclear safeguards fields. The total project balance amounts to more than €9 million euros. 2014 is the target closing date for implementation.

It is noteworthy that the involvement in nuclear safeguard using funds from the Instrument for Nuclear Safety Cooperation (INSC)²⁷ has not been very strong during its first programming years. However, the focus has changed with new regional initiatives in nuclear safeguards funded under INSC, specifically:

- 2011: adoption of a €2 million project in "Nuclear Safeguards – Brazil and Argentina", for which support is provided to the regional safeguard organisation ABACC (the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials) which is in charge of applying a full scope safeguard system in the two countries.
- 2014: A new INSC regulation entered into force, and support to nuclear safeguards is a priority under this new programme.

²⁷ Council Regulation (Euratom) No 300/2007 of 19 February 2007 establishing an Instrument for Nuclear Safety Cooperation, OJ L 2007:81/1

EU support to IAEA

Support to the Nuclear Security Office

The EU has enhanced its support to the IAEA in Vienna, including the promotion of Nuclear Security worldwide. The EU remains a key donor to the Nuclear Security Fund, with nearly €40 million committed and more than 100 countries supported with EU funds since 2004 to strengthen nuclear security in the IAEA Member States.

In 2003, the Council of the European Union (EU) adopted its Strategy against Proliferation of Weapons of Mass Destruction (WMD). Six Contribution Agreements between the European Union (EU) and the IAEA have been signed to provide financial support from the EU's Common Foreign and Security Budget to IAEA activities in the areas of nuclear security and verification. These Joint Actions assist States in strengthening their nuclear security infrastructure. The EU and the IAEA have closely coordinated their support to third countries in this field including the border monitoring working group. This included the provision of detection equipment as well as training.

The latest Council Decision in support of the IAEA (2013/517/CFSP of 21 October 2013) alone provides €8.05 million to support Nuclear Security measures in States all around the world for the following measures:

- Sustainability and Effectiveness of Support provided through earlier Joint Actions and Council Decisions²⁸;

²⁸ 2004/495/CFSP (IAEA I), 2005/574/CFSP (IAEA II), 2006/418/CFSP (IAEA III), 2008/314/CFSP (IAEA IV) and 2010/585/CFSP (IAEA V)

- Strengthening of States' Nuclear Security Support Infrastructure: Establishing National Nuclear Security Support Centres;
- Strengthening States Legislative and Regulatory Framework;
- Strengthening Nuclear Security Systems and Measures for Nuclear and other Radioactive Materials;
- Strengthening of States' Institutional Infrastructure and Capabilities for Dealing with Nuclear and Radioactive Materials out of Regulatory Control;
- Supporting Awareness of and Strengthening States' Response and Resilience to Cyber-Crime impacting Nuclear Security;
- Developing Additional Laboratory Capacity to support Evaluation of Industrial Control and Electronic System Level Technologies used to identify Vulnerabilities to Nuclear- related Cyber-Crime, and Exploiting and Increasing Awareness of such issues, including through Participation in Regional Exchanges, and the Utilisation of Compensatory or Remediation Measures.

In addition, technical support is provided to the IAEA through numerous consultancies, development of technical guidance related to nuclear detection and forensics, contribution to IAEA training activities, development of training syllabus, developments of concepts such as "core capabilities in nuclear forensics", participation in the co-ordinated research program on detection and analysis of seized samples.

In illicit trafficking control, the EU is currently implementing a joint project with the IAEA

which aims at improving the usability of the IAEA Illicit Trafficking Database.

The EU and the IAEA have continued to coordinate their support to third countries in the field of nuclear security. A first-ever EU-IAEA Annual Senior Officials Meeting (SOM), involving the EEAS, the European Commission / Euratom and IAEA representatives at senior level, was held on 25 January 2013 in Brussels aiming inter alia at further coordinating action in particular in the

field of Nuclear Security, in order to ensure complementarity and avoid overlap between activities undertaken by the EU CBRN Centres of Excellence and the IAEA, and take benefit from such complementarity. To this effect, the EU and IAEA also concluded, in December 2013, a Practical Arrangement on Nuclear Security, which tackles technical issues to guide their cooperation. The second EU-IAEA SOM was held in Vienna on 20-21 February 2014, and was opened by IAEA DG Yukiya Amano.

Support to the IAEA nuclear safeguards and other security activities

Multilateral Nuclear Assurances

To support Multilateral Nuclear Assurances (MNA) initiatives, a contract has been signed with IAEA to contribute to the Low Enriched Uranium Bank for the Utilization of Nuclear Energy (€20 million) through the Instrument for Stability. The "LEU Bank", owned and managed by the IAEA, will supply countries introducing civil nuclear programmes with secure nuclear fuel, thus limiting the associated proliferation risks. As for the participant States this scheme will reduce the risks of fuel supply disruption due to political reasons

The concept of multilateral approaches to the nuclear fuel cycle has been envisaged for decades. An IAEA-controlled nuclear fuel bank is essential to reducing global nuclear dangers because the same enrichment technology (e.g. centrifugation) can be used to produce both low enriched uranium for nuclear power reactors and high enriched uranium for nuclear weapons. Thus, multilateral approaches to the nuclear fuel cycle, in general, and creation of

nuclear fuel bank, in particular, have potential to facilitate peaceful use of nuclear energy while providing the international community with additional assurance that the sensitive parts of the nuclear fuel cycle are not unduly disseminated and consequently are less vulnerable to misuse for non-peaceful purposes.

The support of the Instrument for Stability to this nuclear fuel bank option adopted by the IAEA, concerns the compliance with basic criteria such as market compatibility, security of supply, consistence with existing international non-proliferation treaties and agreements and the absence of any negative proliferation impact.

A Council Joint Action (up to € 5 million) to support security related activities (the so-called 2nd Pillar), has been prepared by competent Council bodies, in co-operation with the Commission. The Council contribution would be used for security related costs (e.g. containers for secure transport and storage).

EU contribution to Enhancing Capabilities of the IAEA Safeguards Analytical Services (ECAS)

On 23 September 2013, the inauguration of the new IAEA Nuclear Material Laboratory (NML) in Seibersdorf (Austria) took place. The Nuclear Material Laboratory Enhancing Capabilities of Safeguards Analytical Services comprises the IAEA clean laboratory extension, the new nuclear material laboratory construction and the Seibersdorf site infrastructure and security upgrading.

The NML will bring together, in a single building, analytical activities that are currently dispersed among a number of buildings at Seibersdorf. The NML will give state of the art capabilities in the analysis of uranium,

plutonium, spent fuel and high-activity liquid waste samples, as well as in archiving samples safely and securely. Once completed, it will have training facilities for inspectors and nuclear chemists, which will be available to visiting scientists from Member States. The opening of the new NML is now followed by efforts to make it fully operational by the end of 2014.

European Commission (DG DEVCO and DG JRC) and EEAS have been closely and successfully cooperating since 2010 in the frame of the project Enhancing the Capabilities of the International Atomic Energy Agency

Safeguards Analytical Services (ECAS project). The European Union has been supporting the ECAS project from the Instrument for Stability with a €10M donation for the construction and outfitting of:

- Plutonium Laboratory Area
- Thermal Ionisation Mass Spectrometry Laboratory Area
- Trace & Impurities Laboratory Area
- Hot Environmental Samples Laboratory Area
- Low-Level Laboratory Area

- Sample Logistics Areas

Upon request from EEAS and DG DEVCO, the JRC provides technical/scientific advice within its area of expertise to identify the appropriate activities and the most efficient way for using the EU contribution, including participation in the relevant workshops and meetings. The JRC will further follow-up on the progress of the joint EC-IAEA project agreements in its capacity as scientific and technical body of the European Commission and to its experience in implementing the EU support programme to the IAEA in the field of nuclear safeguards.



Vienna representatives of EU countries and senior European Commission officials visited the IAEA Laboratories in Seibersdorf, Austria, on 14 May 2013 (Photo: K. Gaggi/IAEA)

The European Commission cooperative support programme (EC-SP)

Established in 1981, the European Commission Cooperative Support Programme (EC-SP) continues to provide the framework for the technical support to the IAEA in the field of Nuclear Safeguards. The EC-SP has been involved in more than 125 tasks in different technical and application areas – 46 active tasks in 2013.

Working areas include:

- Measurement techniques: including destructive analytical techniques and particle analysis, non-destructive assays and process monitoring techniques. It also includes the development of reference materials and particles targeted to Safeguards needs.
- Containment, Surveillance and Sealing / identification techniques
- Information collection and treatment, including analysis of trade data
- Training of inspectors: jointly with Euratom inspectors or targeted to IAEA needs.

The Joint Research Centre (JRC) of the European Commission operates the EC-SP in close cooperation with the EC Directorate General for Energy (DG ENER in charge of the implementation of the Euratom safeguards

system). Two JRC institutes actively collaborate with the IAEA under the framework of EC-SP: (a) the Institute for Reference Materials and Measurements (IRMM), Geel, Belgium, and (b) the Institute for Transuranium Elements (ITU), Karlsruhe (Germany) and Ispra (Italy) sites.

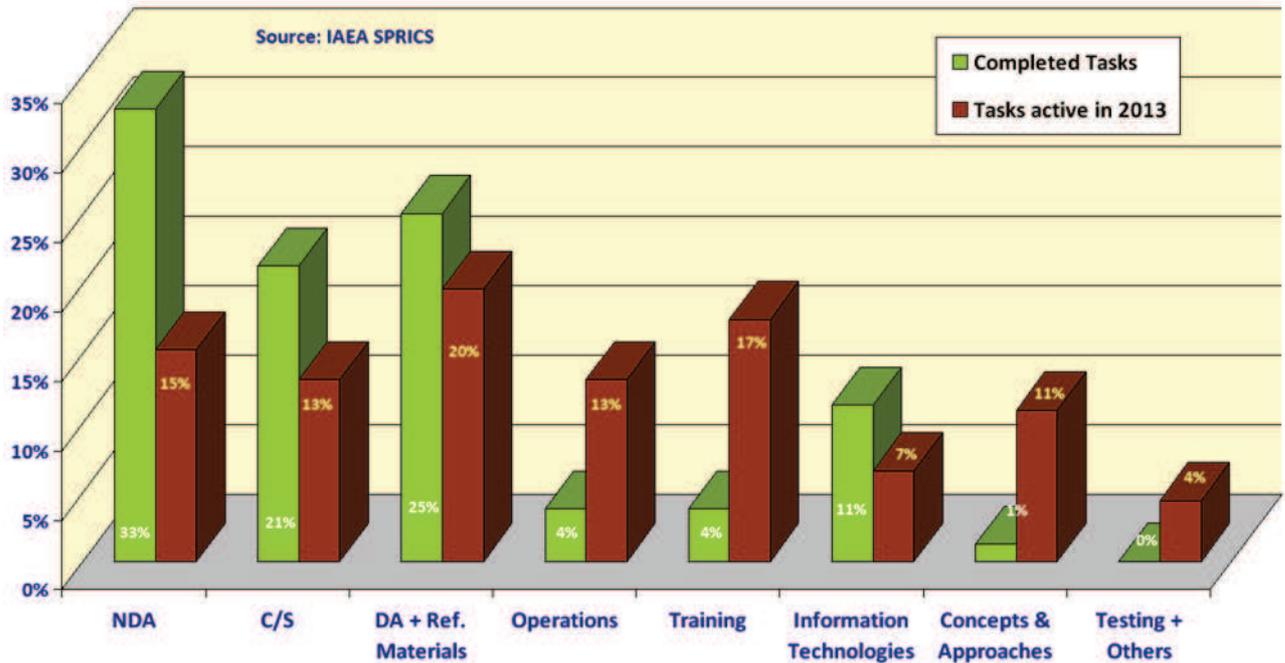
Collaboration with other Support Programmes

To address IAEA expressed needs, the EC-SP fosters the active collaboration and cooperation with Support Programmes from other Member States. Collaborative activities can take the form of Joint Tasks or co-organization of dedicated technical meetings. As an example, around 30% of EC-SP tasks are executed jointly or in close collaboration with other MSSPs. EU member states are regularly invited to participate in the EC-SP Annual Review Meetings.

Areas of Activity

The graphic below shows the evolution of the EC-SP along the years comparing the technical/application profile of all completed tasks with the currently active tasks. There is a substantial increase in tasks associated to supporting IAEA operations, training and Safeguards Concepts and Approaches.

Evolution of the EC-SP by Application Area (%)



Distribution of EC-SP active and completed tasks in the several Safeguards technical and application areas

Recent Highlights of the EC-SP

In recent years, five JRC-developed technological systems have been approved for IAEA Safeguards use (also known as category A equipment), which is a major EC-SP achievement. They are:

- a) COMPUCEA – Combined Procedure for Uranium Concentration and Enrichment Assay
- b) 3DLR: 3D Laser Range Finder

c) Ultrasonic Seals

d) L2IS: Laser Item Identification System

e) LMCV: 3D Laser Surface Mapping of Canister Closure Welds

Other international cooperation

UNSCR 1540 (and 1977)

In accordance with the EU strategy against the proliferation of weapons of mass destruction, which sets the objective of fostering the role of the UN Security Council and of enhancing its expertise in meeting the challenges of proliferation, the EU supports the implementation of the UNSCR 1540 (2004) and its extension decision 1977 (2011)²⁹. The EU has implemented two Council Decisions: 2006/419/CFSP of 12 June 2006 (EU contribution of €0,195 million) and 2008/368/CFSP (with a financial amount of €0.475 million).

A new Council Decision was adopted on 22 July 2013 and is in force since November 2013³⁰ (with a contribution of €0,75 million).

Several activities are planned by the 1540 Committee under this EU funding, such as:

- enhancing the relevant national and regional efforts and capabilities primarily through capacity-building and assistance facilitation;
- contributing to the practical implementation of specific recommendations of the 2009 Comprehensive Review of the status of implementation of UNSCR 1540 (2004), in particular in the areas of technical assistance, international cooperation and raising public awareness;

²⁹ Resolution 1977 (2011) adopted by the Security Council at its 6518th meeting, on 20 April 2011 ([http://daccess-ods.un.org/access.nsf/Get?Open&DS=S/RES/1977%20\(2011\)&Lang=E&Area=UNDOC](http://daccess-ods.un.org/access.nsf/Get?Open&DS=S/RES/1977%20(2011)&Lang=E&Area=UNDOC))

³⁰ 2013/391/CFSP of 22 July 2013 (OJ L198/40 of 23.7.2013)

- initiating, developing and implementing National Action Plans upon States' request.

G8 global partnership

The EU continues to be an important contributor to the G8 Global Partnership. Under the Instrument for Stability, it spent around €300 million with various third countries on chemical, biological, radiological and nuclear risk mitigation during the period 2007-2013. G8 Global Partnership activities

include assistance on nuclear security, engagement of relevant scientists, export controls, border monitoring, illicit financing, biosecurity and, more generally, illicit trafficking of nuclear and radiological materials.

Global Initiative to Combat Nuclear Terrorism (GICNT)

The EU is strongly committed to contribute, in a tangible and constructive way, to the activities of the GICNT. The EU continued in 2012 and 2013 to be actively involved in working together with the other partner nations and observers to the GICNT in order to strengthen international co-operation to advance nuclear forensics technical capabilities, information-sharing mechanisms and training and education of nuclear security relevant personnel. The EU is actively involved in the activities of the GICNT Implementation and Assessment Group, in both areas of

nuclear detection and nuclear forensics, as well as the newly established working group on response and mitigation, priority areas of the GICNT in combating nuclear terrorism. In October 2012, meetings of the GICNT Working Groups on Nuclear Forensics and, respectively, Response and Mitigation were hoisted in Arona and Ispra (Italy) by the European Commission's Joint Research Centre. In September 2013, a meeting of an ad-hoc group was hosted at the Joint Research Centre in Karlsruhe (Germany).

Euratom agreements

Euratom's international nuclear cooperation agreements, covering trade in nuclear materials and equipment, include obligations on both parties on the adhesion to the strictest international standards in physical protection and nuclear export controls. This reflects the Euratom policy of encouraging the responsible use of nuclear energy by those states which choose to include nuclear in their energy mix. The most recent agreement of this type was signed in 2013 between the EURATOM Community and the Republic of South Africa³¹.

In the field of R&D nuclear safeguards and security, a new Agreement was signed by Euratom and the DOE on the 2nd of November

2010, replacing the old agreement signed in 1995. In addition to nuclear safeguards R&D areas, new areas of cooperation have been defined: technologies and methodologies related to combating the illicit trafficking, nuclear forensics and related data bases, open source information tools; , technical aspects of export controls including technical training, emergency management, nuclear security training courses. Moreover, DOE and Euratom decided to enhance their coordination efforts to cooperate with third countries and relevant international organizations that may contribute to the improvement of nuclear security.

The cooperation with Russia has been mainly developed under the EU TACIS programme. Many projects in the field of nuclear material accountancy and control and on combating the illicit trafficking of nuclear materials, including nuclear forensics, have been implemented as

³¹ OJ, L204/3 of 31.07.2013

the result of a very close cooperation between the EU and its Russian partners.

With the Japan Atomic Energy Agency, the scope of cooperation has been enlarged to include in addition to nuclear safeguards, activities in the field of nuclear security detection and forensics. Cooperation on nuclear security training represents an important component of the cooperation, mainly in relation to the nuclear security support centre established recently by Japan.

Reinforced cooperation on promoting nuclear security, strengthening the international non-proliferation regime and related export control arrangements, and combatting the smuggling of nuclear material is included as an objective in the EU-China 2020 Strategic Agenda for Cooperation adopted in 2013. Euratom and China have recently started implementing the Euratom/China R&D agreement. In the area of safeguards and security, after a meeting between EC and China Atomic Energy Authority (CAEA)³² where the areas of cooperation have been defined.

Finally we should mention the role of the European Safeguards Research and Development Association (ESARDA)³³ and the Institute of Nuclear Materials Management (INMM)³⁴ as platforms for technical cooperation, exchange and convergence on nuclear safeguards and nuclear security including nuclear forensics.

³² See <http://www.caea.gov.cn/n602670/n621894/index.html>

³³ See <http://esarda2.jrc.it/about/index.html>

³⁴ See http://www.inmm.org/About_INMM.htm

International Working Groups related to the Nuclear Field

The Border Monitoring Working Group (BMWG) was created in 2006 between the US, the EU and IAEA. This working group was initially set up with the aim of coordinating the support given by the members to third countries in order to not duplicate their efforts and to optimise their resources. Now the mission of the BMWG has evolved towards the implementation of joint projects where the members are sharing the efforts in the specific area of nuclear forensics. The BMWG is a proven framework for collaboration and coordination of assistance related to nuclear security.

Main activities of the BMWG consist of:

- Sharing information on individual support programs.
- Coordinating activities in the areas of equipment deployment, training, and sustainability
- Conducting joint BMWG assessment missions in various regions aiming at ensuring common approaches and

practices to assistance and support to be provided.

- Implementing joint projects in different regions in the world.
- Cooperating on some R&D aspects related to the technologies used for radiation.

The Nuclear Forensics International Technical Working Group (ITWG) takes a prominent position, as this group gathers nuclear forensics practitioners (including scientists, law enforcement and regulatory authorities) from more than 30 countries and international organizations like the IAEA, Interpol or Europol. Developing guidelines and performing inter-comparison exercises are essential products of the group. Additionally, exchanging experience and international cooperation are very important for advancing nuclear forensic science and thus for sustainable success in combating illicit nuclear trafficking, terrorism and proliferation.

Both working groups are co-chaired by the European Commission.

Nuclear forensics

Since 1992 the JRC has been involved in activities related to combating illicit trafficking and to nuclear forensic analysis in particular. Presently the JRC, with its Institute for Transuranium Elements in Karlsruhe, takes a leading position in this area and activities comprise research and development, actual case work and capacity building measures including training.

During the past two decades JRC has examined seized nuclear material in more than 45 cases, providing support to the competent authorities in Member States and beyond. Thereof some 10 incidents occurred in the past few years involving uranium materials ranging from natural to highly enriched material.

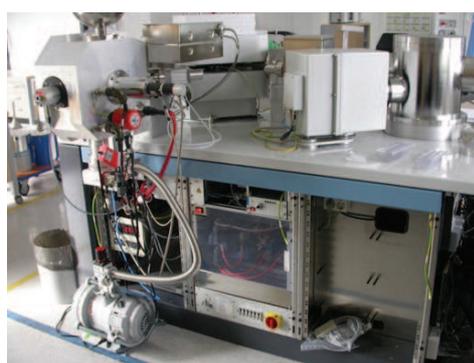
Nuclear and other radioactive material out of regulatory control continue to be detected by EU Member States. Nuclear materials pose not only a radiological hazard, but are indicative of nuclear proliferation or potentially of nuclear terrorism. Therefore these incidents often require a detailed nuclear forensic investigation in order to reveal information on the history, the origin and the intended use of the material. This information provides investigative leads to law enforcement in case a criminal act was involved but it serves as well for taking appropriate action by the member states in which the seizure occurred together with the IAEA.

Nuclear forensics support is based on the sound expertise on nuclear materials and the unique analytical facilities available at the laboratories of JRC. Continued research and development work aims at improving and validating nuclear forensic methods and at identifying new signatures (i.e. parameters which provide hints on the potential origin of unknown nuclear material) and demonstrating their robustness.

Signatures may point at the age of the material, at the process used for

manufacturing the material and at the source material used. Recently, the JRC has developed rapid and accurate methods for age-dating of uranium, and prepared the first certified reference material for uranium radiochronometry. Also, an interlaboratory comparison exercise was launched in order to evaluate the state of expertise in age dating among nuclear forensic laboratories worldwide. Stable isotopes of Sulphur (present as impurity in uranium ore concentrate) proved to be a new signature pointing at the geographic origin of the sulphuric acid used for uranium mining.

The intersection between nuclear forensics and classical forensics requires particular attention as it draws on the expertise from two different areas. A study for separating DNA (the so called "genetic fingerprint") from radioactively contaminated evidence was successfully completed. The EU is funding a research project to investigate novel technologies for visualizing fingerprints (on contaminated matrices) and other forensic techniques.



Measurement of U and/or Pu isotopic Ratios by Mass Spectrometry using new modified total evaporation method developed by JRC

Capacity building activities are funded through the Instrument for Stability (for countries outside the EU) and through the CBRN Action Plan (for EU Member States). These activities include the provision of equipment, exchange of staff, exchange of samples, sharing knowledge and training of experts.

For implementing these activities and for furthering nuclear forensic science JRC has built strong partnerships with international expert laboratories in the US, Japan, France,

the UK, Russian Federation, ... and with the International Atomic Energy Agency. Moreover, cooperation with law enforcement agencies like the FBI, Europol, Interpol, the Netherlands Forensic Institute or the German Federal Criminal Police ensure that due consideration is given to aspects of traditional forensics including chain of custody and evidence management.

Nexus between nuclear safety and security

The EU has a particular interest in ensuring that the peaceful uses of nuclear energy take place with the highest standards of nuclear safety and security.

The EU promotes the highest possible safety standards for all types of civilian nuclear activities. Primary responsibility for the safety of nuclear installations lies with their operators, who are supervised by the national independent regulators.

Legislation

In the field of nuclear safety, including waste management and radiological protection, the EURATOM Community has developed common legislative frameworks. In 2009 the Nuclear Safety Directive³⁵ was adopted. An amendment to this Directive was proposed by the Commission in October 2013 to the Member States with a number of areas identified for legislative improvements. In particular, the proposal strengthens the role and independence of national regulators; introduces EU-wide nuclear safety objectives; sets up a European system of topical peer reviews of nuclear installations to ensure these common objectives are met; increases transparency on nuclear safety matters; and includes new provisions for on-site emergency preparedness and response.

In 2011, the EU adopted binding legislation on spent fuel and radioactive waste management³⁶ which requires the EU Member

³⁵ Council Directive 2009/71/Euratom of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations - OJ L 2009:172/18

³⁶ Council Directive 2011/70/Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste - OJ L 2011:199/48

States to establish national programmes for managing radioactive waste and includes a requirement for these programmes to develop concrete plans for construction of waste disposal facilities.

Fukushima

As a response to the 11 March 2011 Fukushima accident, the European Commission and the European Nuclear Safety Regulators' Group (ENSREG)³⁷ agreed on 25 May 2011 on voluntary tests for the EU's 143 nuclear power reactors. Based on a common methodology, all nuclear power plants in the EU underwent comprehensive nuclear risk and safety assessments (called "stress tests") in 2011 and 2012, which were conducted by national regulators and through international peer review. The European stress tests consisted of three phases:

- In *phase one* the nuclear power plant operators carried out a self-assessment, and
- in *phase two* the national regulators evaluated these self-assessments and prepared national reports. 17 countries fully participated in the stress tests

³⁷ The European Nuclear Safety Regulators Group (ENSREG) is an independent, authoritative expert body created in 2007 following a decision of the European Commission. It is composed of senior officials from the national nuclear safety, radioactive waste safety or radiation protection regulatory authorities and senior civil servants with competence in these fields from all 28 EU Member States and representatives of the European Commission. ENSREG's role is to help to establish the conditions for continuous improvement and to reach a common understanding in the areas of nuclear safety and radioactive waste management.

including all EU Member States operating nuclear power plants³⁸.

- in *phase three*, these reports were analyzed by multinational teams in a peer review process with participation of experts from nuclear and non-nuclear EU Member States, Switzerland, Ukraine, and the EC's own services³⁹. The final European Commission Communication on the stress tests was published in October 2012⁴⁰.

Other countries also conducted comprehensive nuclear risk and safety assessments, based on the EU stress-test model. These include Switzerland and Ukraine (both of which fully participated in the EU stress tests), the Russian Federation, Armenia, Turkey, Taiwan, Japan, South Korea, South Africa and Brazil. The EC is now holding discussions with some of these countries, particularly with those in its geographical neighborhood, regarding possible peer review of their stress tests.

Based on the stress tests, national regulators concluded that there are no technical reasons requiring the shutdown of any nuclear power plant in Europe, and identified a series of good practices. Further, significant and tangible nuclear power plant improvements have been identified in all participating countries, and are currently being implemented or planned.

Countries participating in the stress tests exercise were requested to submit a National Action Plan in response to the findings of the stress tests. These National Action Plans describe the actions that were taken, planned or implemented and their schedule to improve the safety of nuclear power plants operated in Europe. The Commission and ENSREG have

³⁸ <http://www.ensreg.eu/EU-Stress-Tests>

³⁹ <http://www.ensreg.eu/node/407>

⁴⁰ http://ec.europa.eu/energy/nuclear/safety/doc/com_2012_0571_en.pdf

scheduled to follow-up progress with the implementation of these plans during 2013-2014. Presentations and in-depth discussions on the status of these National Action Plans have been held at a dedicated seminar organized by ENSREG in Brussels in April 2013.

Synergies

Synergies between safety and security applicable to existing nuclear installations are indeed possible, and the aim is to ensure that, as both frameworks develop, safety and security obligations serve to reinforce each other. In fact, the safety of nuclear installations could improve in synergies with some of the risks addressed by nuclear security (e.g. malicious acts against nuclear plants), while other nuclear security aspects for example those related to nuclear trafficking and proliferation need specific different approaches.

Possible areas of application are: risk prevention, risk management and emergency preparedness and response. The technologies used for assessment of plant response to accidents can be used for both safety and security purposes and the techniques and methods developed in the field of radiation protection (to address the health of workers and the general public following the peaceful use of nuclear energy) are similar to some of those used in nuclear security. For future installations, synergies between safety and security are also to be guaranteed at the level of the conception design and construction phase, the risk assessment and risk management methodologies, the operation and oversight of the installations and licensing processes

Aircraft Crash

As an example, due to the potential severity of its effects, the issue of the impacts of aircraft crashes on nuclear installations received significant attention in the course of the European stress tests.

The feedback from the various public interactions held in the course of the European stress tests confirmed the strong interest of

several stakeholders, including the general public, in the topic of the safety of nuclear power plants against accidental or deliberate aircraft impacts.

The Council's Ad-hoc Group of Nuclear Security (AHGNS)⁴¹ dealt, among other, with this issue from a security perspective. The AHGNS proposed additional follow-up activities to be performed by operators and/or competent authorities.

The Commission organised in September 2012 in Luxembourg a closed workshop on "Safety of Nuclear Power Plants against Aircraft Impacts" with the aim to review how this issue is dealt with from a nuclear safety perspective in Europe for both operating nuclear power plants (from regulators' viewpoints) and for new nuclear power plant designs (from vendors' viewpoints). The main objective was to come – on the basis of the level of information which participating organisations were ready to share – to a summary assessment of the relevance of this issue from a safety perspective.

FP7+2

The EU Euratom framework programme 7 for nuclear research and training has also been re-focused for the two-year extension (2012-2013) towards nuclear safety and security. In particular, research topics addressing the impact of the nuclear accident in Japan on severe accident management, emergency management and nuclear education and training in Europe and the consequences of combination of extreme external events on the safety of nuclear power plants have been added to the work programmes.

⁴¹ In order to deal with matters related to the security of nuclear power plants, the AHGNS was set-up in July 2011 in the Council. It comprised security experts from the Member States with the Commission closely associated.

EU Legislation concerning the management of radioactive sources

The Euratom Treaty addresses the need to protect the health of workers and the general public against the dangers arising from ionising radiation.

Pursuant to the Treaty, a comprehensive set of directives, regulations, recommendations and decisions has been elaborated and adopted. Since the first Basic Safety Standards (BSS) Directive adopted in 1959, this Directive was updated many times. The latest update was in 1996⁴². Other legislation was adopted in the aftermath of the Chernobyl accident, with regard to the exchange of information, and on contamination of food. Legislation on specific aspects was developed with regard to outside workers, control of radioactive sources and shipment of radioactive waste and substances.

Development of the EU radiation protection legislation on control of radioactive sources

The EURATOM framework for radiation protection has been revised, including the regulatory control of radioactive sources. The new EURATOM Basic Safety Standards⁴³ consolidate five existing EURATOM Directives, including the High-Activity Sealed Sources (HASS) Directive. The aim of the HASS related modifications in the new BSS is to align the EURATOM HASS provisions with the IAEA Code of Conduct on Safety and Security of Radioactive Sources, particularly in respect of

aligning the EURATOM definition of high-activity sealed source with the IAEA source categorisation system. In addition the new Directive includes requirements concerning the management of orphan sources and scrap metal contamination situations.

HASS Directive implementation

The Commission has under its CBRN Action plan studied the implementation of the current HASS Directive requirements in the EU Member States. The results indicate good, even excellent, implementation in most States. The only requirement resulting from the HASS Directive that could be subject to further improvements is the requirement to carry out search and recovery campaigns for orphan sources.

Environmental radioactivity monitoring

The EURATOM Community has a radiation monitoring platform based on the EURDEP (European Radiation Data Exchange Platform) system. It now aims at expanding the geographical coverage of the platform to the whole territory of the European continent (currently Ukraine, Belarus, Bosnia-Herzegovina, Albania, Moldova and Montenegro do not participate in the data exchange programme).

The EC has also initiated a qualitative expansion by introducing new sample types in the data exchange; most important being nuclide specific air radioactivity concentration data.

In 2011, the EC has concluded a Memorandum of Understanding with the IAEA for using the EURDEP system as a technical basis for a global data exchange system operated by the IAEA.

⁴² Council Directive 96/29/Euratom of 13 May 1996.

⁴³ Council Directive 2013/59/EURATOM of laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom

Emergency preparedness

The new BSS Directive introduces a comprehensive set of requirements which will ensure an effective and efficient emergency preparedness and response in European Union Member States, strengthening many requirements following the lessons learned from the Fukushima accident.

The ECURIE (European Community Urgent Radiological Information Exchange) system, which is used for exchanging urgent information during a radiological emergency has been upgraded and modernised. The system includes arrangements for making national emergency information available on urgent basis, rapid exchange of monitoring data and facilitating urgent audio conferencing

between EU Member States in order to achieve a common European approach to the management of the emergency situation.

CBRN

With regard to public health protection, the European Commission is coordinating together with the EU Member States through the EU Health Security Committee preparedness and response to CBRN events and threats. With the perspective of reinforcing this coordination, the Decision No 1082/2013/EU of the European Parliament and of the Council on serious cross-border threats to health streamlines and strengthens EU capacities and structures for effectively preparing, early warning and responding to major cross-border public health emergencies.