

GREECE

**National report on the implementation of the
Code of Conduct
on the safety and security of radioactive sources and
its associated guidance on the import and export of
radioactive sources**

May 2019

Executive Summary

The Greek Atomic Energy Commission (EEAE) is the national regulatory authority, competent for the control, regulation and supervision in the fields of nuclear energy, nuclear technology, radiation and nuclear safety and security. EEAE operates as a public entity and enjoys full administrative and financial independence in relation to its duties. EEAE is supervised by the Minister of Education, Research and Religious Affairs.

Greece has submitted to IAEA its commitment to implement the Code of Conduct and its Supplementary Guidance on the Import and Export of Radioactive Sources.

Radioactive sources are used for medical, industrial, research and educational applications, in Greece; their activities range from few Bq to TBq. Several legislative, regulatory and enforcement provisions are in place for the safety and security of radioactive sources, for, inter alia, orphan sources, disused sources and high activity sealed sources (HASS). Recently, the national framework has been revised to: i) transpose the Directive 2013/59/Euratom on the Basic Safety Standards for protection against the dangers arising from exposure to ionising radiation and ii) fully comply with the requirements of the Directive 2011/70/Euratom on Establishing a National Legislative, Regulatory and Organizational Framework for the Responsible and Safe Management of Spent Fuel and Radioactive Waste.

The national framework assigns the prime responsibility for the safe and secure management of radioactive sources to the operator (licensee). Qualified persons are appointed by the operator to assess and ensure, on a continuous basis, the safety and security of the sources.

EEAE maintains the national inventory of radioactive sources and implements a regular inspection program on annual basis; scheduled and extraordinary inspections, both unannounced and announced are based on graded approach.

For the import and export of radioactive sources to EU Member States (MSs), the ANNEX I document applies, as consent of the competent authorities, prior to the commencement of the shipment. For non-EU countries and for the HASS, a consent form is submitted to competent authorities prior to the shipment, according to IAEA and CoC recommendations. Import of radioactive sources receives authorization (i.e. licensing) by EEAE. For the transport practices, the graded approach is implemented, as for the rest of the practices; notification, registration or licensing is applied, based on the risk that commensurate with the transport activity i.e. UN numbers and frequency of shipments. Prior to the import of radioactive sources, a formal written declaration from the source manufacturer for accepting back the source after its useful life, is a prerequisite, as well as a formal written declaration from the operator (licensee) for undertaking all financial and administrative arrangements to export the source back to manufacturer or other authorized radioactive source management facility.

EEAE reassures the recovery and the safe and secure management of orphan sources and of those that potentially could fall out of regulatory control and impose risk to population and the environment. An interim storage facility in NCSR "Demokritos" is available, where sources are collected and temporarily stored for final management (cleared, disposed or exported to recycling facilities abroad), whenever, there is a clear and urgent need based on EEAE decision. Furthermore, financial resources to cover intervention costs relating to the recovery and

management of orphan and potentially out of regulatory control sources are provided by EEAE and the Government.

According to the national framework, the licensee establishes internal appropriate emergency response plans and makes every effort to ensure preparedness, as well as the necessary human resources and technical means for their effective and timely response in accordance with their role and responsibilities, as defined in the Special Radiological or Nuclear Emergency Response Plans. Licensees implement arrangements and apply measures for the prevention of accidents and for the mitigation of their consequences, in order to protect the workers and the public from significant exposure to radiation.

At national level, the General Secretariat for Civil Protection (GSCP) is responsible for the preparation of the relevant EPR plans (e.g. National Emergency Plan for Nuclear, Radiological, Biological and Chemical Threats, CBRN). To this end, GSCP cooperates with the EEAE and other relevant authorities, as defined in the General Civil Protection Plan (codename "XENOKRATIS").

The defense-in-depth system incorporates portable radiation detectors and radiation detection portals that operate at metal processing - scrap metal industry, as well as, at border points, ports, customs and the Athens International Airport. EEAE is systematically notified for alarms or radioactive sources events and responds according to the plans. EEAE has on-line access 24/7 in the detection portals.

The main developments and achievements during the last 3-years reporting period (2016-2019) include:

- completion of legislation to transpose and successfully fulfil the requirements of the European directives (2013/59/Euratom and 2011/70/Euratom);
- the appointment and operation of the National Committee of Radioactive Waste Management (EEDRA), tasks of which are focusing, among others, on radioactive sources management;
- progress on decision making for the establishment of radioactive waste disposal options, including disposal options for radioactive sources;
- training, research and development (R&D) in the management of radioactive sources and radioactive waste.

The CoC and its Supplementary Guidance are considered as satisfactorily applied in the country. At the same time needs for improvement have been identified and some actions are in progress.

A. The infrastructure for regulatory control of the safety and security of radioactive sources

A.1. National and international coordination

Inter-departmental liaison is in place for EPR and security issues. Indicatively, a cooperation and work agreement exist between the EEAE, General Secretariat for Civil Protection, Customs, first responders (medical aids, police, fire brigade); cooperation also exists with security agencies and the Hellenic Police, regarding the security of high activity sealed sources (at facilities and during transport).

Regarding international coordination, Greece is a signatory to the Convention on early Notification of a Nuclear Accident, Vienna, 1986 and the Convention on Assistance in the case of a Nuclear Accident or Radiological Emergency, Vienna, 1986.

Co-operation between States and authorities in the event of a transport accident is achieved in practice through established contacts between Competent Authorities (CAs) at European, Mediterranean and International level, EPR mechanisms launched by EU & IAEA, bilateral agreements or Memoranda of Understanding (Bulgaria, Romania, Cyprus).

EEAE represents the country in international and European organizations and committees with role in the formulation of policies and of the regulatory framework. EEAE represents the country in the European Nuclear Safety Regulators Group - ENSREG, as well as in the Heads of European Radiological protection Competent Authorities Association-HERCA.

In detail, EEAE senior staff members participate in relevant committees of the International Atomic Energy Agency (IAEA), e.g. Technical Cooperation Group of Experts, Steering Committee for Education and Training, Nuclear Security Guidance Committee (NSGC), Transport Safety Standards Committee (TRANSSC), Nuclear Safety Standards Committee (NUSSC), Radiation Safety Standards Committee (RASSC) and Waste Safety Standards Committee (WASSC), as well as in relevant committees of EU, e.g. Groups of Experts under the Euratom Treaty Articles 31, 35, 36 and 37, ECURIE - European Community Urgent Radiological Information Exchange, EURDEP - European Radiological Data Exchange Platform, etc.

EEAE senior staff members represent Greece in several fora, e.g.) OEDC/NEA Steering Committee for Nuclear Energy, European Radiation Dosimetry group (EURADOS), European ALARA Network (EAN), IAEA Advisory Group on Nuclear Security, European Association of Competent Authorities for the Safe Transport of Radioactive Material (EACA), Mediterranean Network for strengthening of an effective compliance assurance regime for the transport of radioactive material in the Mediterranean region and in associated shipping States (MedNet), IAEA/WHO Secondary Standard Dosimetry Laboratories Scientific Committee, etc.

A.2. Legislation and regulations

The national framework for radiation and nuclear safety is set out primarily in a number of Laws, Presidential Decrees and Joint Ministerial Decisions. In particular, the main legislative and regulatory documents currently in force are outlined below:

Competent authority

1. Law No.4310/2014, Government Gazette Folio No: 258/A/8.12.2014, Research, Technological Development and Innovation and other provisions”, Chapter E, Management of Nuclear Energy, Technology and Radiation Protection – Greek Atomic Energy Commission (EEAE)
2. Presidential Decree No. 404/1993 “Organization of the Greek Atomic Energy Commission”

Radiation Protection

3. Presidential Decree No. 101/2018 Folio No. 194/A/20.11.2018, “Transposition of the Council Directive 2013/59/Euratom of 5th December 2013, 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 – Establishment of the Radiation Protection Regulation”
4. Ministerial decision No. 45872 Folio No 1003/B/3.4.2019, “Procedures for regulatory control of ionizing radiation practices - recognition of services and experts”

Nuclear safety and radioactive waste

5. Presidential Decree No. 60, Folio No. 111/A/3.5.2012, “Establishing a National Framework for the Nuclear Safety of Nuclear Installations”
6. Presidential Decree 122/2013, Folio No. 177/A/12.08.2013, “Transposition to Greek legislation of 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”
7. Presidential Decree 91/2017, Folio No. 130/A/01.09.2017 “Legislative, regulatory and organizational framework for the responsible and safe management of spent fuel and radioactive waste and amendment of the Presidential Decree. 122/2013”
8. Presidential Decree No. 83, Folio No. 147/A/03.09.2010, “Transposition of Council Directive 2006/117/Euratom of 20 November 2006 on the supervision and control of shipments of radioactive waste and spent fuel into the Greek legislative framework”
9. Ministerial Decision No 131207/I3 Folio 1858/B//27.08.2015 on the Establishment of the National Policy for the Management of Spent Fuel and Radioactive Waste
10. Ministerial Decision No Π/112/214196 Folio No. 2941/B/31.12.2015 National Program of the Management of Spent Fuel and Radioactive Waste
11. EEAE-194/2018: EEAE decision No Π/112/4364/2018, Folio No. 194/YOΔΔ/05.04.2018, “Appointment, composition and functioning of the National Committee for Radioactive Waste Management”, 2018, as amended by the 7b/254, Folio No. 325/YOΔΔ/07.06.2018 (EEAE-325/2018).

A.3. Establishment and responsibilities of the regulatory body

The Greek Atomic Energy Commission (EEAE) is the national competent authority for radiation and nuclear safety and security. EEAE was initially established by an Act in 1954. The organization has been re-established with a different scheme in 1987. In 2014, with the Law 4310 (Government Gazette Folio No. 258/A/08.12.2014) titled “Research, Technological Development and Innovation and other provisions”, in which an individual chapter, i.e. chapter E, titled “Nuclear Energy, Technology and Radiation Protection - Greek Atomic Energy Commission” is included (articles 39 - 46, article 90), the whole framework (Law 1733/1987,

Legislative Decree 181/1974) is replaced by a new operation framework of EEAE. The new framework brings important improvements, regarding, inter alia, EEAE independence, enforcement means, inspectors' role and inspection procedures, licensing authority and transparency enhancement.

The effective independence of EEAE in the decision making process is ensured by the fact that the Board makes autonomous decisions on safety matters, without political or other interference. These decisions, as well as the minutes of the Board meetings are accessible to the public via the EEAE website. Moreover, EEAE staff members are not allowed to have other job positions in the private or public sector.

The new EEAE operation regime is in line with the International and European requirements for radiation protection and nuclear safety regulatory authorities, enhances the independent and effective regulatory control of this field and addresses most of the IRRS mission findings.

EEAE organizational structure was published in the form of a Presidential Decree in 1993. Currently, a new Presidential Decree for the re-organization of EEAE has been approved by the government and is at the final stage of issuance. Following IRRS mission findings, the new organizational structure of EEAE provides for the operational separation between its regulatory functions and scientific and technical services.

EEAE employs a sufficient number of about 75 qualified and competent staff to carry out its tasks. Most of EEAE personnel holds a degree of high level education and dispose specialized scientific expertise (M.Sc. and/or Ph.D.). Their continuous training, the participation in EEAE E&T activities and the participation in scientific networks and international fora and activities is encouraged in order to sustain the knowledge and experience required for the fulfillment of their tasks.

EEAE financial resources are provided from the State budget and from fees. The accounts and fiscal reports of the EEAE are subject to the control of the Audit Council. These data and fiscal reports are published on the EEAE website and submitted to the President of the Hellenic Parliament and the relevant Minister alongside the annual report and the budget for the upcoming year.

EEAE implements an integrated management system (IMS) designed according to IAEA GSR part 2; in 2013 it was certified in accordance with the requirements of ISO 9001:2008 standard, which incorporates all functions and accreditations of EEAE. Since then, the IMS has been reviewed and revised, taking into account the revised ISO 9001:2015 standard and the recommendations and suggestions of the initial IRRS mission in 2012. All the relevant findings were closed at the Follow-Up IRRS Mission held in 2017 presented in other parts of the report.

According to its statutory role EEAE responsibilities include:

- development of safety procedures and regulations;
- *authorization*: EEAE issues licenses for practices involving the possession, use, import and transport of radioactive sources;
- *inspections and enforcement*: A regular inspection program is implemented by EEAE annually. Unannounced and announced compliance inspections are included to EEAE's inspection program. Graded approach is applied in this process; for example high risk facilities and activities are inspected per year. The inspection plan includes verification of compliance with the regulatory requirements and the license terms for the safety and security of radioactive sources. The enforcement procedure has been developed and incorporated to the EEAE IMS.

- *radiation and radioactive source registry*: EEAE maintains the national inventory of radiation sources, radiation equipment and radiation facilities;
- *environmental monitoring*: EEAE operates the telemetric environmental radioactivity monitoring network, throughout the country and performs laboratory measurements by alpha and gamma spectroscopic analysis and total α/β measurements in drinking water, air filters, soil and other type of samples, as well in materials and industrial waste for NORM;
- *dosimetry services*: EEAE is currently the only individual dosimetry service provider in the country and monitors more than 12,000 occupationally exposed workers (external and internal exposure) throughout the country. EEAE maintains the National Dose Registry;
- *calibration of ionizing radiation instruments*: EEAE operates the Ionizing Radiation Calibration Laboratory (IRCL) which is the national metrology laboratory (SSDL);
- *emergency preparedness & response*: EEAE, as the competent authority for responding to radiological and nuclear emergencies, participates in the General Plan for Civil Protection “Xenokritis” and in the National Emergency Plan for Chemical, Biological, Radiological and Nuclear (CBRN) threats. EEAE has established and operates its internal emergency plan and has the appropriate infrastructure and experienced personnel for this purpose. Furthermore, EEAE is the national contact point for the early notification systems ECURIE and ENATOM of the European Commission and the IAEA respectively;
- *education and training*: EEAE provides education and training in the fields of radiation protection, radiation safety and nuclear security. EEAE is the IAEA Regional Training Centre for Europe) in the fields of radiation protection and safety of radiation sources. It participates to and partly hosts the national Inter-University Postgraduate Course in Medical-Radiation Physics and organizes several educational activities;
- *research in the fields of its competence*: EEAE participates in research and development activities and programs, taking advantage of European financial resources, opportunities of cooperation within European scientific networks, national resources. EEAE scientific and technical personnel are of high scientific level. They participate in several working groups and committees as mentioned above. Their contribution in European research projects and scientific networks, as well as their scientific work in EEAE, produces a number of publications in international journals and presentations in conferences;
- *public information*: EEAE holds the responsibility of providing credible and accurate information to the public and the media regarding its fields of competence, by organizing events and disseminating information (e.g. leaflets, website), while in case of radiological emergencies, it provides all the necessary data and information, as part of the General plan for radiological emergencies;
- *international cooperation and national representation*: indicatively IAEA, EC, NEA OECD, ENSREG, HERCA, EURADOS, EURAMET.

B. Facilities and services available to the persons authorized to manage radioactive sources

Centralized Interim Storage facility

The National Centre for Scientific Research “Demokritos” (NCSR “Demokritos”), one of the most prominent research centers in Greece, is a self-administered governmental legal entity, under the supervision of the General Secretariat for Research and Technology of the Ministry of Education, Research and Religious Affairs. NCSR “Demokritos” operates a centralized

facility for the interim storage of radioactive waste (RW), radioactive sources (RS) and radioactive material (RM). The license of the facility includes practices for the interim storage of RW and disused RS, low activity sources dismantling, characterization of RW, re-packaging and re-sorting of RW and RS and de-characterization and clearance of RW. In this storage facility, waste from the research reactor, legacy waste and other radioactive sources and waste are temporarily stored.

Management of radioactive waste - Disposal facility

The National Committee for Radioactive Waste Management (EEDRA) has been recently established (April 2018) by EEAE decision, according to the legislative framework. As the establishment of a separate Waste Management Organization (WMO) is not justified, as the already small nuclear program that Greece has, is not foreseen to be further developed. EEDRA is independent from the waste producers, maintaining its autonomy in relation to the regulatory authorities due to its diverse composition, and has a flexible and effective form.

EEDRA is a 9-member body with advisory and supportive role towards the Minister on the implementation of the practical aspects of the national policy and national framework and on the coordination of the entities involved in RW management, including the management of radioactive sources. The establishment of EEDRA, ensures the collaboration between the organizations/entities involved in RW management and the coordinated implementation of actions.

Greece has not yet established a disposal facility. One of the EEDRA assigned duties is to set up and coordinate the road map of the establishment of a disposal facility.

Border Entry Points and Metal Industry

Portable radiation detection systems and portal detectors operate in custom offices at border entry points, as well as at metal industry facilities. Smaller custom offices have only portable equipment. The portals of the custom offices are networked and EEAE has an on-line access to their detection readings.

Radiation protection services

The dosimetry service for *radiation workers* is provided by EEAE. EEAE is currently the only individual dosimetry service provider in the country and monitors more than 12,000 occupationally exposed workers (external and internal exposure) throughout the country. EEAE keeps the National Dose Registry;

EEAE operates the Ionizing Radiation Calibration Laboratory (IRCL) which is the national metrology laboratory (SSDL) and has an official partnership with the National Metrology Institute.

User / Facilities

The licensee (facility – end user) for practices involving radioactive sources has the prime responsibility for safety, security and radiation protection and for compliance with the safety principles and radiation protection regulations, according to the national and European legislation and the applicable IAEA safety standards. The licensee has the prime responsibility for the management of the radioactive sources, either until their physical decay to the statutory clearance levels, or for their export to an authorized facility (manufacturer, producer) or for

their transfer to an authorized radioactive waste management facility. Management cost is borne by the licensee. Licensees are required to comply with the binding principles of the national policy and the relevant national guidelines and international standards, as well as to have, according to the graded approach principle, the necessary financial resources, infrastructure and skilled workforce required to ensure safety.

For each radioactive source, a Radiation Protection Officer (RPO) and/or a safety source officer (person in charge) is assigned by the licensee, who is responsible to assess the safety and security of sources and to communicate and address to the licensee all necessary measures.

All category 1 sources (teletherapy, industrial irradiators and blood irradiators) countrywide are equipped with security alarm systems connected to a Security Agency. The security systems include motion detectors, infrared barriers, interlocks on external source device surface, door and window interlocks, audio and visual alarm sirens, lockers and entry keypad interlock. The security agency performs checks of the communication on-line system daily and reports to EEAE, immediately, in case of alarm. For the rest categories of sources, security systems are in place, following the graded approach.

C. Training of staff in the regulatory body, law enforcement agencies and emergency service organizations

During the last 3-years reporting period, important training and R & D have been taken place.

A significant number of scientific and technical staff from EEAE and NCSR “Demokritos”, the major key partners in radioactive sources and waste management participated in IAEA training activities and programs, as RER and INT projects.

NCSR “Demokritos” and EEAE participated or/and developed consortiums for EU and IAEA R & D activities, programs and proposals (e.g. JOPRAD, EJP)

These activities have strengthen the cooperation between Greek scientists, research and technical centers and initiated and broadened the collaboration with EU research centers and IAEA.

In addition, EEAE participates in IAEA and EU training workshops, seminars, meetings and practical exercises concerning the safety and security of radioactive sources. At national level, EEAE organizes in cooperation with national and international organizations (e.g. DoE USA) and participates in practical exercises with first responders (policy, fire brigade, medical aids, etc).

D. Establishment and maintenance of a national register of radioactive sources

EEAE maintains the national inventory of all radioactive sources in the country, with the following information:

- Operator i.e. licensee : facility / laboratory / organization
- Person in charge : Radiation protection officer / advisor or source officer
- License : validity period- conditions
- Source/s location within the facility
- Source device : manufacturer, type, etc
- Source isotope, type – form, s/n
- Source activity and reference date

- Other available information from the licensee

The centralized interim storage facility at NCSR “Demokritos” stores disused sealed radioactive sources in gauges, lightning rods, smoke detectors, neutron sources, industrial sources, contaminated objects, as well as, depleted uranium, Pu-Be sources, , beryllium blocks, decommissioning waste from the research reactor, liquid waste in tanks, resins in drums, contaminated biological waste in concrete, Pu contaminated soil. The inventory of these sources is submitted to EEAE for licensing purposes.

Lightning Rods - Greece has a large inventory of lightning rods containing radioactive sources (Ra-226 and Am-241). It is estimated that about 1000 rods are still on buildings. Two private companies are licensed to perform decommissioning of the rods, upon request of the rod owner. The radioactive elements of the rods cannot be exported for recycling to authorized facilities abroad; therefore they have to be managed within the country.

E. National strategies for gaining or regaining control over orphan sources

1. Greece has provisions in place for the safe and secure interim storage of orphan sources or sources that potentially could fall out of regulatory control and impose risk to population and the environment. EEAE coordinates the recovery of such sources. The sources for which, by EEAE decision, there is a clear and urgent need – from the safety, security and radiation protection point of view - are transferred to the interim storage facility in NCSR "Demokritos", where they are temporarily stored until they are exported to a recycling facility abroad, or finally managed, i.e. transferred to the disposal facility upon its establishment or cleared whenever the clearance levels are met. Financial resources to cover intervention costs relating to the recovery and management of orphan or unattended sources are provided by EEAE and the Government.

2. At country borders, main ports and Athens international airport radiation detection systems - portals have been installed and operate for the control of illicit trafficking and illegal import/export of radioactive materials, as well as for the detection of sources. Customs officers use portable radiation detectors (survey meters and spectrometers) for further monitoring and assessments. EEAE is notified for every alarm or radiation source event and actions. Furthermore, according to the national framework (i.e. Ministerial Decision for Control of high-activity sealed radioactive sources and orphan sources and Ministerial Decision for metal processing factory operation), every metal processing facility has installed and operates radiation portals for the detection of radiation sources or radioactive material in scrap metal. Metal products from these factories are also checked for contamination by the installed portals. EEAE is immediately notified for every alarm or radiation source event and actions accordingly. There is a number of innocent alarms every year, which involve mainly NORM or items and old consumer products that contain small amount of radioactive material, e.g. luminance material in old vehicle’s speed meters.

3. In case of bankrupt of facilities possessing sources, the licensee (operator) retains the prime responsibility of the safe and secure management of the sources. In case a compromise between debtor and creditors is reached, the responsibility of source management is transferred to the creditors or to the new owners of the facility. The bankrupt issue is important and difficult to be handled in many cases, due to legal and technical implications.

4. Radioactive sources that have been detected in scrap metal shipments, mainly concern small amounts of radioactive material or surface contaminated objects, are collected and temporarily stored to the interim storage facility of the NCSR “Demokritos”. In such cases, EEAE announces the events to the IAEA information incident database (former illicit trafficking database).
5. EEAE has organized campaigns to recover orphan or disused sources from past activities. The pertinent leaflet was disseminated widely.
6. Security measures are applied to all sources taking into account the risk encountered. These measures are inspected by EEAE and include security alarm systems, interlocks, lockers, etc.
7. Police escort is always requested during transport of category 1 sources in the Greek territory, while for categories 2 and 3 sources, the RPO or RSO accompanies the shipment.
8. The domestic threat from radioactive sources has been assessed. Category 1 sources (e.g. teletherapy, blood irradiators and commercial sterilization) are assessed as difficult to be lost or stolen. Malicious acts on site could cause local, not-extended, contamination. Category 2 industrial radiography sources are subject to potential loss or theft. For this, the operation license conditions state that the sources must return to their authorized safe-boxes after their use on-sites, while radiographers must attend the sources continuously. Other industrial, research and educational sources have low potential hazards.

F. Approaches to managing radioactive sources at the end of their lifetimes

1. Every radioactive source, that cannot be cleared, is required to be repatriated to the manufacturer after its useful life. For this, prior to the import of radioactive sources, a formal written declaration from the source manufacturer for accepting back the source after its useful life, is necessary, as well as a formal written declaration from the operator (end user) for undertaking all financial and administrative arrangements to export the source back to manufacturer or other licensed storage/recycling facility abroad.
2. EEAE encourages the re-use of radioactive sources by another user. However, this has happened in practice only in a few cases in the past and mainly concerned well logging devices and educational/research sources.
3. For the moment, the only available solution for sources is the repatriation or export for recycling and re-use. This option has been implemented successfully in Greece, in the past during a respective project. It is anticipated that this strategy will continue to be implemented, whenever needed, considering that disposal facility does not yet exist in the country.
4. The fact that the repatriation option is not feasible in all cases (e.g. legacy radioactive sources, closure of manufacturer, bankrupt of operator, etc), has been taken into account to the national framework and the national program on radioactive waste management. Since, a disposal facility is not foreseen for the near – mid future, the sources are kept in the owners facilities and are inspected and authorized systematically.
5. Since 1990, the import and installation of radioactive lighting rods has been prohibited. However, due to past practices, Greece has a large inventory of lightning rods containing radioactive sources (Ra-226 and Am-241). About 1000 of them are still on buildings. EEAE informs the users for their replacement and performs occasionally on-site checks for their integrity, as well as, radiation leak tests and verifies the radiation protection measurements applied to the surrounding area. There are two authorized facilities that provide dismantling, replacement and management services for radioactive lightning rods.

G. Experience with arrangements for implementing the import and export provisions of the Code and of the Guidance on the Import and Export of Radioactive Sources

Import/Export

The end user (hospital, radiographer, commercial sterilization unit etc.) is requested to submit to the Greek Atomic Energy Commission (EEAE) the following:

- Application describing the radioactive sources to be imported (e.g. number of sources, isotope, activity)
- The ANNEX I document, if the country of origin of the shipment is an EU Member State. For non EU Member States, the Consent Form in case of Category 1 & 2 radioactive sources
- Accept back letter from the manufacturer abroad (i.e. confirmation that the radioactive source/-s will be taken back after their useful time)
- End user confirmation about covering the cost of future re-export of the radioactive sources to their manufacturer abroad
- Date of import
- Package description and categorization (label, T.I. etc)
- Certificate for special form (whenever applicable)
- Certificate for transport package design (whenever applicable)

In case of road transport under Individual Transport License, the end user is additionally requested to submit to EEAE the following:

- Point of entry in the country (e.g. airport, custom) and route
- Driver and co-driver contact details and training records (e.g. ADR certificates)
- Vehicle description, plate No. and labeling
- Emergency response plan and 24/7 contact information
- Shipment duration
- Date of transport

In case of road transport, the end user is requested to specify the carrier who holds the above-mentioned transport license.

Transport of category 1 sources in the Greek territory is escorted by the Hellenic Police, while category 2 and 3 sources are accompanied by the RPO or RSO.

Annually, approximately 100 radioactive sources (of all categories) are imported and 80 radioactive sources are exported. Most of them are used in medical brachytherapy (Ir-192) and in industrial radiography (I-192 & Se-75). The import of category 1 sources is very rare. During the last three years, 2 teletherapy Co-60 sources have been imported and 2 exported. It is worth mentioning that lately, there is a tendency for teletherapy Co-60 machines replacement by linear accelerators; therefore, several (about 6 to 7) Co-60 units is expected to be repatriated in the near future.

In all cases the import / export / transport has been implemented successfully, without any incidences.

Import or Export under exceptional circumstances are addressed ad-hoc. Till to date, request for such import or export has not been submitted to EEAE.

H. Additional topics relevant to the implementation of the Code and the Guidance

IAEA - Integrated Regulatory Review Service (IRRS) mission

At the request of the Government of Greece, an IAEA Integrated Regulatory Review Service (IRRS) Follow-up mission was conducted in EEAE from 20 to 24 November 2017. The purpose of the IRRS Follow-up mission was to review progress against the recommendations and suggestions identified in the initial IRRS mission (20 to 30 May 2012).

Overall, the IRRS team concluded that Greece has been responsive to each recommendation and suggestion made in 2012, and continues to place appropriate focus on implementing a framework that provides for effective protection of public health and safety. 26 out of 28 recommendations and 9 out of 10 suggestions identified in 2012 have been closed. More specifically, in the areas relevant to the RW management, the IRRS team deduced that since 2012, EEAE has taken positive steps to:

- Update its legal and regulatory framework to bring into compliance with the latest IAEA safety standard;
- Develop and implement an integrated management system and foster safety culture;
- Clearly assign responsibility for radiation safety including for the safe management of spent fuel and radioactive waste; and setting out the obligations and responsibilities of the license holder and the prime responsibility for safety;
- Develop its compliance assurance program for transport of radioactive material and strengthen its capacity for review and approval of package design by validation of the original certificate;
- Enhance the national regulatory framework for the management of radioactive waste and decommissioning.

Conversely, the IRRS team concluded that even if the IAEA classification scheme is generally applied in the regulatory oversight, EEAE has not incorporated it into its regulatory system. Therefore, the IRRS team considered that the relevant suggestion made in 2012 is still open.

EEAE projects for source recycling

In 2001 – 2005 EEAE implemented a national project for the identification, collection and export of disused and orphan sealed sources. About 3000 sources with total activity of 120 TBq (3500 Ci) for medical, industrial and research use, including about 700 old Ra-226 brachytherapy sources, as well as ten Co-60 and Cs-137 radiotherapy sources were collected from facilities and exported for recycling to the Gamma Service Recycling facility, in Germany. A similar project is provided in the National Program for radioactive waste management. Currently the project is at its initiation phase. The disused sources that could be recycled have been identified and recorded, countrywide. The next phases include the identification of facility abroad that accept to receive the sources for recycling, the collection and conditioning of the sources and the actual sources export. The project is estimated to last for 5-6 years. The required costs shall be borne by the facilities / holders of the radioactive sources and partially by EEAE and the Government.