



**JOINT CONVENTION
ON THE SAFETY OF
SPENT FUEL
MANAGEMENT AND
ON THE SAFETY OF
RADIOACTIVE
WASTE
MANAGEMENT**

**October
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**NATIONAL
REPORT OF GREECE**

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SECTION A.

INTRODUCTION

Greece has signed the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management on 5 September 1997. The Convention has been ratified and entered into force on 16 March 2000.

The present report is the National Report of Greece for the 5th Review Meeting to the Convention, which will take place in 2015 at the IAEA in Vienna. The report has been prepared in accordance with the Guidelines regarding the Form and Structure of National Reports (IINFCIRC/604/Rev.3, 13 May 2014), established by the Contracting Parties under Article 29 of the Convention.

Greece has no nuclear power plants. Spent fuel management is therefore relevant only with the research reactor (GRR-1) at the National Centre of Scientific Research (NCSR) "Demokritos". GRR-1 is licensed for extended shutdown and the irradiated fuel stored in the reactor is covered by an agreement with the US Department of Energy for shipment back to the USA until 2019.

Radioactive waste in Greece originates from medicine, research and industry, including waste from the past operation of GRR-1 (resins, irradiated objects etc); waste with Naturally Occurring Radioactive Materials (NORM) results from some industrial activities. In 2013 the Presidential Decree No. 122 was issued for the transposition of the EC Directive 2011/70/Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste. Secondary legislative documents are currently in preparation, including the National Program for the management of spent fuel and radioactive waste in Greece.

A facility for interim storage of radioactive waste ("New Radioactive Waste Interim Storage" (NRWIS)) exists at the premises of the NCSR "Demokritos" and operates under the Institute of Nuclear and Radiological Sciences & Technology, Energy & Safety (INRSTES) by the Laboratory for Radioactive Material Management (LRMM) of the NCSR "Demokritos". The license of the facility was recently renewed by EEAE for the interim storage of radioactive waste and disused radiation sources, low activity sources dismantling, characterization of radioactive waste, re-packaging and re-sorting of radioactive waste and radioactive sources and de-characterization and clearance of radioactive waste. The legislative basis for the licensing of the facility is the Radiation Protection Regulations (RPR) (Joint Ministerial Decree 1014 (ΦΟΠ) 94, Official Gazette No 216/B/6-03-2001) and the Presidential Decree (PD) No.122 (117/A/12.08.2013). Waste from past practices are also stored on site in GRR-1 and in facilities associated with its previous operation.

As it concerns sealed radioactive sources, according to the Greek Atomic Energy Commission (EEAE) Board decision and the Greek legislation since 1990, a legal written declaration from the source manufacturer for accepting back the source after its useful life, is necessary prior to import of any radioactive source, as well as a legal written declaration from the source user for undertaking all financial and administrative provisions to export the source back to manufacturer or other licensed storage/recycling facility abroad. The import, export and transport of all radioactive sources are licensed by EEAE (with an exception of the radioactive smoke detectors, where special provisions apply).

Moreover, Greece has transposed and implemented the European Council Directive 2003/122 on the control of the high activity sealed radioactive sources and orphan sources (HASS) (Ministerial Decision 10828/ EFA (1897) (859/B/10.7.2006).

In 2012, an Integrated Regulatory Review Service (IRRS mission) of the national regulatory framework, as well as of EEAE as the competent authority, was conducted. Radioactive waste management was included in the scope of the mission. A thorough action plan is now being implemented; the mission report is publicly available at EEAE website. More information about the mission is provided in the ANNEX of this report, where the recommendations and suggestions pertaining directly to radioactive waste management are also listed. The full IRRS mission report is publicly available at EEAE website. Moreover, actions have been taken for the development and implementation of an integrated management system of the organization, its staff and its resources, according to the terms of ISO 9001 and the requirements of IAEA Safety Standard, The Management System for Facilities and Activities, GS-R-3. In the context of the action plan implementation and also for EC Directive 2011/70/Euratom implementation, EEAE participates effectively in IAEA activities and exploits IAEA expertise on radioactive waste and sources management (e.g. INT 9176, RER/9/107, invitation of two IAEA expert missions in Greece on National Program development).

Greece attaches the highest importance to international efforts to harmonize and increase all aspects of nuclear and radiological safety. In this respect, Greece has initiated projects and bilateral agreements with other countries and participates and contributes to international and European activities, including review meetings of the Joint Convention on the Safety of the Spent Fuel Management and on the Safety of Radioactive Waste Management.

SECTION B.

POLICIES AND PRACTICES

Article 32 (Reporting), paragraph 1

(a) Spent fuel management policy

The spent fuel of the GRR-1 was returned to the USA for the last time in 2005. The irradiated fuel currently stored in GRR-1 is under an agreement with the US DoE for return to the USA until 2019. Spent fuel final disposal in Greece is not presently considered as part of the Radioactive Waste Management National Policy. According to Article 4.1c of PD 122 “Transposition of Council Directive 2011/70/EURATOM establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste” (177/A/12.08.2014), spent fuel shall be returned to a supplier or producer country, according to agreement which shall be in place before the import of the fuel in Greece.

(b) Spent fuel management practices

The irradiated fuel from the past operation of the GRR-1 is stored on site until the return shipment to the USA. Interim wet storage of the fuel of GRR-1 takes place in the fuel storage pool inside the reactor building. Storage of fuel follows radiation protection and safety regulation, applied during the recent licensing of the reactor for the extended shutdown state. Shipment follows transport and safeguards legislation.

The nuclear material existing in Greece is subject to the control and regular inspection of IAEA and EURATOM Safeguards.

(c) Radioactive waste management policy

Radioactive waste in Greece originates from medicine, research and industry (including industries generating waste with NORM). Radioactive waste also originated from the past operation and activities of the GRR-1. The majority of them are LL-W, while there is a small amount of IL-W, like irradiated parts from the reactor core and three Pu-239 sources.

As high activity sealed radioactive sources are concerned, at the moment, the only solution for their up to end management remains the repatriation or the export for recycling and reuse. This option has been implemented successfully in Greece in the past. This practice should be repeated when need arises.

The National Program for radioactive waste management is currently under development, as part of the EC Directive 2011/70/Euratom Directive implementation. Relevant legislative documents are being drafted.

The basic principles of the National Policy for radioactive waste management are already provided in Article 4 of PD 122, according to which:

- Disposal in Greece is allowed only for radioactive waste produced in Greece.
- Until the construction of a disposal facility, waste shall be safely stored in a licensed storage facility.

- The production of radioactive waste shall be kept as minimum as possible, through the appropriate measures, including recycling and reuse.
- The interdependencies among the various stages of radioactive waste management shall be taken into account.
- The management of radioactive waste shall be performed with safety, including in the long term with passive means.
- A graded approach shall be followed, in accordance with the magnitude and the characteristics of the potential hazards.
- The cost for the management of radioactive waste is borne by the waste producers.
- In all stages of radioactive waste management an evidence-based and documented decision making process shall be implemented.

The national policy will be issued in the form of a Ministerial Decision which is under development as part of the EC Directive 2011/70/Euratom implementation.

Regarding orphan sources, EEAE has taken provisions for the safe and secure interim storage of the orphan sources or sources that cannot be exported to their manufacturer or other source management facilities (e.g. in case of bankrupt, facility closure, etc). These provisions include an interim storage in the NCSR "Demokritos" facility, where the sources could be collected, temporarily stored and then exported for recycling. Furthermore, financial resources to cover intervention costs relating to the recovery and management of orphan or disused sources are provided to EEAE by the Greek Government.

Greece supports the idea of sharing of common activities, practical solutions and R & D programmes in the context of agreements between the countries, taking into account the conditions specified in the EC Directive 2011/70/Euratom.

(d) Storage facilities

The NRWIS was designed in 2003 and built one year later. It is located within a safe and secure area of the NCSR "Demokritos" and is operated by the Institute of Nuclear & Radiological Sciences & Technology, Energy & Safety (INRSTES), which is also the operator of the GRR-1.

The NRWIS facility is used for safekeeping of spent/orphan sealed sources (without back-end agreement) and primary unconditioned radioactive waste. The sealed disused or orphan sources in the country – not being able to be exported - and radioactive waste produced within the NCSR "Demokritos" are transferred and temporarily stored accordingly, at prescribed locations in the NRWIS. Radioactive waste resulting from activities within the NCSR "Demokritos" is segregated at the origin. Segregation is based on: (i) the information given by the licensee of the particular activity; (ii) results of radiological survey and (iii) material composition.

The NRWIS facility consists of two storage compartments for safekeeping of Low and Intermediate Level Waste (LILW-SL). The first compartment is used for: (i) radioactive waste produced from research activities at the NCSR "Demokritos" that should be kept for more than 2 years before sorting and/or clearance and (ii) historical radioactive waste after sorting and characterization. The second room is for (i) spent/disused/orphan sources, (ii) radioactive contaminated objects, mainly with alpha emitters, that are found within the country and characterized as radioactive waste, as for example: lightning rods using Ra-226, parts of aircraft engines with thorium and several items found in scrap metals, like materials with NORM, objects with luminance (Ra-226) material (e.g. vehicle speed meters, etc), and others and (iii) radioactive waste from the GRR-1. Besides the storage rooms, the facility operates also as radioactive waste characterization laboratory.

The license of the facility was recently renewed by EEAE for interim storage of radioactive waste, and unused radiation sources, dismantling of radioactive smoke detectors, lightning rods and simple devices using small activity radioactive sources, characterization of radioactive waste produced from past activities of the NCSR "Demokritos" (e.g. resins, biology experiments, etc), on-site works for space arrangements, re-packaging and re-sorting of radioactive waste and radioactive sources and de-characterization and release of radioactive waste. The legislative basis for the licensing of the facility were the RPR and the PD No.122. *IAEA Safety Standards WS-G-6.1, Storage of radioactive waste, safety guide* was also used by EEAE as further guidance.

(e) Radioactive waste management practices

For the waste produced in NCSR "Demokritos", on-site waste treatment includes a range of operations, such as waste segregation, characterization, conditioning, storage and discharge after verification of clearance. The waste that cannot be cleared is stored in the NCSR "Demokritos" facilities.

For waste discharge without restriction, the followings are taken into account:

1. The composition and the activity of the waste, provided by the users.
2. Independent measurements performed by the waste management personnel. In particular, the dose rate on the surface of the waste drum should be at the level of the background dose rate (the measurements are performed at a low background area), and the spectrum after a 30 min measurement with a portable NaI detector on contact to the drum should be comparable to the 30 min background spectrum. Then the drum is evacuated inside the segregation box and contamination measurements are performed with a surface contamination detector.

Medical & research activities

Nuclear medicine and other research laboratories short lived waste are appropriately stored on site until decay and then released to a waste disposal for non-radioactive waste or to a waste treatment facility for infectious waste. Special retention tanks might be required in nuclear medicine laboratories using I-131 (EEAE has issued a relevant decision). Liquid waste is disposed through the laboratory's dedicated and labeled pipelines to the national sewage system, in accordance to the specific levels for unconditional clearance provided in the RPR.

The radioactive waste management provisions for the research and medical sectors, included in Part 6 of the RPR, are:

1. Sealed sources after their useful life are returned to their manufacturer abroad.
2. Radioactive waste produced by the use of unsealed sources in solid and/or liquid form:
 - Solid waste is stored in dedicated shielded storage containers for decay, until they reach the unconditional clearance levels provided by the RPR, which are in accordance with the EC Publication Radiation Protection 122-Part 1.
 - Liquid waste is disposed through the laboratory's dedicated and labeled pipelines to the national sewage system, in accordance to the specific levels for unconditional clearance provided in the RPR.

EEAE has adopted the EC Publication Radiation Protection 122 ("Practical use of the concepts of clearance and exemption" – Part II) and has issued an explanatory circular for this purpose. Industrial waste produced by NORM industries with radionuclide concentrations exceeding the exemption levels has been exported for recycling.

Criteria to categorize low and intermediate-level radioactive waste: Radioactive waste characterization in Greece follows the IAEA standards in force.

SECTION C.

SCOPE OF APPLICATION

Article 3 Scope of Application

- (a) As mentioned before in Sections A and B, spent fuel management in Greece concerns only the GRR-1. All spent fuel of the GRR-1 has or will be returned to the United States.
- (b) Greek legislation declares waste that contains NORM as radioactive waste, only if the exposure to the general public exceeds predefined limits when this material is released to the environment. Activities inducing NORM waste include the agricultural applications of phosphogypsum, the decommissioning activities of abandoned industries, etc.
- (c) Greece has not declared spent fuel or radioactive waste within military or defense programmes as spent fuel or radioactive waste for the purposes of the Convention.

According to Greek legislation, EEAE is the competent authority for the safety of radioactive waste management. Even if EEAE is not responsible for the radioactive waste from the military sector, it is handled by EEAE in the same way as described in this report, since this waste is covered by the legislative system described in Section E.

SECTION D.

INVENTORIES AND LISTS

Article 32 Reporting, paragraph 2

(a) Spent fuel management facilities

There are no spent fuel management facilities in Greece.

(b) Inventory of spent fuel

The inventory of the irradiated nuclear fuel stored in the GRR-1 is given in Section L (Table a).

(c) Radioactive waste management facilities

NRWIS interim storage facility of NCSR “Demokritos”

The NRWIS facility is used for safekeeping of spent/orphan sealed sources (without back-end agreement) and unconditioned primary radioactive waste. Sealed sources and radioactive waste collected in the country which cannot be stored on site for decay and discharge, as well as the waste produced within the NCSR “Demokritos”, are transferred and temporarily stored at specified locations in the NRWIS. Radioactive waste from activities within NCSR “Demokritos” is segregated at the origin. Segregation is based on: (i) the information given by the licensee of the particular activity; (ii) results of radiological survey and (iii) material composition.

Other facilities-practices in NCSR “Demokritos”

In addition to the NRWIS interim storage facility, other infrastructure exists in NCSR “Demokritos” which has been used in the past, during the operation of the research reactor and the production of radioisotopes, for the management, mainly, of liquid or sludge radioactive waste. This infrastructure is still operating and includes:

- Central retention tanks for aqueous waste
- Sorting box for the segregation of solid waste
- High force compactor
- Equipment for cementation (sludge-liquid)
- Facilities for interim storage

On site storage of institutional waste

Nuclear medicine and other research and industrial laboratories waste is appropriately stored on site until decay or repatriation to the country of origin or transport for disposal or recycling and reuse to an authorized facility. On site storage of radioactive waste and sources is covered by the operational license of the facility, according to the RPR.

(d) Inventory of radioactive waste

Waste produced by GRR-1

No additional radioactive waste have been produced in the GRR-1 during the reporting period, therefore the data provided for the period 2008-2010 in the previous report are still valid (Tables b and c). The radiological characterization of the resins was performed as part of the ongoing project for the characterization of the NCSR "Demokritos" legacy waste from past practices.

National Inventory of Sources

EEAE maintains the national radioactive sources inventory including the following information:

- License holder: facility / laboratory / organization
- Person in charge: Radiation protection officer / advisor or source officer
- License: expiration - conditions
- 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

By the end of 2013, the following sources, (which potentially might become waste), were in use in industrial, medical and research laboratories within the country:

Category 1: 9 Co-60 teletherapy of activities between 5 kCi to 10 kCi, 14 Cs-137 in blood irradiators, and 1 sterilization Co-60 source(s) of 300 kCi total activity

Category 2: 11 high dose rate brachytherapy Ir-192 sources, 1 medium dose rate brachytherapy Cs-137 sources, 36 industrial radiography Ir-192 and Se-75 sources

Category 3: 101 radioactive sources for well logging gauges – devices

Category 4 and 5: 752 radioactive sources for industrial applications

Category 5: 1175 sources for research and educational applications

Additionally, the following radioactive sources and waste are stored in the radioactive waste management facilities of NCSR "Demokritos" (see par. c above), including GRR-1.

GRR-1:

- Sources at reactor in storage including Pu-Be
- Contaminated items
- Beryllium blocks
- GRR-1 Primary Cooling System decommissioning waste

Central retention tanks

- Liquid Waste

NRWIS

- Resins in drums
- Contaminated biological waste in concrete
- Pu contaminated soil
- Disused sealed radioactive sources in gauges

- Lightning rods and sources
- Contaminated metal objects
- Smoke detectors
- Neutron source
- Industrial sources
- Depleted uranium

Radioactive sources located in GRR-1 are granted with a possession license, while the central retention tanks are granted with an operation license. Characterization of the waste and sources stored in NRWIS is still under development. Updated relevant data have been submitted during the recent licensing and are continuously submitted on a regular basis.

Lightning Rods

Greece has a large inventory of lightning rods containing radioactive sources (Ra-226 and Am-241). Well over 1000 are still erected on buildings and it appears that these sources cannot be exported outside the country for recycling because they are technically not sealed sources. These sources need to be removed from buildings, conditioned and stored for future disposal.

SECTION E.

LEGISLATIVE AND REGULATORY SYSTEM

Article 18 Implementing measures

Greece has implemented the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.

Article 19 Legislative and Regulatory Framework

The laws and regulations relevant to this Convention are given below.

Spent fuel and radioactive waste management

- Government Gazette, Presidential Decree No. 122, Folio No: 177, First issue, August 12, 2013, "Transposition of Council Directive 2011/70/EURATOM establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste".

Radiological protection

- Government Gazette, Legislative Decree No. 181, Folio No: 347, First issue, November 20, 1974, "Protection against ionizing radiation";
- Government Gazette, Joint Ministerial Decision No. 1014 (FOR) 94, Second Issue, Folio No. 216, March 6, 2001, "Approval of RPR";
- Government Gazette, Ministerial Decision No. 10828/(EFA)1897, Folio No. 859, Second Issue, July 10, 2006, "Control of high-activity sealed radioactive sources and orphan sources" (transposition the Council Directive 2003/122/Euratom);
- Government Gazette, Ministerial Decision No. 9087(FOR)1004, Folio No: 849, Second issue, September 13, 1996, "Operational protection of outside workers exposed to the risk of ionizing radiation during their activities in controlled areas".

Nuclear installations

The legislative framework with regard to nuclear installations is as follows:

- Government Gazette, Act No. 854, Folio No. 54, First Issue, March 18, 1971, "On the terms regarding the establishment and operation of nuclear facilities";
- Government Gazette, Presidential Decree No. 610, Folio No. 130, First issue, August 23, 1978. "Establishing terms and procedures in licensing Public Power Corporation to construct a nuclear power plant on a specific site" (the Public Power Corporation is the Greek national utility);
- Government Gazette, Presidential Decree No. 60, Folio No. 111, First Issue, May 3, 2012, "Establishing a National framework for the nuclear safety of nuclear installations" (transposition of the Council Directive 2009/71/ Euratom of 25 June 2009).

Nuclear research reactors

- Government Gazette, Ministerial Decision P/112/305, Folio No. 2877, Second Issue, October 26, 2012, "Basic requirements – principles of nuclear safety and regulatory supervision of nuclear research reactors".

Implementation of International Instruments

Greece has ratified the international conventions related to nuclear safety and radioactive waste management, with the following laws:

- Government Gazette, Law No. 2480, Folio No. 70, First Issue, May 14, 1997, "Ratification of the Nuclear Safety Convention";
- Government Gazette, Law No. 1758, Folio No. 44, First Issue, March 10, 1988, "Ratification of the Protocol Amending the Convention on Third Party Liability on the Field of Nuclear Energy of 29 July 1960, as it was modified by the Additional Protocol of the 28 January 1964";
- Government Gazette, Law No. 1937, Folio No. 35, First Issue, March 13, 1991, "Ratification of the International Convention in case of a Nuclear Accident or Radiological Emergencies";
- Government Gazette, Law No. 1938, Folio No. 36, First Issue, March 13, 1991, "Ratification of the International Treaty on Early Notification in case of a Nuclear Accident";
- Government Gazette, Law No. 2824, Folio No. 90, First Issue, March 16, 2000, "Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management".

Safeguards and non-proliferation

The Greek legislative framework related to safeguards and non-proliferation is the following:

- Government Gazette, Legislation Decree No. 437, Folio No. 49, First Issue, February 26, 1970, "Ratification of the non proliferation treaty signed on the 1 June 1968";
- Safeguards agreement between Greece and IAEA signed on 17.11.1972;
- Government Gazette, Law No. 1636, Folio No. 106, First Issue, July 18, 1986, "Ratification of the physical protection of nuclear material treaty";
- Government Gazette, Ministerial Decision No. 5408 /E3/2362/ Φ MSG, Folio No 730, Second Issue, September 21, 1993 "Control on transfer of nuclear materials, armament and technologies affecting national Defense and Security";
- Government Gazette, Law No. 2805, Folio No. 50, First Issue, March 3, 2000, "Ratification of the additional protocol".

Establishment of the regulatory body

- Government Gazette, Law No. 1733, Folio No. 171, First issue, September 22, 1987, "Transfer of Technology, inventions, technological innovation and establishment of the Greek Atomic Energy Commission";
- Government Gazette, Presidential Decree No. 404, Folio No. 173, First issue, October 5, 1993, "Organization of the Greek Atomic Energy Commission".

Emergency preparedness

In order to cope with emergency situations, Greece has established the General Plan for Civil Protection. Annex "P" of this Plan is dedicated to radiological/nuclear emergencies (see Art. 16).

- Government Gazette, Ministerial Decision 2739/94, Folio No.165, Second issue, March 15, 1994, "Regulation for public information in the event of a radiological emergency";
- Government Gazette, Ministerial Decision No. 2025, Folio No. 12, Second Issue, January 19, 1998, "Approval of the General Plan for Civil Protection, under the Code Name Xenokratis";

- Government Gazette, Ministerial Decision No. 1299, Folio No. 423, Second Issue, April 10, 2003, “Approval of the General Plan for Civil Protection, under the Code Name Xenokratis”;
- Government Gazette, Law No. 3491, Folio No. 207, First Issue, October 10, 2006, “Establishment of the supporting team for Nuclear, Radiological, Biological and Chemical Threats”.

Other relevant legislation

- Government Gazette, Law No. 3787, Folio No. 140, First Issue, August 7, 2009, “Ratification of the Protocol amending the Convention on Third Party Liability in the field of nuclear energy of 29 July 1960, as amended by the additional protocol of 28 January 1964 and by the Protocol of 16 November 1982”;
- Government Gazette, Presidential Decree No. 83, Folio No. 147, First Issue, September 3, 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”.

Circulars – Decisions

- EEAE Interpreting Circular of 18.10.2006, “Quality control protocols for radiology laboratories”;
- EEAE Circular Ref. No. P/105/388 / 30.11.2006, “Patients’ excreta release after nuclear medicine treatments (therapies)”;
- EEAE Circular Ref. No. P/105/241 / 03.08.2006, “Clearance levels of Naturally Occurring Radioactive Materials”;
- Decision of the General Secretary for Civil Protection “National Plan on CBRN threats”, November 2011.

Legislation in progress

- A task group has been assigned for the preparation of additional legislation, as required by PD 122, for the transposition and implementation of the EC Directive 2011/70/EURATOM. In particular, under preparation are: a Presidential Decree concerning the national framework for radioactive waste and spent fuel management, and two Ministerial Decisions, one defining the National Program and the other the licensing of facilities and practices relevant to spent fuel and radioactive waste management.

Article 20 Regulatory Body

The Greek Atomic Energy Commission (EEAE) was initially established by an Act in 1954; EEAE has been re-established with a different scheme in 1987, according to which it is an autonomous civil service. EEAE is currently supervised by the General Secretariat for Research and Technology, under the Ministry of Education and Religious Affairs, and is responsible for issues of nuclear technology, radiological protection and nuclear safety in the country.

EEAE is governed by a seven member Board, appointed by the Minister.

EEAE mission is the protection of the public, the workers and the environment from ionizing and artificially produced non-ionizing radiation. According to its statutory role, EEAE responsibilities include:

- development of safety procedures, regulations and legislation;
- licensing and inspection procedures;
- radiation protection of workers and the public;

- environmental radioactivity monitoring;
- radiological surveillance;
- emergency preparedness;
- research in the fields of its competence;
- public information;
- international cooperation and national representations;
- education and training.

Regulatory activities

EEAE regulatory role entails the following responsibilities:

- drafting and proposing legislation, transposition of EC directives;
- issuing regulations and guidelines in conformity with international standards (IAEA, ICRP);
- issuing of technical documents and recommendations (e.g. concerning radiation protection, quality control and the safe operation of equipment and radiation sources);
- inspections and licensing of facilities and activities. EEAE performs announced and unannounced on-site inspections. EEAE is responsible for issuing certificates of compliance and/or licenses for medical, industrial, research and other applications of ionizing radiation in Greece, for licensing the import, export, possession, use and transport of radioactive sources and materials and for keeping the national inventory of all radiation sources, radiation equipment and radiation facilities. All relevant information is kept in the National Radiation Protection Database;
- providing expert advice;
- national representation e.g. IAEA, EC, NEA OECD, ENSREG, HERCA, EAN, EURADOS, EURAMET etc.

Occupational exposure monitoring

Operation of the personnel dosimetry service in the country; monitoring of more than 12,000 occupationally exposed workers and keeping of the National Dose Registry.

Environmental radioactivity monitoring

Monitoring of radioactivity levels throughout Greece, activation of the national emergency system in case of increased levels of radioactivity caused by a radiological or nuclear accident and updating of the National Radiation Protection Database. The monitoring mechanism is based on the operation of the telemetric environmental radioactivity monitoring network, as well on laboratory radioactivity measurements. Alpha and gamma spectroscopic analysis and total alpha/beta radioactivity measurements are performed in drinking water, air filters, soil samples, as well in materials and industrial waste for NORM.

Emergency preparedness and response

Participation in the National Plan for Civil Protection “Xenokratis” and in the National Emergency Plan for Chemical, Biological, Radiological and Nuclear (CBRN) threats. EEAE is the national contact point for the early notification systems ECURIE and ENATOM of the European Commission and the IAEA respectively. It also participates in the European Mechanism of Civil Protection.

Calibration of ionizing radiation instruments

Operation of the Ionizing Radiation Calibration Laboratory (IRCL), which is a secondary standard dosimetry laboratory, that has developed and maintains national standards of Gy, Sv, Cb/kg (for γ , X and β radiation). IRCL provides calibrations in terms of Air Kerma, Absorbed Dose in water, Personnel Equivalent Dose Hp(10) and Hp(0,07), Ambient Dose Equivalent H*(10) in the fields of radiotherapy, diagnostic radiology and radiation protection.

Non-ionizing radiation

Protection of the general public and the environment from artificially produced non-ionizing radiation (electromagnetic fields) and provision of relevant information to any interested party. EEAE control activities include high frequency electromagnetic fields, as well as low frequency electric and magnetic fields.

Education and training

- operation since 1960 of the Hospital Physicists' post graduate School. From 1994 the Hospital Physicists' Institute operates in a legislated cooperation with the Inter - University Postgraduate Course in Medical - Radiation Physics (IPCMRP) of the Universities of Athens, Ioannina, Thessalonica, Crete and Thrace and the NCSR "Demokritos", aiming at specialized training of Physicists in Medical - Radiation Physics;
- it is recognized as the European Regional Training Centre (in English language) of the International Atomic Energy Agency (IAEA) in the English language for Radiation, Transport and Waste Safety, as well as for nuclear security issues;
- provides education and training courses in the field of radiation protection to occupationally exposed workers;
- organizes seminars and workshops in collaboration with professional and scientific institutions;
- provides on the job training to scientists proposed by IAEA in issues of radiation protection, such as regulatory control, dosimetry, calibration of ionizing radiation equipment and environmental radioactivity.

Research and development

EEAE participates in research and development programmes, such as the projects under IAEA Technical Cooperation Programme and the EC Framework Programmes. EEAE staff has a significant number of publications in scientific journals and conference.

Public information

EEAE holds the responsibility of providing information to the general public and the media regarding its fields of competence (e.g. Article 8 of the Presidential Decree No 60). Public information related activities, such as organization of events, dissemination of information material, are systematically addressed. In case of radiological emergencies, EEAE acts as the channel which provides all the necessary data and information (e.g. measures to be taken). EEAE website is a useful tool for public information and includes: data from the telemetric monitoring stations; data on medical radiation laboratories and reports, such as annual activity reports, radiological incidents reports, external evaluation reports (e.g. IRRS mission report), reports submitted to IAEA (CNS, Joint Convention).

EEAE policy regarding information dissemination is based on the principles of transparency and openness both towards interested parties and the general public. EEAE has both formal and informal mechanisms of communication, including: correspondence by mail, fax, email, oral communication, meetings, web-based information and public consultation as appropriate. As a

public service, EEAE is obliged to follow official procedures of communication with all authorized parties and the general public.

Organization, human and financial resources, quality management systems and infrastructure

EEAE organizational structure was developed and published in the form of a Presidential Decree in 1993. Afterwards, due to additional responsibilities assigned to EEAE (e.g. non-ionizing radiation inspections), certain units, such as independent offices, were established by decisions issued by EEAE Board. EEAE structure currently comprises of 4 Divisions, 10 Departments and 6 independent offices.

EEAE employs a sufficient number of qualified and competent staff (74) to carry out its functions and discharge its responsibilities, commensurate with the nature and number of facilities and activities to be regulated: 12 special scientific personnel, 47 scientific and technical personnel, 15 administrative personnel. Most of EEAE personnel hold a degree of high level education and dispose specialized scientific expertise (M.Sc. and/or Ph.D.). They participate in several working groups and committees at national, European or international level. The outcome of their participation in European research projects and scientific networks, as well as their scientific work in EEAE is a number of publications in international journals and presentations in conferences. Their continuous training, the participation in EEAE E&T activities and the participation in scientific networks is encouraged in order to gain the knowledge and experience required for the fulfillment of their tasks.

A quality management system (QMS) has been established in EEAE since 2003 for the following activities: individual monitoring, calibration, gamma spectrometry measurements, radon measurements and non-ionizing radiation measurements. All these services are accredited according to the terms of ISO/IEC 17025 standard.

In 2011, an accreditation according to the terms of ISO/IEC 17020 standard has been acquired for the inspection activities performed. In 2013, a certificate verifying the compliance of EEAE with the ISO 29990:2010 standard was acquired regarding the scope "Design, development and provision of non-formal education and training in radiation protection and nuclear safety". EEAE implements an integrated management system which was certified, in 2013, according to the terms of ISO 9001:2008 standard. Full compliance with requirements of IAEA Safety Standard, the Management System for Facilities and Activities, GS-R-3, is also a goal for EEAE and is currently in progress.

EEAE is funded by the governmental budget, as well as from licensing fees and provision of services (special account), covering adequately its needs.

A brief list of EEAE infrastructure is given below:

- National Radiation Protection Database;
- National Ionizing Radiation Calibration Laboratory;
- Radiological Analysis Laboratory;
- Individual monitoring of external and internal exposure;
- Telemetric network for monitoring radioactivity levels in the atmosphere nationwide – on line access to the results through EEAE website;
- Computational tools for atmospheric transport and dispersion of radioactivity;
- Expertise and specialized equipment/infrastructure in radiation emergency response;
- Facilities for education.

SECTION F.

OTHER GENERAL SAFETY PROVISIONS

Article 21 Responsibility of the license holder

Article 7.1 of PD 122 explicitly assigns the prime responsibility for the safety of facilities or activities related to the management of radioactive waste and spent fuel to the license holder. The waste management concept and all relevant actions undertaken by a facility are evaluated by EEAE as part of the licensing process. The current license of the NRWIS is based on the safety and radiation protection evaluation of the facility against the general requirements of the RPR and the PD 122. However, as already mentioned, the licensing procedure and the safety requirements for radioactive waste management facilities will be further specified in the Ministerial Decision which is currently being drafted. Radioactive waste and sources management facilities are subject to EEAE inspection.

Article 22 Human and financial resources

The RPR and the PD 122 provide general requirements for human and financial resources of the licensee. Information for the available human and financial resources of the INRWIS storage facility were provided in the application for the operation license and found adequate by EEAE, for the current, licensed activities in the facility.

For the import of sealed radioactive sources, licensing imposes that full financial provisions are made by the licensee for waste management and the return of the sealed sources to the manufacturers. In case the collected funds are insufficient for the real costs of management, the government will cover the difference (implementation of HASS Directive).

Article 23 Quality assurance

According to PD 122 (Article 7.4), license holders shall implement integrated management program, including quality assurance program. Also, according to the RPR, the end-user (e.g. nuclear medicine or research laboratories, etc) should implement QA programmes, which are subjected to EEAE evaluation and inspection.

The QA programme of NRWIS is based on:

1. Document Standardization and Codification
2. Handling of Incoming and Outgoing Documentation
3. Organization and Responsibilities of the personnel

The most important elements of the QA include Records and Document Control System, Radioactive Waste Management Review, Personnel Meetings, Surveillance and Maintenance of Instrumentation, Sampling Quality Control, Handling, Storage and Shipping, Quality Assurance Records and Training Program.

Article 24 Operational radiation protection

All activities with ionizing radiation in the country shall be performed in accordance with the RPR. All radiation protection measures for the public, the occupationally exposed workers, the patients and the environment, are subjected to EEAE inspection, control and evaluation.

For the activities within the scope of the Joint Convention (e.g. waste management facilities, interim storage, environmental radioactivity laboratory, etc), NCSR “Demokritos” and the GRR-1 apply radiation protection programmes. Radiation protection programs are submitted and evaluated by EEAE, as part of the licensing procedure.

In particular, the radiation protection program of the NRWIS includes:

- General Principles and Policies;
- Dose limits and Occupational Dose Constraints;
- Radiation protection program commitments;
- Activity Work Control, Radiation Work Permits;
- Surveys and Monitoring;
- Exposure Control;
- Monitoring of External Exposure;
- Monitoring of Internal Exposure;
- Control of Radioactive Materials;
- Instrumentation;
- Dose Estimates;
- Radioactive Waste Management;
- Identification of Waste Streams;
- Clearance Criteria and Methods to Verify Clearance;
- Occupational Safety;
- Physical Security;
- Emergency Plan;
- Radiological Accident Analysis.

EEAE provides the individual monitoring of the occupationally exposed workers in the country and keeps the national records. The workers of NRWIS are submitted to medical surveillance programme.

The liquid or air discharges are monitored by the license holders and surveyed by EEAE. Moreover, EEAE performs intercomparison and intercalibration exercises with the environmental monitoring, waste and research reactor measurement laboratories of the NCSR “Demokritos.

Article 25 Emergency preparedness

According to the RPR, in each facility there is an internal emergency preparedness plan in case of a radiological accident or event, which is subjected to EEAE inspection and evaluation. Moreover, in PD 122 (Article 7.3) is provided that license holders shall implement measures for the prevention of accidents and for the mitigation of their consequences, in order to protect the workers and the public from significant exposures to radiation.

The emergency plan for the NRWIS facility is based on the assessment of the possible risks and dangers that might arise: (i) during the RW management activities; (ii) in case of fire; (iii) in case of larceny. The risk assessment consists of tracking and recording the dangers and risks that threaten the safety and health of the personnel, the general public and the environment. Main objectives of the risk assessment are:

- The depiction of dangers and risks that exist for the health and the safety of the personnel and the public. This depiction contains the sources of dangers as well as technical, organizational and procedural measures that exist for the prevention or even the repression of relative dangers.
- The recording of existing protection measures, for the confrontation of various dangers aiming at the prevention and/or repression of creation of unfavorable conditions with consequences in the health and in the safety. This measures are technical (concrete systems/bodies), organizational and/or procedural.

Based on the depiction/recording of dangers and main causes of undesirable consequences that might result, the organization of personnel for the prevention of accidents or creation of unfavorable conditions of work as well as in the repression of consequences of accidents that already have happened (Situations of Emergency) can be determined.

Based on the risk assessment results, additional measures of safety are proposed which could decrease the corresponding danger.

EEAE role

According to its statutory role, EEAE is responsible for emergency preparedness, advises the Government on the measures and interventions necessary to protect the public and acts as contact point for receiving and communicating information to the emergency response systems.

Since its establishment, EEAE participates in the National Emergency Plan for Civil Protection “Xenokratis” (Ministerial Decree No 1299, Official Gazette of the Greek Government No 423B, 10.04.03, “Approval of the General Plan for Civil Protection, under the Code Name Xenokratis”). In particular Annex “P” (Greek letter rho) of the plan concerns the response to an emergency situation from important and extensive radioactivity contamination due to radiological or nuclear accidents taking place inside or outside Greece and is designed to provide response to accidents involving the release or potential release of radioactive substances.

EEAE is the authority responsible for activating Annex “P”, while the overall management of the emergency response rests with increasing level of responsibility with the following three managing Committees:

- The Staff Office (SO): a three-member committee chaired by the Chairman of the EEAE and supported by a properly staffed Information Group;
- the Scientific Committee (SC): a seven-member committee chaired by the President of EEAE, having as main task the assessment of the proposals submitted by the SO and the suggestion to the Ministerial Coordination Board the proper actions and counter measures for the situation in hand;
- the Ministerial Coordinator Board: is convened in emergency cases according to the provisions of the general emergency plan, and is chaired by the Minister of Development.

According to the emergency plan, the emergency situations arising from a wide spread radioactive contamination of the Greek territory, are classified as follows:

- normal level - level A;
- alert level - level B which is characterized by increased environmental radiation or radioactivity levels or when information is received for a nuclear accident through the ENATOM or ECURIE systems or through the countries with which Greece has signed bilateral agreement on early notification;
- alarm level - level C. In this level the emergency plan is fully activated and all governmental and other national authorities are ready to perform their duties according to the plan.

EEAE's relevant infrastructure contains measuring and detection systems (detectors, surveys, dosimeters, contamination monitors, portable spectrometers, pagers, etc), protective equipment, independent communication systems, a mobile laboratory equipped with detectors, spectrometers, protective equipment and a radiochemical laboratory, a specialized vehicle for collecting radioactive sources, a scientific library containing recent publications relevant to the nuclear and radiological safety and security, radiological emergency computer codes (Lasair, Hotspot, Hysplit, JRODOS etc) and detailed, step by step documentation for the procedures to be followed in case of an emergency.

In addition to the above, EEAE specialized laboratories (environmental radioactivity laboratory, telemetric network, individual monitoring laboratories, etc.) and the network of the collaborating laboratories assist in case of an emergency.

Staff training, emergency exercises intercalibration and intercomparison exercises are performed on a regular basis.

EEAE participates in International and European Emergency Response Systems and Data Bases (ECURIE, IAEA Illicit trafficking data base, ENATOM, etc).

Finally, EEAE is responsible for the coordination of the national environmental radioactivity monitoring programme. In this respect:

- operates a national telemetric network containing 24 stations for total gamma dose rate measurements and 3 stations for aerosol measurement (results available in the EEAE web-page and EURDEP platform);
- coordinates the network of collaborating laboratories providing environmental radioactivity measurements;
- performs intercomparison exercises and harmonizes the measurement procedures.

Article 26 Decommissioning

GRR-1 is owned and operated by NCSR "Demokritos", a governmental institution. There are no plans submitted to EEAE, concerning the future decommissioning of the reactor. This obligation is provided by the relevant legislation (Ministerial Decision P/112/305, Folio No. 2877, Second Issue, October 26, 2012, "Basic requirements - principles of nuclear safety and regulatory supervision of nuclear research reactors").

Decommissioning of the waste management facility and the interim storage facility of the NCSR "Demokritos" is not foreseen for the near future. It will be included in the National Program for radioactive waste management which is currently under development.

SECTION G.

SAFETY OF SPENT FUEL MANAGEMENT

Article 4 General safety requirements

As explained previously, Greece has only one research reactor (GRR-1), which is in extended shutdown. There are no plans for a nuclear power programme or for additional research reactors.

Spent fuel from GRR-1 has already been returned to the US DoE. Remaining irradiated fuel is covered by agreement for return to the USA by 2019. The safety of the stored fuel, in terms of criticality, was addressed adequately in the safety documentation submitted to EEAE for the extended shutdown license. Regular surveillance of the pool, the fuel and the water quality is also in place.

Article 5 Existing facilities

GRR-1 is an open-pool, light water moderated and cooled reactor with MTR plate-type fuel elements. The core has been dismantled and the main pool of the reactor is empty from water. The remaining irradiated fuel is stored in the fuel interim wet storage pool inside the reactor building, which has a capacity of 57 assemblies.

Article 6-8 Siting of proposed facilities, Design and construction of facilities, Assessment of safety of facilities

It is not foreseen to design or construct new facilities.

Article 9 Operation of facilities

The irradiated fuel from the past operation of GRR-1 is stored in the fuel storage pool inside the reactor building. The pool is an underground stainless-steel, 1.6m x 2.6m and 4m deep tank, offering 57 storage positions arranged in five groups. Cadmium sheets are properly positioned between storage positions. The tank is filled with demineralized water the quality of which is under surveillance. Recirculation of the water through a resin-type mixed-bed ion exchanger ensures the appropriate pH and conductivity levels. The tank is secured by steel covers.

Article 10 Disposal of spent fuel

All spent fuel from GRR-1 is to be transferred to the USA, according to an agreement with the US Department of Energy for shipment until 2019. Fuel purchases beyond 2019 shall be based on similar arrangements with foreign nuclear companies/organizations that will guarantee the return of spent fuel to the country of origin for storage or reprocessing (Article 4.1.c, PD 122).

SECTION H.

SAFETY OF RADIOACTIVE WASTE MANAGEMENT

Article 11 General safety requirements

General Safety Requirements, pertaining in particular to radioactive waste management are provided in Article 7 of PD 122. These requirements define the responsibilities of the license holders regarding:

- The periodic safety assessment of the facility and activity.
- The demonstration of the safety of the facility, covering all stages of the facility lifetime (development, operation, decommissioning, closure), including normal conditions and events or accidents considered in the facility design.
- Measures for accident prevention and mitigation of their consequences, including the verification of the safety barriers and of the organizational procedures, in order to avoid significant exposure of the workers and the public.
- Integrated management systems and quality assurance.
- Adequate human and financial resources.

The general requirements of the RPR are also applied.

Article 12 Existing facilities and past practices

The safety of radioactive waste management facilities of the NCSR “Demokritos” were assessed in terms of personnel radiation protection, against the RPR. Radiological hazards to the public, although are considered to be limited, it has been requested, as a term imposed to the current license, to be further assessed qualitatively. Additional conditions of the license refer to the continuous improvement of the safety and physical protection of the facility.

As mentioned previously the safety of the on-site storage of institutional radioactive waste and sources countrywide follow the requirements of the RPR and evaluated as part of the operation licensing and inspection by EEAE. Greece has a well-established regulatory system for controlling waste from nuclear medicine labs, so that disposing such solid or liquid waste does no harm to the environment. The RPR contain the following provisions:

Liquid:

- The disposal of liquid radioactive waste to the public drainage is permitted only if the maximum concentration in any part of it is less than 1GBq/m³.
- Under no circumstances the daily disposed quantity should exceed 18 MBq for in vitro labs, 37 MBq for in vivo diagnostic labs, and 110 MBq for in vivo diagnostic and therapeutic labs.
- H-3 and C-14 used as organic solvents in liquid scintillators can be disposed in quantities of less than 3 GBq and 0.3 GBq per day, respectively.

Solid:

- Solid radioactive waste is permitted to be disposed as ordinary waste if it does not contain reusable objects and its concentration is below the clearance levels for each radionuclide.

- Short-lived (half-life < 60 days) solid waste that cannot be disposed according to the regulations is stored in vaults inside the labs, under specific requirements provided by the RPR, until its radioactivity falls below the clearance levels. All the other solid waste such as used sealed sources is returned to its supplier abroad for recycling.

Article 13-15 Siting of proposed facilities, Design and construction of facilities, Assessment of safety of facilities

As provided in the PD 122 (Article 7, par. 2 and par. 3) license holder shall perform safety assessment of their facilities periodically and demonstrate the safety during the licensing procedure for all stages of the facility lifetime. More specific legislative safety requirements, as well the licensing procedure are currently, as already mentioned, under development as part of the EC Directive 2011/70/Euratom implementation.

Article 16 Operation of facilities

See above, Article 12.

Article 17 Institutional measures after closure

There are currently no plans for closure of the existing facilities.

SECTION I.

TRANSBOUNDARY MOVEMENT

Article 27 Transboundary movement

The transboundary movement of the spent fuel shipped to the US is covered by the provisions of the agreement with the US Department of Energy.

The transboundary movement of radioactive waste is covered by the RPR, which takes into account the Council Directive 93/3/Euratom/3.2.1992 "On the supervision and Control of Shipment of Radioactive Waste between Member States and into and out of the Community". Also, other safety standards (e.g. IAEA etc) are taken into account.

For the prevention of illicit trafficking of radioactive or nuclear material, EEAE, in collaboration with IAEA, the U.S. Department of Energy, and the Greek Customs Department, equipped the country's entrance points with radioactivity detectors. In particular, fixed systems for radioactivity detection are installed at the major customs offices and 456 portable radioactivity detectors (300 pagers, 98 plastic scintillators, 58 portable spectrometers) have been distributed to the custom offices in the country, which are networked and controlled by EEAE.

In the same context, 180 radioactivity detectors – pagers and 32 portable spectrometers have been distributed to the Green Lines (border police and Coast Guard).

The customs local detection systems have been networked; the central server includes a database that includes the alarms triggered on any custom alarm system.

SECTION J. DISUSED SEALED SOURCES

Article 28 Disused Sealed Sources

According to national legislation enacted in 1990, in order to import a sealed radioactive source, the foreign supplier must make the commitment to take back the source when it is decommissioned. This is also provided by the implementation of the European Council Directive Euratom 2003/122 on the control of the high-activity sealed radioactive sources and orphan sources (HASS). In case the source user or the supplier bankrupts, the government will cover the additional funds needed for disposing of the source.

In Greece there are no manufacturers of sealed sources; all sealed sources are imported.

A programme exists for collecting all spent and disused sources, imported into the country before 1990. Up to now, the old "legacy" sources have been collected and exported to a country with the appropriate infrastructure for recycling according to a programme started by the EEAE in 2003 and financed by the government. Mainly industrial and medical sources of different types and activities were exported.

This action will be repeated when a significant number of non-used sources is collected again. In the mean time, the collected sources (bankrupt source user, scrap yards, foundries, etc) are waiting for exportation in the interim storage facility located in the campus of NCSR "Demokritos".

EEAE maintains the National Database, including information about installations, laboratories, equipment, sources, occupationally exposed workers, etc.

In addition to the provisions taken to prevent the smuggling of radioactive sources or nuclear material into the country (section J, art. 27), radioactivity detectors (portals) have been installed in the scrap yards and foundries to monitor the scrap entering these facilities and detect any hidden sealed sources. In case of a finding, the persons in charge communicate immediately with EEAE, so as to perform a secondary control and collect the object.

SECTION K.

PLANNED ACTIVITIES TO IMPROVE SAFETY

Greece plans to take steps towards the strengthening of the safety of radioactive waste management. In this context, the following steps have been already initiated:

1. IRRS action plan implementation.
2. Completion of legislative documents for formulation of the National Program for radioactive waste management and the licensing procedure of radioactive waste management facilities.
3. Continuation of radioactive waste inventory estimation and definition of the waste streams.
4. Participation in R&D programs for common or shared activities with other European countries.
5. Enhancement of public information and public involvement on radioactive waste management National Program.

SECTION L. TABLES

(a) Inventory of irradiated fuel assemblies stored in the reactor building.

Assembly no.	U-235 (gr)	Burn-up (%)
601	200,67	9,50
602	188,62	14,92
603	218,81	1,37
604	187,63	15,45
605	192,69	13,14
606	188,36	15,02
607	195,29	11,96
608	193,74	12,68
609	197,39	11,04
610	197,95	10,73
611	194,33	12,40
612	199,52	10,03
613	198,58	10,41
614	206,23	6,98
615	208,14	6,09
616	209,82	5,34
617	218,51	1,41
618	219,04	1,22
6C01	89,23	34,02
6C02	105,14	18,03
6C03	108,33	14,86
6C04	113,10	10,09

(b) Radioactive waste produced from GRR-1 primary cooling system decommissioning works.

Task	Waste type	Date	Volume (L)	Nuclides	Activity (kBq)	Route
Pool Decontamination	Sediment	4/2010	2	Eu-152	30	Storage, NCSR Waste Management
				Ag-108m	50	
				Co-60	220	
Pool Drainage	Water	3/2010	30000	Ag-108m	55	Released to sewage through NCSR liquid waste management facility
				Cs-137	67	
				Co-60	210	
Old delay tank decontamination	Water	7/2008	36000	Co-60, Cs-137, Ag-108m, Eu-152	<500	Released to sewage through NCSR liquid waste management facility
Spent fuel pool	Water	5/2011	8944	H-3	569×10 ³	Storage, NCSR Liquid waste storage tanks
				Cs-137	47	
				Co-60	51	

(c) Radionuclide activity in the primary resin waste. The waste is separated into 158* drums of 100 Kg.

Radionuclide	Radioactivity (MBq)
Ag-108m	15
Cs-137	213
Eu-152	4
Co-60	13

*10 drums of primary resin satisfy the general clearance criterion, 115 drums of primary resin satisfy the clearance criterion for disposal at a landfill and 33 drums of solidified in cement resin will have been disposed gradually at a landfill until 2031.

ANNEX

2012 IRRS MISSION in Greece

At the request of the Government of the Hellenic Republic, an Integrated Regulatory Review Service (IRRS) mission to Greece has been arranged, which was conducted from 20 to 30 May 2012.

The purpose of this IRRS mission was to review the effectiveness of the Greek framework for safety and of the competent regulatory authority. The review compared the national regulatory framework for safety against IAEA safety standards. The mission was also used as an opportunity to exchange information and experience between the IRRS review team members and the EEAE counterparts in the areas covered by the IRRS.

The IRRS Review team carried out the review in the following areas: responsibilities and functions of the government; the global nuclear safety regime; responsibilities and functions of the regulatory body; the management system of the regulatory body; the activities of the regulatory body including the authorization, review and assessment, inspection and enforcement processes; development and content of regulations and guides; emergency preparedness and response; transport, control of medical exposure, occupational radiation protection, control of radioactive discharges and materials for clearance, environmental monitoring associated with authorized practices for public radiation protection purposes and the control of chronic exposures and remediation.

The IRRS mission also included the following regulatory policy issues for discussion: independence of the regulatory body, long term policy on waste management, clinical quality audits. The IRRS review addressed the facilities and activities regulated by EEAE which involve radiation sources in addition to the waste management facilities. The research reactor GRR-1 was out of the scope of this IRRS review, but will be included in the follow-up mission.

The IRRS team members observed the working practices during inspections carried out by EEAE, including discussions with the licensee personnel and management. In addition the IRRS team observed an emergency exercise which was conducted with representatives from multiple organizations.

The IRRS review team identified a number of good practices and made recommendations and suggestions highlighting the points where improvements will enhance the effectiveness of the regulatory framework and functions in line with the IAEA Safety Standards. The IRRS Team recognized that the action plan prepared by EEAE as a result of the self-assessment was closely correlated with the IRRS findings. The majority of IRRS Recommendations and Suggestions had been raised as issues during the self-assessment process, thus the action plan, proposed before the mission takes place, included a series of actions directly related to the fulfillment and implementation of the formulated Recommendations and Suggestions.

Recommendations related directly to waste management

R3. The Government should provide for a graded approach in the implementation of the regulatory framework.

R4. The Government should establish and maintain a national policy and strategy for radioactive waste management including provisions for the decommissioning of facilities, management of radioactive waste and related financial provisions.

R5. The Government should expressly assign the prime responsibility for safety to the person or organization responsible for a facility or activity within the legal framework for radiation safety.

R13. GAEC* should further develop guidance on the format and content of the documents to be submitted by the applicant in support of an application for licensing of facilities and activities.

R14. GAEC should improve the implementation of a graded approach in the authorization process.

R15. GAEC should enforce the licensing requirements for all facilities at NCSR “Demokritos”, including the interim storage facility.

R17. GAEC should provide inspection results officially to the operator of the NCSR “Demokritos” waste storage facility, and ensure that the inspection findings are addressed.

R20. GAEC should establish safety requirements for decommissioning of facilities and pre-disposal management of radioactive waste.

Suggestions related directly to waste management

S5. GAEC should consider revising its licensing approach in order to include conditions, limits and controls on licenses and or certificates of compliance.

S8. GAEC should consider incorporating a waste classification scheme into its regulatory system.

*GAEC is the previously used abbreviation for EEAE

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