GREEK ATOMIC ENERGY COMMISSION

GREEK NATIONAL REPORT

under the

"CONVENTION ON NUCLEAR SAFETY"

2013

Table of Contents

A. Introduction 3
B. Summary 4
C. Reporting article by article 6
Article 6 Existing nuclear installations 6
Article 7 Legislative and regulatory framework 7
Article 8 Regulatory Body 10
Article 9 Responsibility of the license holder 14
Article 10 Priority to safety 14
Article 11 Financial and human resources 17
Article 12 Human Factors 17
Article 13 Quality Assurance 18
Article 14 Assessment and verification of safety 18
Article 15 Radiation Protection 19
Article 16 Emergency Preparedness 19
D. Activities, achievements and concerns regarding the improvement of safety – Since CNS Review Conference 2010 25

A. Introduction

Greece has signed the Convention on Nuclear Safety, which entered into force in 1997 by parliamentary ratification. Greece participated in the previous review meetings of the contracting parties.

Greece has no nuclear power plants and no intention to build any in the foreseeable future. Consequently, excluding the non-power nuclear activities in the country (research reactor, sub-critical assemblies, radiological installations), the focus on activities considered by the Convention on Nuclear Safety is on the environmental and health consequences of nuclear accidents in nuclear power plants of neighboring countries. Therefore, the reporting obligations are limited to those of Articles 7, 8 and 16 of the Convention on Nuclear Safety. Information is provided, however, on some other non-power applications existing in Greece falling under other articles of the Convention. The report follows the Guidelines regarding National Reports under the Convention on Nuclear Safety (INFCIRC/572/Rev.4, IAEA, 16 April 2013).

Greece has established and implemented laws and regulations on nuclear and radiological safety, in conformity with IAEA Safety Standards, the Euratom Treaty and European Directives. Mechanisms and structures are in place in order to face and cope with nuclear/radiological emergency situations resulting from accidents or events within the national territory or abroad.

In view of potential high risks emanating from nuclear installations, the country attaches great importance to international or European efforts towards nuclear safety and security issues. In this respect, Greece has undertaken activities with IAEA (education and training, exchange of information, IRRS mission), the European Commission, as well as with other countries through bilateral agreements on early notification and warning schemes.

B. Summary

Greece has no nuclear power installations and no intention to build any in the foreseeable future. The existing research reactor and two sub-critical assemblies are not defined as nuclear installations by the Convention. So, according to the Guidelines regarding National Report under the Convention on Nuclear Safety, reporting only on Articles 7, 8 and 16 is considered applicable for Greece. However, similarly with the previous reports, information on radiation facilities and activities is provided, by seek of completeness and transparency.

The Greek Atomic Energy Commission (GAEC) is the competent regulatory authority, responsible for radiological protection and nuclear safety. Having adequate infrastructure, financial and human resources, sets the regulatory framework and overviews the radiation facilities and activities in the country in terms of compliance with the safety standards. Emergency preparedness plans and an environmental radioactivity monitoring network that covers the national territory are in place.

Greece attaches great importance to nuclear safety and security. This is mainly reflected in GAEC efforts to improve the effectiveness of regulatory actions and its competence in terms of infrastructure, human resources, application of quality management systems. Moreover, GAEC continues its collaboration with IAEA in the fields of education and training, radiation protection, nuclear safety and nuclear security.

Developments achieved within the time period since the last review meeting could be summarized as following:

- an Integrated Regulatory Review Service (IRRS mission) of the national regulatory framework in radiation protection and nuclear safety, as well as of GAEC as the competent authority, was conducted in 2012. Greek Research Reactor GRR-1 was out of the mission scope, but it will be included in the follow-up mission. A thorough action plan is now being implemented; the mission report is publicly available at GAEC website;
- provisions for nuclear safety issues, as well as regulatory supervision requirements for the research reactor in line with EC directive and IAEA standards accordingly, were included in the Greek legislation in 2012. Two legislative documents came into force in 2012: the first in the form of a Presidential Decree for the transposition of the EC Nuclear Safety Directive and the second in the form of a Ministerial Decision on the implementation of the Presidential Decree on research reactors, covering licensing procedure, regulatory supervision and nuclear safety requirements and principles. Specific transitional provisions are also included for the GRR-1;
- the refurbishment programme of the GRR-1 has been suspended by the operator and the reactor is currently considered to be in “extended shutdown”, as provided for by the new legislation that came into force in 2012. As provided in this legislation, the operator shall submit appropriate safety documentation as part of the application for extended shutdown license. GAEC is currently in the process of detailing the required content of the safety assessment and documentation for the extended shutdown phase;
- the Fukushima nuclear accident, for a non-affected country such as Greece, acted as an exercise to test the authority’s own capabilities in emergency response; GAEC emergency response mechanism (environmental radioactivity monitoring, control of imported food and feedstuff, public information etc.) was activated;
- the agreement between the Government of the Hellenic Republic and the IAEA, to support GAEC as a Regional Training Centre in Europe for Radiation, Transport and Waste Safety was signed and ratified by Law;

- actions have been taken for strengthening transparency and openness of the regulatory body, as well as international cooperation (e.g. update of agreements with neighboring countries);
- 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 Standards, The Management System for Facilities and Activities, GS-R-3.

Regarding the challenges identified in the previous CNS Review Meeting, these are presented below, along with description of the actions taken:

- Nuclear safety expertise maintenance: The Fukushima accident and the subsequent European response for the re-assessment of the safety of the EU NPPs had a consolidating effect on the issue of nuclear safety expertise maintenance. Greece contributed to the review process of the European stress tests and participated in the organized on-site visits. Furthermore, in order to strengthen GAEC nuclear safety expertise, a two-month on-the-job training of our staff to USA NRC research reactor branch has been effectuated in 2013, in the framework of the existing arrangement between GAEC and USA NRC for the exchange of technical information and cooperation in nuclear safety matters. We also try to take advantage by participating in relevant to nuclear safety projects of the IAEA Technical Cooperation Programme.
- Licensing framework of the GRR-1: A new licensing framework has been established, and provided in the national legislation on the occasion of the transposition of the nuclear safety EC Directive 71/2009.
- Regulatory body independence: As the IRRS Team concluded, GAEC is effectively independent and has functional separation from entities having responsibility or interests that could unduly influence its decision making.

C. Reporting article by article

Article 6 Existing nuclear installations

Article 6 of CNS:

Each Contracting Party shall take the appropriate steps to ensure that the safety of nuclear installations existing at the time the Convention enters into force for that Contracting Party is reviewed as soon as possible. When necessary in the context of this Convention, the Contracting Party shall ensure that all reasonably practicable improvements are made as a matter of urgency to upgrade the safety of the nuclear installation. If such upgrading cannot be achieved, plans should be implemented to shut down the nuclear installation as soon as practically possible. The timing of the shut-down may take into account the whole energy context and possible alternatives as well as the social, environmental and economic impact.

Greece has no nuclear installations as defined in Article 2 of the Convention on Nuclear Safety and has no intention to build any in the near future. Nuclear energy is not included in electricity production programme for the foreseeable future.

Information on non-nuclear-power installations and applications is provided here for completeness.

Greek Research Reactor (GRR-1)

The GRR-1 is situated on the premises of the National Centre for Scientific Research (NCSR) "Demokritos". GRR-1 is a 5MW open-pool type light water moderated and cooled reactor, fueled by Material Test Reactor (MTR) type fuel elements. All used HEU fuel elements were returned to the USA in 2005, following the terms of fuel purchase agreement between the U.S. Department of Energy and the Greek Government. The remaining irradiated fuel (LEU) is under safe wet storage in the fuel pool inside the reactor building. The reactor is currently considered to be in the state of "extended shutdown". The operator has to provide the appropriate safety documentation in order to receive the extended shutdown license.

Sub critical assemblies

- The subcritical assembly at the National Technical University of Athens is dismantled (fuel is under secure in-situ storage).
- A sub critical assembly exists at the Aristotelian University of Thessaloniki.

Ionizing radiation installations

In the following list, information concerning the fields of applications of the ionizing radiation in the country is provided, as in year 2013:

- medical applications: 9 teletherapy laboratories (38 linear accelerators, 9 60Co systems, 11 High Dose Rate (HDR) and 1 radiotherapy X-ray system), 6 125I brachytherapy laboratories, 1174 diagnostic radiology laboratories (369 CT scanners, 2166 X-ray conventional systems, 613 mammography systems, 565 DEXA and 115 interventional diagnostic radiology systems), 178 nuclear medicine laboratories (158 γ-cameras and 5 PET/CT, 41 wards for the accommodation of patients administered with therapeutic doses of radioisotopes);
- research laboratories: 223 laboratories in research centers and University departments. An 11MeV Tandem accelerator is located at the NCSR "Demokritos";

- industrial laboratories: 304 industrial laboratories using ionizing radiation devices and radiation sources. Among them, one private irradiation facility for sterilization of medical equipment;
- other applications related to education, agriculture, etc.

Article 7 Legislative and regulatory framework

Article 7.1 of CNS:

Each Contracting Party shall establish and maintain a legislative and regulatory framework to govern the safety of nuclear installations.

The Greek legislation for nuclear safety and radiation protection is listed below.

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 the Convention on Nuclear Safety obligations

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”.

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 Radiation Protection Regulations”;
- 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”.

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

- GAEC Interpreting Circular of 18.10.2006, “Quality control protocols for radiology laboratories”;
- GAEC Circular Ref. No. P/105/388 / 30.11.2006, “Patients' excreta release after nuclear medicine treatments (therapies)”;
- GAEC 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

- Presidential Decree for the transposition in the Greek legislation of the Directive 2011/70/ Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste. The draft has been approved by the Commission of the European Union and is currently in the process of signing and publication by the Greek Government.
- A task group has been assigned for the preparation of the Ministerial Decisions required by the above Presidential Decree.

Article 7.2 of CNS:

The legislative and regulatory framework shall provide for:

i. the establishment of applicable national safety requirements and regulations;

ii. a system of licensing with regard to nuclear installations and the prohibition of the operation of a nuclear installation without a license:

iii. a system of regulatory inspection and assessment of nuclear installations to ascertain compliance with applicable regulations and the terms of licenses;

iv. the enforcement of applicable regulations and of the terms of licenses, including suspension, modification or revocation.

The Presidential Decree No 60 (see Article 7.1) provides for the general legislative, regulatory and organizational framework for nuclear safety of nuclear installations, allocates generic responsibilities to the regulatory body (GAEC) and the license holder and defines generic nuclear safety principles. Following Presidential Decree 60, the Ministerial Decision P/112/305 was issued to provide for more specific nuclear safety requirements and principles and regulatory control for research reactors in compliance with the IAEA NS-R-4 “Safety of Research Reactors: safety requirements, Vienna, IAEA, 2005”. Safety requirements are

specified in chapter 2 of the Ministerial Decision for all life stages of research reactors and in relation to:

- license holder responsibility;
- safety management;
- evaluation and verification of safety;
- radiation protection (with reference to the Greek Radiation Protection Regulations);
- siting evaluation;
- design and construction;
- commissioning, operation;
- maintenance modification and utilization;
- extended shutdown;
- decommissioning;
- waste management.

The licensing procedure for research reactors is provided in chapter 3 of the Ministerial Decision. The licensing procedure follows the different stages of the research reactor lifetime, as follows:

- Construction license: the issuance of the construction license is a two-step process, beginning with an establishment license (it can be viewed as a "decision in principle"), issued by the competent Minister, for the construction of the reactor and followed by the issuance of the construction license by the Minister with GAEC approval.
- Commissioning license is issued by GAEC before the fuel installation in the core.
- Operation license, issued by GAEC, with maximum duration of 10 years.
- Extended shutdown license, issued by GAEC, with maximum duration of 5 years.
- Decommissioning license, issued by the competent Minister with GAEC approval.
- Modifications important to safety it is explicitly provided that shall be authorized by GAEC.

Inspections by GAEC can be performed in a regular or irregular basis, announced or unannounced, and the findings must be documented. In case of non-compliance with safety requirements terms of license, GAEC has the authority to proceed to modification, suspension or revocation of the license.

Article 8 Regulatory Body

Article 8 of CNS:

1. *Each Contracting Party shall establish or designate a regulatory body entrusted with the implementation of the legislative and regulatory framework referred to in Article 7, and provided with adequate authority, competence and financial and human resources to fulfill its assigned responsibilities.*
2. *Each Contracting Party shall take the appropriate steps to ensure an effective separation between the functions of the regulatory body and those of any other body or organization concerned with the promotion or utilization of nuclear energy.*

The Greek Atomic Energy Commission (GAEC) was initially established by an Act in 1954. The organization has been re-established with a different scheme in 1987, according to which GAEC is an autonomous civil service. GAEC 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.

GAEC is governed by a seven member Board, appointed by the Minister of Education and Religious Affairs.

GAEC 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, GAEC 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

GAEC 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. GAEC performs announced and unannounced on-site inspections. GAEC 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, TRANSSC, 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. In addition, laboratory 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. GAEC 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 inspections

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. GAEC 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 the European Regional Training Centre 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 to radiation workers in the field of radiation protection;
- organizes seminars and workshops in collaboration with professional and scientific institutions;
- provides on the job training to scientists proposed by the International Atomic Energy Agency, in issues of radiation protection, such as regulatory control, dosimetry, calibration of ionizing radiation equipment and environmental radioactivity.

Research and development

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

Public information

GAEC 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, GAEC acts as the channel which provides all the necessary data and information (e.g. measures to be taken). GAEC 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).

GAEC policy regarding information dissemination is based on the principles of transparency and openness both towards interested parties and the general public. GAEC 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, GAEC 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

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

GAEC employs a sufficient number of qualified and competent staff (70) 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, 43 scientific and technical personnel, 15 administrative personnel. Most of GAEC 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 GAEC is a number of publications in international journals and presentations in conferences. Their continuous training, the participation in GAEC 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 GAEC 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 GAEC 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". The development of an integrated management system according to the terms of ISO 9001 standard and the requirements of IAEA Safety Standards, The Management System for Facilities and Activities, GS-R-3, is currently in progress.

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

A brief list of GAEC infrastructure is given below:

- National Radiation Protection Database;
- National Ionizing Radiation Calibration Laboratory;

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

Article 9 Responsibility of the license holder

Article 9 of CNS: Each Contracting Party shall ensure that prime responsibility for the safety of a nuclear installation rests with the holder of the relevant license and shall take the appropriate steps to ensure that each such license holder meets its responsibility.

For nuclear installations and research reactors, the prime responsibility is assigned explicitly to the license holder in the Presidential Decree No 60 (see Article 7). Specific responsibilities of the license holder are provided in the Radiation Protection Regulations for any radiation involving activity and in the Ministerial Decision P/112/305 for research reactors, respectively. For example, the license holder is responsible for the protection of workers from occupational exposure, the workplace supervision and the monitoring equipment, the control of any discharges, the protection of the public, the safety assessment, the establishment of appropriate management system, safety periodic review, keeping of records, education and lifelong training of the personnel, reporting of events to GAEC and other radiation protection and nuclear safety requirements as provided in the above legislation.

As it concerns radiation facilities, in the Radiation Protection Regulations there are provisions attributing implicitly the prime responsibility for safety to the license holder.

The required documents must be submitted by the license holder and reviewed by GAEC, as part of the licensing procedure, in the form of a radiation protection and hazard report or in the form of a safety analysis report. GAEC performs inspections to all license holders in order to assure the compliance with the regulation provisions.

Article 10 Priority to safety

Article 10 of the CNS: Each Contracting Party shall take the appropriate steps to ensure that all organizations engaged in activities directly related to nuclear installations shall establish policies that give due priority to nuclear safety.

The national legislation gives due priority to safety in relation to radiation involving activities, including research reactors, and nuclear security issues.

Research reactor

For the research reactor, relevant requirements are explicitly provided in the Ministerial Decision P/112/305. More specifically, the following are applicable in all stages of the research reactor lifetime:

- policy for the management of research reactors that gives to safety high priority and promotes safety culture, through the appropriate organizational structure;
- quality management system;
- internal safety committee, independent from the reactor manager;
- lifelong learning of the reactor staff with duties connected to safety;

- due consideration of human factors;
- defense in depth concept applied to the design of the research reactor;
- systematic operator safety self-assessment.

Radiation protection

According to the Radiation Protection Regulations, each activity with radioactive material exceeding the exemption levels or with equipment producing radiation needs a license. The license holder must fulfill specific requirements, conditions and obligations laid down in connection with the operating license, as already described in Article 9.

For the medical applications the license is issued by the Prefectures based on the "certificate of compliance with radiation protection regulations" issued by GAEC. For other types of applications the license is issued directly by GAEC. Licenses have specific duration (radiodiagnostic laboratories: 5 years, nuclear medicine laboratories: 3 years, radiotherapy laboratories: 5 years, research laboratories: 5 years, industrial applications: 2 years) and their renewal requires the same procedure. In all cases a certificate of compliance with radiation protection provisions is required, which is issued by GAEC after examining the submitted documents and performing in-situ inspections.

According to the radiation protection regulations, GAEC performs in situ inspections to the license holders in order to assure the compliance with the regulations provisions. The license holder must submit in advance the hazard report and the radiation protection report of the establishment. During the inspections, GAEC performs measurements to assure the conformity of the construction, operation and quality of the installations, systems and devices with the specifications and terms defined in radiation protection regulations. Interviews with the staff and unannounced inspections are also performed.

Nuclear Security

GAEC in collaboration with the IAEA and the U.S. Department of Energy upgraded the physical protection systems of selected radiological facilities in the country. These installations are:

- the nuclear research reactor GRR-1 and the subcritical installations;
- medical clinics and hospital installations – radiotherapy units and blood irradiators;
- sensitive industrial installations.

For the prevention of illicit trafficking of radioactive or nuclear material, GAEC, 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.

In the same context, 181 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.

Education and Training

GAEC provides E&T on radiation protection since 1960. Nowadays, it has a range of activities, in providing post-graduate and continuing E&T on radiation protection, at national and regional level. The educational activities are fully supported by GAEC scientific personnel and the available technical infrastructure.

At national level:

- In the particular field of medical exposures, GAEC, since 1994, is a participant and a major contributor to the Inter-University Post-Graduate Course on Medical Radiation Physics. This course is organized by the Universities of Athens, Ioannina, Thessaloniki, Crete and Thrace in collaboration with GAEC and NCSR "Demokritos", aiming to a specialised training of physicists in Medical - Radiation Physics. The course is attended annually by 10 to 15 students, leading to a M.Sc Degree.
- A variety of training courses are organized by GAEC for occupationally exposed workers in the medical, industrial and research applications of ionizing radiation. Moreover, GAEC participates in the training of the safety advisors in the safe transport of dangerous goods and in particular for class 7 while training is provided on radiation protection, prevention, detection, emergency preparedness and response to the personnel of several national organizations involved in the national emergency plan (military forces, police, coast guards, fire brigade, first line officers, etc.), in order to support the sustainability of national operational capability on preparedness and response.

At regional and international level:

GAEC significant educational work is recognized by the fact that GAEC is the IAEA Regional Training Centre (RTC) in English language in Europe on Radiation, Transport and Waste Safety, as well as on nuclear security. After the successful completion of the IAEA Education and Training Appraisal (EduTA) mission of Greece in 2008, a Long Term Agreement (LTA) between the Government of Greece and the IAEA, to support GAEC as the RTC in Europe for radiation, transport and waste safety was signed in July 2011. The LTA was ratified by the Greek Parliament in October 2012.

Also, "Practical Arrangements between GAEC and IAEA" was signed in 2010, supporting GAEC as a Regional Training Center in Europe for nuclear security. This cooperation has been extended and validated through "Practical Arrangements between IAEA and the Government of the Hellenic Republic on cooperation in the area of Nuclear Security", signed during the International Conference on Nuclear Security held in Vienna in July 2013.

In this framework GAEC:

- Hosts, since 2003, the Postgraduate Educational Course on Radiation Protection and the Safety of Radiation Sources co-organised and co-funded by IAEA. The Course provides education and training to young scientists pursuing to acquire a sound basis in radiation protection and knowledge of related safety fundamentals in order to become, in the course of time, qualified experts in their home country.
- Organizes regional and international seminars in specialized fields of radiation protection, as well as in nuclear security.
- Offers on the job training to scientists proposed by IAEA, in the fields of radiation protection, regulations and regulatory control, dosimetry, ionizing radiation calibration, radioactivity control, etc.

<u>IRRS mission</u>

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 GAEC 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 GAEC 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 GAEC, 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 GAEC as a result of the self-assessment was closely correlated with the IRRS findings.

The full list of recommendations, suggestions and good practices as well as the full IRRS mission report, are publicly available at GAEC website.

Article 11 Financial and human resources

Article 11 of the CNS:

1. *Each Contracting Party shall take the appropriate steps to ensure that adequate financial resources are available to support the safety of each nuclear installation throughout its life.*
2. *Each Contracting Party shall take the appropriate steps to ensure that sufficient numbers of qualified staff with appropriate education, training and retraining are available for all safety-related activities in or for each nuclear installation, throughout its life.*

According to the Greek legislation, the operator of a research reactor shall ensure adequate financial and human resources throughout the entire reactor lifetime. The arrangements and plans for assuring the necessary financial and human resources, as well as a detailed list of the personnel are required to be included in the application for a commissioning license. Similar requirements are also provided in the legislation for the case of an extended shutdown license. As far as other activities are concerned, the Radiation Protection Regulations provide for the requirement of properly trained and/or licensed staff within the license holder organization. The certification of the personnel competency in radiation protection, when necessary, is performed by GAEC.

Article 12 Human Factors

Article 12 of the CNS: Each Contracting Party shall take the appropriate steps to ensure that the capabilities and limitations of human performance are taken into account throughout the life of a nuclear installation.

In the Radiation Protection Regulations it is clearly stated that only persons with recognized specialty can be involved in radiation practices. Also, the Regulations give provisions for the specialties and the relative curricula required (e.g. radiation protection officer, medical physicist, radiologist, etc). Education and training on radiation protection is also required, the adequacy of which is recognized by GAEC. The continuous training of the workers is strongly encouraged.

Consideration of human factors and human-machine interface is a safety requirement provided in the legislation for research reactors for the entire reactor lifetime, particularly applied to the design of the research reactor. With regard to the GRR-1, human factors are also required by the regulation to be taken into account in all stages of its lifetime, including the extended shutdown phase.

Article 13 Quality Assurance

Article 13 of the CNS: Each Contracting Party shall take the appropriate steps to ensure that quality assurance programmes are established and implemented with a view to providing confidence that specified requirements for all activities important to nuclear safety are satisfied throughout the life of a nuclear installation.

GAEC, through the radiation protection regulations, fully supports and encourages the activities related with Quality Assurance / Quality Control programs for the radiological installations. GAEC laboratories have been accredited by the Hellenic Accreditation Council according to ELOT EN IEC/ISO 17025 standard since 2003; in 2011 the Department of Licensing and Inspections has been accredited, according to ELOT EN IEC/ISO 17020 standard.

In 2013 the education department of GAEC was certified for the design, the development and the provision of non-formal education and training in radiation protection and nuclear safety, according to the ISO 29990:2010.

Quality assurance program comprise one of the basic safety requirements for research reactors as explicitly provided in the legislation, and shall be applied in all stages of the reactor lifetime. In particular for the existing GRR-1, quality assurance program is required to be included in the safety documentation at all stages of the research reactor lifetime.

Article 14 Assessment and verification of safety

Article 14 of the CNS:

Each Contracting Party shall take the appropriate steps to ensure that:

i. comprehensive and systematic safety assessments are carried out before the construction and commissioning of a nuclear installation and throughout its life. Such assessments shall be well documented, subsequently updated in the light of operating experience and significant new safety information, and reviewed under the authority of the regulatory body;

ii. verification by analysis, surveillance, testing and inspection is carried out to ensure that the physical state and the operation of a nuclear installation continue to be in accordance with its design, applicable national safety requirements, and operational limits and conditions.

According to the Radiation Protection Regulations, GAEC carries out on-site inspections (with and without prior notification) of the radiation facilities in order to verify the compliance with the radiation protection requirements, when issuing or renewing their license. Radiation protection and hazard reports are submitted to GAEC for revision and evaluation during the licensing process.

As provided in the legislation, GAEC is responsible for the assessment of the nuclear safety of research reactors. GAEC is authorized to require the assistance of other authorities or

organizations for issues out of its competence (e.g. fire protection, industrial safety). The operator is obliged to perform safety assessment and inspections in a systematic manner in all stages of the research reactor lifetime. With regard to the existing GRR-1, according to provisions of the Ministerial Decision P/112/305, the operator shall establish arrangements and procedures for maintenance and preservation of the facility, a surveillance and inspection program, as well as updated physical protection program. The above together with an applicable safety analysis report shall be submitted to and reviewed by GAEC as part of the extended shutdown licensing procedure. The last years, visits and in particular inspections of the integrity of the fuel storage pool, as well as measurements of the pool water quality have been performed by GAEC.

In addition, inspections are carried out by IAEA and Euratom inspectors within the framework of safeguards, and in compliance with Articles 35, 36 of the Euratom Treaty.

Article 15 Radiation Protection

Article 15 of the CNS: Each Contracting Party shall take the appropriate steps to ensure that in all operational states the radiation exposure to the workers and the public caused by a nuclear installation shall be kept as low as reasonably achievable and that no individual shall be exposed to radiation doses which exceed prescribed national dose limits.

The national legislation on radiation protection implements the European Directives 96/29 and 97/43 Euratom, which are based among others on the ALARA concept. In this respect, the legislation provides the requirement and the guidelines for implementing radiation protection programmes in radiation facilities. GAEC, as the regulatory body, during its inspections verifies the compliance with the requirements.

The ionizing radiation installations where radiation protection is implemented were described under Article 6. Relevant information on the radiation protection legislative framework can be found under Article 7.

Article 16 Emergency Preparedness

Article 16 of the CNS:

1. *Each Contracting Party shall take the appropriate steps to ensure that there are on-site and off-site emergency plans that are routinely tested for nuclear installations and cover the activities to be carried out in the event of an emergency.*

   For any new nuclear installation, such plans shall be prepared and tested before it commences operation above a low power level agreed by the regulatory body.

2. *Each Contracting Party shall take the appropriate steps to ensure that, insofar as they are likely to be affected by a radiological emergency, its own population and the competent authorities of the States in the vicinity of the nuclear installation are provided with appropriate information for emergency planning and response.*

3. *Contracting Parties which do not have a nuclear installation on their territory, insofar as they are likely to be affected in the event of a radiological emergency at a nuclear installation in the vicinity, shall take the appropriate steps for the preparation and testing of emergency plans for their territory that cover the activities to be carried out in the event of such an emergency.*

Greece can be affected in the event of a radiological emergency at a nuclear installation of a third country (in the sense of the CNS). In order to be ready and cope with such situations, Greece has established radiological emergency preparedness regulations, plans, and an organizational scheme, as well as an extensive environmental radioactivity monitoring network covering the national territory.

The national emergency plans

I) The General Civil Protection (Emergency) Plan (GCPP) under the code name “Xenokratis” concerns any emergency situation in the Greek territory (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”). It has been revised and re-approved in 2000, after the legislative restructuring of the responsibilities related to facing national disasters of all kinds and the establishment of the General Secretariat for Civil Protection. After governmental approval, it was published in the Government Gazette in 2003 (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”). In particular Annex “R” of the GCPP concerns the response to an emergency situation from important and extensive radioactivity contamination due to nuclear accidents taking place outside Greece and is designed to provide response to accidents involving the release or potential release of radioactive substances.

   GAEC is the authority responsible for activating the GCPP Annex “R”, 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 GAEC and supported by a properly staffed Information Group;
   - the Scientific Committee (SC): a seven-member committee chaired by the Chairman of GAEC, 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;
   - inter-Ministerial Coordination Board: is convened in emergency cases according to the provisions of the general emergency plan.

According to the emergency plan, the situations arising with respect to the 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 (USIE) and/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.

II) On the occasion of the Athens 2004 Olympic Games, the Athens 2004 Olympic Games Security Division developed the National Emergency Plan for Nuclear, Radiological, Biological and Chemical Threats. Nowadays this plan runs under the coordination of the General Secretariat for Civil Protection. GAEC was deeply involved in drafting and implementing the Nuclear/Radiological part of this plan and acts as the major counterpart of the General Secretariat for Civil Protection for those two factors (N/R).

GAEC role and preparation for the emergency situations

GAEC plays the major role in implementing the emergency plans regarding nuclear or radiological components. In addition to what has been already mentioned, GAEC is responsible for emergency preparedness and advises the Government on the measures and interventions necessary to protect the public. GAEC is the contact point for receiving and communicating information to the IAEA, ENATOM and ECURIE emergency-response systems. GAEC also organizes national emergency response exercises and participates in international exercises.

Several governmental departments and other national authorities are involved in the emergency plan including, the General Secretariat for Civil Protection, the Ministry of Interior, the Ministry of Health, the Ministry of Rural Development and Food, the Ministry of Education and Religious Affairs, the Ministry of National Defence, the Ministry of Infrastructure, Transport and Networks, and the National Meteorological Service. The cooperation with the Police, the Fire Brigade, the Coast Guard, the Ministry of National Defence, the General Chemical State Laboratory, the Ministry of Health and other civil services and institutes has been significantly strengthened.

In order to cope with its statutory duties in the field of emergency planning and response, GAEC has established an internal emergency plan, the general lines of which are as follows:

1. Personnel: The majority of GAEC personnel participate in emergency situations. Special teams (intervention team, support team …) have been formed, the members of which have specific duties.
2. Equipment: GAEC equipment devoted to emergency planning includes:

- a mobile laboratory equipped with a radiochemical lab, a HpGe spectrometer, and a plastic detector of high volume placed on its roof and connected to a laptop computer;
- measuring and detection systems: a series of instruments for rapid detection (plastic scintillators with audio signals and pagers), dosemeters for dose assessment (survey meters, contamination monitors for alpha, beta, gamma) and portable spectrometers (NaI and HpGe) for radionuclide identification;
- protective equipment of different types, like uniforms, gloves, masks, shoes, casks, respiratory devices, etc.;
- independent communication systems, in order to permit its staff to communicate independently of the general communication network, if needed;
- specialized vehicle with the possibility of carrying and stabilizing shielded radioactive sources (with shielding of different types, like Pb boxes, sheets of Pb, Pb bricks and pellets);
- computer codes for atmospheric dispersion and transport of radioactivity. For calculation of long range atmospheric dispersion of radioactivity and estimation of the associated doses in the case of a severe nuclear accident outside Greece, the computer code HYSPLIT (U.S. NOAA), supplemented with customized pre- and post-processing tools is employed. RODOS system has been installed in GAEC computers and is under consideration for being employed also, as a tool for decision making. Meteorological data are available to GAEC, on a daily basis, under a formal agreement with the Greek National Meteorological Service. Estimations regarding short range radioactivity dispersion are made by use of the code HOTSPOT. In the National Emergency Plan, a special team of experts dealing with calculation of the dispersion and contamination after a nuclear accident has been established.

  Apart from the infrastructure devoted to emergency response purposes, GAEC specialized laboratories and their personnel are prepared to participate in emergency response if needed. These laboratories are: the environmental radioactivity laboratory for performing measurements of environmental samples, the telemetric network for monitoring of the environmental radioactivity all over the country, the individual monitoring laboratory for external and internal radiation.

3. A critical component of the nuclear accident emergency plan is the network of monitoring stations covering the national territory. The GAEC telemetric network consists of 24 stations with total-gamma dose-rate detectors (ionization chambers, equipped with data loggers for storing data and releasing alarms), and three aerosol telemetric stations (pips detectors with NaI and a proportional chamber). The stations are connected and networked. NCSR “Demokritos” in cooperation with GAEC operates a complementary network consisting of aerosol samplers, surface water sampling

places and fall-out sampling positions for radioactivity measurements in air, water and soil samples.

4. Collaboration with national, European and international organizations (e.g. emergency response systems, databases, networks …). GAEC has established a network of "collaborating laboratories" belonging to Universities and Research Centers throughout the country. Specialized equipment and training has been provided. GAEC performs periodic inter-calibration exercises to ensure the validity of the results provided. GAEC monitoring stations and the collaborating laboratories network were activated during the Fukushima Daiichi accident. The response in terms of time and measurement capability was satisfactory.

5. Documentation: the procedures to be followed in case of an emergency are documented. This document contains the responsibilities of the GAEC teams, administrative information, information for the premises and vehicles and the supporting or back-up infrastructure used for the purpose, step-by-step procedures of the actions to be performed the first moments after receiving the alarm for each team involved, technical procedures to be followed based on possible scenarios, technical fiches to complete, list of the equipment, quality control procedures, basic description of each piece of equipment, list of useful bibliography, phone numbers and addresses of the personnel involved.

Response to Fukushima accident

Following the accident in Fukushima Daiichi NPPs, GAEC, according to its statutory role, implemented the following actions:

- issue, through the Ministry of Foreign Affairs, of recommendations regarding travelling to Japan and instructions for the Greek citizens in Japan, especially for the crews of ships;
- extension of the daily operation to 18 hours in the period from 12 March to 26 March and to 12 hours from 27 March to 17 April 2011 (week-ends included);
- monitoring of individuals arriving from Japan (upon demand);
- teams in Athens and Thessaloniki international airports for information provision and radioactivity measurements;
- whole body and laboratory measurements in GAEC premises;
- environmental radioactivity monitoring (telemetric network for air gamma radiation and aerosols);
- laboratory radioactivity measurements of environmental samples (grass, milk, water etc.);
- activation of the collaborating laboratories network in order to perform sampling and measurements covering the whole country. Provision of a common platform to upload measurement results and comments;
- collaboration with the Hellenic Food Authority (EFET) for organizing sampling and measurements of imported foodstuff and feedstuff, following relevant EC recommendation;
- continuous connection with international and European networks (ENATOM, ECURIE) for getting information regarding the accident evolution and its consequences;
- public information (issue of press releases, mass-media interviews, continuous update of the web page, special phone line);
- Government information;
- Parliament information.

Issues like staff response, collaboration with other national organizations, measurement capabilities, communication channels, were tested with satisfying results. However, some issues for further improvement have been identified, such as:

- need for additional GAEC staff training on nuclear technology, like severe accident phenomenology;
- staff redundancy.

GRR-1 emergency plan

Within the framework of the GRR-1 Research Reactor radiation protection program, the internal emergency response plan has been prepared.

Information activities in case of radiation emergency

GAEC has the major responsibility to provide information through appropriate channels to the public during a radiation emergency. The provisions about the information of the public in case of radiological or nuclear emergencies are described in the Ministerial Decision No 2739, Government Gazette Folio No.165, Second Issue, March 15, 1994, "Regulation on informing the general public about health protection measures to be applied and steps to be taken in the event of a radiological emergency", as well as in the Annex "R" of the General Civil Protection Plan "Xenokratis".

Depending on the demand for information from the public, GAEC adopts a range of tools to ensure broad dissemination and transparency. These include press releases and individual responses to media, press conferences and interviews. GAEC has issued specialized information leaflets for the emergency situations, which have been largely distributed to the Prefectures, police, fire brigade, public services, schools, etc. GAEC website during emergencies becomes the main dissemination channel of the related information. Additionally, there GAEC presents in real time the environmental radioactivity monitoring results (telemetric network). A link to EURDEP is also provided.

The 2011 Fukushima nuclear accident, for a non-affected country such as Greece, acted as an exercise to test the authority's own capabilities in emergency communication. That period GAEC had high visibility in the media and established itself as "the" information source for the public and the journalists. The adopted strategy emphasized on the media relations, the continuous availability to respond to questions, the extensive use of GAEC website and the development of informative material (e.g. FAQ). Additionally, the fact that available information from the environmental radioactivity laboratories in the country was centrally collected and communicated by GAEC conferred consistency and reliability to the information provided.

On 7 July 2011, an information event entitled "The first months of the nuclear accident in Japan. Actions and measurements in Greece" was organized by GAEC. The aim was to present an overview of the decisions made and the actions implemented at national and European level after the nuclear accident, as well as details for the laboratory measurements performed in Greece.

Reporting

In the radiation protection regulation and the research reactor relevant legislation, it is clearly stated that the license holders have to communicate to GAEC any event, incident or accident relevant to radiation protection. Moreover, the license holders have to submit to GAEC a detailed report describing the incident/accident and the countermeasures taken.

As it concerns the reporting towards other countries or organizations, GAEC applies the ECURIE and ENATOM procedures and follows the INES scale. Moreover, GAEC participates in the IAEA "Incident reporting system for research reactors" and the "Incidents and trafficking

database" (ITDB). In addition, GAEC has concluded provisions on a bilateral basis for early notification with Bulgaria and Romania.

D. Activities, achievements and concerns regarding the improvement of safety – Since CNS Review Conference 2010

Since 2010 the following achievements have been made:

- an IRRS mission was conducted in Greece in 2012 (see GAEC web page). Steps have already been taken for the implementation of the action plan;
- a Long-Term Agreement between the Government of the Hellenic Republic and the IAEA, to support GAEC as a Regional Training Centre in Europe for Radiation, Transport and Waste Safety was signed in 2011 and ratified by Law in 2012;
- the transposition to the national legislation of the European Directive 2009/71/Euratom, establishing a Community framework for the nuclear safety of nuclear installations, has been completed in 2012. As a result, a new licensing framework has been established and is being implemented for the GRR-1 research reactor;
- legislation has been developed towards the harmonization with the European Directive 2011/70/Euratom, establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste;
- the updating of existing bilateral agreements between GAEG and homologue authorities has been initiated and is in progress;
- participation in CNS second extraordinary meeting;
- verification in Greece under Art. 35 Euratom Treaty (20 to 25 October 2012); the report is not available yet;
- emphasis on quality management issues has resulted in the accreditation of GAEC as “inspection body”, according to the EN/EC/ISO 17020 standard, and the certification of educational activities according to the terms of ISO 29990:2010 standard;
- an extensive programme of training in radiation protection for non-medical staff of ionizing radiation laboratories started and completed during 2010-2012. The participant’s competence in radiation protection was certified by GAEC.

GREEK ATOMIC ENERGY COMMISSION
P.O. BOX 60092, Agia Paraskevi,
Postal Code 15310 Athens
T: + 30 210 650 6700 / F: + 30 210 650 6748
E-mail: info@eeae.gr
www.eeae.gr
www.facebook.com/eeaegr
www.twitter.com/#eeaegr