IAEA-NS-IRRS-2015/07

ORIGINAL: English

INTEGRATED REGULATORY REVIEW SERVICE (IRRS)

MISSION

TO

ARMENIA

Yerevan, Armenia

31 May – 12 June 2015

DEPARTMENT OF NUCLEAR SAFETY AND SECURITY

IAEA

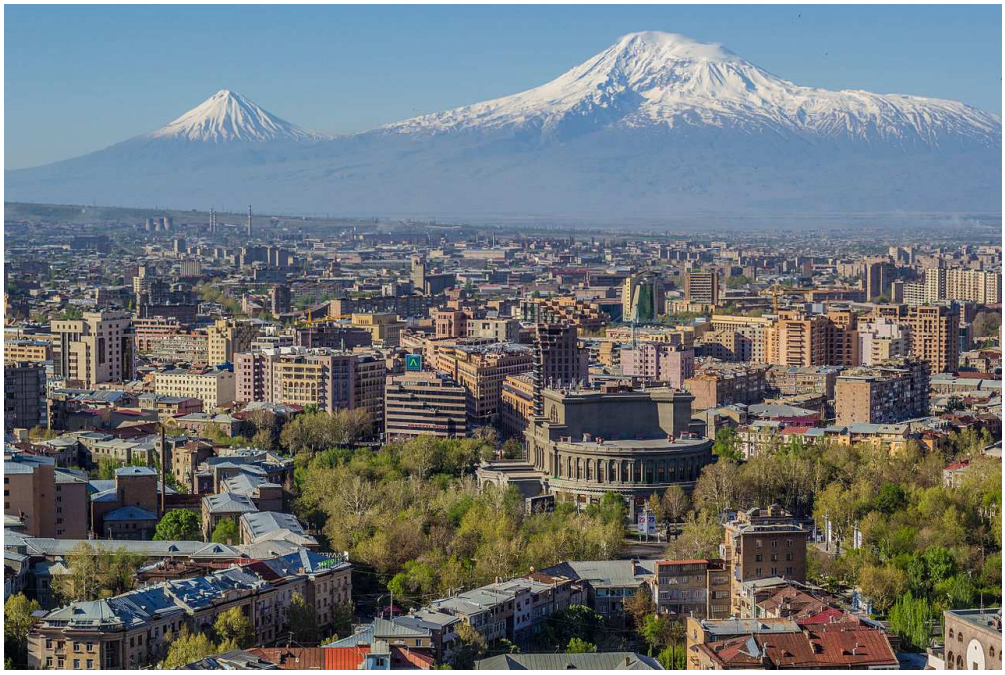
Integrated Regulatory Review Service

IRRS

Integrated
Regulatory
Review Service

IAEA | IRRS

REPORT OF THE
INTEGRATED REGULATORY REVIEW SERVICE (IRRS) MISSION
TO
ARMENIA



Integrated Regulatory Review Service

IAEA | IRRS

REPORT OF THE
INTEGRATED REGULATORY REVIEW SERVICE (IRRS) MISSION
TO
ARMENIA

Mission dates:	*31 May – 12 June 2015*
Regulatory body visited:	*Armenian Nuclear Regulatory Authority*
Location:	*Tigran Mets 4; Yerevan*
Regulated facilities and activities in the mission scope:	*Armenian Nuclear Power Plant; Waste Storage Facility; Dry Spent Fuel Storage Facility; National Centre of Oncology; Radiation Sources in Industrial Facilities.*
Organized by:	*IAEA*

IRRS REVIEW TEAM	
WANNER Hans	Team Leader (Switzerland)
BROWN Frederick	Deputy Team Leader (United States)
ABDEL-GELEEL Mohamed	Reviewer (Egypt)
BODIS Elizabeth	Reviewer (Hungary)
DOSIEVA Deyana	Reviewer (Bulgaria)
GORODNICHA Olga	Reviewer (Ukraine)
KAPRALOV Evgeny	Reviewer (Russia)
KELLER Bernd	Reviewer (the Netherlands)
KHESHTPAZ Hossein	Reviewer (Iran)
KIM Kyun Tae	Reviewer (Republic of Korea)
KRS Petr	Reviewer (Czech Republic)
KUMAR Susheel	Reviewer (India)
SERENAITE Dovile	Reviewer (Lithuania)
TOMAS ZERQUERA Juan	Reviewer (Cuba)
ZACHARIASOVA Ivanka	Reviewer (Czech Republic)
MUELLER-GERMANA Annatina	Observer (Switzerland)
NOEL Marc	Observer (European Commission)
JUBIN Jean-René	IAEA Team Coordinator
HAILU Teodros	IAEA Deputy Team Coordinator

BACIU Adriana	IAEA Review Area Facilitator
LUX Ivan	IAEA Review Area Facilitator
REBIKOVA Olga	IAEA Administrative Assistant

IAEA-2015

The number of recommendations, suggestions and good practices is in no way a measure of the status of the national infrastructure for nuclear and radiation safety. Comparisons of such numbers between IRRS reports from different countries should not be attempted.

CONTENTS

EXECUTIVE SUMMARY

At the request of the Government of Armenia, an international team of senior safety experts visited the Armenia Nuclear Regulatory Authority (ANRA) from 31 May to 12 June 2015 to conduct an Integrated Regulatory Review Service (IRRS) Mission. The the IRRS mission performed a peer review of Armenia regulatory framework for nuclear and radiation safety.

The IRRS mission covered all facilities and activities in Armenia. The review compared the Armenian regulatory framework for safety with IAEA safety standards as the international benchmark for safety. The mission was also used to exchange information and experience between the IRRS team members and the Armenian counterparts in the areas covered by the IRRS.

The IRRS team consisted of 15 senior regulatory experts from fourteen IAEA Member States, four IAEA staff members, one IAEA administrative assistant and two observers. The IRRS team conducted a review of the following areas: responsibilities and functions of the government; the global safety regime; responsibilities and functions of the regulatory body; management system of the regulatory body; the activities of the regulatory body including authorization, review and assessment, inspection, enforcement and development and content of regulations and guides; emergency preparedness and response; control of medical exposure, occupational radiation protection; control of radioactive discharges and materials for clearance; environmental monitoring; control of chronic exposures, and transport of radioactive materials, as well as lessons learned from the TEPCO Fukushima Daiichi accident. The IRRS mission also included discussions on policy issues regarding: the staffing of ANRA with competent personnel; and long-term operation and ageing management of nuclear facilities.

In preparation for the IRRS mission, Armenia conducted a self-assessment and prepared a preliminary action plan to address weaknesses that were identified. The results of the self-assessment and supporting documentation were provided to the team as advance reference material for the mission. During the mission, the IRRS team performed a systematic review of all topics presented in the advance reference material. The mission included a series of interviews and discussions with Mr Ashot Martirosyan, Chairman of ANRA, with management and staff of ANRA, with Mr Armen Amirjanyan, Director of the Technical Service Provider in Armenia, the Nuclear and Radiation Safety Centre (NRSC), with management and staff of NRSC, and with Mr Movses Vardanyan, Director General of the Armenia Nuclear Power Plant (ANPP), to help assess the effectiveness of the regulatory system.

The mission also included a visit to Armenia Nuclear Power Plant (ANPP), nuclear and radioactive waste management facilities, and two facilities using radiation sources, the National Center of Oncology, and the Geopromining Gold (GPM Gold) to make direct observation of the implemenation of regulatory activities during safety inspections carried out by ANRA. The visits included discussions with the management and staff of the facilities. The team also made observations of activities related to emergency preparedness and response. The team was received by the Prime Minister Mr Hovik Abrahamyan.

Throughout the mission, the IRRS team received full cooperation in regulatory, technical, and policy issues by all parties, in particular the management and staff of ANRA.

The nuclear power contributes significantly to electricity generation in Armenia. The IRRS team acknowledges that the ANRA faces many challenges in regulating nuclear safety. This includes the lifetime extension of the ANPP unit 2 for which ANRA has not yet received the corresponding application while the current license will expire in 2016.

ANRA was established by law in 1993 to oversee nuclear and radiation safety of facilities and activities in Armenia. Over the years, ANRA has developed safety standards and rules to carry out its regulatory responsibilities and for compliance with the IAEA safety standards and international best practices. The IRRS team recognized that ANRA continues to update its regulatory requirements and encouraged ANRA to further enhance its regulatory framework. In this regard, the team identified a number of good practices that should be considered for implementation by other Member States, and identified recommendations and suggestions for improvement and for consistency of ANRA's regulatory functions with the IAEA safety standards.

The IRRS team found that Armenia has an experienced and dedicated regulatory body for the protection of people and the environment. As a result, the team identified the following good practices:

- Extensive use of international peer reviews and international support programs to improve its framework for safety;
- Regular meeting of the Nuclear Safety Council is a good opportunity for ANRA to convey messages about the most important issues in nuclear safety directly to the President of Republic of Armenia;
- Statutory commitment to comply with IAEA safety standards reflects a strong national commitment to the best international practice for nuclear safety;
- Public education on the national television on how to react in case of a nuclear or radiological emergency.

The IRRS team also identified issues warranting attention or in need of improvement and believes that consideration of these would enhance the overall performance of the regulatory system. These issues include:

- A policy and strategy for safety should be promulgated that should include necessary measures to demonstrate its Government's long-term commitment for safety;
- ANRA should have adequate human and financial resources, and should be authorized to structure its organization and manage its resources;
- ANRA should make the necessary arrangements to identify lessons from operating and regulatory experience in other States. Specifically, the identification of lessons learned from the TEPCO Fukushima Daiichi accident should be finalized and appropriate corrective actions identified and implemented in a timely manner;
- The regulation related to medical exposure control, occupational radiation protection and transport of radioactive materials should be reviewed in order to be consistent with the relevant IAEA safety standards;

The IRRS team findings are summarized in Appendices V and VI.

An IAEA press release was issued at the end of the IRRS mission.

I. INTRODUCTION

At the request of the Government of Armenia, an international team of senior safety experts met representatives of the Armenian Nuclear Regulatory Authority (ANRA) from 31 May to 12 June 2015 to conduct an Integrated Regulatory Review Service (IRRS) mission. The purpose of the mission was to review the Armenian regulatory framework for nuclear and radiation safety. The review mission was formally requested by the Government of Armenia in July 2012. A preparatory mission was conducted 10-11 September 2014 at ANRA Headquarter in Yerevan to discuss the purpose, objectives and detailed preparations of the review in connection with regulated facilities and activities in Armenia and their related safety aspects and to agree the scope of the IRRS mission.

The IRRS team consisted of 15 senior regulatory experts from 14 IAEA Member States, 4 IAEA staff members, 1 IAEA administrative assistant and 2 observers. The IRRS team carried out the review in the following areas: responsibilities and functions of the government; the global safety regime; responsibilities and functions of the regulatory body; management system of the regulatory body; the activities of the regulatory body including authorization, review and assessment, inspection, enforcement and development and content of regulations and guides, emergency preparedness and response; control of medical exposure, occupational radiation protection; control of radioactive discharges and materials for clearance; environmental monitoring; as well as control of chronic exposures. As recommended by the IAEA Action Plan on Nuclear Safety, special attention was given to regulatory implications in the Armenian framework for safety of the TEPCO Fukushima Daiichi accident.

In addition, policy issues were discussed, including: staffing of ANRA with competent personnel; and long-term operation and ageing management of nuclear facilities.

The ANRA conducted a self-assessment in preparation for the mission and prepared a preliminary action plan. The results of ANRA's self-assessment and supporting documentation were provided to the IRRS team as advance reference material for the mission. During the mission the IRRS team performed a systematic review of all topics within the agreed scope through review of the Armenia advance reference material, conduct of interviews with management and staff from ANRA and direct observation of 6 regulatory activities at regulated facilities. The IRRS team met also with the Nuclear and Radiaton Safety Centre (NRSC) representatives to discuss the technical support provided by this organization to ANRA. A meeting with the Prime Minister Mr Hovik Abrahamyan was organized.

All through the mission the IRRS team received excellent support and cooperation from ANRA.

II. OBJECTIVE AND SCOPE

The purpose of this IRRS mission was to review the Armenian radiation and nuclear safety regulatory framework and activities against the relevant IAEA safety standards, to review regulatory effectiveness and to exchange information and experience in the areas covered by the IRRS. The agreed scope of this IRRS review included all facilities and activities regulated in Armenia. It is expected this IRRS mission to facilitate regulatory improvements in Armenia and other Member States from utilising the knowledge gained and experiences shared between ANRA and IRRS reviewers and the evaluation of the Armenian regulatory framework for nuclear safety, including its good practices.

The key objectives of this mission were to enhance the national legal, governmental and regulatory framework for nuclear and radiation safety, and national arrangements for emergency preparedness and response through:

a) providing an opportunity for continuous improvement of the national regulatory body through an integrated process of self-assessment and review;

b) providing the Armenia (regulatory body and governmental authorities) with a review of its regulatory technical and policy issues;

c) providing the Armenia (regulatory body and governmental authorities) with an objective evaluation of its regulatory infrastructure with respect to IAEA safety standards;

d) promoting the sharing of experience and exchange of lessons learned among senior regulators;

e) providing key staff in Armenia with an opportunity to discuss regulatory practices with IRRS team members who have experience of other regulatory practices in the same field;

f) providing Armenia with recommendations and suggestions for improvement;

g) providing other states with information regarding good practices identified in the course of the review;

h) providing reviewers from Member States and IAEA staff with opportunities to observe different approaches to regulatory oversight and to broaden knowledge in their own field (mutual learning process);

i) contributing to the harmonization of regulatory approaches among states;

j) promoting the compliance with the IAEA Safety Requirements; and

k) providing feedback on the use and application IAEA safety standards.

III. BASIS FOR THE REVIEW

A) PREPARATORY WORK AND IAEA REVIEW TEAM

At the request of the Government of Republic of Armenia, a preparatory meeting for the Integrated Regulatory Review Service (IRRS) was conducted from 10 to 11 September 2014. The preparatory meeting was carried out by the appointed Team Leader Mr Hans Wanner, Deputy Team Leader Mr Frederick Brown and the IRRS IAEA Team representatives, Mr Jean-René Jubin and Mr Teodros Hailu.

The IRRS mission preparatory team had discussions regarding regulatory programmes and policy issues with the senior management of the Armenian Nuclear Regulatory Authority (ANRA) represented by Mr Ashot Martirosyan, the chairman of ANRA, other senior management and staff. It was agreed that the regulatory framework with respect to the following facilities and activities would be reviewed during the IRRS mission in terms of compliance with the applicable IAEA safety requirements and compatibility with the respective safety guides:

- Nuclear power plants;
- Spent fuel facility;
- Waste management facilities;
- Radiation sources facilities and activities;
- Decommissioning;
- Transport of radioactive materials;
- Control of medical exposure;
- Occupational radiation protection;
- Public and environmental exposure control;
- Control of radioactive discharges and materials for clearance;
- Regulatory implications of the TEPCO Fukushima Daiichi accident; and
- Selected policy issues.

Mr Ashot Martirosyan made presentations on the national context, the current status of ANRA and Ms Anna Melkumyan on the self-assessment results to date.

IAEA staff presented the IRRS principles, process and methodology. This was followed by a discussion on the tentative work plan for the implementation of the IRRS in Armenia in June 2015.

The proposed composition of the IRRS team was discussed and tentatively confirmed. Logistics including meeting and work places, counterparts and Liaison Officer identification, proposed site visits, lodging and transportation arrangements were also addressed.

The Armenia Liaison Officer for the IRRS mission was confirmed as Ms Anna Melkumyan.

ANRA provided IAEA with the advance reference material (ARM) for the review at the end of March 2015. In preparation for the mission, the IRRS team members reviewed the Armenia advance reference material and provided their initial impressions to the IAEA Team Coordinator prior to the commencement of the IRRS mission.

B) REFERENCES FOR THE REVIEW

The relevant IAEA safety standards and the Code of Conduct on the Safety and Security of Radioactive Sources were used as review criteria. The complete list of IAEA publications used as the references for this mission is provided in Appendix VIII.

C) CONDUCT OF THE REVIEW

The initial IRRS team meeting took place on Sunday 31 May in ANRA premises, directed by the IRRS Team Leader and the IAEA Team Coordinator. Presentations and discussions included the general overview, the scope and specific issues of the mission the methodolology of review, and report writing to clarify the bases for the review and the background, context and objectives of the IRRS programme. The understanding of the methodology for review was reinforced. The agenda for the mission was presented to the team. As required by the IRRS Guidelines, the reviewers presented their initial impressions of the ARM and highlighted significant issues to be addressed during the mission.

In addition, the IAEA Review Area Facilitator presented the expectations regarding the module on the "Regulatory implications from TEPCO Fukushima Daiichi Accident".

The host Liaison Officer was present at the initial IRRS team meeting, in accordance with the IRRS Guidelines, and presented logistical arrangements planned for the mission.

The IRRS entrance meeting was held on Monday, 1 June 2015, with the participation of ANRA senior management and staff. Opening remarks were made by Mr Ashot Martirosyan, ANRA chairman, Mr Hans Wanner, IRRS Team Leader, and Mr Jean-Rene Jubin, IRRS Team Coordinator. Mr Ashot Martirosyan gave an overview of the Armenia context, ANRA activities and the action plan prepared as a result of the pre-mission self-assessment.

During the IRRS mission, a review was conducted for all review areas within the agreed scope with the objective of providing Armenia and ANRA with recommendations and suggestions for improvement and where appropriate, identifying good practice. The review was conducted through meetings, interviews and discussions, visits to facilities and direct observations of regulatory activities regarding the national legal, governmental and regulatory framework for safety.

The IRRS team performed its review according to the mission programme given in Appendix II.

The IRRS exit meeting was held on Friday, 12 June 2015. The opening remarks at the exit meeting were presented by Mr Ashot Martirosyan ANRA chairman and were followed by the presentation of the results of the mission by the IRRS Team Leader Mr Hans Wanner. Closing remarks were made by Mr Grzegorz Rzentkowski, Director, Division of Nuclear Installation Safety, IAEA.

A joint IAEA and ANRA press conference took place at the end of the mission.

An IAEA press release was issued.

1. RESPONSIBILITIES AND FUNCTIONS OF THE GOVERNMENT

1.1. NATIONAL POLICY AND STRATEGY FOR SAFETY

The Republic of Armenia has established a legislative and regulatory framework for the use of nuclear power and for protection of people and the environment from the harmful effects of ionising radiation. This legislative framework includes the Law of the Republic of Armenia on Safe Utilization of Atomic Energy for Peaceful Purposes (the Atomic Law), the Ordinance of the President of Armenia NH-121-N on establishment of nuclear regulatory authority and associated Decrees and Ministerial Orders.

The policies and strategies for safety are promulgated in Armenia mainly through legislative acts of the Parliament and the Government.

The safety objective stipulated by the Atomic Law does not explicitly describe the scope of its application (for all facilities and activities) and the duration of its application (for all stages over the lifetime of a facility or activity).

To achieve the fundamental safety objective identified in IAEA SF-1, ten fundamental safety principles are to be embedded in appropriate parts of the framework for safety. In the legislative framework for safety, neither the fundamental safety objective nor the fundamental safety principles are fully incorporated. The principle establishing the prime responsibility for safety is not completely incorporated into the Atomic Law. For details, see Section 1.4 of this Section of the Report. It was identified that full application of the fundamental safety objective and fundamental safety principles would be needed to help to apply a graded approach more consistently throughout the regulatory practices and would support more clear demonstration of long term commitment to safety.

The Armenian nuclear programme is facing a number of challenges, such as long term operation of NPP units, decommissioning of NPP units, application of modern nuclear technologies (medicine, science, etc.), maintaining availability of appropriate number of qualified experts, and long term management of radioactive waste and spent fuel. To ensure that the priority of safety will be maintained for all future developments in the Armenian nuclear program, there is a need to prepare and promulgate a long term policy and a corresponding strategy for nuclear and radiation safety. There is also a need to develop a strategy that includes (but not be limited to) the following items: current situation and definition of challenges; principles and objectives; tasks and priorities; projects; measures to ensure full and timely implementation; and verification and validation measures.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *Explicit national safety policy and corresponding strategy are not in place that would reflect the existing situation and development plans for use of nuclear energy and ionising radiation in Armenia (including plans for new nuclear plant unit) and that would express the long term commitment to safety of the government.*	
(1)	**BASIS: GSR Part 1 Requirement 1, para. 2.3 states that** *"The national policy and strategy for safety shall express a long term commitment to safety. The national policy shall be promulgated as a statement of the government's intent. The strategy shall set out the mechanisms for implementing the national policy. In the national policy and strategy, account shall be taken of the following:* *... (c) The specification of the scope of the governmental, legal and regulatory framework for safety;* *(d) The need and provision for human and financial resources;* *(e) The provision and framework for research and development;* *(f) Adequate mechanisms for taking account of social and economic developments;* *(g) The promotion of leadership and management for safety, including safety culture.*
(2)	**BASIS: GSR Part 1 Requirement 1, para. 2.4 states that** *"The national policy and strategy for safety shall be implemented in accordance with a graded approach, depending on national circumstances, to ensure that the radiation risks associated with facilities and activities, including activities involving the use of radiation sources, receive appropriate attention by the government or by the regulatory body.*
R1	**Recommendation: The Government should promulgate a policy and corresponding strategy for safety with all the elements required by the respective IAEA safety requirements that would include necessary measures to demonstrate its long term commitment to safety.**

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *The safety objective in the Atomic Law does not explicitly mention the scope of its application (all facilities and activities) and the duration of its application (all stages over the lifetime of a facility or an activity). Fundamental safety principles such as responsibility for safety, leadership and management for safety or protection of present and future generations are not fully embedded in the Armenian legislative framework for safety.*	
(1)	**BASIS: GSR Part 1 Requirement 1, para. 2.5 states that** *"The government shall promulgate laws and statutes to make provision for an effective governmental, legal and regulatory framework for safety. This framework for safety shall set out the following:* *(1) The safety principles for protecting people — individually and collectively — society and the environment from radiation risks, both at present and in the future; …*
(2)	**BASIS: GSR Part 1 Requirement 1 states that** *"The government shall establish a national policy and strategy for safety, the implementation of which shall be subject to a graded approach in accordance with national circumstances and with the radiation risks associated with facilities and activities, to achieve the fundamental safety objective and to apply the fundamental safety principles established in the Safety Fundamentals".*
(3)	**BASIS: GSR Part 1 Requirement 5 states that** *"The government shall expressly assign the prime responsibility for safety to the person or organization responsible for a facility or an activity, and shall confer on the regulatory body the authority to require such persons or organizations to comply with stipulated regulatory requirements, as well as to demonstrate such compliance".*
R2	**Recommendation: The Government should ensure that the fundamental safety objective and fundamental safety principles of IAEA SF-1 are fully incorporated in to the Armenian framework for safety.**

1.2. ESTABLISHMENT OF A FRAMEWORK FOR SAFETY

The Republic of Armenia has a complex governmental, legal and regulatory framework for safety. The legislative framework is composed of binding laws, ordinances, decrees, ministerial orders and non-binding guidance documents. However, in areas such as emergency preparedness and response or security, the legislative framework still needs to be completed or updated to comply with the IAEA safety requirements. Detailed discussion of these cases and individual conclusions of the team are given in the appropriate sections of this Report.

Article 2 of the Atomic Law binds RA to follow IAEA safety standards when developing and adopting legal acts in the nuclear area. As stipulated in the law, the intention of the legislation is to ensure that the safety level of the peaceful use of atomic energy in Armenia is in compliance with good international practice.

The legislation assigns responsibilities for regulation of peaceful uses of nuclear energy and ionising radiation. There is only a very limited scope of responsibilities assigned to bodies other than the nuclear regulatory authority. In most cases, the framework for safety clearly allocates these responsibilities. There are still areas such as security, where amendments of appropriate legislative acts are needed to be completed to clearly define specific and shared responsibilities. Detailed discussion and conclusions for these cases are given in specific sections of the report.

The provisions for responsibility for the safe management of spent fuel are established in a respective Governmental Decree.

1.3. ESTABLISHMENT OF A REGULATORY BODY AND ITS INDEPENDENCE

In accordance with the Atomic Law, the state supervision of the use of atomic energy shall be executed by a competent authority, which is a state government authority financed from the state budget, as well as from other sources not prohibited under the legislation.

An Ordinance of the President establishes an independent State Committee on Nuclear Safety Regulation under the Government of the Republic of Armenia. This state committee (ANRA) is the competent authority for regulatory control of nuclear and radiation safety, physical protection, safeguards, emergency preparedness and response and security.

The concept of a central nuclear regulatory body positioned directly under the Government (reporting through the Prime Mister) minimises the possibility of conflicting responsibilities and provides this authority with effective independence.

The Atomic Law gives a wide range of responsibilities to ANRA that require appropriate human and financial resources to ensure adequate and effective regulatory control of safety. The IRRS team observed that the human resources are insufficient in several areas of ANRA competence, in particular in the area of emergency preparedness and response, and security. Lack of resources also adversely affects essential processes such as regulatory control of facilities and activities, regulations and guides development and updates, preservation of knowledge, development and maintenance of management system, and basic and refreshment training.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *ANRA is not provided adequate financial and human resources to fulfil its regulatory control of nuclear and radiological safety in Armenia.*	
(1)	**BASIS: GSR Part 1 Requirement 3, states that** *"The government, through the legal system, shall establish and maintain a regulatory body, and shall confer on it the legal authority and provide it with the competence and the resources necessary to fulfil its statutory obligation for the regulatory control of facilities and activities.*
R3	**Recommendation: The Government should provide ANRA with human and financial resources to ensure adequate discharge of its statutory obligation for the regulatory control of safety.**

1.4. COMPLIANCE WITH REGULATIONS AND RESPONSIBILITY FOR SAFETY

The principle of prime responsibility for safety is not completely addressed in the Atomic Law (as mentioned in Section 1.1). The responsibility for safety is explicitly defined only for facilities but not for activities. Responsibility for safety in case of activities is partially covered in the Decree on radiation protection rules. The principle that responsibility for safety covers all stages of the facility or activity is not fully addressed in the legal acts. In addition, the principle that compliance with regulatory requirements does not relieve licensees from their prime responsibility for safety is missing (See Recommendation R2).

In general, ANRA has the authority under the Atomic Law to require demonstration of compliance with safety requirements. Specific provisions are then given in specific Decrees.

1.5. COORDINATION OF AUTHORITIES WITH RESPONSIBILITIES FOR SAFETY WITHIN THE REGULATORY FRAMEWORK

To discharge its regulatory responsibilities, ANRA cooperates with a number of authorities.

Specific legislative acts (e.g., the Law on general administrative procedure) set out general rules and procedures for coordination and cooperation between state/government authorities and agencies.

Cooperative agreements are concluded for ensuring coordination and liaison among authorities where appropriate. ANRA concluded agreements where responsibilities and interfaces are determined with the following organizations:

- Ministry of Health;
- Ministry of Territorial Administration and Emergency Situations;
- Police;
- National Security Service;
- Customs Service.

1.6 SYSTEM FOR PROTECTIVE ACTIONS TO REDUCE EXISTING OR UNREGULATED RADIATION RISKS

There is a high level legislation in place in Armenia for dealing with radiation risks associated with unregulated sources (of natural or artificial origin). The responsibilities for making the necessary arrangements for the protection of workers, the public and the environment in such situations are allocated to designated organizations.

The radiation risks associated with natural or artificial unregulated sources (so called orphan sources) are regulated under the Decree on approval of procedure on detection and isolation of radioactive materials. This Decree represents a high level legislative instrument. However, the regulatory body has not yet developed and implemented detailed rules and procedures that establish the regulatory requirements and criteria for protective actions in cooperation with the other authorities involved, and in consultation with interested parties, as appropriate. For detailed explanation and conclusions on this issue see Section 5 of this Report.

1.7. PROVISIONS FOR DECOMMISSIONING AND MANAGEMENT OF RADIOACTIVE WASTE AND SPENT FUEL

A Decree on approval of the concept of safe management of radioactive waste and spent nuclear fuel in Republic of Armenia sets the objectives of the respective national policy, but does not address a national policy on the final disposal of spent fuel.

This Decree addresses all the topics and typical elements highlighted in the IAEA document NW-G-1.1 on policies and strategies for radioactive waste management as well as other circumstances specific for Armenia, except as noted above.

In order to implement the policy and to specify the ways for achieving the goals identified in the policy, activities on development of spent fuel and radioactive waste management strategy document were initiated in 2011. A strategy for radioactive waste management and spent fuel management (except for final disposal) is being developed under the framework of Armenia – EC cooperation. The goal is to finalise the strategy document by the end of 2015.

Armenia has not established a policy and a corresponding strategy for the final stage of spent fuel management.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *National policy for the final stage of the spent nuclear fuel does not exist. The National Strategy on Radioactive Waste and Spent Fuel Management was not yet finalised.*	
(1)	**BASIS: GSR Part 1 Requirement 5 states that** *"The Government shall provide a national policy and strategy for safety, the implementation of which shall be subject to a graded approach in accordance with national circumstances and with the radiation risks associated with facilities and activities, to achieve the fundamental safety objective and to apply the fundamental safety principles established in the Safety Fundamentals."*
(2)	**BASIS: GSR Part 1 requirement 1 and Para. 2.3 states that** *"The Government shall establish a national policy and strategy for safety", "National policy and strategy for safety shall express a long term commitment to safety", "The national policy shall be promulgated as a statement of the government's intent. The strategy shall set out the mechanisms for implementing the national policy."*
R4	**Recommendation: The Government should promulgate a national policy for the final stage of spent nuclear fuel management and consequently finalize the National Strategy on Radioactive Waste and Spent Fuel Management.**

1.8. COMPETENCE FOR SAFETY

At the the time of the IRRS mission there is no explicit national policy and corresponding strategy for safety that would include elements providing for necessary professional training to maintain the competence of a sufficient number of suitably qualified and experienced staff for all parties having responsibilities in relation to safety. The same applies for the area of research and development for safety, where very limited resources are available.

Development of the "National education and training program on radiation protection" (that include also a part on nuclear safety) has been initiated. The program will be effective from 2017 and its proposed terms of reference envisages a special intergovernmental committee that would steer the program's implementation.

Development and implementation of a national policy and a corresponding strategy for safety that would include, among others, components for provision of:

- adequate human resources for all parties with responsibility for safety, including for competence building;

- adequate research and development for safety programmes;

should allow for maintaining adequate safety levels in the long term. The national education and training programme mentioned above may be included into the national strategy as one of its elements.

The IRRS team concluded a national policy and a corresponding strategy for safety that would include provisions for the area of competence building and maintenance and for research and development for safety is not in place (See Recommendation R1).

High level provisions are given for the Government, regulatory authority and operators for building and maintaining competence by means of technical training and retraining and with the use of research and development work in the nation's legislation. The legislation also establishes the Nuclear and Radiation Safety Centre (NRSC) to provide technical support to ANRA, including training for ANRA personnel. Details on how the provisions of the legislation are implemented are given in specific sections of the Report.

Where the available training programmes within Armenia are insufficient, training is organised with support from outside the country. This is the case for example in the framework of national projects in the IAEA Technical Cooperation Program, as well as in the European Union INSC projects, including the regional T&T project specifically designated for the regulatory authorities and their technical support organizations. Specific training programs are also organised in the framework of the Cooperative Arrangement between ANRA and US NRC.

1.9. PROVISION OF TECHNICAL SERVICES

There are three organizations in Armenia that provide services in the field of individual exposure monitoring and workplace monitoring: NRSC, the Nuclear Power Plant of Armenia (ANPP) and a service organization under the Ministry of Health. NRSC provides service to 150 radiation workers, the service organization under the Ministry of Health about 200 radiation workers mostly for medical installations (number of the workers based on the provided report on individual monitorin) and the NPP provides services for its own radiation workers - approximately 900 persons. According to current legislation these services do not need a license.

Furthermore, there is no legal requirement for an organization that would provide training in radiation protection. NRSC performs workplace monitoring on request.

Calibration services are licensed by ANRA.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *Technical services for personal monitoring and training services do not need authorization from the regulatory body.*	
(1)	**BASIS: GSR Part 3 Requirement 20, para. 3.73 states that** *"The regulatory body shall be responsible, as appropriate, for* *c) Authorization or approval of services provider for individual monitoring and calibration services*
(2)	**BASIS: GSR Part 1 Requirement 13, para 2.41 states, that** *"Technical services do not necessarily have to be provided by the government. However, if no suitable commercial or non-governmental provider of the necessary technical services is available, the government may have to make provision for the availability of such services. The regulatory body shall authorize technical services that may have significance for safety, as appropriate.*
(3)	**BASIS: GSR Part 3 Requirement 2, para 2.21 states, that** *" The government shall ensure that requirements are established for:* *(c) The competence of organizations that have responsibilities relating to protection and safety.*
(4)	**BASIS: GSR Part 3 Requirement 3, para 2.32 states, that** *"The regulatory body shall ensure the application of the requirements for education, training, qualification and competence in protection and safety of all persons engaged in activities relevant to protection and safety."*
R5	**Recommendation: The Government should establish requirements to authorize technical services.**

1.10. SUMMARY

The Republic of Armenia has established a legislative and regulative framework for the use of nuclear power and for the protection of people and the environment from the harmful effects of ionising radiation. National policies and strategies needs to be developed and promulgated to ensure appropriate levels of safety in the long term. Full application of fundamental safety objective and fundamental safety principles would help to apply a graded approach more consistently throughout the range of regulatory practices, and would support a more clear demonstration of long term commitment to safety.

The IRRS team observed that insufficient human and financial resources are provided to ANRA in view of its wide range of responsibilities.

2. THE GLOBAL SAFETY REGIME

2.1. INTERNATIONAL OBLIGATIONS AND ARRANGEMENTS FOR INTERNATIONAL COOPERATION

The Republic of Armenia is a contracting party to the following international treaties and conventions that establish common obligations and mechanisms for ensuring safety in the utilization of atomic energy for peaceful purposes and that provide for an effective coordinated international response to a nuclear or radiological emergency:

- Convention on Early Notification of a Nuclear Accident, 22.06.1993;
- Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency 22.06.1993;
- Vienna Convention on Civil Liability for Nuclear Damage, 22.06.1993;
- Convention on the Physical Protection of a Nuclear Material, 22.06.1993);
- Comprehensive Nuclear-Test-Ban Treaty, 21.12.1993;
- Convention on Nuclear Safety 22 Sep 1994, entry into force 20 Dec 1998;
- Treaty on the Non-Proliferation of Nuclear Weapons 21.06.1993;
- Agreement between the Republic Armenia and the International Atomic Energy Agency for the Application of Safeguards in connection with Treaty on the Non-Proliferation of Nuclear Weapons signed on 23.09.1993;
- Protocol Additional to the Agreement between the Republic Armenia and the International Atomic Energy Agency for "The Application of Safeguards in connection with Treaty on the Non-Proliferation of Nuclear Weapons" , 28.06.2004;
- Revised Supplementary Agreement Concerning the Provision of Technical Assistance by the International Atomic Energy Agency to the Government of the Republic of Armenia ratified on 04.06 2003;
- Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, 20 Aug 2013;
- Amendment to Convention on Physical Protection of a Nuclear Material 22 May 2013;
- International Convention for the Suppression of Acts of Nuclear Terrorism.

ANRA cooperates with the US Nuclear Regulatory Commission on exchange of technical information, nuclear safety related researches, personnel training and exchange of experience. If necessary, joint inspections are conducted with application of harmonized risk and methodological approaches.

Inter-governmental agreement with the Republic of Belarus was concluded on cooperation and exchange of information in the nuclear safety and radiation protection field. In the last 15 years, Armenia has requested a number of international peer reviews. Peer reviews performed through the IAEA include an IRRT mission (2002) and its follow-up mission (2004), ISSAS mission (2007) and its follow up (2008), ANPP design safety review mission (2003) and its follow-up (2009), OSART mission (2011) and its follow-up (2013), EPREV mission (2012), IPPAS mission (2014). Several missions on seismic safety were also organised by the IAEA on request of ANPP. In addition there are WANO peer review missions invited by the ANNP on regullar bases.

ANRA has also an intensive cooperation and experience exchange, and has received significant support from IAEA and EC projects to support the development of expertise in certain areas.

Armenian specialists participated in the review of a number of the IAEA safety standards and technical documents, for instance TECDOC dedicated to the integrated risk-informed decision making which will be shortly published. A specialist from the NRSC, ANRA TSO, participated in the IPSART mission to the Kozloduy NPP (Bulgaria).

ANRA participates in the activities of the working group of VVER Regulators forum. The working groups exchange information and develop proposals for regulatory requirements to resolve issues of concern. Armenia is also an observer in the Western European Nuclear Regulators Association (WENRA).

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *Eight major peer review missions have been invited by Armenia in the last fifteen years. Follow-ups were requested where appropriate.*	
(1)	**BASIS: GSR Part 1 Requirement 14 states that** *"The government shall fulfil its respective international obligations, participate in the relevant international arrangements, including international peer reviews, and promote international cooperation to enhance safety globally."*

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(2)	**BASIS: GSR Part 1 Requirement 15 states that** *"The regulatory body shall make arrangements for analysis to be carried out to identify lessons to be learned from operating experience and regulatory experience, including experience in other States, and for the dissemination of the lessons learned and for their use by authorized parties, the regulatory body and other relevant authorities.*
GP1	**Good practice: Armenia makes extensive use of international peer reviews and international support programs to improve its framework for safety.**

2.2. SHARING OF OPERATING EXPERIENCE AND REGULATORY EXPERIENCE

ANRA receives information on events in other States through the dedicated IAEA information systems and performs analysis of that information. ANRA is also involved in a number of other IAEA information systems (USIE, NEWS, NUSEC, GNSSN, REGNET, INIS, etc.).

ANRA is extensively using regulatory experience from international partners through bilateral contacts and multilateral programmes in areas such as development of regulatory requirements, conduct of regulatory practices or development of regulatory databases and/or registers.

With respect to dissemination of lessons learned from operating experience and their use, including feedback on measures taken in response to information received, the team made general observation in Section 5 of this report.

The operating organization receives information from WANO on operating experience which is analysed for further improvement and implementation of the safe operation program.

In the particular case of the TEPCO Fukushima Daiichi accident, the Government of Armenia voluntarily joined the European stress tests efforts to evaluate lessons learned. The main assessment was performed in accordance with the European stress test methodology and with the support of EU assistance programmes. Review of the stress test report has not been finalised yet. Stress test results for Armenia are also planned to be peer reviewed with assistance of EU countries. Based on outcomes from these reviews, ANRA will make appropriate changes in regulatory requirements and enforce implementation of necessary measures at ANPP. ANPP already started to implement first modifications that resulted from the stress tests.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *Assessment of the lessons learnt from the TEPCO Fukushima Daiichi accident, in particular from the stress test analyses, is not yet finalised. Relevant corrective actions and safety improvements need to be enforced by ANRA. In addition, the measures identified in the RA's national report submitted in CNS-2012 have not been yet fully implemented.*	
(1)	**BASIS: GSR Part 1 Requirement 15 para 3.4 states that** *"… The regulatory body shall require appropriate corrective actions to be carried out to prevent the recurrence of safety significant events. This process involves acquisition of the necessary information and its analysis to facilitate the effective utilization of international networks for learning from operating experience and regulatory experience.*
S1	**Suggestion: ANRA should consider making all necessary arrangements to finalise the identification of the lessons learned from the TEPCO Fukushima Daiichi accident. As a result of this, ANRA should require appropriate corrective actions to be implemented by ANPP and should determine appropriate actions to improve the regulatory framework, in a timely manner.**

2.3. SUMMARY

Armenia makes extensive use of international peer reviews in order to get necessary feedback to ensure continuous improvement of safety. Armenian experts are part of a number of international efforts such as VVER Regulators Forum working groups and IAEA information exchange mechanisms.

After the TEPCO Fukushima Daiichi accident, Armenia voluntarily joined the European initiative and required that ANPP perform a stress test. Assessment of the stress test results needs to be finalised, and modifications to the regulatory requirements have to be implemented by ANRA if necessary.

3. RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY

The regulatory authority for nuclear and radiation safety (ANRA) was established in 1993 by the Government of the Republic of Armenia (RA). ANRA was initially an independent body within the government. In 2002, following the change in Government Policy, the regulatory authority was placed under the Ministry of Nature Protection, and during the period 2002-2008 ANRA functioned within the Ministry for Nature Protection as an inspectorate. In accordance with the Ordinance of the President of Armenia adopted on May 20, 2008, ANRA was again made an independent State Committee reporting to the Prime Minister.

Currently there are two departments and 6 sections at the ANRA headquarters in Yerevan responsible for:

- Legal support
- Regulation of nuclear installations
- Regulation of radiation sources and technologies
- Regulation of radioactive waste and spent fuel management
- Regulation of transport of radioactive waste material
- Emergency preparedness response
- Safeguards implementation
- Physical protection regulation
- Assessment of nuclear and radiation safety

The ANRA organizational structure is in the Appendix IX.

The Nuclear and Radiation Safety Centre (NRSC) is a technical support organization that provides support to ANRA regulatory activities, but may be also contracted by other clients such as ANPP. NRSC is a company established in 2001 under the RA Government Decree to fulfil requirements of the Atomic Law by providing safety expertise in atomic energy utilization field and by rendering technical support in practices with account, control and conduction of a register on nuclear materials, ionizing radiation sources and radioactive wastes.

3.1. ORGANIZATIONAL STRUCTURE OF THE REGULATORY BODY AND ALLOCATION OF RESOURCES

The organizational structure of ANRA is fixed in a Decree approved by the Government. Any change in structure has to be approved by the Government, which is a lengthy process that may limit ANRA's flexibility to adapt its organization when necessary for effective regulatory control over safety. ANRA has a total of 44 positions, of which 32 are positions for professional staff and 12 are for support and technical staff. 5 professional positions are currently vacant.

In accordance with Article 16 of the Atomic Law, the regulatory authority is financed from the state budget. ANRA develops a proposed budget plan for the next year after evaluating annual plans and current needs. Additional detailed information about allocation of financial and human resources are described in Section 1.3. The enacted annual budget is approved by the RA National Assembly. During the last few years the enacted budget has been approximately at the same level.

The number of staff in ANRA has remained more or less constant following an increase in 2008, when ANRA became an independent authority. Staffing is discussed in Section 3.3.

The regulatory processes of ANRA are based on established policy, principles and criteria in order to prevent subjectivity in decision making. Tasks, responsibilities and functions of ANRA departments and sections are specified in their relevant provisions approved by the ANRA Chairman.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *The structure of ANRA can be changed only by the decision of the Government. This limits ANRA's ability to respond as necessary for effective regulatory control over safety when conditions and workload change.*	
(1)	**BASIS: GSR Part 1 Requirement 16 states that** *"The regulatory body shall structure its organization and manage its resources so as to discharge its responsibilities and perform its functions effectively…"*

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(2)	**BASIS: GS-G-1.1 paragraph 3.2 states that** *"A regulatory body, its structure and size, and the technical skills of its staff will change as the regulatory body passes through various phases, starting with its early organization and the preparation of its regulatory foundation to the stage where it is considered fully operational. The structure and composition of the regulatory body should be adapted in the course of time for it to be able to act effectively and to address key issues that arise at any time during the siting, design, construction, commissioning, operation and decommissioning of nuclear facilities, or closure in the case of waste disposal facilities."*
R6	**Recommendation: The Government should provide ANRA with the authorization to structure its organization and manage its available resources so as to fulfil its statutory obligations effectively.**

3.2. EFFECTIVE INDEPENDENCE IN THE PERFORMANCE OF REGULATORY ACTIVITIES

Since 2008, ANRA has been an independent regulatory authority on nuclear and radiation safety in the atomic energy utilization field. The Chairman of ANRA is appointed by, and reports directly to, the Prime Minister of RA. ANRA is independent from the agencies responsible for promotion of nuclear energy or radiation application and has an independent budget. The ANRA jurisdictions are established in the Atomic Law.

Any decision of ANRA can be appealed by the concerned party. The Law on Licensing provides the legal framework for resolution of any disagreement. Any disagreement or dispute is resolved through bilateral meetings and discussions; if agreement is still not reached the issue is settled in the courts.

3.3. STAFFING AND COMPETENCE OF THE REGULATORY BODY

ANRA determines staffing decisions based on the funding provided through the state budget and the organizational structure contained in government decrees.

The process for advertising job vacancies, examination of professional competence and selection of new recruits is part of the Quality Management System developed by ANRA. In this respect, the qualifications and competences that are needed for newcomers are defined by the Human Resource management process (MP-003).

Staff at ANRA is appointed according to ANRA special procedures for recruitment on the basis of competition in accordance with the law of the RA on Civil Service. A new employee must undergo initial training after which the section head jointly with a new employee decide on fields where further training is needed in order to ensure the implementation of his/her official duties appropriately. An individual training program is in place in accordance with the IAEA Guidance set in GS-G-1.1. The individual training program for new employee is approved by the ANRA Chairman and implemented within the specified period of time (usually up to six months).

In particular, a training program is developed for new employees based on the nature of assigned work. The new employee may be assigned to the ANPP for training, in accordance with the approved training program. The regulatory body regularly organizes seminars on specific topics, wherein ANRA's senior staff present material and engage new staff to ensure their comprehension of the material. Such meetings help newly recruited employees develop a better understanding of the regulatory system. ANRA also receives significant training support from the IAEA and EU.

The average age of ANRA staff is 56. This indicates that there will be problems over the next few years as a large portion of the staff reaches the retirement age. The retirement age at ANRA is 65, after which they have the possibility to work in ANRA under an expert contract, but not as inspectors. Two such contracts are already in place. In the next few years, six more experienced employees will reach retirement age. All these competent specialists hold leading positions, and there is no qualified staff within ANRA to replace them and ANRA does not have a method to train and develop internal candidates to replace critical positions as they become vacant. The salary level of ANRA staff is much lower than similar positions at the ANPP. This is likely to make recruitment and retention of suitably qualified and experienced staff by ANRA very difficult.

ANRA jointly with EU experts has developed a "Knowledge Development Plan for ANRA" based upon the "Strategic Plan of Regulatory Body of Armenia, Implementation period: 2011-2016" (IN-010). This plan considers the progress already made and the remaining needs. According to the Strategic Plan, ANRA should recruit 25 new

specialists for licensing of new NPP by the end of 2016. For reference to the issue of securing sufficient number of competent staff for all parties having responsibility for safety in Armenia see Section 1.8 of this Report.

3.4. LIAISON WITH ADVISORY BODIES AND SUPPORT ORGANIZATIONS

ANRA is supported by the Nuclear and Radiation Safety Centre (NRSC), which is a closed joint stock company where 100% of stocks belong to the RA Government. NRSC performs a technical support under the annual contract with ANRA. Approximately one third of NRSC financial support comes from ANRA's annual budget, while the rest are in form of grants from US NRC (5-year agreement) and EU under international joint projects. It should be mentioned that US NRC support for NRSC has been very important since the beginning. NRSC has greatly benefitted from this close cooperation as can be seen from several joint scientific publications.

At the time of the mission NRSC had a total of 34 occupied positions, 27 professional staff (including 5 students) and 7 support and technical staff.

The areas of NRSC specialization include:

- Safety analyses and assessment of nuclear installations;
- Risk assessment of nuclear installations ;
- Drafting regulations and guides on different aspects of nuclear and radiation safety;
- Development of emergency response procedures and scenarios for emergency exercises;
- Radiation safety and protection assessment;
- Radiometric and dosimetric measurements;
- IT support, development of tools and databases.

The structure of NRSC is shown in Appendix IX.

For identification of the most important areas of activities for the future, NRSC developed a 5-year plan approved by ANRA that specifies the regulatory focus areas. Currently the future challenge being faced by ANRA and NRSC are related to technical and regulatory aspects of the lifetime extension of ANPP-2.

Most of the work carried out by NRSC is techncial support to ANRA or international parteners, but it also provides technical support to ANPP and other ANRA licensees. According to the information received, ANRA is always informed by NRSC about any cooperation with ANPP, but only in an informal manner. There is no formal procedure by which ANRA is notified in such cases. There are two issues with this, one of them being a potential conflict of interest, and the other a loss of technical support for ANRA in critical review areas.

IRRS team noticed that during the inspection of facilities using radiation sources, NRSC experts are always included and the measurements needed for verification of safety are conducted by them. ANRA's inspectors check only documentary evidence provided by the authorized party and conduct interviews with personnel and management as necessary and make an observation in the facility. More detailed information regarding this issue is provided in Section 7.

The Nuclear Safety Council was established under the President of the RA in 1996. The Nuclear Safety Council is an advisory body to the President of RA on nuclear safety issues and regulatory activities.

There are two main functions of the Council:

- Identification of the main directions of the safety of nuclear energy and its development, and the formulation of recommendations and preparation of proposals on main tasks in the field of nuclear energy;
- Expert analysis of legal acts which have been submitted to the President of Armenia.

The Council consists of international senior scientists and high level experts enjoying worldwide recognition. Its members are nominated by the President of RA. Meetings are convened at the initiative of President but not less than once a year. The ANRA Chairperson participates in meetings of the Council and reports on ANRA's work and future challenges. The fulfilment of the Council's recommendations is regularly checked by the President of RA. The fact that the Council can advise the President of RA directly on high-level nuclear safety issues is of great importance for supporting the regulatory activities of ANRA.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *The NRSC provides technical support to the ANPP while also being the TSO for ANRA, this can lead to conflicts of interest. IRRS team concluded that ANRA is always informed by NRSC about any cooperation with ANPP, but only in an informal manner.*	
(1)	**BASIS: GSR Part 1, Requirement 20, paragraphs 4.21 states that** *"…If the necessary advice or assistance can be obtained only from organizations whose interests potentially conflict with those of the regulatory body, the seeking of this advice or assistance shall be monitored, and the advice given shall be carefully assessed for conflicts of interest."*
R7	**Recommendation: ANRA should establish a formal process which ensures that the technical assistance provided by NRSC to a licensees including the ANPP is monitored so that any conflict of interest can be avoided.**

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *NRSC staff also participates in the inspections of facilities and activities together with staff of the ANRA and the measurements for verification of safety are conducted by the NRSC. During inspection of a facility or activity using radiation sources ANRA did not demonstrate the independent decision making with regards to advice provided by the TSO and regulatory decisions are based on this advice.*	
(1)	**BASIS: GSR Part 1 Requirement 20, paragraph 4.22 states that** *"The obtaining of advice and assistance does not relieve the regulatory body of its assigned responsibilities. The regulatory body shall have an adequate core competence to make informed decisions. In making decisions, the regulatory body shall have the necessary means to assess advice provided by advisory bodies and information submitted by authorized parties and applicants".*
R8	**Recommendation: ANRA should ensure that its staff has adequate technical competence to make informed decisions including the means to assess advice provided by NRSC.**

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *The Nuclear Safety Council under the President of the RA comprises high level experts in the nuclear energy field enjoying worldwide recognition. The regular meetings of the Council provide a good opportunity to the ANRA Chairperson to inform the President himself about the most important issues and current needs.*	
(1)	**BASIS: GSR Part 1 Requirement 20, paragraph 4.18 states that** *"The regulatory body may decide to give formal status to the processes by which it is provided with expert opinion and advice. If the establishment of advisory bodies, whether on a temporary or a permanent basis, is considered necessary, it is essential that such bodies provide independent advice, whether technical or non-technical in nature."*
(2)	**BASIS: GS-G.1.1 paragraph 3.30 states that** *"The government or the regulatory body may choose to give formal structure to the processes by which expert opinion and advice are provided to the regulatory body. For example, broadly based advisory committees with membership drawn from other government departments, regulatory bodies of other States, scientific organizations and the industry that is regulated can bring broad perspectives to bear on the formulation of regulatory policy and regulations. A well founded committee can render valuable service to the regulatory body by helping to ensure that policies and regulations are clear, practical and complete, and provide a good balance between the regulated industry's interests and the need for strict regulatory control"*
GP2	**Good practice: The regular meeting of the Nuclear Safety Council is a good opportunity for ANRA to convey messages about the most important issues in nuclear safety directly to the President of RA.**

3.5. LIAISON BETWEEN THE REGULATORY BODY AND AUTHORIZED PARTIES

There are various means used by ANRA to inform authorized parties. These include official correspondence, publications on the ANRA's website, official and unofficial meetings.

The IRRS team concluded that ANRA aims to build an open and frank relationship with ANPP. In addition to professional regulatory contacts such as inspections and correspondence, the management of ANRA meets the ANPP management periodically (not less than once per month). There are no formal arrangements in place for scheduling the meetings; however, the practical arrangements have been working well. Experts from NRSC also participate in these meetings which makes the meetings constructive and efficient.

3.6. STABILITY AND CONSISTENCY OF REGULATORY CONTROL

ANRA carries out its regulatory activities following the legal and regulatory framework established by the Atomic Law, Law on Licensing and various Government decrees. The core regulatory processes for licensing, review and assessment, inspections and enforcement are carried out in accordance with the laid down laws and procedures.

Changes in the legal acts are made if needed with respect to operational experience and new IAEA safety standards. ANRA has implemented a transparent regulatory regime within which it publishes the drafts of relevant legal acts on its web-site for seeking comments or inputs from the public and coordinates it with the interested state authorities. Proposals/comments made to the regulatory requirements drafted by ANRA are discussed and resolved in joint meetings. The power to accept or reject proposals and comments lies with ANRA.

However, the IRRS team has identified a need for developing acceptance criteria and explicitly referring to applicable safety standards with regard to authorization process in some specific areas of ANRA's activities.

3.7. SAFETY RELATED RECORDS

ANRA has established processes for establishing and maintaining adequate and retrievable records relating to the safety of facilities and activities including state registration of ionizing radiation sources, registration of licenses, database on occupational exposures, records on safety of installations and radioactive wastes.

All data concerning operation is stored at the ANPP archive during the entire period of facility lifetime. During inspections, ANRA has free access to this data and can require the operator to submit necessary documentation.

During the IRRS mission, ANRA had only one register in use. This register contained data on ionizing radiation sources, and is named RASOD. The following records related to safety of facilities and activities are in the process of development:

1. AUTHORIZATION – the database containing information on licenses granted, licence holders and data contained in applications submittals, authorizations and permissions.
2. INSPECTION – the database of inspections of performed by regulatory authority, including preparation, performing and submission of inspection results.
3. NUCMAT – the database of accounting for and control of nuclear materials.
4. OCCUDOSES – the database of doses received by personnel.
5. TESTING – the database of questions and answers for attestation of personnel.

The hard copy reports on radioactive waste (volumes, radionuclides composition and other properties) are submitted by radioactive waste management facilities (i.e. ANPP and institutional waste storage facility) to ANRA on an annual basis. The database of accounting for and control of radioactive waste is being developed in frame of EC cooperation programme and is to be finalised at the end of 2015.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *ANRA has only a register on the use of ionizing radiation sources and the rest of registers are in the process of development.*	
(1)	**BASIS: GSR Part 1 Requirement 35 states that** *"The regulatory body shall make provision for establishing, maintaining and retrieving adequate records relating to the safety of facilities and activities"*

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
S2	**Suggestion: ANRA should consider finalizing the development of adequate safety related records, including records that might be necessary for the decommissioning of ANPP, records of events, including non-routine releases of radioactive material to the environment.**

3.8. COMMUNICATION AND CONSULTATION WITH INTERESTED PARTIES

According to the Law of "Freedom of Information" ANRA responds to queries of interested parties, including the public and news media, on possible radiation risks associated with facilities and activities. Besides responses under the Freedom of Information process, ANRA utilizes various communication tools for dissemination of information related to its regulatory processes and major decisions. These tools include ANRA's website, press releases, press-conferences as well as an annual report on ANRA activities. Article 10 of the Atomic Law provides that in the field of atomic energy utilisation, the local authorities are empowered to ensure the participation of the population in local communities in public discussions and investigations on the design of atomic energy utilisation installations to be constructed on the territory of that community. Article 17 of the Atomic Law stipulates that the regulatory body shall provide information to state, regional, local authorities and mass media on nuclear and radiation safety.

It should be noted that in recent years the public of Armenia has shown no interest to the activities of ANRA. The website provides the hotline number as well as phone number of ANRA's Chairperson, but in 2015 only two calls were made.

Additionally, it was observed that ANRA has established diverse tools for dissemination of information. On the other hand, the process for consulting the public in its regulatory decision making has not been formally established. In this respect, it was noted that there is no requirement for ANRA to promote the establishment of the appropriate means for consulting interested parties including public about the possible radiations risks associated with the facilities/activities and regulatory processes and decision making.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *There is no formal process to consult the public, among other stakeholders, in the regulatory decision making process.*	
(1)	**BASIS: GSR Part 1 Requirement 36 states that** *"The regulatory body shall promote the establishment of appropriate means of informing and consulting interested parties and the public about the possible radiation risks associated with facilities and activities, and about the processes and decisions of the regulatory body."*
(2)	**BASIS: GSR Part 1 Requirement 36 para 4.67 states that** *"…In particular, there shall be consultation by means of an open and inclusive process with interested parties residing in the vicinity of authorized facilities and activities."*
S3	**Suggestion: ANRA should consider establishing a formal process to consult the interested parties including the public as appropriate.**

3.9. SUMMARY

ANRA is an independent regulatory authority on nuclear and radiation safety. Its functions and responsibilities are clearly described in its Statute and relevant legal acts. Most of them are in line with IAEA requirement, but some recommendations and suggestions are addressed to improve the existing regulatory system, among which are the following:

- Avoiding conflicts of interests between ANRA, NRSC and ANPP;
- Finalization of safety related records;
- Giving authorization to ANRA to structure its organization to have more flexibility in addressing future needs;
- Establishing a formal process to consult the public on safety issues.

4. MANAGEMENT SYSTEM OF THE REGULATORY BODY

4.1. IMPLEMENTATION AND DOCUMENTATION OF THE MANAGEMENT SYSTEM

The Armenian Nuclear Regulatory Authority (ANRA) has established a management system which intends to provide a single framework of the arrangements and processes to addressing all the goals of ANRA. This management system has been developed according to the ISO 9001:2001 requirements. It has evolved over time in line with the changes of ANRA and its position and role in the Government structure.

The IAEA safety standard, GS-R-3, requires the management system be used to promote and support a strong safety culture. While in ANRA Quality Policy (IN-10) there is a clearly stated principle to promote safety culture together with achievement of high levels of safety performance, safety culture is not addressed elsewhere in the management system. The management system does not provide structure and direction to ANRA staff in a way that promotes the development of a strong safety culture. In particular there is not any arrangement to ensure a common understanding of the key aspects of safety culture and reinforce learning and questioning attitude within the organization.

The documentation of the management system includes processes, sub-processes, procedures and working instructions. These documents form the ANRA Management Handbook. The organization of the documentation according to these three levels is well structured and clear. Overall, the IRRS team found that the level of detail and the structure of documents were appropriate. The last significant revision of the documentation of the management system was conducted in 2014.

The ANRA management system is a process-based system. The overview of the management system is provided by the document *Introduction* (MP-001.D.). The process map is described by the document *Process Structure* (TB-024.C). The 16 key ANRA processes identified in the aforementioned document are divided into three categories: management, core and support processes. The core processes are identified as: Legislation, Safety Assessment, Licensing, Inspection, Enforcement, Nuclear Events Assessment, Emergency Preparedness, and International Cooperation. The IRRS team reckoned that this structure as described in the management system documentation provides a clear and understandable framework for the management of ANRA.

Contrary to GS-R-3 requirements related to generic processes which should be in the system, the management system does not comprise a process for internal communication with the staff of the organization on the implementation and effectiveness of the management system. Moreover, the ANRA management system did not cover the process for management organizational changes, including the evaluation of the human resourceneeds and for the actual implementation of such changes.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *The ANRA management system does not comply with several key requirements of GS-R-3. In addition, the ANRA Management Handbook does not describe a process to evaluate and identify the human resource needs according to the graded approach.*	
(1)	**BASIS: GSR Part 1 Requirement 19 states that** *"The regulatory body shall establish, implement, and assess and improve a management system that is aligned with its safety goals and contributes to their achievement."*
(2)	**BASIS: GS-R- 3 para. 2.1. states that** *"A management system shall be established, implemented, assessed and continually improved. It shall be aligned with the goals of the organization and shall contribute to their achievement. The main aim of the management system shall be to achieve and enhance safety by:* - *Bringing together in a coherent manner all the requirements for managing the organization;* - *Describing the planned and systematic actions necessary to provide adequate confidence that all these requirements are satisfied;* - *Ensuring that health, environmental, security, quality and economic requirements are not considered separately from safety requirements, to help preclude their possible negative impact*

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
	on safety.
(3)	**BASIS: GS-R-3 para. 2.2. states that** *"Safety shall be paramount within the management system, overriding all other demands."*
(4)	**BASIS: GS-R-3 para. 2.5. states that** *"The management system shall be used to promote and support a strong safety culture."*
(5)	**BASIS: GS-R-3 para. 5.27. states that** *"Internal communication concerning the implementation and effectiveness of the management system shall take place between the various levels and functions of the organization."*
(6)	**BASIS: GS-R-3 para. 5.28. states that** *"Organizational changes shall be evaluated and classified according to their importance to safety and each change shall be justified."*
(7)	**BASIS: GS-R-3 para. 4.1 states that** *"Senior management shall determine the amount of resources necessary and shall provide the resources to carry out the activities of the organization and to establish, implement, assess and continually improve the management system."*
R9	**Recommendation: ANRA should upgrade its management system in compliance with the GS-R-3 requirements, and should implement, assess and continuously improve it, in particular with respect to safety culture, internal communication, organizational change management and human resources management.**

4.2. MANAGEMENT RESPONSIBILITY

The ANRA management system describes the functional responsibilities within the organization. The head of staff has been assigned by the ANRA Chairman as the Quality Manager. Furthermore, the process owners are identified within the management system documentation.

Except the ANRA Quality Policy issued by the ANRA Chairman, the IRRS team did not observe evidence demonstrating the real ANRA management commitment to the implementation and improvement of the management system. In this respect, there is no record that the ANRA management is fulfilling its specific roles regarding the management system implementation. For instance no management system review has been conducted so far.

The Quality Policy clearly addresses ANRA's relationship with the public and other interested parties: *"ANRA is open to public and media and provide with concise information on nuclear and radiation safety situation in the Republic of Armenia"*. However, except for a few provisions addressing international cooperation, the IRRS team noted that there is no process for effective mechanisms of communication with interested parties. Furthermore, the IRRS team noted that the licensing process for nuclear facilities did not define a process for consultation with interested parties, which is legally required (See Recommendation R9).

The goals and policy of ANRA are expressed by the ANRA Chairman through the Quality Policy. This Policy states the ANRA mission and its role regarding the safety of population and personnel, protection of environment. However "*safety is a priority overriding all other demands"* is not clearly stated. This requirement should serve as the high level starting point from which the management system is derived.

ANRA states in its Quality Policy that each staff member should understand the "*importance and necessity for implementation of the quality management requirements at his/her workplace and within his/her competence*". The ANRA values and expected behaviors (vigilant, critical, consistent and competent) are listed in the text at the end of the Quality Policy, but they should be more visible and should be demonstrated, communicated and explained to the staff to ensure a common understanding throughout the organization.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *It was observed that the ANRA management is not sufficiently involved in the implementation of the management system.*	
(1)	**BASIS: GS-R-3 para. 3.1. states that** *"Management at all levels shall demonstrate its commitment to the establishment, implementation, assessment and continual improvement of the management system and shall allocate adequate resources to carry out these activities."*
(2)	**BASIS: GS-R-3 para. 5.26. states that** *"Information relevant to safety, health, environmental, security, quality and economic goals shall be communicated to individuals in the organization and, where necessary, to other interested parties."*
(3)	**BASIS: GS-G-3.1 para 3.2 states that** *"3.2. The senior management is responsible and accountable for the planning and implementation of a management system that is appropriate to the organization. It is the role of senior management to establish and cultivate principles that integrate all requirements into daily work."*
R10	**Recommendation: ANRA Management should demonstrate its commitment to the implementation, assessment and continual improvement of the management system in line with the IAEA safety standard GS-R-3.**

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *ANRA`s policy statement does not make sufficiently visible the principle of 'Safety is an overriding priority', the ANRA values and the behavioural expectation of the staff.*	
(1)	**BASIS: GS-R-3 para. 5.26. states that** *"Information relevant to safety, health, environmental, security, quality and economic goals shall be communicated to individuals in the organization and, where necessary, to other interested parties."*
(2)	**BASIS: GS-R-3 para. 2.2. states that** *"Safety shall be paramount within the management system, overriding all other demands."*
(3)	**BASIS: GS-R-3 para 3.3 states that** *"Management at all levels shall communicate to individuals the need to adopt these individual values, institutional values and behavioral expectations as well as to comply with the requirements of the management system."*
S4	**Suggestion: The ANRA senior management should consider revising its policy statement to place emphasis that safety is an overriding priority and to clarify the ANRA organizational values and expected staff behavior.**

4.3. RESOURCE MANAGEMENT

The objective of the human resource management process is that ANRA employs sufficient number of personnel with the necessary qualifications, experience and expertise. This process consists of recruitment and selection, training and retraining of the ANRA staff. However, the management system manual and its documentation do not describe the arrangements to evaluate and identify the human resource need of ANRA (See Recommendation R9).

The organizational structure, the number of positions and associated job descriptions are approved by the Government. The recruitment of ANRA personnel is organized through the Civil Service Committee on a competition basis in accordance with the Law of the RA on Civil Service. Consequently any modification of

structure or re-allocation of positions within this structure required governmental approval. In addition the IRRS team was informed that the process of making changes in the organization structure takes at least 6 months. This legal provision does not allow allocation of human resources according to the graded approach within ANRA e.g., when new safety challenges emerge (See Recommendation R9).

The ANRA management determines, provides, maintains and re-evaluates the infrastructure and the working environment necessary for work to be carried out. The IRRS team confirmed that there was a relevant infrastructure and the working environment in place for ANRA staff members.

4.4. PROCESS IMPLEMENTATION

The existing processes were developed following a systematic approach and are properly documented. The sequence and interactions of the processes are determined and described in the management system documentation. As described, these processes provide the means to meet all requirements and deliver the expected products as planned. On the other hand, the risks associated with processes are not formally identified and potential mitigatory actions were not identified.

The ANRA Chairman has assigned an owner of each management system process and defined his/her responsibilities. These process owners are assigned to maintain and, when necessary, improve their process(es) and therefore revise the associated documentation. The control of document changes needs to be reinforced, particularly the traceability of the changes. Indeed, the IRRS team did not find any records relating to description of document changes and assignment of other individuals involved in preparing, revising and reviewing documents. In addition, it was not clear how the revision of management system documentation is initiated (See Recommendation R9).

Only the latest version of management system documents is available to the Staff. This prevents the use of a wrong document version.

The records to be kept are clearly specified in each ANRA process. The statutory retention time is 5 years before sending them to the national archive. Considering the importance of its records for nuclear and radiation safety, ANRA keeps all the official records in its premises without time limitation (See Recommendation R9).

The IRRS team suggested that ANRA should review its strategy for record retention and the proper archive storage management. ANRA should anticipate as a mid/long-term approach the development of a retention records schedule to establish clear rules for properly managing records when archive space is full.

Management system related information is sent among the ANRA staff members via email. The Management system is also addressed during the quarterly ANRA meeting where all ANRA staff members are invited to attend. However the IRRS team found that this communication towards the ANRA staff members encompasses only the implementation of the management system, it does not cover the evaluation of its effectiveness.

4.5. MEASUREMENT, ASSESSMENT AND IMPROVEMENT

The principle on continuous improvement stated in the Quality Policy is covered by the document "*Measurement and Improvement*" (MP-005). This process for measurement, assessment and improvement comprises the relevant provisions as required by GS-R-3 except regarding the self-assessment which should be used to evaluate the performance of work and the improvement of safety culture. The IRRS team was told that ANRA already identified this non-compliance and had started developing new provisions to address it.

The performance indicators associated with the management system processes were clearly described in the documentation but are not used to monitor the efficiency and effectiveness of the ANRA management system. The process documented in the document "*Measurement and Improvement*" stated the objectives of internal audits as a mechanism to advise the ANRA management on: fulfillment of the ANRA's statutory functions as established in the RA legislation; fulfillment of the duties assigned to the ANRA sections and departments as established in their statutes; and the ANRA's objectives set in the annual work plan. On the other hand, the audit objectives do not include, inter alia the verification of the compliance with the management system, the adequacy of work performance and leadership or the evaluation of safety culture. The process MP-005 describes in detail how the audits are planned, prepared, conducted as well as how the conclusions are expected to be used. The Measurement and Improvement process comprises also other mechanisms to evaluate the ANRA performance and to identify opportunities for improvement such as the provisions to collect non-conformances, staff suggestions or 'customer complaints' based on the feedback form.

However, the review of the existing records associated to the Measurement and Improvement Process showed that this process is not at all implemented. Overall ANRA does not have any mechanisms to evaluate its performance which prevents ANRA from improving the management system and more generally its performances (See Recommendation R9).

GS-R-3 requires conducting at planned intervals a management system review in order to ensure the continuing suitability and effectiveness of the management system. The focus of this holistic review is to confirm that the management system is efficient and effective and that the desired outcomes are achieved by the processes of the organization. This is also a visible opportunity for the management to demonstrate its commitment for implementing, using and improving the management system. However, the IRRS team noted that ANRA does not hold any management system review (See Recommendation R10).

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *The ANRA management did not conduct any management system review to measure, evaluate and ensure the suitability and effectiveness of the management system.*	
(1)	**BASIS: GS-R-3 para. 6.7. states that** *"A management system review shall be conducted at planned intervals to ensure the continuing suitability and effectiveness of the management system and its ability to enable the objectives set for the organization to be accomplished."*
(2)	**BASIS: GS-G-3.1 para. 6.45. states that** *"Senior management should develop activities for management system review into a process that extends to the whole organization. Management system reviews should be platforms for the exchange of new ideas, with open discussion and evaluation of the inputs, and should be stimulated by the leadership of senior management."*
S5	**Suggestion: ANRA should consider conducting a regular review of its management system to ensure its continuing suitability and effectiveness.**

4.6. SUMMARY

The ANRA has established a management system which provides a framework of the arrangements and processes addressing the goals expressed in the ANRA Quality Policy. The management system it is not fully in line with the IAEA requirements for the management system defined in GS-R-3 and is not completely implemented.

The management commitment is not fully demonstrated. For instance, the management system reviews are not conducted as required in the IAEA safety standards. The ANRA Management does not provide structure and direction to ANRA staff in a way that promotes the development of a strong safety culture. ANRA management system does not comprise a process for both internal and external communication and does not have arrangements for conducting self-assessment, independent assessment, management system review, management of non-conformances and organizational changes. The Governmental provisions of making changes in the organizational structure prevent ANRA from allocating its human resources according to the graded approach.

5. AUTHORIZATION

5.1. GENERIC ISSUES

Roles and Responsibilities for authorization

The legal framework for regulatory processes related to authorization of various nuclear and radiation facilities and activities is provided by the Atomic Law and the Law on Licensing. The provisions made in these laws have been further elaborated in the different 'Procedures' (Decrees of the Government of Armenia) which deal with various stages and aspects of the facilities or activities under consideration in a separate manner. ANRA is the only regulatory authority for the safety of nuclear facilities, safe use of ionizing radiation sources, the safe management of radioactive waste and the safe transport of radioactive and nuclear materials.

Process of authorization

The process of authorization as established in RA has been developed taking into account the requirements and guidance stipulated in the IAEA safety standards among other things and encompasses various facilities and activities. ANRA has developed separate procedures for licensing of various stages of NPP's life i.e. site-selection, design, construction, operation and decommissioning. Similarly various Decrees elaborating the procedures for different aspects of radiation facilities and radioactive waste management have also been issued. These procedures also describe the documents to be submitted along with the application.

Provisions with respect to extension, suspension and termination of the validity of the authorization have been made in the Law on Licensing. While these procedures outline the general steps involved in the authorization process and mention the documents required to be submitted, it was noted that these procedures do not explictly identify the applicable safety standards and guidance for the facility and activity under consideration.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *The binding decrees applicable to the licensing of facilities and activities do not identify the specific safety standards that are applicable for the various types of licenses. There are no supporting implementing procedures and guidance documents to provide specifically applicable technical requirements and the associated acceptance criteria.*	
(1)	**BASIS: SSG-12 para. 2.19 (f) states that** *"A clear and explicit set of requirements, criteria and standards forming the licensing basis should be defined by regulation and by the regulatory body.*
S6	**Suggestion: ANRA should consider identifying clear and explicit requirements, criteria and standards forming the licensing basis for specific types of facilities and activities.**

ANRA has established a licensing commission to make conclusions on granting, termination or revocation of license, which reviews licence applications in sessions. This commission presents its finding to ANRA Chairman as recommendations based on which the Chairman takes a final decision. The statute of licensing commission is approved by the ANRA Chairman. NRSC as a TSO for ANRA provides the competence to independently review the safety analysis carried out by the applicant.

The requirement for licensing of the physical persons having important role in management of safety is explicitly mentioned in the Atomic Law; ANRA has established the relevant procedure accordingly.

The 'Atomic Law' provides the legal framework for licensing with respect to physical protection of nuclear installations and nuclear materials. The provisions made therein have been further elaborated in Government Decrees which, among other things also bring out the submissions to be made for grant of the license. The 'Atomic Law' makes provision with respect to the timeline of the safety review and grant or denial of the license. It requires ANRA to review all documents needed in order to obtain license for construction, operation and decommission of installations important in terms of atomic energy safety within 30 days after receiving the application and to grant or refuse license in 180 days after receiving all documents. These provisions have been made to make 'Atomic Law' consistent with the Law on Licensing. Similarly, the Government Decree on approval of procedure on licensing the site selection provides for a period of 23 working days after all documents specified therein are submitted. It is expected that in near future, ANRA will have to assume additional regulatory responsibilities, e.g. the licensing and construction oversight for the new NPP or NPP decommissioning . ANRA in its present form has

not carried out such extensive activities. It may be noted that these activities will be carried out in addtion to routine activities of ANRA. ANRA should carry out an exercise to systematically assess the adequacy of stipulated time durations for granting license, in light of the existing severe constraints regarding competent human resources.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *The adequacy of the stipulated periods for completing the licensing processes for a new NPP need to be verified in light of the severe constraints existing on ANRA's human resource.*	
(1)	**BASIS: GS-R-3 Requirement 2.2, para. 2.2 (X) states that** *"2.2. Safety shall be paramount within the management system, overriding all other demands."*
S7	**Suggestion: Government should consider re-evaluating the adequacy of the current licence approval timelines with respect to the new NPP.**

In conduct of its regulatory activities for authorization of various facilities and activities, ANRA considers application of graded approach The provision for inclusion of foreign experts in regulatory supervision practices has been established in the highest level of legislative instrument. This aspect is further reflected in the various Government Decrees which elaborate the regulatory process for various facilities and activities. ANRA may further look into the suitability for developing arrangements for use of external experts in its various regulatory process so as to formalize this aspect.

The legal framework for making appeals against the decisions made by the 'ANRA is laid down by the Law on Licensing, which establishes the provision that the applicant which has been denied the license can approach the Court of RA or higher authorities of the concerned agency. The licensing procedure established by ANRA further specifies the process for appeal.

5.2. AUTHORIZATION OF NUCLEAR POWER PLANTS

The Atomic Law explicitly identifies the facilities and activities which require licensing by ANRA. The section also makes provisions for licensing of physical persons holing posts and implementing practices important in terms of safety. The 'Atomic Law' further envisages issuance of separate licenses for site selection, design, construction, commissioning, operation and decommissioning of NPPs. Separate procedures catering for these stages have been issued in form of various Government Decrees. These procedures elaborate the authorization process in terms of prerequisites and responsibilities of each party. However, it was observed that the applicable safety standards (bearing comprehensive technical requirements) and related guidance applicable to a particular stage or process have not been referred in these procedures.

ANRA significantly relies on the technical support provided by NRSC to, inter alia, draft new regualtions, and carry out independent audits of various safety analyses performed by the applicant. In its safety review, ANRA also considers those external or internal aspects which may have an impact on nuclear and radiation safety.

The Government Decrees elaborating the 'Procedures' related to site selection, design, construction, operation and decommissioning of nuclear installations explicitly require the applicant to submit a 'Quality Assurance Programme' along with other submissions. Another Decree further stipulates the procedure on licensing of Manufacture of Systems, Structures and Components Important to Safety of Atomic Energy Utilization.

The regulatory processes in place to review, assess and inspect the information on the nuclear installation are established in the Atomic Law and further translated in procedures. ANRA approach has been to adopt safety standards developed by an international organization (e.g. IAEA safety standards) or other regulatory authorities (e.g., ANRA utilizes the safety standards developed by ROSTECHNADZOR or USNRC). There is no formal process of reviewing the regulatory documents in order to assess whether revision of the documents is required and if the relevant regulatory processes including the authorization process need modification in light of operating experience, regulatory experience and the revisions of IAEA safety standards (See Recommendation R15 and Suggestion S1).

NRSC augments ANRA's capabilities in several areas including development of regulatory requirements, safety analysis and regulatory research & development. The training programme established by ANRA has been strengthened by utilizing the opportunities presented in various programmes of IAEA, EC and regulatory authorities of other countries e.g. USNRC.

ANRA has developed procedure consistent with the provisions of Atomic Law for licensing of personnel having safety critical role. The procedure explicitly mentions the submissions to be made in this regard and elaborates the process for applicant's interview. It may be noted that the operating reactor at ANPP site started its operation in 1980 and ageing aspects have to be systematically accounted for. In view of this, it is necessary to have a comprehensive programme for aspects associated with ageing management both at regulatory body level as well as operator level. There is a renewed focus on extending the regulatory requirements to cater for management of Severe Accidents and augment existing competences of personnel having role in safety management in areas of severe accident management, especially those of operators.

ANRA uses various communication tools for keeping the interested parties informed about its regulatory processes and major decisions. In this regard ANRA employs its website, press releases, press conferences and various reports to communicate with the interested parties including public and the licensee. It was observed that though ANRA has established various means for communicating with public, the processes for consulting public in its regulatory decision making have not been formally established (See Suggestion S3).

ANRA, in accordance with the European Commission guidelines, has required ANPP to carry out the 'stress-test' with a view to assess the capabilities of ANPP to cope up with the extreme events of external nature. Based on the review of the report submitted by ANPP, ANRA will finalize its national report and submit it to EC. ANRA has started reviewing its regulatory requirements for any need of modification in light of the TEPCO Fukushima Daiichi accident. The document established for 'design of new NPPs' has already been modified while the requirements with respect to 'site selection for new NPP', 'the form and content for safety analysis report' and 'seismic qualification' are under the review process. However, ANRA has not carried out a comprehensvie review of all its established requirements and relevant regulatory processes to identify if any changes are required in these requirements.

RA had submitted its national report in the 2nd Extraordinary Review Meeting under Convention on Nuclear Safety. In the summary table of the report several measures have been identified to be implemented along with the responsible agencies and associated timeline. These measures pertain to external events and design issues among others. Several of these measures have yet to be completed by the responsible parties including ANRA.

5.3. AUTHORIZATION OF FUEL CYCLE FACILITIES

All fresh fuel is imported from abroad and the spent nuclear fuel is stored in the fuel storage areas located at ANPP site. Spent fuel is initially stored in Away From Reactor (AFR) and Additional Away From Reactor (AAFR) areas. After sufficient cooling, the spent fuel is moved to the dry storage area also located at ANPP site.

Additionally, as per 'Concept on Safe Management of Radioactive Waste and Spent Fuel in RA', the Government of RA is expected to consider consolidating all aspects of radioactive waste management and expected to promulgate an integrated strategy for safe management of radioactive waste and of spent fuel. ANRA has also identified this aspect in its knowledge management programme and one of the objective of the programme is the development of regulatory guidance including site approval and the design, construction and operation of fuel cycle facilities. However, the establishment of effective regulatory guidance and safe operation of the fuel cycle facilities will also require specific competences in the personnel responsible for operation and safety management. In view of the aforementioned it will be useful to employ a holistic approach and develop human resource and competences, associated with various aspects of nuclear fuel cycle facilities.

The 'Radioactive waste and spent nuclear fuel safe management in the Republic of Armenia Concept' further indicates that in future, radioactive ore mining may be a new source of radioactive waste. Commencement of such activity will further necessitate the establishment of comprehensive regulations and availability of competent human resource.

5.4. AUTHORIZATION OF RADIOACTIVE WASTE MANAGEMENT FACILITIES

ANRA has established a Licensing Procedure on radioactive wastes processing which establishes the requirements for licensing of radioactive waste management facilities following the provisions made in the Atomic Law and Law on Licensing. Criteria and requirements have been established in relation to 'release from regulatory control'.

There are two radioactive waste management facilities in Armenia: one at ANPP site and another one, the near surface institutional radioactive waste storage facility (i.e. Radon type facility). Both have been authorized by ANRA. There is no processing (treatment and conditioning) facility for solid radioactive waste in RA. The only

available treatment facility is Deep Evaporation Facility (DEF-200) located at ANPP site which has been designed for treatment of evaporator concentrate that is liquid radioactive waste generated after evaporation.

The construction of radioactive waste management facilities is subjected to licensing. The operation of predisposal radioactive waste management facilities is based on documented procedures, issued as Government Decree. All the predisposal radioactive waste management facilities are operated in accordance with national regulations and with the conditions imposed by the regulatory body.

The institutional waste storage facility was initially designed as a disposal facility for solid and liquid waste generated by institutional radioactive waste producers. However in 2009, this facility has been authorized as a storage facility for low and intermediate level solid radioactive waste.

5.5. AUTHORIZATION OF RADIATION SOURCES FACILITIES AND ACTIVITIES

According to Atomic Law, ANRA is empowered to authorize facilies and activities related to radioactive sources and radiation generators, and several related procedures have been established as Government Decrees. ANRA issues authorizations for all facilities and activities involving radiation sources. Also, ANRA has the authority to renew, terminate or revoke issued authorizations for which provisions have been made in the Law on Licensing.

The authorization system for facilities and activities involving radiation sources includes notification and licensing for facilites and activities that are not exempted or require only notification. A categorization of radioactive sources and radiation generators exists which has been established based on the radiation safety rules.

The application forms and requirements for authorization of facilities and activities using radiation sources have been issued in a RA Governmental Decree on licensing procedure which also includes the licence form for use of radioactive materials, devices containing radioactive materials, or ionizing radiation generators. ANRA has also established the guidelines for licensing of practices with radioactive sources and ionizing radiation generators. Additional necessary information for getting authorization can also be obtained from ANRA's web page.

The documents that have to be submitted for obtaining a licence for use of radiation sources are: justification of the practice, radiation protection program, emergency plan, plan for ensuring security of radiation sources, and quality assurance programme. Additionally, it is necessary to provide information about a temporary storage for radioactive sources.

One of the documents to be submitted to ANRA is the safety assessment report, named 'Expert Conclusion'. This Expert Conclusion covers aspects related to quality assurance program, emergency plan, plan for ensuring security of radiation sources and qualification of personnel. The Expert Conclusion is usually prepared by NRSC, since NRSC is also service provider for facilities using radiation sources in Armenia in addition to being TSO to ANRA.The process of amendment or renewal of an authorization is not similar to that of an application for new licence, since for amendment or renewal the ANRA request only the information about the new sources or activities the license holder has started or want to start and related to that the documents in frame of the license. There are no clearly established written procedures for the amendment or renewal of an authorization for the use of radiation sources. The licences can be revoked on request by the licence holder and based on termination of practice with radiation sources. ANRA can also revoke the licence as a consequence of enforcement action.

ANRA makes use of the conclusion of NRSC and takes regulatory decisions (such as, to issue a licence and to take actions of enforcements) based on the aforementioned *Expert Conclusion* (safety analysis report). Currently, there are no internal processes established for review and assessment of these safety assessment reports of facilities or activities using radiation sources. Submitted documents are summarized in a report produced by ANRA, which would be the basis for the decision making of the ANRA Chairman. The licence for the use of radiation sources, equipment including radioactive sources and radiation generators are valid for 10 years. The licence holders pay annual fee for the licence.

Import and export of radiation sources are authorized. However, for high activity radioactive sources, the financial resource for the long-term management of the source is not required during the process of authorization (See Suggestion S14).

When reasonable, radiation sources can be reused or recycled with the approval of ANRA.

Radiation sources are registered in the "RASOD" national register of ionizing radiation sources maintained by ANRA.

Armenia has made a political commitment to the Code of Conduct on the Safety and Security of Radioactive Sources and to the Guidance on the Import and Export of Radioactive Sources.

The process for regaining control over radiation sources that have been abandoned, lost, misplaced, stolen or otherwise transferred without proper authorization, is established in a Government Decree. ANRA's responsibilities are also defined in the decree. However, there is no clearly described process for implementation of these legal provisions. ANRA has drafted procedures with provisions to recover and restore appropriate control over orphan sources, but these drafts have not been approved yet.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *There are no internal processes established by ANRA for the review and assessment of safety assessment of facilities or activities using radiation sources.*	
(1)	**BASIS: GSR Part 1 Requirement 24, para. 4.33 states that** *"Prior to the granting of an authorization, the applicant shall be required to submit a safety assessment, which shall be reviewed and assessed by the regulatory body …"*
(2)	**BASIS: GSR Part 1 Requirement 24, para. 4.26 states that** *"The regulatory process shall be a formal process that is based on specified policies, principles and associated criteria, and that follows specified procedures as established in the management system. The process shall ensure the stability and consistency of regulatory control and shall prevent subjectivity in decision making by the individual staff members of the regulatory"*
R11	**Recommendation: ANRA should establish a process and procedures for conducting verification of the safety assessment submitted with application for authorization of radiation sources, including during the amendment and/or renewal of the authorization.**

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *There are no clearly established procedures for amendment or renewal of an authorization for the use of radiation sources.*	
(1)	**BASIS: GSR Part 1 Requirement 24, para. 4.37 states that** *"Any subsequent amendment, renewal, suspension or revocation of the authorization for a facility or an activity shall be undertaken in accordance with a clearly specified and established procedure".*
R12	**Recommendation: ANRA should establish internal procedures for amendment or renewal of an authorization of radiation sources.**

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *Legislation on detection and isolation of radioactive materials approved by the Government is established, but there is no internal procedure established by ANRA for its implementation.*	
(1)	**BASIS: GSR Part 3 Requirement 2, para. 2.26 states that** *"The government shall ensure that arrangements are in place for regaining control over radioactive sources that have been abandoned, lost, misplaced, stolen or otherwise transferred without proper authorization"*
(2)	**Code of Conduct on the Safety and Security of Radioactive Sources, para. 22 states that** *"Every State should ensure that its regulatory body … is prepared, or has established provisions, to recover and restore appropriate control over orphan sources, and to deal with radiological emergencies and has established appropriate response plans and measures"*
S8	**Suggestion: ANRA should consider establishing an internal procedure for the implementation of the legal provisions and make arrangements for regaining control over radioactive sources.**

5.6. AUTHORIZATION OF DECOMMISSIONING ACTIVITIES

There are no nuclear facilities under decommissioning in RA and thus no authorization for decommissioning has been issued. The 'Atomic Law' provides that the installations important in terms of safety are constructed and decommissioned by the principal approval of the Parliament (under the Law). The government of the RA submits to the Parliament for approval the Law on construction and decommissioning. It further recognizes decommissioning of nuclear installations as a separate licensing stage. However, the Government has not established and promulgated a comprehensive strategy for long term radioactive waste management and decommissioning. The Atomic Law further provides that the financial securities for decommissioning of nuclear installations have to be accumulated in a special account and that the use of the same for other purposes is prohibited. However, during the discussions held between the senior team members and the Director General of ANPP it was observed that the funds reserved for decommissioning are not adeqaute to meet the cost-estimate of the decommissioning of the reactors at the ANPP site. There is no formal process to periodically assess the adequacy of these reserved funds to carry out the activities of decommissioning in light of revised decommissioning plan.

The regulatory requirements and guidance with respect to decommissioning aspects have not been established (See Recommendation R24). ANRA informed that the decommissioning of the NPP is not a priority and the available human resource is being utilized for other regulatory areas having higher priority. However, a Government Decree elaborates the procedure for decommissioning of nuclear installations in terms of submission time-line and information to be submitted (environmental impact assessment report, financial resources, Quality Assurance programme etc). The procedure does not bring out the regulatory requirements related to ensuring adequacy of financial resources reserved for the decommissioning purpose, management of large volumes of radioactive waste generated in short time, availability of technical know-how required for safe decommissioning and formal process for releasing decommissioned nuclear installations from regulatory control.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *There is no mechanism in place which ensures that the financial provisions made by the Government for decommissioning of existing NPPs are adequate to provide for all activities associated with the safe decommissioning, and the Government has not established means to augment the existing decommissioning funds if the funds are found to be inadequate.*	
(1)	**BASIS: GSR Part 6 Requirement 2, para. 2.5 (16) states that** *"Responsibilities in respect of financial provisions for decommissioning shall be set out in national legislation. These provisions shall include establishing a mechanism to provide adequate financial resources and to ensure that they are available when necessary, for ensuring safe decommissioning";*
(2)	**BASIS: GSR Part 1 Requirement 2, para. 2.5 (16) states that** *"The government shall promulgate laws and statutes to make provision for an effective governmental, legal and regulatory framework for safety. This framework for safety shall set out the following… responsibilities and obligations in respect of financial provision for the management of radioactive waste and of spent fuel, and for decommissioning of facilities and termination of activities";*
(3)	**BASIS: GSR Part 6 Requirement 9, para. 6.2 states that** *"The cost estimate for decommissioning shall be updated on the basis of the periodic update of the initial decommissioning plan or on the basis of the final decommissioning plan. The mechanism used to provide financial assurance shall be consistent with the cost estimate for the facility and shall be changed if necessary".*
R13	**Recommendation: The Government should formally establish a mechanism to provide adequate financial resources for ensuring safe decommissioning of NPPs. The mechanism should also update the cost estimate in light of a periodic update of the decommissioning plan.**

There are no fuel reprocessing facilities in Armenia and all the fuel is stored at ANPP site, first in 'under water storage facilities' and then in dry spent nucelar fuel storage facilities. There are two dry spent nuclear fuel facilities already established and third such facility is under construction.

Armenia also does not have a program for decommissioning of the institutional waste storage facility. Provisions of the Atomic Law require that the decommissioning plan should be prepared and submitted to the regulatory body at least five years before the intended time of decommissioning. ANRA has not established regulatory requirements

specific to decommissioning of facilities other than NPPs (e.g. institutional waste storage facility) (See Recommendation R24).

The exemption and clearance levels for radioactive materials have been established by ANRA and are in line with IAEA safety requirements. The Licensing Procedure for decommissioning of radioactive waste storage facilities requires the submission of an environmetnal impact assessment report. The report among other things, also include the plan for the site-remediation.

5.7. AUTHORIZATION OF TRANSPORT

The transport activities within Armenia are transport of fresh fuel from Yerevan Airport to the ANPP, transport of radioactive material (mainly sealed sources) from Yerevan Airport to the user of the radioactive material, transport of mobile sources by the user and transport of disused sources from the user to the institutional waste storage facility.

The spent fuel is stored at the ANPP site itself (first in under-water storage facilities and then in dry spent fuel storage facilities) and for an internal shipment a separate permission is granted based on application. All imported sources stay in Armenia and are currently not exported or returned back and after their usage are finally transported for storage to the institutional waste storage facility.

Authorization process for transport depends on the properties of the 'material under transport' and accordingly the permission may be issued for each individual transport activity or for a particular duration, or issuance of a permission itself might not be required. Additionally, the carrier which facilitates transport needs also to have a separate 'Transport License' (except for lower risk category material, which can be transported by the user). The applicable procedures specify the process of licensing, time duration within which the authorization has to be granted or denied, the document required to be submitted along with the application, the criteria for refusal of an application and the criteria for termination of the license.

This is an implementation of graded approach in the authorization of transport operations.

ANRA has no authorization powers for licensing transit transports. This is a responsibility of a special government commission. This commission can ask ANRA to advise on aspects related to nuclear or radiation safety. Currently this is not an issue, as border crossing transports are not possible at this moment.

In Armenia no packaging and special form are designed and manufactured, thus ANRA does not approve packaging and special form certificates.

5.8. SUMMARY

The legal framework for authorization process is provided by the Atomic Law and the Law on licensing and various Government Decrees. In its activities ANRA is supported by NRSC which is the TSO of ANRA. The procedures pertaining the authorization process do not specifically identify the applicable safety standards and safety guidance. ANRA should consider making explicit references to the relevant safety standards in these procedures.

An exercise to comprehensively review all established safety standards, safety guidance and relevant regulatory processes and procedures have not been carried out to verify if there is any need of modification in these. ANRA should review its regulations and regulatory processes in light of the experience generated in the aftermath of the TEPCO Fukushima Daiichi accident. ANRA should formally require ANPP to carry out training of its personnel on aspects related to severe accident management.

ANRA has established various tools to inform the public on its various regulatory activities, however, a formal process for consulting the public among other interested parties does not exist.

6. REVIEW AND ASSESSMENT

6.1. GENERIC ISSUES

ANRA has implemented a framework governing safety review and assessment for submissions related to activities and facilities it regulates according to the laws of Republic of Armenia (RA).

Safety review and assessment is one of ANRA's principal regulatory functions. The objective of ANRA's review and assessment of information submitted by a licensee or applicant is to determine whether activity or facility comply or will comply with the safety objectives, safety principles, and safety requirements stipulated or established by RA. Review and assessment results are the basis on which ANRA makes safety decisions on the acceptability of an application for authorization of facility or activity.

ANRA's regulatory review and assessment is based on the Atomic Law, the Law of RA on Licensing (Licensing Law) and the ANRA Statute and other legal acts.

These require that a safety assessment shall be performed for all facilities and activities that may have a radiation risk for the population and the environment. They establish that ANRA will apply a graded approach (consider the related potential hazards of activities or facilities) in its review and assessment process.

Each applicant or licensee in Armenia shall take the appropriate steps to ensure that comprehensive and systematic safety assessments are carried out and submitted to ANRA for review and assessment before the construction and commissioning of a nuclear installation, as well as throughout its lifetime. Such licensee's safety assessments are required to be well-documented and updated in the light of operating experience and significant new safety information.

The Atomic Law establishes a comprehensive set of assessment requirements covering site selection, design, construction, operation, and decommissioning. These include commitments and responsibilities of the operating organizations to submit periodical safety assessments and analyses on safety state of the unit with respect to its compliance with the newly adopted regulatory rules and standards.

The Licensing Law establishes the types of practices subject to licensing in the atomic energy utilization field. The licensing procedures establishing rights, responsibilities, order, content and form of application documents for obtaining a license for a specific practice have been adopted under the RA Government Decrees.

6.1.1. MANAGEMENT OF REVIEW AND ASSESSMENT

ANRA has established an internal procedure to address the performance of review and assessment in order to determine whether licensee's submissions comply with the safety objectives, safety principles, and safety requirements of ANRA.

ANRA establishes an annual plan for review and assessment based on information contained in the licensing plans of the ANPP. The annual plan includes ANRA's research program and training program for new staff as well as a schedule of planned review and assessment activities. In scheduling reviews and assessments, ANRA considers the potential that the documents submitted may be incomplete and that additional, unanticipated, tasks may need to be performed during the planning period.

6.1.2. ORGANIZATION AND TECHNICAL RESOURCES FOR REVIEW AND ASSESSMENT

ANRA's competence of its personnel is maintained based on a systematic approach to training with application of modern methodologies providing stage-by-stage theoretical and practical training (covering standard and individual programs). Initial training of ANRA's newly recruited staff is organized in the NRSC. IAEA TC, the US NRC cooperative arrangement, and EC projects can provide training opportunities. On-the-job training can be used.

The Nuclear and Radiation Safety Centre (NRSC) has been established under Article 17 of the Atomic Law as the technical organization (TSO) to support ANRA in fulfilling its regulatory functions. For review and assessment, NRSC is empowered to provide safety expertise in the atomic energy utilization field and other technical support upon ANRA's request.

ANRA usually asks NRSC for support in the review of safety analyses. The safety expertise is provided in accordance with a Decree on the organization and conduct of safety expertise in the atomic energy utilization field. The safety expertise of NRSC is mandatory for certain cases including:

- Safety documents covering;
  - Site selection,
  - Design and construction documentation of systems and elements important from the safety aspect,
  - Analysis of emergency situations,
  - Commissioning programs of the facilities,
  - Operational documents,
- QA program;
- Decommissioning program;
- Safety analysis reports.

Also for specific cases European expert teams (e.g., RISKAUDIT) and IAEA review services are invited by ANRA to support the safety analyses review.

6.1.3. BASES FOR REVIEW AND ASSESSMENT

RA established government decrees for review and assessment during the various stages of licensing activities. The decrees are developed based on comparative analysis with the existing IAEA safety standards as well as the regulations of other countries.

The decrees define the required documents, licensing procedures, the basic criteria, and rules of nuclear safety and radiation protection of nuclear power plants. The IAEA safety standards, criteria and requirements of Russia and USA can be invoked as applicable requirements.

The Decree on approval of radiation standards is used to determine acceptance of the safety analysis results for activities involving radiation exposures.

When developing new regulations, as well as revising the existing ones, ANRA works in a cooperative and complementary manner with NRSC. Initial drafts of regulations are developed by NRSC, reviewed and then processed for finalization by ANRA. During the development of new regulations NRSC performs comparison of available approaches (IAEA, EC, US etc.) using the comparative matrix. Comparative matrix allows to come up with the comprehensive decision related to selected method for particular aspect.

6.1.4. PERFORMANCE OF REVIEW AND ASSESSMENT

When receiving an application and its supporting documents, the ANRA Chairman appoints a responsible person to deal with the application. The responsible person organizes a discussion in order to determine the appropriate departments to take part in the review and assessment process. As a result of the discussion, the departments and the specialists to be involved are identified. When necessary, NRSC can be involved in the activity.

Heads of department distribute the responsibilities in such a way that each specialist is responsible for resolving a definite task. A specialist engaged in an activity is required to have the adequate competence for conducting the assigned task.

The assigned specialists develop a review and assessment program schedule, and select the relevant legislation and safety standards. Heads of department coordinate the schedule of review and assessment as well as the peculiarities of the review task with the responsible person. In accordance with the law, the relevant ANRA department notifies to the licensee or the applicant the review and assessment schedule.

The review plan includes necessary review procedures approved by ANRA, the use of which will allow evaluating all the safety aspects. If necessary and agreed upon with the responsible person in advance, international procedures can be used. However, the review plans of ANRA do not contain all the detailed information, such as acceptance criteria, necessary to ensure complete and comprehensive applications and reviews. This issue is also addressed in Module 5.

Deterministic and probabilistic approaches are applied in the review and assessment process, and engineering judgement is used in certain cases as well. ANRA invites IAEA and foreign experts to review PSA results. If ANRA finds it necessary the submittal is transferred to the NRSC for expertise in the above mentioned program of

review and assessment. NRSC uses computer codes to perform independent calculations during the review using those from abroad as well as their own codes.

As a result of the review work conducted, a relevant report is submitted to the head of the department. After summarizing the reports of the specialists performing the reviews, the head develops the report of the department and submits it to the responsible person. The responsible person develops the consolidated report from all involved departments and submits it to the ANRA Chairman for approval.

Documents produced during the review and assessment process, including the assessment schedule, review and assessment results, the conclusion of experts, and the final decision, are stored and managed in the document management system.

6.2. REVIEW AND ASSESSMENT FOR NUCLEAR POWER PLANTS

ANPP Unit 2 was restarted in 1995 and has operated in 92% full power. During the commission testing, ANRA granted permission to operate the NPP at 35%, 55%, and 92%, in a step-by-step basis. After finishing the 92% commission test, ANPP did not submit a licensing application for 100% power operation, so the power limit is fixed to 92%.

Since 2011, ANPP Unit 2 is operated in accordance with the license issued by ANRA on April 2011 in accordance with the Decree on approval of the licensing procedure and license form for operation of nuclear installations. The license is supported by terms and conditions to be complied with by ANPP within the specified deadlines. In accordance with the license terms and conditions, ANPP Unit 2 will be operated within 92% of the design thermal power rate till September 2016.

The Decree on operating licensing procedures specifies the procedure and the required documents for the review and assessment applicable to NPPs. This Decree stipulates that the regulatory authority will review the completeness of submitted documents within 30 days and that the license is granted or rejected within 180 days after all documents are submitted. In compliance with the Decree, a SAR, PSA report, QA program on operation, technological specification, and the plan on fire safety measures and other supporting documents are required for operating license application.

In 2012, the RA Government adopted a Decree on the approval of extension of design lifetime (LTE) of ANPP Unit 2. This decree directed the Chairman of ANRA to submit a draft government decree on approval of the requirements to the design lifetime extension program of the ANPP Unit 2 operation to the RA Government for approval by July 2012. Consequently ANRA developed the appropriate decree for LTE which was enacted on August 2012.

The review process developed for LTE consists of 4 stages;

Stage 0 – Feasibility of plant lifetime extension;

Stage 1 – Safety evaluation, comprehensive investigation and development of program for lifetime extension;

Stage 2 – Evaluation of the residual lifetime of non-changeable components, plant modernizations, testing activities and update of plant SAR;

Stage 3 – Application for licence.

ANPP is preparing the application for stage 1. For stages 1 and 2, ANRA will review the submitted documents within 90 days, respectively, after all the required information is submitted.

As a general rule, ANRA applies the requirements and acceptance criteria of Russia in the review processes. In specific cases, those from IAEA and other countries can be applied as well. When the requirements from different origins are applied in the specific review process, ANRA should pay special attention whether it might cause conflicts between the requirements. ANPP analysed the aging effects of the reactor pressure vessel (RPV) of ANPP Unit 2 for aging management. In the analysis, a requirement document from Russia developed in 1980's was referred to be applied as the acceptance criteria. However, after reviewing the experiences with aging effects of RPV materials from VVER type reactors along with countries having similar reactors, EU developed a document (VERLIFE) which contains assessment methodology and acceptance criteria for RPV integrity of VVER reactors. ANRA considers that EU document would be also applicable because it reflects the recent assessment results. However, there are some discrepancies in the approaches between two documents. ANRA has not made a decision

on the acceptability of these documents for LTE. ANRA should clarify what requirements and associated criteria are to be applied to make its regulatory decision.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *Safety criteria for life time extension are not specified systematically in the regulatory requirements.*	
(1)	**BASIS: GSR Part 1 Requirement 32 states that** *"the regulatory body shall establish or adopt regulations and guides to specify the principles, requirements and associated criteria for safety upon which its regulatory judgements, decisions and actions are based."*
R14	**Recommendation: ANRA should specify the principles, requirements and associated safety criteria applicable to the design lifetime extension in the regulatory documents.**

The license terms and conditions for ANPP Unit 2 stipulate the issues related to Safety Analysis Report (SAR) revision and submission of periodical safety review (PSR). PSR is the common tool to ensure and enhance the safety throughout the lifetime of NPP as emphasized in GSR Part 1 and GSR Part 4. However, there is no eminent need for PSR in Armenia since ANPP-2 is being assessed for LTE.

Within 15 days after a notifiable event, ANPP is required to submit a written event report, including root cause analysis and corrective action plan. Based on records from the last 5 years, ANPP submitted to ANRA 7 to 8 event reports per year. Sometimes ANRA investigates the event independently, and may impose additional corrective actions on ANPP Unit 2. NRSC, as the national IRS coordinator, has an internal procedure to utilize the experience feedback from IRS. In addition, ANRA's quality management handbook describes the procedure to conduct nuclear events assessment at ANRA. This handbook is limited to the consideration of events that occur at ANPP. The external operating experience is also analysed within international projects where ANRA is actively participating. However, external operating experience issues are not included in the handbook. In preparing for the review of LTE of ANPP Unit 2, ANRA has drafted a document describing requirements on use of operating experience for LTE. ANRA commented that this document will be extended to all operational stages of NPPs.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *The scope of the ANRA internal procedure on operational experience feedback is limited to the information from IRS and misses important information from other countries. The regulations do not require the licensee to utilize operating experience from abroad.*	
(1)	**BASIS: GSR Part 1 Requirement 15 states that** *"The regulatory body shall make arrangements for analysis to be carried out to identify lessons to be learned from operating experience and regulatory experience, including experience in other States, and for the dissemination of the lessons learned and for their use by authorized parties, the regulatory body and other relevant authorities.*
(2)	**BASIS: GSR Part 1 Requirement 15 para 3.4 states that** *"The regulatory body shall establish and maintain a means for receiving information from other States and from authorized parties, as well as a means for making available to others lessons learned from operating experience and regulatory experience. The regulatory body shall require appropriate corrective actions to be carried out to prevent the recurrence of safety significant events. This process involves acquisition of the necessary information and its analysis to facilitate the effective utilization of international networks for learning from operating experience and regulatory experience.*
R15	**Recommendation: ANRA should make the necessary arrangements to identify lessons from operating and regulatory experience in other States, in particular by extending the scope of operational experience feedback and by establishing a regulation on OEF for all operating stages. In addition, ANRA should require appropriate corrective actions to be implemented at the ANPP.**

For site selection, the operating organization should submit the following documentation in support to the license application:

- Assessment results of external events;

- Assessment results of human factor induced events;
- Assessment results of events with human induced hazard;
- Assessment of NPP impact on population and environment;
- Results of public hearings.

For new nuclear power plant, ANRA developed Decree 1411 to formulate the design safety requirements. It contains radiation safety criteria to be met by the applicant:

- Dose of public for first year following a design basis accident shall not exceed 1 mSv;
- Accidents with core melt shall not lead to permanent relocation, long term restrictions in food consumption, or need for emergency evacuation outside the exclusion zone.

Decree 1411 on approval of Design Safety Requirements for new NPP defines the basic criteria and rules of nuclear safety and radiation protection, as well as the administrative provisions and the technical requirements for ensuring NPP safety. This Decree defines safety principles and objectives, defense in depth, safety functions, prevention of events (including severe accident measures), deterministic and probabilistic analysis (including severe accidents), safety classification of equipment, safety requirements for structures, systems, and components (SSC), radiation protection, emergency preparedness, and quality assurance (QA) system. However, it does not reflect the new IAEA safety requirements for NPP design (SSR-2/1) such as those related to DEC. NRSC has developed a draft revision of the decree reflecting the relevant IAEA standards. Regulations and guides should be reviewed and revised as necessary to keep them up to date. ANRA should accelerate the revision of the decree based on a comparative analysis to the relevant IAEA standards (See Recommendation R21).

The Decree on Safety Analysis Reports specifies the format and contents of SARs to be submitted to ANRA. In Section 2 of the decree, the term "safety criteria" is defined as "limiting values of plant unit characteristics and operation radiological indicators, specified in standard – legislative acts and/or established by regulatory bodies. Against these values NPP safety shall be justified". However, the safety criteria are not specified in this decree (See Suggestion S6).

The Decree on licensing of nuclear installation construction requires that the following documents should be submitted in support to the license application:

- Preliminary safety analysis report;
- NPP environmental impact assessment report and conclusion;
- Report on site selection.

6.3. REVIEW AND ASSESSMENT FOR FUEL CYCLE FACILITIES

There are no fuel cycle facilities other than spent fuel storage facility in Armenia. The spent fuel storage facility is located at ANPP site. After the TEPCO Fukushima Daiichi accident, ANRA has increased its focus on the safety aspects of spent fuel pools. A draft revision of the design safety requirements for new NPP has been developed to require heat removal from spent nuclear fuel, in addition to heat removal from reactor core, as one of the fundamental safety functions.

As a result of the Government's decision, ANPP plans to extend the capacity of the dry spent fuel storage facility using US technology. Requirements and guides of US NRC are applied in the review process for the dry spent fuel storage facility.

6.4. REVIEW AND ASSESSMENT FOR WASTE MANAGEMENT FACILITIES

All radioactive waste storage facilities at ANPP are included into the ANPP design. For this reason the issues of the safety assessment are presented in the Safety Analysis Report for ANPP Unit 2.

The safety assessment of near surface institutional waste storage facility was performed in 2006 in the frame of EU support project.

6.5. REVIEW AND ASSESSMENT FOR RADIATION SOURCES FACILITIES AND ACTIVITIES

The RA Government Decree on the licensing procedure for use of radioactive materials, devices containing radioactive materials, and radiation generators, defines the list of documents to be submitted for authorization. Review and assessment for radiation sources facilities and activities are done by ANRA.

During implementation of the licensed practice, ANRA implements control over licence terms and conditions as well as performs reviews and assessments of the received information. The process is implemented throughout the lifecycle of the installation or practice.

For licensees with radiation sources, the holder of the licence has to prepare and provide to ANRA a report about operations. The report is prepared with a graded approach in terms of content and periodicity. The content of this report consists of information about the radiation sources, workers, individual and working place monitoring, information about accidents or events, and location of the sources.

ANRA reviews all reports on the use of radioactive sources. If it is necessary to clarify details in the report, NRSC could be sent to gather additional information and to provide a safety assessment.

Current practice is that ANRA always asks for NRSC support in review and assessment of end users reports on radiation situation at the facility level. During the review process, ANRA relies on NRSC's expertise for some evaluations.

Review and assessment are performed in a systematic way taking account of all characteristics of facilities and practices that are important to safety. The depth and scope of the review and assessment of the facility by ANRA depends on the potential magnitude and nature of the hazards associated with a particular facility.

Review and assessment is commensurate with the radiation risks associated with the facility or activity, in accordance with a graded approach.

6.6. REVIEW AND ASSESSMENT FOR DECOMMISSIONING ACTIVITIES

The RA Government Decree on requirements for nuclear installation decommissioning requires the following documentation be submitted in support to the license application:

- Information on accumulation of financial securities for nuclear installation decommissioning,
- Decommissioning program;
- Safety analysis report at NPP decommissioning;
- Program on management of generated radioactive wastes;
- Plan on emergency response at decommissioning;
- Justification on safe handling of nuclear materials and radioactive wastes at NPP;
- Physical protection concept.

At present there are no nuclear facilities in Armenia that have a license for decommissioning.

6.7. REVIEW AND ASSESSMENT FOR TRANSPORT

The review and assessment of transport license and permission is carried out using requirements found in the appropriate regulations. If necessary, internationally available or Russian guidance material is used. An overview of the guidance material used for review and assessment is not established by ANRA. Safety documentation submitted by an applicant of a license or permission is compared with the legal requirements and guidance material. At ANRA's request, NRSC performs a safety assessment of the transport activity. In this safety assessment, routine and accident conditions are considered. Licenses and permissions are processed and issued in accordance with the procedures.

Currently, all radioactive material packages in use in Armenia are designed and manufactured in other countries, and accordingly are approved (if required) by the Competent Authority in that country. Competent authorities, other than that of the country of origin of the package, have the option of either performing a separate safety assessment and evaluation or making use of the assessment already made by the original competent authority, thus limiting the scope and extent of their own assessment. Such validation may also take the form of an endorsement on the original certificate. Review and assessment of packages is not performed in Armenia. All certificates of packagings used in Armenia are legally endorsed by Atomic Law.

6.8. SUMMARY

The safety review and assessment is one of ANRA's principal regulatory functions. Review and assessment is undertaken in order to enable ANRA to make decisions on safety aspects of facility and activity.

ANRA personnel qualification is maintained based on systematic approach to training with application of modern methodologies. NRSC has been established under Article 17 of the Atomic Law as the technical organization (TSO) to support ANRA in fulfilling its regulatory functions. The safety expertise of NRSC is conducted in accordance with the relevant Decree.

On April 19, 2012, the RA Government decided to pursue the lifetime extension for ANPP Unit 2. ANRA developed the licensing requirements, and ANPP have to prepare the LTE plan as well as the licensing documents to be submitted to ANRA.

For the current radioactive waste management facility an operating licence was issued. The safety assessment of the near-surface institutional waste storage facility was performed in 2006.

There are no nuclear facilities in Armenia that have a license for decommissioning at present. ANRA developed the licensing requirement only for NPP decommissioning (See Recommendation R24).

The review and assessment of transport license and permission is carried out using requirements found in the appropriate regulations. Additionally guidance material of Russian origin is used if necessary.

7. INSPECTION

7.1. GENERIC ISSUES

The legal authority to conduct regulatory inspections and take enforcement actions is conferred to ANRA by the Atomic Law. Article 17 of this Law establishes the rights and obligations of the inspectors. It is required in this Law that the scope and depth of the regulatory activities are determined with respect to the radiation risks associated with the facility or activity.

ANRA inspects facilities and activities to verify that the authorized party is in compliance with safety requirements and the terms and conditions specified in the authorization.

Based on the 'instruction on organization and conduction of inspections' and ANRA's statute, ANRA inspections cover all nuclear and radiation facilities and activities.

7.1.1. INSPECTION PROGRAMME

ANRA has developed a 'periodical inspection programme' which fixes the periodicity of inspection in ANPP. The programme does not define the basis and scope (licence conditions, regulatory requirements, etc.) of the inspections.

ANRA inspections can be planned and unplanned; both announced and unannounced. Planned inspections are conducted according to the annual inspection work plan whereas unplanned inspections are conducted in response to incidents and accidents (reactive inspection), or based on the decision of ANRA management. ANRA notifies announced inspections to facilities and activities at least 10 working days in advance. Depending on the scope and the topic of the inspection, it can be considered as complex, special or routine inspection.

In accordance with the Atomic Law, ANRA can be supported by the TSO, the Nuclear and Radiation Safety Centre (NRSC), to fulfil its regulatory functions. NRSC contributes to the implementation of ANRA's regulatory inspections, including at the Armenia Nuclear Power Plant (ANPP) site, and also provides technical support in the areas where ANRA lacks the expertise. With regard to interfaces with authorization, review and assessment and enforcement, ANRA performs inspections based on terms and conditions of the authorization. Any non-compliance with safety requirements leads ANRA to take enforcement actions.

7.1.2. INSPECTION PROCESS AND PRACTICE

ANRA has established general procedures and instruction for conducting inspections. In accordance with the 'procedure on Inspection', check-lists are prepared and used to conduct routine inspections. On the other hand, there is no specific guidance for carrying out special or complex inspections, e.g., transport, I&C systems, maintenance, etc.

The inspection methods used by ANRA consist of:

- Observation;
- Discussion and interview with the personnel;
- Review and verification of the licensee's documents and records;
- Tests and measurements.

The inspection results are documented and recorded in accordance with the 'procedure on Inspection'.

The IRRS team did not find any systematic mechanism to use the feedback from inspection process for future regulatory activities and for improving the performance of the regulatory body.

The inspections of facilities and activities using radiation sources are conducted according to ANRA's 'procedure on inspection'. While planning inspections, ANRA develops an annual inspection plan which includes information about the facilities, date of inspection, etc. The annual inspection plan is not developed on clearly defined criteria and is prepared annually with reference to an IAEA guideline. ANRA is yet to develop internal criteria for determining the frequency of inspections.

In the available inspection documents of ANRA, such as the procedure on inspection and the annual inspection plan, the approach with regard to the prioritization and frequency of the transport inspection is not established.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *There is no internal guidance for inspectors for the conduct of inspections in specific areas, e.g., transport, NPP maintenance, etc.*	
(1)	**BASIS: GS-G-1.3 Para 4.1 states that** *"To ensure that all nuclear facilities in a State are inspected to a common standard and that their level of safety is consistent, the regulatory body should provide its inspectors with written guidelines in sufficient detail. The guidelines should be followed to ensure a systematic and consistent approach to inspection while allowing sufficient flexibility for inspectors to take the initiative in dealing with new concerns that arise".*
(2)	**BASIS: TS-G-1.1 Para. 307.5. states that** *"…This should inform users about the way the competent authority expects them to comply with the Transport Regulations and about new developments in the regulatory field….".*
S9	**Suggestion: ANRA should consider establishing inspection guidance to ensure a systematic and consistent approach for inspection of facilities and activities.**

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *The results of inspection are not used systematically as feedback for improving the effectiveness of the regulatory processes.*	
(1)	**BASIS: GS-G-1.3 Para 4.12 states that** *"The regulatory body should establish a process of periodically evaluating the findings of inspections, identifying generic issues and making arrangements to enable inspectors from various plants, locations or projects to meet to exchange views and discuss the findings and issues."*
S10	**Suggestion: ANRA should consider establishing a systematic mechanism for using feedback from inspections as input for improving the effectiveness of the regulatory processes.**

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *In the established inspection documents of ANRA (such as the inspection procedure and annual inspection work plan) the approach with regard to the prioritization of transport inspection and inspection frequency is not established. Additionally, ANRA is preparing an annual plan for inspection of radiation sources. However, frequencies of inspections for this plan are determined without established criteria.*	
(1)	**BASIS: GSR Part 1 Requirement 29 states that** *"Inspections of facilities and activities shall be commensurate with the radiation risks associated with the facility or activity, in accordance with a graded approach."*
(2)	**BASIS: GSR Part 1 Para. 4.50 states that** *"The regulatory body shall develop and implement a programme of inspection of facilities and activities, to confirm compliance with regulatory requirements and with any conditions specified in the authorization. In this programme, it shall specify the types of regulatory inspection (including scheduled inspections and unannounced inspections), and shall stipulate the frequency of inspections and the areas and programmes to be inspected, in accordance with a graded approach."*
R16	**Recommendation: ANRA should implement an inspection programme and planning process, related facilities and activities using radiation sources and transport of radioactive material, to that defines a baseline, includes frequency of inspections and areas and programmes to be inspected based on established criteria and should allow for prioritization.**

7.1.3. INSPECTORS

At present there are 26 inspectors at ANRA involved for inspection of all activities and facilities.

Under its Quality Management System (QMS) ANRA has established a systematic way for training and retraining of its staff and has developed a knowledge management plan. Regular qualification improvement is organized by the Civil Service Committee (CSC) in the periods specified in the Law of the RA on Civil Service, i.e. once per 3

years one-third of ANRA staff should attend the retraining courses organized by the CSC's approved program. Besides, once per 3 years one-third of ANRA's staff should pass examination (attestation) to confirm their competence to the occupied position.

The Atomic Law establishes the right and responsibilities of the inspectors. According to the Atomic Law inspectors have unlimited access to authorised facilities and activities on the condition of not to interfere with the normal course of activities in the inspected installation. However, there is an exception in facilities and activities using radiation sources (See Recommendation R18).

7.2. INSPECTION OF NUCLEAR POWER PLANTS

ANRA performs inspections at the ANPP according to the annual inspection work plan. This plan includes types and periods of inspections.

At the ANPP site, routine or operational inspection results are reported and attached to the checklist of inspection.

During the site visit to the ANPP, the IRRS team observed an announced routine inspection. Two state inspectors conducted the inspection. The conduct of the inspection and the inspectors' behaviour was in compliance with the 'procedure on Inspection'. After inspection, the inspection result was discussed and agreed upon with the licensee.

ANRA had conducted from 2007 to 2009 several joint inspections with inspectors from BelV (TSO of Belgium regulatory body) and STUK (Finnish regulatory body) at the ANPP on operational safety related issues. The last joint inspection at the ANPP took place in 2012 with inspectors from the Russian Federation regulatory authority.

ANRA inspections do not cover licensee's safety culture. Some inspection reports mention information on safety culture. However, there is no formal provision to oversee safety culture such as a systematic method to collect information and data relating to safety culture, to evaluate them, and to report the result to the licensee.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *ANRA's inspections do not cover oversight of the licensee's safety culture.*	
(1)	**BASIS: GSR Part 1 Req. 29 Para.4.53 states that** *"In conducting inspections, the regulatory body shall consider a number of aspects, including...management system; ... safety culture..."*
R17	**Recommendation**: **ANRA should establish and implement in a systematic manner a programme to oversee licensee's safety culture, including during inspection.**

7.3. INSPECTION OF FUEL CYCLE FACILITIES

This issue is covered by section 7.4.

7.4. INSPECTION OF WASTE MANAGEMENT FACILITIES

ANRA conducts regulatory inspections for the oversight of waste management facilities in order to verify the state of radioactive waste safety and operation of the Dry Spent Fuel Storage Facility (DSFS) among others.

Based on the quarterly and annual reports on radioactive waste as well as other information submitted by the ANPP including for review and approval, ANRA conducts periodical inspections at the waste management facility to inspect:

- Fulfillment of radiation protection requirements during the radioactive waste management;
- Ensuring the ANPP Waste Acceptance Criteria and clearance criteria;
- Compliance with the safety assessment measures.

7.5. INSPECTION OF RADIATION SOURCES FACILITIES AND ACTIVITIES

There are about 500 facilities using radiation sources in the national register of ANRA. About 40 inspections are planned for the current year and the IRRS team was informed that facilities with high activity sources (about 10 facilities) are inspected annually.

Currently, there is a government decree in Armenia that prohibits conducting inspection in facilities that have annual income below a certain threshold. Therefore ANRA is not allowed to conduct inspections irrespective of the radiation source used in such facilities if they report to the finance ministry that their income is below the set limit.

During the inspection of facilities using radiation sources, NRSC experts can be involved in ANRA's inspections, as necessary. The NRSC experts conduct the measurements for safety verification whereas ANRA inspectors conduct interviews with personnel and management as necessary and check the documentation provided by the authorized party. Following the inspection, ANRA documents inspection results which also includes the measurements and conclusions made the NRSC and is basis for decision making. The IRRS team observed during a site visit that the inspected facility also gets technical services for radiation safety, including safety assessment required by ANRA, from the NRSC.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *ANRA is not allowed to conduct inspections in facilities and activities using radiation sources if the annual income of the facility is below a certain limit set by Government Decree irrespective of the radiation risk associated with the facility or activity.*	
(1)	**BASIS: GSR Part 1 Requirement 28, para. 4.52 states that** *"…Provision shall be made for free access by regulatory inspectors to any facility or activity at any time…"*
R18	**Recommendation: The Government should authorise ANRA to have free access to any facility or activity to conduct inspection to verify safety and compliance with regulatory requirements.**

7.6. INSPECTION OF DECOMMISSIONING ACTIVITIES

Practical decommissioning of any facility in Armenia has not yet commenced. As per national regulation, the activities associated with decommissioning are considered as part of the operation of the facility or activity, and special consideration has been given to incorporate the features that will facilitate decommissioning.

7.7. INSPECTION OF TRANSPORT

ANRA is responsible for assuring compliance with the regulations for safe transport of radioactive material. The compliance assurance of ANRA includes two major elements: firstly, transport activities are reviewed for approval before these activities are conducted (see section 5.7 and 6.7); secondly, ANRA performs transport inspections (including enforcement) to get confident that the licensee correctly fulfills all the regulatory requirements.

The inspections of transport activities of transport licence holders are conducted according to an annual inspection work plan of ANRA. Currently a transport inspection is done once every two years and the number of inspectors involved for transport inspections is low. Transport inspections are announced and afterwards depending on the findings, an unannounced follow-up inspection can be conducted as necessary. A checklist with the relevant transport requirements is not yet established for transport inspections. The other transport activities which are considered of lower risk within Armenia (such as transport of Categories 4 and 5 sources) are not inspected. In Armenia, there is no design and manufacture of packaging and special form; therefore inspection activities like witnessing of manufacture and witnessing of testing are not performed by ANRA. During review of license and permission applications ANRA can perform inspections to verify the accuracy of submitted information or to obtain additional information if necessary.

According to national transport legislation of Armenia the licence holders of transport licences should implement an appropriate quality assurance system to assure that packaging comply with national requirements. At present there is neither guidance issued nor action taken by ANRA to enforce full compliance with this requirement. As a result, transport license holders do not currently have a quality assurance system in place and the additional requirements of IAEA SSR-6 concerning the management system are not yet fully legalized and in place (See Recommendation R25).

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES
Observation: *ANRA does not enforce the current regulatory requirement for quality assurance. Additionally, ANRA has not yet provided any guidance for implementation of the required quality assurance for the licensee.*

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(1)	**BASIS: SSR-6 para. 307 states that** *"The competent authority shall assure compliance…"*
(2)	**BASIS: GSR Part 1 Requirement 27 states that:** *"The regulatory body shall carry out inspections of facilities and activities to verify that the authorized party is in compliance with the regulatory requirements and with the conditions specified in the authorization."*
R19	**Recommendation: ANRA should enforce compliance with the national regulatory requirements for quality assurance system in transport.**

7.8. SUMMARY

ANRA has established a regulatory framework to conduct inspections to cover all areas of its responsibility. Annual work plans are prepared to carry out inspections for facilities and activities. The IRRS team noted that guidelines for specific inspection types to ensure a systematic and consistent approach are not established. ANRA's inspection programme should be improved to cover, in a systematic manner, frequency, areas, basis and types of inspections. A mechanism should be established and implemented for using feedback from inspection process, as input for improving the effectiveness of regulatory processes. A concern was also expressed with regard to ANRA's inspectors not being allowed to conduct inspection in facilities using radiation sources with annual income below a certain treshold.

8. ENFORCEMENT

8.1. ENFORCEMENT POLICY AND PROCESS

In accordance with the Article 17.1 of Atomic Law, when the inspectors identify a non-compliance with a safety requirements or with conditions specified in the authorization, they can take enforcement actions, including cessation of activities, in case of threat to the population or the environment.

In case of violations of minor significance to safety the inspectors issue orders for rectification, where the nature of violation and the regulatory basis, deadlines for correcting the violations, as well as the guidance, instructions, and proposals on corrective measures are indicated.

Enforcement actions by ANRA include suspension or revocation of a licence, imposing administrative fines, and proposal to the law enforcement authorities on imposing criminal sanctions. In accordance with ANRA statute, the right to shutdown the Armenian NPP is assigned to the ANRA chairman, first deputy of the ANRA chairman and the site inspectors.

According to ANRA Quality Management System provisions on enforcement and the Code on administrative offences, the following types of administrative offences and liabilities related to the 'atomic energy utilization field' are established:

- Non-compliances with norms, rules and instructions existing in the atomic energy utilization field;
- Non-compliance by persons conducting practices in the atomic energy utilization field with requirements of ANRA;
- Forcing of officials on personnel of nuclear facility, radioactive waste facility, and facility or activity using ionizing radiation sources to violate the operating procedure or the safety rules;
- Hampering in functions of officials and personnel of a nuclear facility, radioactive waste facility, and ionizing radiation sources;
- Hampering in functions of officials of the nuclear regulatory authority;
- Concealing facts on accident at nuclear installation, radioactive waste facility, ionizing radiation source or violation of procedure for reporting on event - related information, concealing information on environmental contamination, provision of competent authorities with incorrect information on radiation situation;
- Concealing or distorting information related to nuclear and radiation safety in the atomic energy utilization field.

The criminal code establishes the following types of offences and penalties related to nuclear and radiation safety:

- Non-compliance with safety rules in nuclear installation;
- Non-compliance with safety rules connected with operation of ionizing radiation sources;
- Illicit trafficking of radioactive materials;
- Theft or extort of radioactive materials.

The criminal code includes provisions on breach of safety regulations at nuclear energy facilities and prescribe sanctions such as punishment and prison or deprivation of the right to hold certain posts in accordance with the severity of the breach.

According to ANRA's 'Instruction on organization and conduction of inspection', inspection results are documented in a report which includes information whether or not a non-compliance has been detected and, if any, the enforcement action taken with indication of necessary corrective measures and deadlines imposed on the licensee.

All enforcement actions by ANRA are imposed on individuals rather than on organizations which is detrimental to the safety culture, as this might lead to defensive behaviour of the personnel of the licensee. The IRRS team was informed that the Ministry of justice has initiated the drafting of a new version of the code of the Administrative offenses to include possible enforcement actions on organizations rather than on individuals.

In accordance with Article 39 of the Law of the RA on Licensing, the licensee has the right to appeal to the regulatory decisions, including ANRA's decisions on applications' dismissal, decisions on the suspension of the validity of the license, or results of the qualification tests.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *ANRA imposes penalties for non-compliance with regulatory requirements on individuals working in the facilities or conducting activities rather than to the organizations, since the code of administrative offenses requires that individuals should be penalized.*	
(1)	**Basis: GS-G-1.3 Para 5.13 states that "***…Experience in some States shows that imposing penalties on the organization rather than on individuals is preferable and is more likely to lead to improvements in safety performance."*
S11	**Suggestion: The Government should consider amending the code on administrative offences so that ANRA is able to impose penalties on organizations.**

8.2. ENFORCEMENT IMPLEMENTATIONS

According to 'Instruction on organization and condution of inspection' in case of non-compliances or violations, inspectors draw up a protocol on an administrative offence when there is a need to take an enforcement action. In addition, if an inspector detects a violation of safety requirement which causes or may cause a hazard to health of personnel, public and environment, the leader of the inspection team or the inspector who detected the violation is expected to take immediate measures to issue an enforcement order on elimination of the violation right up to curtailment of activities (on–site enforcement).

If during inspection violation of license terms and requirements have been detected, the inspection team leader or inspector issues enforcement action and submits an enforcement order to the manager of a licensee. The inspection team clarifies with the manager of a licensee or a person appointed by him the dates for elimination of deficiencies. According to the QMS document, reviews are open and any person (such as other inspectors or technical staff in the department of nuclear safety of ANRA) can participate in the review and make proposals.

In accordance with the procedure on conduct of inspections, if a licensee does not agree with contents of or deadlines specified in the enforcement order, the licensee can turn to the regulatory authority within 15 days with substantiation of non-agreement. Any non-fulfilment of corrective actions requested by ANRA can result in administrative penalty.

ANRA verifies during inspection the implementation of corrective measures taken following the enforcement action. According to ANRA QMS, ANRA should be transparent and predictable for all interested parties.

In ANRA's personnel training system, inspection and enforcement topics are covered during training of new staff.

ANRA conducts verification of its enforcement actions which incorporates the process from receiving of information, performing of analysis, control over deadlines, and checking of implementation of corrective measures.

ANRA takes enforcement actions for non-compliance or violation of the terms and conditions of authorizations based on inspections. However, ANRA has not yet established any enforcement guidance and criteria for taking enforcement actions and has not established any guidance and procedures on the enforcement process.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *ANRA has not established an enforcement policy and defined criteria for taking corrective actions for responding to non-compliance of regulatory requirements or conditions of authorization. There is also no established guidance related to enforcement.*	
(1)	**BASIS: GSR Part 1 Requirement 30, states that** *"The regulatory body shall establish and implement an enforcement policy within the legal framework for responding to non-compliance by authorized parties with regulatory requirements or with any conditions specified in the authorization".*
(2)	**BASIS: GSR Part 1 Requirement 30, para. 4.58 states that** *"The regulatory body shall establish criteria for corrective actions, including enforcing the cessation of activities or the shutting down of a facility where necessary".*

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
R20	**Recommendation: ANRA should establish within Armenia's legal framework enforcement guidance and criteria for requiring corrective actions, and develop guidance for inspectors on the implementation of enforcement actions.**

8.3. SUMMARY

ANRA is empowered by the Atomic Law to take enforcement actions which include fines, penalties, suspension and revocation of licenses. According to the Code on Administrative offenses, all enforcement actions are imposed to individuals rather than the licensee.

ANRA conducts a follow-up inspection to ensure the corrective actions are properly implemented by the licensee.

ANRA has not yet developed a clear criteria and procedures for taking appropriate enforcement actions communsurate to the significance of non-compliance with regulatory requirements.

9. REGULATIONS AND GUIDES

9.1. GENERIC ISSUES

According to the Law of the Republic of Armenia (RA) for the Safe Utilisation of Atomic Energy for Peaceful Purposes (Atomic Law) the Government of the Republic of Armenia approves the safety regulations and rules submitted by the regulatory authority (ANRA). The mandatory regulations and rules are established in the form of Governmental Decrees.

Developing draft regulations is an open process, which can be initiated and conducted by any interested organization; however only ANRA is authorised to officially submit the draft regulation to the Government for approval and enactment. Representatives from scientific organisations, interested bodies and other organizations as well as specialists may also be involved in order to carry out the activities for development of draft regulations and guides.

Developmennt of draft regulations can start with creation of a regulation concept paper. The concept paper includes the description and objectives of the proposed regulation, states the main provisions, analyse of the anticipated consequences of implementation of the proposed requirements, and may present the preliminary structure of the regulation.

Drafts of regulations are reviewed and commented on by the concerned ministries within 5 days (15 days is only allowed for the Ministry of Justice). Simultaneously, public consultation is opened and conducted for at least 15 days through the ANRA website. Also, a regulatory impact assessment is conducted by an assessor appointed by the Government. The Ministry of Justice provides the state legal expertise (within 15 days) in accordance with the ordinance of the RA President.

Regulations approved by the Government are publicly available via the state register of legal acts.

The Government has approved regulations containing licensing procedures corresponding to the lifetime of nuclear and radiological facilities. The regulations apply a graded approach, based on the type of licensed activities, characteristics of the site, and design of the facility. These regulations specify the requirements that must be met in order to obtain a license. The IRRS team found these regulations together with the RA Government Decree on Approval of the Licensing Procedure, License and Application Forms and Qualification Check of Individuals Implementing Practices and Holding Positions Important for Safety of Atomic Energy Utilization Field to establish a consistent framework for authorisation.

Requirements for content and format of certain documents, that must be provided by applicant within the process of licensing are established in documents, standards and rules, approved or officially recognized by the RA Government. In addition, the international and foreign documents officially recognized at national level, are used as a review and assessment criteria. Such documents usually provide design-specific requirements or guidances for nuclear installation safety review and assessment (for example russian guidances on probabilistic safety analyses or safety analyses report (SAR) content are used for russian designed ANPP).

The IRRS team was impressed that RA made as legally binding the requirement to meet IAEA safety standards. Based of the experience of the IRRS team members, most countries are committed to establish national safety standards consistent with the IAEA safety standards, but the IRRS team was not aware of any countries having adopted a similar legally binding approach for the application of IAEA safety standards within their laws.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *It is the law in Armenia that the Government and ANRA must ensure that safety standards they adopt shall be in compliance with the safety standards of the IAEA.*	
(1)	**BASIS: GSR Part 1 Requirement 32, para. 4.61 states that** *"The government or the regulatory body shall establish, within the legal framework, processes for establishing or adopting, promoting and amending regulations and guides. These processes shall involve consultation with interested parties in the development of the regulations and guides, with account taken of internationally agreed standards and the feedback of relevant experience…*
GP3	**Good Practice: The statutory commitment to comply with IAEA safety standards reflects a**

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
	strong national commitment to the best international practice for nuclear safety.

ANRA is committed to a periodically review of the regulatory documents, taking into account the experience with their application and new developments in nuclear and radiation safety. This commitment is established by the order of the Head of ANRA titled "Requirements for Periodical Review of Regulatory Documents". According to this decision, laws should be reviewed every 7 years, regulations every 5 years, and internal guides every 3 years. The same periodicity was supposed to be fixed in the QMS procedure IN-008. The IRRS team found there is no procedure IN-008. The existing QMS procedure MP-006 "Legislation" does not address the issue of periodically review laws, regulations and guides.

The development and revision of regulations and guides is based on the annual plan drafted by the ANRA departments and approved by the ANRA Head. The proposed annual plans are based on experience and judgment. No systematic approach to decision making on the revision process for existing regulations or guides was identified.

The IRRS team concluded that the root cause of the failure to meet the commitment on updating ANRA's regulations and guides is inadequacy of resources (See Recommendation R3).

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *ANRA does not have a systematic approach to including the revision of existing regulations and guides into the annual plan of regulatory documents development and revision.*	
(1)	**BASIS: GSR Part 1 Requirement 33 states that** *"Regulations and guides shall be reviewed and revised as necessary to keep them up to date…"*
S12	**Suggestion: ANRA should consider implementing a systematic approach to ensure that regulations and guides are reviewed and revised as necessary to keep them up to date.**

9.2. REGULATIONS AND GUIDES FOR NUCLEAR POWER PLANTS

RA has established a consistent system of regulatory requirements for safe NPP design, commissioning and operation. The main regulatory requirements concerning the design of NPPs were established in: (1) Government Decree on Approval of Licensing Procedure; and (2) Licence Form for Designing of Systems, Structures and Components Important to Safety of Atomic Energy Utilization Installation, and (3) Government Decree on Design Safety Requirements to New NPP Units.

RA operates a Russian designed NPP, Russian Federation regulations and guides are recognized as mandatory by the Government Decree on Adoption of Internal Legal Acts in English and in Russian in the Atomic Energy Utilization Field (Decree 709).

In April 2012 the Goverment Decree on Aproval of Operation Lifetime Extension of Unit 2 of Armenian NPP was approved. This decree obliged ANRA to establish requirements for the design lifetime extension of ANPP Unit 2 operation. The corresponding requirements were drafted by ANRA and approved by the corresponding Government Decree.

The Law on Construction of New NPP Units in RA was adopted in 2009, challenging ANRA with the need to significantly revise the safety requirements associated with new NPPs.

Design safety requirements for new NPP units Decree (Decree 1411) provides a comprehensive set of safety design criteria addressing safety functions, application of defence in depth, plant states, design basis, design extension, postulated initiating events, reliability and failure tolerance requirements. The IRRS team identified a deficiency concerning the requirements to address the concept of DEC (Design Extension Condition), and to define NPP design limits in the Decree 1411.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *Decree 1411 on requirements for new NPP does not address the concept of DEC which supersedes the concept of severe accident in IAEA SSR-2/1 revised in 2012. Para. 7 of the Section 3 of the Decree 1411-N states that design limits for NPPs will be defined in guidance published by the regulatory body. No guidance defining design limits is in place.*	
(1)	**BASIS: GSR Part 1 Requirement 3 states that** *"Regulations and guides shall be reviewed and revised as necessary to keep them up to date, with due consideration taken of relevant international safety standards and technical standards and of relevant experience gained."*
(2)	**BASIS: SSR 2/1 Requirement 15, para. 5.4 states that** *"The design limits shall be specified and shall be consistent with relevant national and international standards and codes, as well as with relevant regulatory requirements."*
R21	**Recommendation: ANRA should revise Decree 1411 to reflect the current IAEA safety standards on design extension conditions and establish the associated guidance.**

In general, the set of requirements for NPP design in the RA is in compliance with the requirements of SSR-2/1 and covers the basic design safety issues.

To support the operation of the ANPP unit 2, the Government Decree on Approval of the Requirements to Form and Contents of the SAR of the Armenian NPP Unit 2 has been approved in 2002. The current license for Unit 2 operation was granted in 2011.

Decree 400-N on Approval of the Licensing Procedure and License Form for Operation of Nuclear Installations identifies the documents necessary to licence the operation of NNPs. In addition to a SAR, required documents include procedures and documents for personnel qualification and training, monitoring of safety performance, accident management, operating issues and modification, maintenance, testing, surveillance and inspections. As there are no specific national requirements to the above mentioned documents content, ANRA evaluates these documents for adequacy using directly the IAEA safety standard SSR-2/2 and international requirements and standards (basically Russian) that are mandatory according to the Decree 709.

9.3. REGULATIONS AND GUIDES FUEL CYCLE FACILITIES

This issue is covered by section 9.4.

9.4. REGULATIONS AND GUIDES FOR WASTE MANAGEMENT FACILITIES

The National Strategy on Radioactive Waste (RW) and Spent Fuel Management is now being elaborated in the Republic of Armenia (See Recommendation R4).

The RA Government Decree on approval of Procedure on RW Management designates the Ministry of Energy and Natural Resources as the state competent authority empowered with radioactive waste management related issues. It also specifies requirements for radioactive waste management in the RA, including the functions of other authorities involved in the management of radioactive waste.

In the Section XI of "Radiation Safety Rules" adopted under the Government Decree (last amended in 2014) the conditions of clearance, reuse and recycling of materials and the radiological criteria used for the development of the levels are specified. In the Section XII of the Decree the radioactive wastes are defined, and the criteria for classification are provided. However, no requirements for characterization of radioactive waste to facilitate its future disposal is in place.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *There is no requirement to characterize radioactive wastes to facilitate their future disposal.*	
(1)	**Basis: GSR Part 5 Requirement 9 states that** *"Characterization and classification of radioactive waste. At various steps in the predisposal management of radioactive waste, the radioactive waste shall be characterized and classified in accordance with requirements established or approved by the regulatory body."*

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(2)	**Basis: GSR Part 5 Para. 4.10 states that** *"Radioactive waste has to be characterized in terms of its physical, mechanical, chemical, radiological and biological properties."*
(3)	**Basis: GSR Part 5 Para. 4.12 states that** *"Radioactive waste may be classified for different purposes, and different classification schemes may be used in the successive steps in waste management. The most common classification is that made from the perspective of its future disposal."*
(4)	**Basis: GSG-1 Para. 2.17 states that** *"Substantial amounts of waste arise from the operation and decommissioning of nuclear facilities with levels of activity concentration in the region of or slightly above the levels specified for the clearance of material from regulatory control.[…]The management of this waste, in contrast to exempt waste, does require consideration from the perspective of radiation protection and safety, but the extent of the provisions necessary is limited in comparison to the provisions required for waste in the higher classes (LLW, ILW or HLW) […]."*
R22	**Recommendation: ANRA should establish the requirements for the characterization of radioactive waste to facilitate its future disposal.**

In "Radiation Safety Standards" adopted under the Government Decree in 2006 and amended in 2014, the levels for exemption and clearance of both moderate and bulk amounts of solid radioactive materials are specified.

According to the Decree 709, the IAEA GSR Part 5 "Predisposal Management of Radioactive Waste" is in force in the Republic of Armenia.

Current radioactive waste predisposal management includes pre-treatment and storage of solid radioactive waste and pre-treatment, treatment and storage of liquid waste. All steps of predisposal management of radioactive waste are not implemented and there is no integrated consideration of effectiveness of RW predisposal management. The waste acceptance criteria for disposal of radioactive waste are not established in RA.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *No integrated consideration of effectiveness of RW predisposal management is in place and the waste acceptance criteria for storage and disposal of radioactive waste are not established.*	
(1)	**BASIS: GSR Part 5 Requirement 6 states that** *"Interdependences among all steps in the predisposal management of radioactive waste, as well as the impact of the anticipated disposal option, shall be appropriately taken into account"*
(2)	**BASIS: GSR Part 5 Requirement 6 para. 3.21 states that** *"…It is particularly important to consider the established acceptance criteria for disposal of the waste or the criteria that are anticipated for the most probable disposal option".*
(3)	**BASIS: SSR-5 Requirement 20 states that** *"Waste packages and unpackaged waste accepted for emplacement in a disposal facility shall conform to criteria that are fully consistent with, and are derived from, the safety case for the disposal facility in operation and after closure".*
R23	**Recommendation: The Government should establish waste acceptance criteria for the storage and the disposal of radioactive waste packages.**

General requirements for the development of different types of disposal facilities for RW are in place and stated in the paragraph 15 of Government Decree on Approval of Procedure on RW Management and as well in the Attachment 1 of Government protocol decree on Approval of Concept on Safe Management of RW and SNF in the RA. However, the IRRS team found a lack of specific regulatory requirements for the different types of disposal facilities.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES
Observation: *Only general requirements for the development of different types of disposal facilities for radioactive waste are in place.*

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(1)	**BASIS: SSR-5 Requirement 2 states that** *"The regulatory body shall establish regulatory requirements for the development of different types of disposal facility for radioactive waste and shall set out the procedures for meeting the requirements for the various stages of the licensing process. It shall also set conditions for the development, operation and closure of each individual disposal facility and shall carry out such activities as are necessary to ensure that the conditions are met".*
S13	**Suggestion: ANRA should consider establishing specific regulatory requirements for different types of disposal facilities and setting out the procedures for meeting the requirements established.**

9.5. REGULATIONS AND GUIDES FOR RADIATION SOURCES FACILITIES AND ACTIVITIES

The generic regulations related to radiation sources are established in RA Government Decrees (Radiation safety norms, Radiation safety rules, etc.). These legal acts establish requirements related to registration and accounting of radioactive sources, use and storage (including temporary storage) of these sources, documents to be submitted to apply for a license, and for physical protection programmes.

ANRA applies a graded approach commensurate with the level of risk in its licensing of activities with sources, organization of inspections, and safety assessments, including assessment of security measures. When revising its requirements (safety regulations, rules, procedures, lists, provisions and requirements), ANRA also takes into account the principle of graded approach – the safety regulations being more extensive for activities involving fissionable materials and nuclear facilities than those for activities involving radioactive materials.

However regulations and guides related to specific activities with radiation sources are yet to be developed but international recommendations (for example, IAEA safety standards) are used. There are guides that are at the draft stage (See Suggestion S12).

Import and export of radiation sources are authorized. For high activity radioactive sources, the financial safety for the long-term management of the source is not verified during the process of authorization.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *Import and export of radiation sources are authorized. ANRA does not have a requirement for financial provisions for the long-term management of high activity radioactive sources, and the financial resources are not verified during the process of authorization.*	
(1)	**BASIS: GSR Part 3 Requirement 17, para. 3.60 states that** *"Registrants and licensees shall ensure that arrangements are made promptly for the safe management of and control over radiation generators and radioactive sources, including appropriate financial provision, once it has been decided to take them out of use."*
(2)	**Code of Conduct on the Safety and Security of Radioactive Sources, para. 22 states that** *"Every State should ensure that its regulatory body…ensures that arrangements are made for the safe management and secure protection of radioactive sources, including financial provisions where appropriate, once they have become disused…"*
S14	**Suggestion: ANRA should consider establishing the requirements to ensure financial provisions for safe management of high activity radioactive sources, once they have become disused, and verify these arrangements during the process of authorization.**

9.6. REGULATIONS AND GUIDES FOR DECOMMISSIONING ACTIVITIES

The existing regulatory requirements for decommissioning of nuclear installations are stipulated by several Government Decrees: (1) Approval of the Licensing Procedure and License Form for Decommissioning of Nuclear Power Plants, (2) on Approval of Strategy of Decommissioning of Armenian NPP, and (3) on Approval of the Licensing Procedure and Licence form for Decommissioning of Radioactive Waste Storage Facility. Based on the corresponding regulatory acts ANRA adopted a ministerial Act "The Requirements to Content and Form of

Program on Decommissioning of Nuclear Installations" in 2011. Currently the Program of Decommissioning of the ANPP Unit 1 is under development by the operating organization.

However, the IRRS team noted, that there is no national policy and strategy for decommisioning nor regulatory requirements to decommissioning of facilities other than NPP, except the procedural ones (set of documents to be provided by an applicant, due periods of their assessment by the regulatory authority, etc.) in place. Such important issues as financial provisions for the decommissioning, retaining key staff, compliance with end state criteria, release from regulatory controls or activities if further controls are needed do not have consistent addressing in the existing national regulatory documents (See Recommendation R4).

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *The regulatory requirements for safe decommissioning of nuclear facility different from NPPs have not been established by ANRA.*	
(1)	**BASIS: GSR Part 1 Requirement 10, states that** *"The government shall make provision for the safe decommissioning of facilities, the safe management and disposal of radioactive waste arising from facilities and activities, and the safe management of spent fuel.*
(2)	**BASIS: GSR Part 1 para. 2.28 states that** *"The decommissioning of facilities and the safe management and disposal of radioactive waste shall constitute essential elements of the governmental policy and the corresponding strategy over the lifetime of facilities and the duration of activities. The strategy shall include appropriate interim targets and end states…"*
(3)	**BASIS: GSR Part 6 Requirement 10, para. 7.1 & 7.5 states that** *"The regulatory body shall ensure that the licensee takes decommissioning into account in the siting, design, construction, commissioning and operation of the facility, by means which include features to facilitate decommissioning, the maintenance of records of the facility, and consideration of physical and procedural methods to limit contamination and/or activation…the decommissioning plan shall be updated by the licensee and shall be reviewed by the regulatory body periodically… .*
(4)	**BASIS: GSR Part 6 Requirement 3, states that** *"The regulatory body shall establish the safety requirements for decommissioning, including requirements for management of the resulting radioactive waste, and shall adopt associated regulations and guides. The regulatory body shall also take actions to ensure that the regulatory requirements are met.…*
R24	**Recommendation: ANRA should establish the regulatory requirements for decommissioning in line with the IAEA safety standards.**

9.7. REGULATIONS AND GUIDES FOR TRANSPORT

The requirements of IAEA Transport Regulations TS-R-1 1996 Edition 1996 (ST-1 Revised) are legally implemented in Armenia by Government Decree on Approval of Special Rules on Transportation of Nuclear and Radioactive Materials (Transportation Decree). Since then, the IAEA Transport Regulations have been revised three times and the current IAEA safety standard is SSR-6, 2012 edition. The Transportation Decree has not yet been reviewed and revised, and is therefore not up to date. For example, after 1996 there are additional IAEA requirements concerning management systems for all activities relating to the transport of radioactive material (such as use, procurement, handling, shipping, storage, cleaning and disposal of radioactive material packaging). Requirements for reporting criteria for incidents/accidents occurring during the transport are addressed by ANRA as part of the transport licences and conditions.

In the Procedure for Regaining Control over Radioactive Material and Isolation, approved by the Government Decree, the transportation safety requirements are not sufficiently covered. This is expected to be improved by the new Prompt Response Decree, which is in the stage of finalization and getting approval of other governmental authorities.

The Advisory Material for the IAEA Transport Regulations (SSG-26 or TS-G-1.1) and guidance material (TS-G-1.2: Emergence response, TS-G-1.3: Radiation Protection Programmes, TS-G-1.4: Management system) are not used for guidance to meet the requirements as described in the IAEA Transport Regulations.

Russian and international documents are used within ANRA as additional guidance material. ANRA has not developed its own guidance material. ANRA should consider making guidance material available for users and applicants to meet the requirements of the transport regulations.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *The existing Transportation Decree is based on IAEA Transport Regulations of 1996. This Decree has not yet been reviewed and updated according the actual IAEA Transport Regulation SSR-6.*	
(1)	**BASIS: GSR Part 1 Requirement 33 states that:** *"Regulations and guides shall be reviewed and revised as necessary to keep them up to date, with due consideration taken of relevant international safety standards and technical standards and of relevant experience gained."*
(2)	**BASIS: TS-G-1.1 Para. 307.5 states that:** *"A compliance assurance programme can only be implemented if its scope and objectives are conveyed to all parties involved in the transport of radioactive material (i.e. designers, manufacturers, consignors and carriers). Therefore, compliance assurance programmes should include provisions for information dissemination. This should inform users about the way the competent authority expects them to comply with the Transport Regulations and about new developments in the regulatory field. All parties involved should use trained staff."*
R25	**Recommendation: ANRA should review and revise the Transportation Decree to ensure that it is in compliance with the current IAEA Transport safety standards.**
S15	**Suggestion: ANRA should consider providing guidance for users and applicants to meet the requirements of the transport regulations.**

9.8. SUMMARY

The IRRS team appreciated the strong orientation of the regulatory infrastructure of the RA to follow the IAEA safety standards. IRRS team considered that development of some additional regulations and guides especially dealing with the radioactive waste management and disposal, decommissioning of the nuclear facilities, safe transportations would be of significant effect for the RA regulation system improvement. This process to review regulations and guides should be systematic and properly resourced.

Overall, the legal and regulatory system of RA, including laws, regulations and guides, appears relevant to the IAEA requirements and consistent to provide an appropriate nuclear and radiation safety legal regime in the RA.

10. EMERGENCY PREPAREDNESS AND RESPONSE – REGULATORY ASPECTS

10.1. GENERAL EPR REGULATORY REQUIREMENTS

Note: Through this chapter, the term "operating organization" includes operators of facilities in threat category I, II or III and operators of practices or sources in threat category IV, as per IAEA categorization of threats described in Table 1 of IAEA GS-R-2.

Basic responsibilities

Among other responsibilities, ANRA has the mandate to elaborate and submit safety regulations, rules and guidelines for emergency preparedness and response (EPR). As regulatory body, ANRA is responsible to "control preparedness of licensees to possible extreme situations" and to ensure that the EPR arrangements of all operating organizations are compliant with the existing legal provisions. There is no other organization with which ANRA could share its responsibilities as regulatory body. In all activities, ANRA is supported by its Technical Support Organization (TSO), the Nuclear and Radiation Safety Centre (NRSC). In relation to EPR activities, at ANRA's request and under its direction, NRSC drafts regulations and guidance, performs safety analyses and radiological consequences assessments, writes internal emergency procedures and participates within the emergency response organization of ANRA. The internal procedures and guidance are approved by ANRA, after they are prepared by NRSC.

General requirements on emergency preparedness and response for the operating organizations are included in the Law of the Republic of Armenia for the safe utilisation of atomic energy for peaceful purposes (Atomic Law), the Governmental Decision 51/2001 on the approval of the Basic requirements to planning and implementation of response actions to nuclear and radiological emergencies (Basic requirements) and in the Radiation Safety Standards GD 1219/2006 and Radiation Safety Rules 1489/2006, amended as GD 1367/2014 (Radiation Safety Standards). These general requirements refer mainly to: (1) the obligation of operating organizations to have in place emergency response plans; roles for notification and exchange of information during emergencies; (2) elements on public information; and rules on protecting the emergency workers. However, specific EPR requirements for operating organizations using radioactive sources are missing.

For the ANPP, additional requirements on radiation monitoring and medical response are included in the GD 2328/2005 on the approval of the National Plan for the protection of the population in case of a nuclear and (or) radiological accident at the ANPP (National Plan). A few additional requirements on EPR are included in the Russian standard OPB88 issued in 1997. The use of this standard for regulatory purposes as well of other Russian standards and IAEA Safety Standards (including GSR Part 7, the revision of GS-R-2) has been approved through GD 709.A/2013.

Based on requirements included in the existing legislation, the operating organizations have the responsibility to prepare an on-site emergency response plan that has to be submitted to ANRA during the authorization process. The content of the on-site emergency response plans is described in the Basic requirements. During the licensing process, ANRA checks for compliance of the on-site emergency response plans with the required content. The on-site emergency response plans are approved by the management of respective operating organizations and agreed to by ANRA.

During the interviews it became evident that ANRA's process to evaluate the on-site EPR arrangements of the operating organizations after the license is issued should be improved. ANRA performs mainly 1 inspection per year in relation to the EPR arrangements of the ANPP. The EPR arrangements of radiological installations are inspected globally, during the regular inspections of facilities or activities operating high activity radioactive sources.

In order to strengthen ANRA's control over the adequacy and effectiveness of the on-site arrangements, there is a clear need for specific EPR requirements to be developed for all operating organizations, in line with the international standards, in relation to response to nuclear and/or radiological emergencies.

Assessment of threats

In 2014 ANRA adopted the threat categories as described in Table 1 of GS-R-2, as part of the amendments to the Radiation Safety Standards. A general provision on a "situation assessment" is included in the Basic requirements and, according to the discussions held, a graded approach is used by licensees when developing on-site emergency

response plans and also by ANRA when revising the on-site plans. Nevertheless, there are no specific requirements or guidance in place for the operating organizations on developing threat assessment in line with the international standards, as the basis for their emergency response plans. The requirements should be elaborated by ANRA in the EPR regulation for all operating organizations, as recommended in subchapter 10.1. In addition, ANRA should consider developing guidelines to support the threat assessment of operating organizations.

Taking into consideration the intention of Government of Armenia to prolong the lifetime of Unit 2 of ANPP for another 10 years, ANRA should ensure that ANPP will complete the threat assessment as required in the international standards, as part of the process for life time extension the facility. The threat assessment for ANPP should include consideration of: (a) events that could affect the facility or activity, including events of very low probability and events not considered in the design; (b) events involving a combination of a nuclear or radiological emergency with a conventional emergency; (c) events that could affect several facilities and activities concurrently and the interactions among the facilities and activities affected.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *The legislative framework includes only some general requirements on emergency preparedness and response for the operating organizations that ANRA uses as basis for their regulatory control, mainly in relation to the ANPP. There are no specific EPR requirements in place for all operating organizations.*	
(1)	**BASIS: GS-R-2 para. 3.9 states that** *"In fulfilling its statutory obligations, the regulatory body… shall establish, promote or adopt regulations and guides upon which its regulatory actions are based;… shall provide for issuing, amending, suspending or revoking authorizations, subject to any necessary conditions, that are clear and unambiguous and which shall specify (unless elsewhere specified):… the requirements for incident reporting;… and emergency preparedness arrangements."*
R26	**Recommendation: ANRA should develop and promulgate regulatory requirements for EPR for all operating organizations covering all relevant general, functional and infrastructure aspects of IAEA GS-R-2 in relation to response to nuclear and/or radiological emergencies.**

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *There are no specific guidelines for the operating organizations on developing threat assessments as basis for their on-site emergency response plans.*	
(1)	**BASIS: GS-R-2 para. 3.15 states that** *"The nature and extent of emergency arrangements [for preparedness and response] shall be commensurate with the potential magnitude and nature of the [threat]… associated with the facility or activity. The full range of postulated events shall be considered in the threat assessment. In the threat assessment, emergencies involving a combination of a nuclear or radiological emergency and a conventional emergency such as an earthquake shall be considered. [...]"*
S16	**Suggestion: ANRA should consider developing guidelines to support the threat assessment of all operating organizations.**

10.2. FUNCTIONAL REGULATORY REQUIREMENTS

Establishing emergency management and operations

Within the existing legislative framework, there are no specific regulatory requirements on licensees' emergency management structure, particularly addressing the need for the prompt transition from normal operation to emergency operation command and control. Nevertheless, some requirements are included in the Russian standard OPB88/1997 and the existing emergency management arrangements at the ANPP are verified by ANRA through inspections and by observing the emergency response exercises of the facility.

Identifying, notifying and activating

A generic requirement for operating organizations to have in place a system for emergency classification is included in the Basic requirements. However, a system for emergency classification in line with IAEA requirement is not yet adopted by ANRA.

According to discussions held, ANPP has in place an accident classification system that should be made compatible with the IAEA system for emergency classification. At ANRA's request, the ANPP is going to consider the harmonization of their accident classification system with that of IAEA and the revision and/or development of Emergency Action Levels (EALs.) ANRA should ensure that new EALs will be developed by ANPP as basis for emergency classification, during the upgrading process.

Regulatory requirements for notification of an emergency by licensees are in place and are included in the Basic requirements and in the National Plan. Some timing requirements are included in the National Plan. The means of verification by ANRA are on-site inspections and participation in the ANPP emergency response exercises as observer. Although it is based on a graded approach, ANRA's inspection plan on EPR is rather weak, mainly because of limited availability of human resource.

A well defined notification system is in place and specific requirements are established for notification of events related to scrap metal processing and import/export activities. A special notification procedure has been issued by ANRA on regaining control over radioactive materials. Specific arrangements are in place between ANRA and the Customs Authority for rapid notifications in case of increased radiation levels at border check points. Similar protocols are in place with the Ministry of Emergency Situations in case of detection/recovery of orphan sources.

Taking mitigatory actions

General provisions on emergency services for the ANPP are included in the Basic requirements and in the National Plan. The request for emergency services is made by ANPP directly to the Emergency Response Centre of Ministry of Emergency Situations (MES), at the national level. The decision to provide emergency support to the ANPP is taken at the national level and implemented at the local level. The co-operation between ANPP and MES is realized through the National Plan. Based on discussions held during the interviews, ANRA doesn't have any role on ensuring the efficiency and effectiveness of arrangements between ANPP and MES and the actual implementation of this support is not verified.

For technological support, ANPP co-operates with ROSATOM (Russian Federation), based on a written agreement between Ministry of Energy of Republic of Armenia and ROSATOM.

Taking urgent protective action

The generic and operational criteria described in the IAEA Safety Standards GSR Part 3 and GSG-2 have been adopted by ANRA in 2014, as part of the amendments to the Radiation Safety Standards.

The Emergency Planning Zones (EPZs) around ANPP are defined in the Basic requirements, in line with IAEA GS-R-2 requirements. The responsibility to establish the radii for the EPZs belongs to ANRA. According to the discussions held, the existing radii in the National Plan have been established based on the safety assessments performed by VNIIAES (Russian Federation). At ANRA's request, NRSC will perform a probabilistic safety assessment in order to revise the radii of EPZs. The actual sizes of EPZs should be revised by ANRA after the completion of the probabilistic safety assessment.

Providing information and issuing instructions

General provisions for the operating organizations on public information are included in the Basic requirements and the National Plan. During the response phase, the ANPP is responsible for public information on technological matters.

Arrangements are in place within the EPZs for warning the population and issuing instructions in case of a nuclear emergency at the ANPP. During emergencies, ANPP is responsible to alert the population within PAZs and implement sheltering by activating the existing sirens system. Based on the information received during the interviews, ANRA doesn't verify these arrangements during inspections.

Protecting emergency workers

New provisions for protecting the emergency workers, in line with IAEA Safety Standards GSR Part 3 and GSG-2, have been adopted by ANRA in 2014 as part of the amendments to the Radiation Safety Standards. According to the discussions held during interviews, the responsibilities for managing the protection and dose recording for all emergency workers are not yet allocated, but are going to be considered under the National Plan for Radiological Emergencies, currently in preparation. For the elaboration of the National Plan on Radiological Emergencies, ANRA cooperates with MES and other organizations with responsibilities in case of radiological emergencies. ANRA should initiate the elaboration of a regulation with specific EPR for all operating organizations in line with international standards, as recommended in subchapter 10.1, independent of the progress in completing the National Plan on Radiological Emergencies.

Assessing the initial phase

Generic provisions are included in the Basic requirements for ANPP to perform radiation monitoring in case of a nuclear emergency. Specific requirements are missing for operating organizations to promptly assess: abnormal conditions at the facility or practice, exposures and releases of radioactive material, radiological conditions on and off the site and any actual or potential exposure of the public. These should be addressed in the EPR regulation for all operating organizations that ANRA should elaborate, as recommended in subchapter 10.1.

Managing the medical response

Specific requirements are missing for the operating organizations in relation to the medical response in case of nuclear or radiological emergency. Based on discussions during the interviews, the on-site emergency response plan of ANPP includes arrangements within the facility for medical first aid and on transport of patients from the ANPP to a specialized facility in Yerevan for medical treatment. ANRA verifies these arrangements during inspections. As EPR inspections are performed by ANRA only once in a year due to very limited availability of human resource, the probability to check for consistency of on-site plan's provisions with practical arrangements is in fact very low.

Other activities in emergency preparedness

ANRA has role in establishing criteria for countermeasures against ingestion and long term protective actions. These criteria, in line with the IAEA safety standards GSR Part 3 and GSG-2 have been adopted by ANRA in 2014, as part of the amendments to the Radiation Safety Standards.

ANRA has no specific requirements in place for the operating organizations on the need for mitigating the non-radiological consequences of the emergency and response. Specific requirements should be included in the EPR regulation for all operating organizations that ANRA should elaborate, as recommended in subchapter 10.1.

ANRA has no specific requirements or guidance for the operating organizations for planning the transition from the emergency phase to long term recovery operations. Specific requirements should be included in the EPR regulation for all operating organizations that ANRA should elaborate, as recommended in subchapter 10.1. In addition, ANRA should consider adopting criteria for the termination of the emergency and the transition to long term recovery operations that follows the requirements of GS-R-2.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *Although it is based on a graded approach, ANRA's regulatory control is rather weakly enforced, mainly because of limited availability of human resource; the inspections on EPR are very limited in number for the ANPP (mainly one per year) and randomly performed at radiological facilities.*	
(1)	**BASIS: GS-R-2 para. 3.8 states that** *"The regulatory body shall require that arrangements for preparedness and response be in place for the on-site area for any practice or source that could necessitate an emergency intervention.[...] The regulatory body shall ensure that such emergency arrangements are integrated with those of other response organizations as appropriate before the commencement of operation. The regulatory body shall ensure that such emergency arrangements provide a reasonable assurance of an effective response, in compliance with these requirements, in the case of a nuclear or radiological emergency."*
R27	**Recommendation: ANRA should strengthen its regulatory control on EPR through**

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
	comprehensive inspections, in order to ensure that the on-site EPR arrangements provide a reasonable assurance for an effective response.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *Although a generic requirement for operating organizations to have in place a system for emergency classification is included in the Basic requirements, a system for emergency classification and specific criteria are not yet adopted by ANRA.*	
(1)	**BASIS: GS-R-2 para. 4.20 states that** *"The emergency classification system for facilities or practices in threat category I, II, III or IV shall take into account all postulated nuclear and radiological emergencies. The criteria for classification shall be predefined emergency action levels (EALs) that relate to abnormal conditions for the facility or practice concerned, security related concerns, releases of radioactive material, environmental measurements and other observable indications.[...]"*
R28	**Recommendation: ANRA should adopt a system and develop criteria for emergency classification that follows the requirements of IAEA GS-R-2.**

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *ANRA has no specific requirements for the operating organizations and no developed criteria for the termination of the emergency and transition to the recovery phase.*	
(1)	**BASIS: GS-R-2 para. 4.97 states that** *"The transition from the emergency phase to long term recovery operations and the resumption of normal social and economic activity shall be planned and made in an orderly manner and in accordance with international standards and guidance."*
(2)	**BASIS: GS-R-2 para. 4.100 states that** *"Decisions to cancel restrictions and other arrangements imposed in response to a nuclear or radiological emergency shall be made by a formal process that is in accordance with international guidance. The regulatory body shall provide any necessary input to the intervention process. Such input may be advice to the government or regulatory control of intervention activities. Principles and criteria for intervention actions shall be established and the regulatory body shall provide any necessary advice in this regard."*
S17	**Suggestion: ANRA should consider developing criteria for the termination of the emergency and the transition to long term recovery operations that follows the requirements of IAEA GS-R-2.**

10.3. REGULATORY REQUIREMENTS FOR INFRASTRUCTURE

Authority

ANRA has full authority for regulating the EPR activities of all operating organizations.

Organization

Regulatory requirements are missing for staffing of the licensees emergency response organizations. These should be included in the EPR regulation for all operating organizations that ANRA should elaborate, as recommended in subchapter 10.1.

Coordination of emergency response

According to the National Plan, the response to any nuclear or radiological emergency at ANPP is to be managed at national level and implemented at local level. Based on ANRA's assessment and protective actions recommendations, the decision is taken at national level. Therefore, the harmonization of ANPP on-site planning with the off-site planning is realized through the National Plan.

Plans and procedures

General requirements for on-site plans should be updated in line with the international standards. ANRA does not approve the on-site emergency response plans, only reviews them during the authorization process and agrees to them.

Logistical support and facilities

General requirements on EPR logistics and facilities for the licensees exist in the Basic requirements. They should be updated in line with the international standards. Verification of effectiveness and adequacy of logistical support and facilities is performed by ANRA through inspections and, in case of the ANPP, also during observing exercises.

Training, drills and exercises

General requirements on training and exercising for the operating organizations exist. They should be improved in line with international standards.

The ANPP has annual training program for its staff on performing the response functions within the on-site emergency organization. As resulted from discussions, in order to test their performance, ANPP has to organize on-site exercises anually. At these exercises, ANRA experts participate as observers.

According with the discussions held during interviews, a brief evaluation is performed by ANRA during inspections and immediately after the end of exercises. For evaluating the training and exercise programs of the ANPP or any other operating organization, ANRA should elaborate a methodology and relevant criteria.

Quality assurance programme

Specific regulatory requirements are missing for the operating organizations on quality management, e.g. on periodic revision of on-site plans and procedures. These should be included in the EPR regulation for all operating organizations that ANRA should elaborate, as recommended in subchapter 10.1.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *ANRA has no methodology in place for evaluating the training and exercise programs of the ANPP or any other operating organization. Brief evaluations are performed by ANRA during inspections and immediately after the end of exercises.*	
(1)	**BASIS: GS-R-2 para. 5.31 states that** *"5.31. The operator and the response organizations shall identify the knowledge, skills and abilities necessary to be able to perform the functions specified in Section 4. The operator and the response organizations shall make arrangements for the selection of personnel and for training to ensure that the personnel have the requisite knowledge, skills, abilities, equipment, and procedures and other arrangements to perform their assigned response functions [...]".*
(2)	**BASIS: GS-R-2 para. 5.33 states that** *"Exercise programmes shall be conducted to ensure that all specified functions required to be performed for emergency response and all organizational interfaces for facilities in threat category I, II or III [...] are tested at suitable intervals. These programmes shall include the participation in some exercises of as many as possible of the organizations concerned. The exercises shall be systematically evaluated and some exercises shall be evaluated by the regulatory body [...]".*
S18	**Suggestion: ANRA should consider elaborating an internal methodology for the evaluation of training and exercise programmes of all operating organizations; the methodology should include evaluation criteria needed to ensure that training and exercise programmes of operating organizations are periodically reviewed and updated in the light of experience gained.**

10.4. ROLE OF REGULATORY BODY DURING RESPONSE

As response organization, ANRA has specific roles and responsibilities that are assigned through the Atomic Law, ANRA's Statute, the Basic requirements and the National Plan. The main response functions of ANRA in case of nuclear or radiological emergency are to: provide technical expertise to the Government on ANPP status; formulate

recommendations on protective actions for the public; perform radiation monitoring and coordinate international notification and exchange of information. For all these functions, ANRA is supported by its TSO, the NRSC.

According to the current legislative framework, ANRA is the national competent authority in relation to IAEA, being responsible for receiving and sending notifications and exchange of information in relation to any domestic or abroad nuclear or radiological emergency. The notification of neighbouring countries is performed through IAEA by using the USIE system for notification and exchange of information at international level.

For coordinating the roles in both planning and response to emergencies, ANRA has written agreements with MES, National Security Service, Ministry of Health and the Custom Authority (under progress).

ANRA has established its own Emergency Response Centre (ERC), located at ANRA's premises and endowed it with basic and backup communication systems, IT systems, backup electricity and computer codes for ANPPP parameters collection and analysis, and also for technological and radiological consequences assessment. However, the ERC premise of ANRA is not assessed from the point of view of functionality during emergency situations.

The technological parameters of ANPP are on-line transferred to the ERC of ANRA on a continuous basis, on dedicated radio and optical fibre connections. ANRA has ongoing project with IAEA for upgrading its radiation monitoring equipment to be used in nuclear or radiological emergencies or incidents.

ANRA has in place its own emergency response plan, an established emergency response organization (ERO) within the ERC and emergency procedures for performing its response functions.

The ANRA's ERO has well defined positions for the respective groups (technological group, radiological consequences assessment group, etc), in line with the international requirements. Because ANRA has limited human resources, the NSRC supports ANRA with qualified personnel assigned to different positions in the emergency organization. Currently, each position of ERO is staffed with insufficient number of experts (one or two, but no more). Therefore the resilience of the ERO cannot be guaranteed in case of a long term response during a severe accident at the ANPP.

The roles of different groups of the ERO have been played by ANRA in a two hour emergency exercise, during the mission. As resulted from oberving the exercise, ANRA's staff is fully knowledgeable in playing its roles in emergency and they have the necessary procedures, instructions and standard forms for completing their tasks. The amount of documents on paper could be reduced and registering of incoming and sent messages could be simplified when ANRA would have in place an information management system for data and information exchange for emergency situations. The existing dose assessment software should be updated so that maps at different scales and distances from ANPP could be produced for the use of decision makers. The existing procedure on formulating recommendations on protective actions within the EPZs should be revised in line with IAEA Safety Standards and guidance (see EPR-NPP Public Protective Actions, published 2013) that incorporate laessons learned from the TEPCO Fukushima Daiichi accident.

As the exercise have been played only within ANRA, the different connections and cooperation with partner organizations (ANPP, MES) could have not been observed. Also communication channels could have not been observed.

As resulted from discussions, ANRA has clearly allocated responsibilities for public information during both preparedness and response phases. During emergencies, ANRA supports MES with technical information and cooperates with MES for issuing joint press statements. Also, ANRA informs media and the public on protective actions implementations. For improving its performance, ANRA should consider developing internal procedures for public information during emergency situations.

As part of the education programme of the population on how to react in case of a nuclear or radiological emergency, ANRA continuously supports MES with technical expertise for the realization of documentary films and interviews with specialists to be broadcasted on the first national TV channel, during the special program called "Emergency channel". The engagement of ANRA to promote public education under the national TV channel is recognized to be a good practice, an example that could be used by other regulatory bodies to increase the effectiveness of public warning and/or information during nuclear or radiological emergencies.

A quality management system is in place at ANRA and the EPR activities are included. The emergency plan and procedures are regularly updated.

The training of ANRA's staff on EPR related issues is mainly achieved through on-the-job training, seminars and internal exercises. Periodically, drills and exercises are organized internally by ANRA in order to test the performance of its personnel within the emergency organization. The list of drills and exercises is part of the annual work list of ANRA. There is no internal training program in place for the personnel assigned to be part of the emergency response organization and no developed criteria to evaluate it. Although, after each exercise an evaluation takes place in order to identify those missing elements or matters of improvement, there is no clear process or written procedures for organizing, conducting and evaluating exercises of ANRA.

At national level, ANRA participates in the full scale exercises of the ANPP, together with MES and other responsible national organizations. During full scale exercises ANRA plays both roles, as regulatory body by sending observers at the ANPP to evaluate the on-site response and as response organization within the national crisis management system responsible with nuclear safety and radiological consequences assessments, recommendation of protective actions and international notification and exchange of information. In the last years, ANRA conducted only one major exercise at ANPP in 2008 with EC support. The main players at that time were ANRA, ANPP and MES and the main goal was testing the communication systems, assessment procedures and formulation of recommendations. There were no actions in the field. The next full scale exercise is planned to be conducted in 2016. As important component of the national crisis management system, ANRA should participate more frequenty in national or large scale emergency response exercises.

Currently, the routine organization of ANRA does not have a section or entity responsible for emergency preparedness and planning activities. The conceptual work on emergency planning is done within the Section for Radiation Safety of Department for Radiation Safety and the support work for elaborating emergency procedures and guidelines is performed within the NSRC. Therefore, the human resource available within ANRA for emergency preparedness and planning activities is very limited. Taking into consideration the future plans of the Armenian Government to expand the operation of the ANPP Unit 2 and also the construction of the new ANPP Unit 3, ANRA will be more and more challenged in performing its duties as regulatory body and response organization in relation to EPR activities. Therefore, ANRA should organize its EPR activities in a more visible way, as a special entity with clear allocated roles for emergency preparedness and planning related to the control of EPR arrangements of operating organizations and also as response organization within the national crisis management system.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *Each position of the Emergency Response Organization is staffed with an insufficient number of experts (one or two, but not more). Therefore the resilience of the emergency organization cannot be guaranteed in case of a long term response during a severe accident at the ANPP.*	
(1)	**BASIS: GS-R-2 para. 5.9 states that** *"Sufficient numbers of qualified personnel shall be available at all times in order that appropriate positions can be promptly staffed as necessary following the declaration and notification of a nuclear or radiological emergency."*
R29	**Recommendation: ANRA should qualify and assign an increased number of personnel for each position within the Emergency Response Organization, so that ANRA can work in shifts during long term response in case of accident at the ANPP, in order to fulfil its responsibilities effectively and sustainably.**

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *The training of ANRA's staff on EPR related issues is mainly achieved through on-the-job training, seminars and internal exercises. There is no internal training programme in place for the personnel assigned to be part of the emergency response organization.*	
(1)	**BASIS: GS-R-2 para. 5.31 states that** *"The operator and the response organizations shall identify the knowledge, skills and abilities necessary to be able to perform the functions specified in Section 4. [...] The arrangements shall include ongoing refresher training on an appropriate schedule and arrangements for ensuring that personnel assigned to positions with responsibilities for emergency response undergo the specified training."*

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
S19	**Suggestion: ANRA should consider developing an internal training programme, including initial and refresher training, for its staff for performing the response functions in case of a nuclear or radiological emergency; criteria should be adopted in order to evaluate the quality of the training. An annual periodicity should be considered for refresher training.**

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *In the last years, ANRA conducted only one major exercise in 2008 with EC support. Although ANRA organizes annually internal drills and exercises for testing its functions during a nuclear or radiological emergency, there is not enough testing of its performance in relation to the interactions with other organizations within the national crisis management system.*	
(1)	**BASIS: GS-R-2 para. 5.33 states that "***Exercise programmes shall be conducted to ensure that all specified functions required to be performed for emergency response and all organizational interfaces for facilities in threat category I, II or III [...]. These programmes shall include the participation in some exercises of as many as possible of the organizations concerned. The exercises shall be systematically evaluated and some exercises shall be evaluated by the regulatory body. The programme shall be subject to review and updating in the light of experience gained".*
S20	**Suggestion: ANRA should consider conducting large scale emergency response exercises more frequently, in order to test its performance as response organization within the national crisis management system; special methodology for evaluating its performance during exercises should be developed as part of the exercise programmes of ANRA.**

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *There is no entity within the organizational structure of ANRA responsible for emergency planning and preparedness activities for both its roles, as regulatory body and response organization.*	
(1)	**BASIS: GSR Part 1 Requirement 16 states that** *"The regulatory body shall structure its organization and manage its resources so as to discharge its responsibilities and perform its functions effectively; this shall be accomplished in a manner commensurate with the radiation risks associated with facilities and activities."*
S21	**Suggestion: ANRA should consider structuring its organization so that an entity should be created within the organizational chart to be responsible for ANRA's emergency planning and preparedness activities as regulatory body and as response organization.**

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *As part of the education programme of population on how to react in case of nuclear or radiological emergency, ANRA continuously supports MES with technical expertise for the realization of documentary films and interviews with specialists to be broadcasted on the first national TV channel, during the special program called "Emergency channel".*	
(1)	**BASIS: GS-R-2 para. 4.83 states that** *"Arrangements shall be made for: providing useful, timely, truthful, consistent and appropriate information to the public in the event of a nuclear or radiological emergency; responding to incorrect information and rumours; and responding to requests for information from the public and from the news and information media."*
GP4	**Good practice: The Government promotion of public education on the national TV channel and the engagement of ANRA to support with technical expertize the process are recognized to be a good practice.**

10.5. SUMMARY

General requirements on EPR for the operating organizations are included in legislative acts, regulations and Russian standards elaborated and/or adopted by ANRA. The existing EPR requirements should be updated and improved in line with the international standards, to provide ANRA with a solid basis for controlling the EPR arrangements of all operating organizations in relation to nuclear and/or radiological emergencies.

Practical arrangements are in place for majority of the response functions at the level of operating organizations. Although an inspection system is established at ANRA in relation to EPR activities of operating organizations, the regulatory control is rather weakly enforced (one inspection per year) and it has to be strengthened.

As response organization, in order to perform its functions, ANRA has established its own emergency organization, in line with the international requirements. Nevertheless, the number of experts assigned to each position is insufficient (one or maximum two) to provide resilience of emergency response in case of a long term response during a severe accident at the ANPP. Therefore, ANRA should qualify and assign an increased number of personnel for each position within its emergency organization, for working in shifts during long term response.

Training and exercising the different parts of the response are important components of EPR that have to be continuously considered for improvement. In this sense, ANRA should develop a methodology to evaluate the training and exercise programs of the operating organizations, especially of the ANPP. In the same time, ANRA should consider the improvement of its own training for the respective positions within the emergency organization and should test its performance through participation in large scale emergency response exercises more frequently.

There is no entity within the organizational structure of ANRA responsible for emergency planning and preparedness activities. Therefore, ANRA should consider structuring its organization so that its EPR planning and preparedness activities as regulatory body and as response organization are clearly allocated.

The Government promotion of public education on the national TV channel and the engagement of ANRA to support with technical exertize the process are recognized to be a good practice for increasing the effectiveness of public warning and/or information during nuclear or radiological emergencies.

11. ADDITIONAL AREAS

11.1. CONTROL OF MEDICAL EXPOSURES

Responsibilities of the government specific to the medical exposure:

The responsibilities for regulation for the safety of sources in medical applications and control of medical exposure have been assigned to ANRA by the Atomic Law.

The Radiation safety standards (RSS) lay down the requirements for the annual dose limits for exposure of carers and comforters but not for dose constraints for carers and comforters or for volunteers participating in the programme of biomedical research. The diagnostic reference levels for the common radiological procedures are established in RSS, based on internationally published values. According to the RSS, when patients injected with radiopharmaceuticals for therapeutic purposes are discharged from the radiological facility, the gamma exposure rate shall not exceed 3 μSv/h at a distance of 1 m and the I-131 concentration in organs shall not exceed 1100 MBq; however the requirements for the release of the patients who still retain implanted sealed sources are not currently established. There are currently no established requirements related to providing written instruction for patients discharged from a medical facility after radionuclides therapy; related to a person in contact with or in the vicinity with the patient; for considering potential radiation risk and the necessity to keep the doses as low as reasonably achievable; and to avoid possible contamination.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *Dose constraints for volunteers participating in the programme of biomedical research are not established. The criteria for patients with implanted sealed sources as well as guidelines for release of patients after therapeutic radiological procedure are yet not established.*	
(1)	**BASIS: GSR Part 3 Requirement 34, states that** *"The government shall ensure that relevant parties are authorized to assume their roles and responsibilities, and that diagnostic reference levels, dose constraints, and criteria and guidelines for the release of patients are established".*
(2)	**BASIS: GSR Part 3 Requirement 34, para. 3.148 states that** *"The government shall ensure […]: a) Dose constraints, to enable the requirements of paras 3.173 and 3.174, respectively, to be fulfilled for (i) exposures of carers and comforters (ii) Exposures due to diagnostic investigations of volunteers participating in a programme of biomedical research; b) Criteria and guidelines for the release of patients who have undergone therapeutic radiological procedures using unsealed sources or patients who still retain implanted sealed sources"*
S22	**Suggestion: The government should consider ensuring the establishment, in consultation with relevant bodies, of dose constraints for exposure of carers and comforters and for volunteers participating in the programme of biomedical research. The government should consider also establishing criteria for the release of patients with implanted sealed sources as well as guidelines for release of patients after therapeutic radiological procedure with sealed or unsealed sources.**

Responsibilities of the regulatory body specific to medical exposure:

According to the regulation № 1858 all persons having responsibilities for safety should be licensed by ANRA with respect to radiation protection issues. In medical facilities these regulations apply to the Head Physician or Director, Physicians who are in charge for diagnostics and therapy applying ionizing radiation sources and the Manager or Radiation Protection Officer. But the requirements for specialization in the appropriate area for health professionals who have responsibilities for medical exposure have not yet been established. Requirements for the appropriate education, training and competence of health professionals who are responsible for patient exposure are not yet established.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *There are no established requirements for the specialization in appropriate area for health professionals with responsibilities for medical exposure. There are currently no established requirements for appropriate education, training and competence for health professionals with responsibilities for medical exposure.*	
(1)	**BASIS: GSR Part 3 Requirement 35, states that** *"The regulatory body shall require that health professionals with responsibilities for medical exposure are specialized in the appropriate area and that they fulfil the requirements for education, training and competence in the relevant specialty".*
(2)	**BASIS: GSR Part 3 Requirement 35, para. 3.150 states that** *"The regulatory body shall ensure that the authorization for medical exposures to be performed at a particular medical radiation facility allows personnel (radiological medical practitioners, medical physicists, medical radiation technologists and any other health professionals with specific duties in relation to the radiation protection of patients) to assume the responsibilities specified in these Standards only if they: a) are specialized in the appropriate area; b) Meet the respective requirements for education, training and competence in radiation protection" [...].*
R30	**Recommendation: The regulatory body should establish requirements for education, training and competence in protection and safety of all health professionals with responsibilities for medical exposure, including for any specialization required.**

Justification

The final decision to conduct particular radiological procedures is made by the medical practitioner as stipulated in Rules on Radiation Safety (RRS). All applicable methods of medical exposure is approved by the Ministry of Health.

There are currently no established requirements for the justification for medical exposure for individual patients to be carried out through consultation between the radiological medical practitioner and the referring medical practitioner. The need for informing the patient or the patient's legal representative of the expected diagnostic or therapeutic benefits, or the radiological procedure as well as the radiation risk before undergoing any medical exposure, is not clearly stated in the current legislative or regulatory requirements.

There are no clearly established requirements that the carer or comforter should receive relevant information on radiation protection and on the radiation risks prior to providing care and comfort to an individual undergoing a radiological procedure.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *The responsibilities for consultation of the referring medical practitioner and the radiological medical practitioner are not included in the regulatory requirements. The responsibilities of licensees and radiological medical practitioners for informing the benefits and risks of medical exposure before incurring medical exposure, as well as for the protection and the safety of carers and comforters, are not yet defined in regulatory requirements.*	
(1)	**BASIS: GSR Part 3 Requirement 36, para. 3.151 states that** *"Registrants and licensees shall ensure that no patient, whether symptomatic or asymptomatic, undergoes a medical exposure unless: b) The medical exposure has been justified by means of consultation between the radiological medical practitioner and the referring medical practitioner, as appropriate [...] d) The patient or the patient's legal authorized representative has been informed as appropriate of the expected diagnostic or therapeutic benefits of the radiological procedure as well as the radiation risks"*
(2)	**BASIS: GSR Part 3 Requirement 36, para. 3.153 states that** *"Registrants and licensees shall ensure that no individual incurs a medical exposure as a carer or comforter unless he or she has received, and has indicated an understanding of, relevant information on radiation protection and information on the radiation risks prior to providing care and comfort to an individual undergoing a radiological procedure. Registrants and licensees shall ensure that the requirements specified in para. 3.173 are fulfilled for the optimization of protection and safety for any radiological procedure in which an individual acts as a carer or comforter"*

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(3)	**BASIS: GSR Part 3 Requirement 36, para. 3.154 states that** *"Registrants and licensees shall ensure that: a) The radiological medical practitioner performing or overseeing the radiological procedure has assumed responsibility for ensuring overall protection and safety for patients in the planning and delivery of the medical exposure, including the justification of the radiological procedure and the optimization of protection and safety, in cooperation with the medical physicist and the medical radiation technologist [...] -*
(4)	**BASIS: GSR Part 3 Requirement 37, para. 3.157 states that** *"The justification of medical exposure for an individual patient shall be carried out by means of consultation between the radiological medical practitioner and the referring medical practitioner" [...]*
S23	**Suggestion: ANRA should consider establishing requirement for the responsibilities of registrants and licensees to ensure that no individual person incurs a medical exposure unless is justified and information for the expected benefits and risks are provided.**

Optimization

There are currently established requirements in RRS [Chapter XV, p. 194] with regard to the need of equipment used in medical exposure to conform to specific standards. The RRS establish requirement for radiation protection of patients and persons during medical exposure. The individual equipment (like a lead apron or ancillary shields of a specified lead equivalence) for protection of patient and medical staff has to be available to ensure the optimized level of radiation protection.

The RRS established that the doses received during the interventional and therapeutic procedures on pelvic or abdominal part of pregnant women should be in such a way that the foetus receives doses as low as possible. Also the RRS establishes, in case of injection of radioactive isotopes in a diseased organ for treatment purposes, the medical practitioner to advise the patient to temporarily preserve from having children and also in case nursing mothers to temporarily interrupt breast-feeding.

However, for therapeutic and diagnostic radiological procedures, there are no specific requirements currently established for optimization of medical exposures related to operational considerations, calibration, dosimetry of patients and quality assurance. According to ANRA Guidelines for licensing of practices, an applicant for a license has to submit to ANRA a quality assurance programme. However, specific requirements on the content of this programme related medical exposure are not established.

Pregnant or breast-feeding female patients

Requirements for registrants or licensees on placement of signs in public places, waiting rooms for patients, cubicles and other appropriate places, as well as for requesting female patients who are to undergo a radiological procedure to notify the medical personnel in the event that she is or might be pregnant or she is breast-feeding are not in place. The requirements for registrants and licensees to ensure that procedures are in place for ascertaining the pregnancy status or breast-feeding status of female patients before performing any radiological procedure are also not yet established.

Unintended or accidental medical exposures

According to ANRA guidelines for the licensing of practices, an applicant for a license has to submit to ANRA a program of emergency response including unintended or accidental medical exposures. There are also requirements to notify the regulatory authority in case of such incidents and accidents in medical exposures in a certain time limit. However, there are currently no established requirements related to the responsibility of licensees and registrants for taking measures and conducting appropriate investigation if unintended or accidental medical exposure occurs.

Review and record

The responsibilities of licensees and registrants related to the implementation of radiological reviews in their medical facilities are not yet clearly established in the existing regulations. There are no specific requirements in place related to keeping records of personnel involved in medical exposures, as well as records of calibration and dosimetry, and for how long these records should be maintained.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *The requirements related to arrangements in place for appropriate radiation protection in cases where a female patient is or might be pregnant or is breast-feeding are not yet established. There are currently no requirements for the review, for records and for investigation of any unintended or accidental medical exposure. There are currently no established specific requirements for optimization of medical exposures related to operational considerations, calibration, dosimetry of patients and quality assurance.*	
(1)	**BASIS: GSR Part 3 Requirement 38 states that** *"Registrants and licensees and radiological medical practitioners shall ensure that protection and safety is optimized for each medical exposure*
(2)	**BASIS: GSR Part 3 Requirement 39 states that** *"Registrants and licensees shall ensure that there are arrangements in place for appropriate radiation protection in cases where a female patient is or might be pregnant or is breast-feeding"*
(3)	**BASIS: GSR Part 3 Requirement 42 states that** *"Registrants and licensees shall ensure that radiological reviews are performed periodically at medical radiation facilities and that records are maintained"*
(4)	**BASIS: GSR Part 3 Requirement 41 states that** *"Registrants and licensees shall ensure that all practicable measures are taken to minimize the likelihood of unintended or accidental medical exposures. Registrants and licensees shall promptly investigate unintended or accidental medical exposures and, if appropriate, shall implement corrective actions"*
R31	**Recommendation: The regulatory body should establish requirements for the responsibilities of registrants and licensees for:** **a) appropriate radiation protection arrangements in place for medical exposure of pregnant or breast-feeding patients;** **b) taking measure and investigating unintended and accidental medical exposures;** **c) ensuring that radiological reviews are performed periodically at medical radiation facilities and records are maintained;** **d) ensuring that protection and safety is optimized for each medical exposure.**

11.2. OCCUPATIONAL RADIATION PROTECTION

Legal and regulatory framework

The legal and regulatory framework for occupational radiation protection has been established in Armenia. The main regulations that stipulate the requirement on occupational radiation protection and systematic control of doses of workers are the Radiation Safety Standards (RSS) and Rules on Radiation Safety (RRS) that were issued in 2006. The RSS and RRS were updated last year for consistency with GSR Part 3. The majority of the limits related to occupationally exposed workers are addressed. The limits for apprentices and students of the age 16 to 18 are not established in regulation because according to the Labour Law of Armenia it is prohibited to expose individuals of the age up to 18 to risk factors. Additionally, the updated version does not specifically indicate that the equivalent dose limit to the skin is applicable to the most exposed part of the skin.

Radiation workers are classified in Armenia into 3 categories A, B, C to which different limits are applied. For category A the dose limits are the same as limits specified in GSR Part 3. For category B the dose limits are equal to ¼ of the limits for category A and dose limit for category C is the same as for the public.

For emergency exposure situations the guidance for limitation of exposure of emergency workers and workers in emergency situation is established. However the requirements on records keeping are not sufficient (personnel doses are not kept separately).

The regulations require ANRA to review all supporting documents before authorization of a new or modified practice in relation to design criteria and design features of the appropriate systems and programme for individual monitoring of workers.

According to ANRA guidelines for the licensing of practices, an applicant for a license has to submit the Radiation Protection Programme covering occupational radiation protection arrangements for individual monitoring of workers and radiation monitoring of the workplace, classification of areas, local rules and procedures, provision and maintenance of personal protective equipment and handling techniques.

Requirements for monitoring and recording of occupational exposure in planned exposure situation are implemented through registration of the personnel doses in accordance with instruction on radiation monitoring approved by the manager of the installation. The requirements on the form and contents of procedures on radiation monitoring system have been established by the regulatory authority.

The regulatory control over the radiation monitoring and recording of occupational doses is performed through inspections and reporting. A system of individual cards of occupational exposure is currently being implemented (so far fully implemented in the NPP). The personal doses are kept at the licensee and reports are sent to ANRA in an established time period according to the categorization of the workplaces. The time period for archiving the individual doses is 50 years. The national register of personal doses is under preparation.

The regulatory requirements for occupational radiation protection in existing exposure situations has been established but not implemented yet.

General responsibilities of registrant, licensees and employers

The current regulations define and assign the responsibilities for the protection and safety of workers in occupational exposure and for the compliance with the requirements of regulations. The licensee has to ensure that occupational exposure is controlled and conducted within established limits.

The regulations require that occupational protection and safety is optimized and the exposures are kept as low as reasonably achievable.

The regulations require the licensee to ensure that appropriate monitoring equipment and personal protective equipment are available and the necessary check (calibration, testing and maintenance) is performed regularly.

In accordance with the documents approved during licensing process the licensees should organize and implement the system for keeping records on individual dosimetric control in accordance with the relevant administrative decisions.

In Armenia specific conditions are applied to the employment of women, and to pregnant and breast feeding women - the equivalent dose for the abdominal part of the body for women up to age of 45 in the course of 1 year should not exceed 1 mSv. After pregnancy has being confirmed or if she is breast feeding she is moved to another work without ionizing radiation.

General responsibilites of workers

General responsibilities of workers considering their duties include the necessity to follow rules and procedures for protection and safety, to use relevant protective and monitoring equipment, to abstain from any wilful action that could put themselves and others in situations that contravene the requirements of the regulations. In addition there are the requirements in the Labour Law for workers on reporting to the employer, registrant or licensee - any reason that could adversely affect the protection and the safety. Based on these requirements the employer has to agree with the employee on the specific duties in the job description.

Requirements for radiation protection programmes

Licensees are required by the regulations to designate the relevant areas of their workplaces as radiation protection areas (controlled or supervised) and to establish the necessary infrastructure, procedures and local rules to ensure appropriate radiation protection and to keep doses under control. An access of unauthorized persons to controlled and supervised areas is limited. Signs and warnings on radiation hazard are placed as specified in the radiation safety rules. During regulatory control ANRA verifies establishment of these areas at licensee's premises and verifies their compliance with the facility design or work plan. ANRA verifies the registration and account of personnel exposure doses in the controlled area for category A and B workers.

Licensees are required to provide the workers with suitable and adequate personal protective equipment and tools. Health surveillance is provided to radiation workers. All radiation workers of category A and in addition the category B workers from NPP undergo routine medical examination once in a year.

In emergency exposure situation further employment of a worker is based on the result of medical examination.

In Armenia compensatory arrangement with respect to salary, working hours, holidays and retirements benefits are implemented in compliance with the Labour Code as a benefit for the workers with risk agents.

Monitoring programmes and technical services

In Armenia there are 3 organizations providing service in the field of individual exposure monitoring (NRSC, NPP´s own service and a service under the Ministry of Health). The services for individual monitoring are provided on request. NRSC provides service to about 150 radiation workers, service organization under the Ministry of Health to more than 200 radiation workers mostly from medical facilities and the NPP provides service for its own personnel, approximately 900 radiation workers.

The NRSC provides training in radiation protection in specific areas as well as monitoring of workplace and quality control measurement of medical installations. Technical services according to current legislation do not need a license.

Only calibration services need to be licensed by ANRA according to the Law on Licensing (See Recommendation R5).

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *The regulatory requirements for existing exposure situations are stipulated in regulation but have not been implemented yet.*	
(1)	**BASIS: GSR Part 3 Requirement 52, states that:** *"The regulatory body shall establish and enforce requirements for the protection of workers in existing exposure situation"*
S24	**Suggestion: ANRA should consider undertaking measures in order to enforce requirements for the protection of workers in existing exposure situations.**

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *Armenia has a system of benefits with respect to salary, working hours, holidays and retirement as a benefit for workers working in hazard conditions (which includes the work with radiation sources) according to Labour Law which is in contradiction to GSR Part 3.*	
(1)	**BASIS: GSR Part 3 Requirement 27, para. 3.111 states that** *"The conditions of service of workers shall be independent of whether, they are or could be subject to occupational exposure. Special compensatory, arrangements, or preferential consideration with respect to salary, special, insurance coverage, working hours, length of vacation, additional holidays or retirement benefits, shall neither be granted nor be used as substitutes for measures for protection and safety in accordance with the requirements of these Standards."*
R32	**Recommendation: The Government should ensure that the conditions of service of radiation workers are independent of whether they are or could be professionally exposed.**

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: The following issues are not addressed in regulations or are not currently implemented: - *The equivalent dose limit for skin is not specifically applicable to the most exposed part of the skin;* - *Records on emergency doses are not distinguished from doses, exposures and intakes due to normal conditions of work;* - *Women after the pregnancy is confirmed are excluded from work with ionising radiation, and they are moved to another work without radiation;* - *There is only one requirement on keeping records on occupational exposure - records are to be retained at the licensee for the period of 50 years.*	
(1)	**BASIS: GSR Part 3 Schedule III 1 states that "***For occupational exposure of workers over the age of 18 years, the dose limits are:* *(c) An equivalent dose to the extremities (hands and feet) or to the skin (the equivalent dose limits for the skin apply to the average dose over 1 cm^2 of the most highly irradiated area of the skin. The dose to the skin also contributes to the effective dose, this contribution being the average dose to the entire skin multiplied by the tissue weighting factor for the skin.) of 500 mSv in a year."*

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(2)	**BASIS: GSR Part 3 Requirement 25, para. 3.105 states that** *"Records of occupational exposure shall include:* *Records of any assessments made of doses, exposures and intakes due to actions taken in an emergency or due to accidents or other incidents, which shall be distinguished from assessments of doses, exposures and intakes due to normal conditions of work and which shall include references to reports of any relevant investigations."*
(3)	**BASIS: GSR Part 3 Requirement 28, para. 3.114 states that** *"Notification of the employer by a female worker if she suspects that she is pregnant or if she is breast-feeding shall not be considered a reason to exclude the female worker from work. The employer of a female worker, who has been notified of her suspected pregnancy or that she is breast-feeding, shall adapt the working conditions in respect of occupational exposure so as to ensure that the embryo or foetus or the breastfed infant is afforded the same broad level of protection as is required for members of the public."*
(4)	**BASIS: GSR Part 3 Requirement 25, para. 3.104 states that** *"Records of occupational exposure for each worker shall be maintained during and after the worker's working life, at least until the former worker attains or would have attained the age of 75 years, and for not less than 30 years after cessation of the work in which the worker was subject to occupational exposure."*
R33	**Recommendation: The regulatory body should update current regulation for compliance with the requirements of GSR Part 3, specifically:** **a) the equivalent dose limit to the skin is applied to the most highly irradiated area of the skin;** **b) doses related to emergency exposure situation are to be distinguished from doses, exposures and intakes due to normal conditions of work;** **c) pregnant or breast feeding women are not automatically excluded from work but allow them to continue to work under specific adjustment of working condition;** d) **to establish provision for archiving of records of occupational exposure**.

11.3. CONTROL OF RADIOACTIVE DISCHARGES, MATERIALS FOR CLEARANCE, AND EXISTING EXPOSURES; ENVIRONMENTAL MONITORING FOR PUBLIC RADIATION PROTECTION

Control of discharges

According to Armenian regulations, facilities that release radioactive materials to the environment should comply with discharge limits established by ANRA as part of the conditions of the license. As part of the conditions established in the license issued by ANRA to ANNP for operation, there have been included discharge limits based on a dose constraint of 250 μSv/y for the members of the public which are included in the "Requirements on design and operation of nuclear power plant" issued in April 2003, which contains the release of requirements for VVER-440 type reactors. Presently there are no other facilities in Armenia discharging radioactive materials to the environment. There are plans for building an isotope production facility with medical purposes in the near future. For this type of facilities specific discharge control criteria, dose constraint and discharge limits should be defined.

Clearance of materials

Armenian radiation safety standards have adopted the clearance levels proposed in the IAEA GSR Part 3. However, the concept of clearance is not explicitly defined in Armenian regulations and clearance criteria are not in compliance with IAEA standards, which could lead to difficulties in the decision making process, in particular when deciding on conditional clearance of materials.

Environmental monitoring for public radiation protection

In Armenia, main facilities releasing radioactive materials to the environment (NPP, radioactive waste management facilities) are located in the same region and site. Smaller facilities, such as nuclear medicine departments, deal currently only with Tc-99m and do not have significant releases to the environment. Nowadays the only ongoing environmental monitoring program in the country is the one carried out by the operator of the NPP. This program

covers not only the monitoring needs of the NPP, but also the needs of the rest of facilities located there. The operator of the NPP sends on a regular basis, as required by the license conditions, the results of the measurements and determinations obtained in the frame of this monitoring program to ANRA for recording and evaluation of doses. ANRA issues an annual report that includes the results of environmental monitoring program, as well as doses to the public evaluated based on these results. ANRA publishes this report in a dedicated site in the ANRA's website and the public can access it. Due to the lack of logistic capabilities, ANRA does not carry out any parallel monitoring program for the verification of the monitoring results provided by the operator.

The Government of RA has adopted the decision N 53 "The Concept of Environmental Radiation Monitoring in RA" as of 18 December 2014. This document states the monitoring needs for assessing the radiological impact on the public of the different radiation sources in Armenia. ANRA started carrying out measurements in places where materials containing radionuclides of natural origin are manipulated or processed (mainly in mines), and started the mapping of the radiation situation in Armenia. There are plans for implementing a nationwide monitoring network that should serve for both the objectives of assessing the overall doses received by Armenian population during normal and accidental situations and verification of the results of monitoring programs (current and future) carried out in the country.

Existing exposure situations

ANRA carried out studies on radon concentrations in Armenian dwellings and highly occupied buildings in the frame of an IAEA technical cooperation project in the period 2009 – 2010. These studies assessed about 800 dwellings and public buildings and values between 40 to 1700 Bq/m^3 were found, with an average value of 800 Bq/m^3. According to the information provided by ANRA, even so it is not still possible to ensure that these results are representative. Existing regulations establish a reference level value for radon of 300 Bq/m^3. In this regard it should be expected that the studies on radon concentrations with protection of the public purposes are being completed, and guidelines for remediation of those scenarios exceeding the reference value should be issued and derived measures implemented. An intergovernmental group with the participation of ANRA prepared a "National Program on Public Exposure Control and Dose Reduction due to Naturally Occurring Radioactive Materials (NORMs), including Radon Gas and their Progeny" and a related action plan with these purposes, which is now under consideration by the EU experts in frame of a cooperation project.

Armenian regulations establish reference levels for water, foodstuffs and some commodities (building materials and fertilizers). In the case of water and foodstuffs, the basis for establishing these values are the Annual Limit for Intake (ALIs) calculated on the basis of an annual dose criterion of 1 mSv/y. For other commodities, the dose criteria used as a basis for deriving reference levels have not been clearly established in the regulations. In all these cases, these criteria are not fully in compliance with relevant criteria in GSR Part 3.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *The concept of clearance and clearance criteria in Armenian regulations are not consistent with GSR Part 3.*	
(1)	**BASIS: GSR Part 3 Requirement 8 para. 3.12 states that** *"The regulatory body shall approve which sources, including materials and objects, within notified or authorized practices may be cleared from regulatory control, using as the basis for such approval the criteria for clearance specified in Schedule I or any clearance levels specified by the regulatory body on the basis of these criteria. By means of this approval, the regulatory body shall ensure that sources that have been cleared from regulatory control do not again become subject to the requirements for notification, registration or licensing unless it so specifies".*
(2)	**BASIS: GSR Part 3 Schedule I para. I.12 states that** *"Radioactive material within a notified practice or an authorized practice may be cleared without further consideration provided that:* *(a) The activity concentration of an individual radionuclide of artificial origin in solid form does not exceed the relevant level given in Table I.2 (p. 124); or* *(b) The activity concentrations of radionuclides of natural origin do not exceed the relevant level given in Table I.3 (p. 128); or* *(c) For radionuclides of natural origin in residues that might be recycled into construction materials, or the disposal of which is liable to cause the contamination of drinking water supplies, the activity concentration in the residues does not exceed specific values derived so as to meet a dose criterion of*

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
	the order of 1mSv in a year, which is commensurate with typical doses due to natural background levels of radiation."
R34	**Recommendation: ANRA should incorporate modifications in the regulations for explicitly addressing the concept of clearance and establishing clearance criteria as specified in GSR Part 3.**

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *Due to the lack of logistic capabilities, ANRA does not carry out any parallel monitoring program for verification of the monitoring results provided by the operator. There are plans for implementing a nationwide monitoring network that should serve for both the objectives of assessing the overall doses received by Armenian population and verification of the results of monitoring programs (current and future) carried out in the country.*	
(1)	**BASIS: GSR Part 3 Requirement 32, para. 3.135 states that** *"The regulatory body shall be responsible, as appropriate, for:* *……..* *(c) Making provision for an independent monitoring programme.* *……*
S25	**Suggestion: ANRA should continue efforts for implementing an independent monitoring infrastructure, including laboratory capacities for verification of results of ANPP's monitoring program.**

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *Studies on radon concentrations in living spaces have been carried out in Armenia, but they are neither exhaustive nor representative. Nevertheless, obtained results indicate the existence of situations in which the radon concentrations exceed the reference value of 300 Bq/m^3 established in regulations.*	
(1)	**BASIS: GSR Part 3 Requirement 50, para. 5.19 states that** *"As part of its responsibilities, ……., the government shall ensure that:* *(a) Information is gathered on activity concentrations of radon in dwellings and other buildings with high occupancy factors for members of the public through appropriate means, such as representative radon surveys;"*
(2)	**BASIS: GSR Part 3 Requirement 50 para. 5.20 states that** *"Where activity concentrations of radon that are of concern for public health are identified on the basis of the information gathered as required in para. 5.19(a), the government shall ensure that an action plan is established comprising coordinated actions to reduce activity concentrations of radon in existing buildings and in future buildings, which includes:* *……* *(b) Reducing activity concentrations of ^{222}Rn and consequent exposures to levels at which protection is optimized;* *(c) Giving priority to actions to reduce activity concentrations of ^{222}Rn in those situations for which such action is likely to be most effective;* *(d) Including in building codes appropriate preventive measures and corrective actions to prevent the ingress of ^{222}Rn and to facilitate further actions wherever necessary.*
S26	**Suggestion: ANRA should consider implementing measures to ensure that studies related to radon levels and their impact on the public are completed and, where needed, implement an action plan for controlling public exposure due to radon indoors.**

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *Criteria for establishing reference levels for foodstuffs, water and selected commodities in Armenian regulations are not fully in compliance with relevant criteria in IAEA standards.*	
(1)	**BASIS: GSR Part 3 Requirement 51 para. 5.22 states that** *"The regulatory body or other relevant authority shall establish specific reference levels for exposure due to radionuclides in commodities such as construction materials, food and feed, and in drinking water, each of which shall typically be expressed as, or be based on, an annual effective dose to the representative person that generally does not exceed a value of about 1 mSv".*
(2)	**BASIS: GSR Part 3 Requirement 51 para. 5.23 states that** *"The regulatory body or other relevant authority shall consider the guideline levels for radionuclides in food traded internationally that could contain radioactive substances as a result of a nuclear or radiological emergency, which have been published by the Joint Food and Agriculture Organization of the United Nations/World Health Organization Codex Alimentarius Commission. The regulatory body or other relevant authority shall consider the guideline levels for radionuclides contained in drinking water that have been published by the World Health Organization.*
R35	**Recommendation: ANRA should establish reference levels for water, foodstuffs and selected commodities fully in compliance with relevant criteria in GSR Part 3.**

11.4. SUMMARY

The legislative and regulatory framework of the Republic of Armenia in the field of radiation protection is in place and quite well developed. However there are discrepancies with respect to the requirements of the IAEA GSR Part 3 especially to occupational and medical exposure.

Armenia has a system of benefits for workers working in hazardous condition including the work with ionizing radiation sources which is not fully in line with the IAEA safety standards. Some challenges for implementation of individual justification and optimization of medical exposure have also been identified.

Currently there are no facilities other than the ANPP releasing radioactive material to the environment in Armenia. Clearance criteria are not fully in compliance with IAEA standards. Although the ANPP conducts environmental monitoring at the site, ANRA does not currently conduct a parallel monitoring program for the verification of the monitoring results provided by the NPP. ANRA had carried out some studies on radon concentrations in dwellings. The current regulations establish reference levels for water, foodstuffs and some commodities (building materials and fertilizers). These criteria are yet to be made fully compliant with GSR Part 3.

12. INTERFACE WITH NUCLEAR SECURITY

12.1. LEGAL BASIS

The Republic of Armenia has established the legal framework for maintaining both safety and security. The National legal framework reviewed by the IRRS team was comprehensive. It involved the full range of Ministries necessary for the assessment of the threat environment, the deterrence of most threats, and response to extraordinary circumstances.

The legal framework includes assignment of authority for inspection and enforcement, and the IRRS team confirmed that security inspections are performed by ANRA in collaboration with the National Security Services.

In preparing for the IRRS mission, ANRA self-identified three actions associated with improvements to the security framework and the implementation of the State System for Accountability and Control (SSAC). For example, Decree 1231 covering the establishment of physical security concepts for nuclear installations and radioactive materials is being updated, in part to improve the clarity of roles and responsibilities for colaberation between agencies. The IRRS team agreed that these are areas where implementation of the legal framework can be improved.

The IRRS team identified one item of note in the existing framework. The responsibility for identification of the Design Basis Threat (DBT) for commercial nuclear facilities is typically assigned to governmental bodies that are not directly responsible for plant operation. The Republic of Armenia assigns this function to the ANPP operating organization, which reports to the Ministry of Energy. Appropriate coordination in the development of the DBT does occur between the operating organization and applicable governmental organizations. ANRA esentially approves the DBT, as well as the acceptability of the mitigation of that DBT via the physical protection plan, through their review and assessment of the facility license. One of the significant changes to be made to Decree 1231 is that the responsibility for creation of the DBT for future NPPs will be a government body not associated with operation of a commercial facility.

12.2. REGULATORY OVERSIGHT ACTIVITIES

The IRRS team evaluated the regulatory program and organization to identify whether the safety and security interface was addressed. The IRRS team found that ANRA addresses the authorization and inspection processes for security in a manner that is consistent with that described for safety issues. However, the IRRS team was unable to identify any programmatic requirement that safety measures and security measures be designed and implemented in an integrated manner. Based on the IRRS team's observations, the existing focus is on ensuring that both sets of requirements are satisfied. There is not currently a specific focus on ensuring that safety measures do not compromise security or that security measures do not compromise safety. For instance, the Design Requirements document for a New Nuclear Power Plant contain requirements for plant safety and requirements for physical security, but does not specify that these requirements be implemented in a manner that optimizes both safety and security considerations.

With respect to staffing, ANRA has a vacancy for a security inspector and they have had difficulty in recruiting a suitable candidate to fill this position.

Based on the IRRS team`s discussions with staff at ANRA and at the ANPP, no cases were identified where the lack of a systematic control to address the interface has had a consequential impact. Because ANRA performs reviews of both Safety and Security compliance, there is an inherent degree of integration that occurs. Similarly, the ANPP operator maintains physical configurations for both safety and security structures, systems, and components inside the facility, ensuring an inherent degree of integration.

Notwithstanding the inherent degree of integration that occurs, the absence of a formal safety and security interface assessment is an impediment to recognizing and addressing operating experience. For example, the installation of security-related barriers has hindered operator access to plant components that are required for safety. Similarly, work on systems required for safety has temporarily interfered with the effectiveness of security systems.

While the IRRS team concluded that ANRA meets the IAEA requirements for the safety and security interface under current circumstances, an expansion of responsibility to include a new NPP would change this conclusion. Perhaps of most significance is the opportunity for optimizing safety and security by integrating consideration of each in the design and construction of a new facility. International operating experience that should be captured is

that safety and security can both be improved if they are considered early in the design processes. One example of the potential benefit is in the area of integrated plant digital instrumentation and control systems with distributed controls. Cyber security for these systems should be considered early in the system design and also in the configuration of the facility.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *There is no provision or practice to systematically evaluate the design and implementation of safety and security measures to ensure that conflicts are avoided and optimization occurs. The importance of a systematic process will increase significantly if the RA proceeds with plans to develop a new nuclear power plant.*	
(1)	**BASIS: GSR Part 1 Requirement 12, paragraph 2.40 states that** *"Safety measures and nuclear security measures shall be designed and implemented in an integrated manner so that nuclear security measures do not compromise safety and safety measures do not compromise nuclear security."*
S27	**Suggestion: ANRA should consider ensuring that safety measures and nuclear security measures for new nuclear power plants are designed and implemented in an integrated manner so that neither negatively affects the other.**

12.3. INTERFACE AMONG AUTHORITIES

The IRRS team found that the relevant agencies are designated by law and that they cooperate in practice. One Decree covering this colageration is undergoing revission to address lessons learned in this area.

12.4. SUMMARY

The Republic of Armenia has established a comprehensive legal framework for safety and security. The responsible agencies coordinate their actions. The IRRS team concluded that ANRA could improve the clarity of its requirements for in order to ensure that the design of a new NPP considers the optimization of the safety security interface, including consideration of applicable operating experience.

13. REGULATORY IMPLICATIONS OF THE TEPCO FUKUSHIMA DAIICHI ACCIDENT

13.1. IMMEDIATE ACTIONS TAKEN BY THE REGULATORY BODY

The Emergency Response Centre (ERC) of ANRA was partially activated immediately after the accident and leaders of the emergency groups gathered for collecting information and evaluating the potential progress of the accident. A responsible person was assigned with the task of monitoring the progress of the accident and its potential implications to Armenia. Information of the actual situation was collected from various sources like IAEA emergency communications, exchange of information with other regulatory bodies and TSOs (US NRC, Rostechnadzor, GRS, and IRNS) and from mass media. After that activation of the ERC was not maintained.

ANRA experts analysed the situation based on the available information and on their engineering judgement and briefed the Chairman of ANRA.

The operator of the Armenian NPP was also requested to perform a prompt rough estimation of the situation in Japan and its relevance to Armenia.

It was concluded that because of the specific character of the Armenian NPP site and due to the safety upgrading measures previously completed as follow-up of a fire induced LOOP in 1982 and of a seismic re-evaluation program in 1994, no immediate actions were needed in Armenia in response to the TEPCO Fukushima Daiichi accident. On the other hand it became obvious that the questions of cooling of spent fuel pools and of hydrogen management in the containment needed further investigations and possible improvement measures. It was also concluded that flooding as a consequence of water flow returning from the cooling tower in specific cases could also be an issue. This latter issue was remedied in the short term by directing the potential water flow away from the diesel hall. Further easy fixes were performed by providing means for additional water supply from fire extinguishing reserves.

As no immediate interventions were deemed necessary, the regulatory body did not considered performing specific inspections after the incident.

In the national system of emergency preparedness ANRA provides advice in nuclear and radiation emergencies to the Governmental Commissions of Emergency Situations. ANRA complied with this obligation during the TEPCO Fukushima Daiichi accident. The Chairman of ANRA was not requested to report to the Commission in person but prepared a written report summarizing the design and operation of the Armenian NPP (ANPP), as it compared to the NPP in Fukushima, the seismic characteristics of ANPP, the way radioactive waste and spent fuel are managed in Armenia and the status of the plans regarding construction of a new unit in Armenia.

The accident raised substantial public interest in Armenia. After the accident ANRA issued a press release discussing the design and siting of the Armenian NPP in the context of the accident. The Chairman of ANRA had about 50 appearances in the media including interviews, press conferences and expert panels. He was interviewed by a great number of foreign and domestic electronic media companies. In the spirit of freedom of information act every citizen has the right to pose questions to the regulatory body.

As a follow-up of the immediate actions by the regulatory body, ANRA decided to revise its emergency response procedures with particular attention to information exchange in emergency situations and on communication with the public. Revision of the procedures will be followed by an emergency exercise aimed at testing the new procedures.

13.2 TECHNICAL AND OTHER ISSUES CONSIDERED IN THE LIGHT OF THE ACCIDENT

Armenia voluntarily joined the initiative by the European Commission and the European Nuclear Safety Regulators Group (ENSREG), to require a targeted safety re-evaluation (Stress Test - ST) of its nuclear power plant. By definition the ST addressed earthquake, flooding and other extreme natural events (also in combinations) as well as potential loss of safety functions (electrical power and/or ultimate heat sink), severe accident management and emergency preparedness and response.

The Stress Test exercise was completed in 2013 by the Armenian NPP with the assistance of an international consortium of Tractabel, UJV, Vibroseism and Armatom. It was submitted to ANRA in March 2014 and, at the time of the IRRS mission, ANRA was finalizing the National Stress Test Report.

Stress Test results

A number of safety enhancement measures having relevance in connection with the TEPCO Fukushima Daiichi accident had been performed at the Armenian NPP prior to the occurrence of the accident, some of them as early as in the beginning of the eighties. Some such upgrades were associated with the restart of Unit 2 in 1995 after a long shutdown period, others were related to extensive international assistance programmes. As emphasised in the National Stress Test Report, specificities of the VVER 440 type reactors provide inherent safety features not present in other types.

As for *earthquakes* a comprehensive seismic re-evaluation was performed prior to the restart of Unit 2 of the NPP. The re-evaluation reconfirmed the suitability of the site relative to its design basis. Following the TEPCO Fukushima Daiichi accident the Russian enterprise Vibroseism was tasked to perform a safety margin assessment assuming a peak acceleration of 0,35 g. The assessment concluded that no cliff edge effects may exist below safe shutdown earthquake level; the relevant components are such that their failure due to earthquakes of considered strengths may not lead to severe fuel damage and the Armenian NPP has a sufficient seismic margin for beyond design basis earthquakes. It is worth noting that a detailed analysis was performed for the safe shutdown earthquake levels of all safety critical components, an achievement not very frequent among other Member States, and it was found that this value is certainly not lower than 0,42 g.

The site of ANPP is highly protected against the most common *flooding* hazards (rivers, ground water, dam beaks, etc.). The analysis revealed certain potential weaknesses in protection against mudflows and rainfalls, for which issues further analyses are needed. It was concluded that the site flooding has extremely low probability and available flood protection measures are considered to be appropriate, yet additional provisions may further increase the plant robustness.

For other *extreme meteorological conditions* the analysis has shown that the impact of external hazards (having a probability higher than 10^{-7}/year) or their combination may not lead to core damage. Nevertheless most of the external hazard may cause LOOP or SBO. The analysis identified the critical safety systems and functions that may possibly be affected by extreme external conditions. It is worth mentioning here that in a project conducted by IAEA with the participation of NRSC and ANPP the fault sequence analysis (FSA) method was applied to systematically evaluate the effect of combination of various extreme external hazards. Specifically the analysis addressed hazards from seismic events, external flood, high winds (including dust storm), high and low temperatures and snow load. The FSA analysis identified new combinations of hazardous events, vulnerabilities, and risks not previously considered in combination, and suggested implementations of specific upgrading measures.

For *loss of electric power* the ST report analyses the existing power backup capabilities of the NPP. The report concludes that there are several independent options for power supply that in total offer a time margin of 33 hours for recovery of AC supply before fuel damage. This margin can be extended further if refilling of emergency diesel fuel tanks is possible (although the tanks are not seismically verified). There is also a back-up power supply for unlimited period of time by a nearby small hydropower station, provided transmission remains available. A number of other contingency possibilities are listed in the ST. The ST report notes that the event based EOPs need extension to address previously unconsidered situations, and a number of other safety enhancing measures are considered like installation of separated make-up pipelines for SFP from external sources, extending operability of motor generators, installing additional diesel fuel tanks, etc.

In case of *loss of ultimate heat sink* cooling is performed by cooling towers and the ultimate heat sink is the atmosphere. In the case of an available power supply, cooling is possible as long as cooling water supply is available. The analysis states that even in the worst case cooling water is available for at least 19 days. In case of SBO the situation is determined by the unavailability of electric power, a situation discussed in the previous section. A number of further measures are proposed by the ST report to increase reliability of the ultimate heat sink. Thus, additional mobile equipment is proposed for SG feedwater supply and for ESWS make-up and measures for maintaining coolant inventory in and removing steam (if produced) from the SFP.

Full scale *severe accident* management guidelines are not available among the existing procedures and guides of the NPP, the Russian origin temporary instructions are in use for managing severe accidents. SAMGs are being developed by the NPP using international cooperation and are to be completed in 2016. Therefore, introduction of full scale SAMG in the ANPP is a matter of urgency as at the time of the IRRS mission the plant is not fully prepared to cope with severe accident. The ST report contains an extensive analysis of the sever accident

management capabilities of the plant and of the possible consequences of a severe accident on the accident management activities under the current conditions.

Follow-up actions by the regulatory body

Based on the results of the Stress Test exercise an Action Plan (AP) has been developed. Certain items therein have already been included into licensing conditions and eventually all AP items shall be converted to a regulatory body requirements and shall be part of conditions of various licenses.

CONCLUSION [1]
The IRRS team considers that the TEPCO Fukushima Daiichi accident had no essential impact in the regulatory activity of ANRA. Armenia voluntarily took part in the European Stress Test exercise. The National Report of Armenia on this is being finalized by ANRA at the time of the IRRS mission. Further lessons learned from the accident may follow from the implementation of the actions foreseen as a result of the Stress Test exercise.

13.3 PLANS FOR UPCOMING ACTIONS TO FURTHER ADDRESS THE REGULATORY IMPLICATIONS OF THE ACCIDENT

Action Plan of the licensee

In the framework of the Stress Test the licensee has compiled an Action Plan (AP) consisting of 38 actions. The most important actions are summarized below.

In protections against *earthquakes* extension of seismic margin analysis with probabilistic methods is foreseen. Further analyses are planned concerning the fire extinguishing system, explosions and the consequences of flooding after earthquakes. Seismic upgrade of I&C equipment and the monitoring system is also planned (6 actions).

Elevation of barriers or sealing of certain doors and penetrations as well as flood alarm systems will provide additional protection to specific locations potentially exposed to *flooding*. Mobile pumps will assist removing water from diesel halls and operation manuals shall be revised with actions in case of a flood (6 actions).

In protecting against *extreme weather conditions* the need for additional measures to protect DG air intake from dust was identified. In addition it was concluded the PSA 1 may need extension to more accurately take into account various possible combinations of external hazards (2 actions).

An extensive list of actions was compiled for the cases of *loss of electrical power and loss of ultimate heat sink* (13 actions) including revision of the symptom-based operating procedures, performing analysis of the cooling of spent fuel pools, performing calculations and taking implementing measures for extension of availability, operating time and capacities of power supply equipment (motor generators, batteries, diesel generators). Purchasing of alternative mobile power generators is also considered. Additional measures are planned to make use of large reserves of service water as alternative heat sink and alternative means and equipment are investigated for water supply for the primary circuit and for the SFPs.

Ten actions are listed for *severe accident management*, including developing EOPs and SAMGs, modernization of the emergency core cooling system, implementation of hydrogen management system in the containment and possibly in other locations, implementation of various severe accident mitigation methods (retention of molten core, improvement of containment tightness, modernization of spray system).

The IRRS team was informed that most of the planned actions are due to be completed by 2018, however, some may need longer implementation times.

Note that although not in the framework of the AP, six seismic monitoring stations have recently been installed in the neighbourhood of the NPP and Yerevan surrounding the most active seismic area.

Actions by the Regulatory Body

The Action Plan submitted by ANPP was under revision by ANRA at the time of the IRRS mission. It was expected that ANRA will require further actions beyond those in the operator's AP. Items needing actions from the part of the operator are foreseen to be inserted among the licensing conditions of ANPP. Note that some actions

have already been completed (like the one on internal flooding mentioned above). Some others will be coupled with requirements related to the life time extension of the plant.

The IRRS team was informed that ANRA does not find it necessary to introduce changes into its working methods as the result of the regulatory implications of the TEPCO Fukushima Daiichi accident, nevertheless department and section heads in ANRA were requested to review the structure of their units and make proposals for possible changes, mainly in view of the upcoming tasks related to life time extension of ANPP.

The inspection program will take into account implications of the assessments related to seismic events and the inspections will focus on verification of seismic stability of safety related equipment.

Planned changes in the legal background, regulations and guides

After the accident ANRA decided to review the regulatory framework and tasked NRSC to revise four of the most relevant documents:

1) Design Safety Requirements for a New NPP
2) Requirements on the format and contents of the NPP SAR
3) NPP Siting Safety Evaluation Requirements
4) Licencing procedure for NPP modifications

The *design document* has been completed and submitted to ANRA. It introduces a new state of the NPP related to design extension conditions. It requires the NPP to be able to cope with such conditions by adequate cooling of both the reactor core and the SFP. In revising the document particular attention was paid to the following topics: Combination and correlation of external events; revision of assumptions in the existing safety assessment techniques; hazard screening; cliff-edge effects; containment behaviour in severe accidents and accident management.

The requirements on the *format and contents of SAR* are being developed; the document is due to be ready by October 2015 and will be finalized by May 2016.

The revised *siting document* is to be completed in June 2015 and will be finalized by the end of 2015.

In the revision of the procedure on licensing modifications the most important changes proposed were: extension of the notion “modification” to all possible topics having potential influence on safety; requiring the use of PSA tools in evaluating the impact of the planned modifications; defining the required content of the final report on modifications.

Besides the changes in the regulatory requirements, a number of related safety guides are also planned to be revised. These guides mainly relate to the application of PSA methods and cover two main areas: assessment of external hazards and modelling of plant response from various aspects. In the first area changes are made as it was realized that screening criteria and combination of various hazards were not treated according to their real importance. The Fault Sequence Analysis was applied to identify a number of critical scenarios related to combinations of external hazards. In the second area the typical topics involved are: external hazard impact assessment, the concept of mission time, human reliability assessment, response by SFPs and waste management facilities, SAMGs.

Revision of the guides is performed by the TSO NRSC and will be completed by February 2016. The resulting guides will be reviewed by international experts in the framework of an EC assistance program to Armenia.

CONCLUSION [2]

The IRRS team concludes that the Action Plan from the Stress Test exercise covers the topics considered important from the point of view of protection against extreme and low probability beyond design basis events similar to those occuring in the TEPCO Fukushima Daiichi accident. ANRA is in the process of determining requirements for completion of the Action Plan items and intends to include those requirements into the licensing conditions of the Armenian NPP.

13.4 CONCLUSIONS BY REVIEWED AREAS

Note: ***The significance of Fukushima implications was considered as part of the review of each IRRS module. The review conclusions below and the plans presented by Armenia to further address issues associated with the TEPCO Fukushima Daiichi accident in the coming years should be included in the scope of the follow-up IRRS mission to be invited by the Republic of Armenia.***

Module 1: Responsibilities and Functions of the Government

Responsibilities are clearly allocated in the governmental legal and regulatory framework for safety also for emergency/accident situations. The role of the authorised party is apropriately specified in the framework for safety and emergency situations. In the legal framework efective independence is ensured also for emergency situations.

CONCLUSION [3]
The IRRS team considers that appropriate actions have been taken.

Module 2: Global Nuclear Safety Regime

All necessary provisions are in place to implement the Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in Case of a Nuclear Accident to which Armenia is party. The Government is fulfilling its obligations towards the Convention on Nuclear Safety, including a continued participation in the activities and mechanisms of the Convention initiated after Fukushima event. The Government is demonstrating high level of openness through quite high participation in international peer reviews such as IAEA IRRS, OSART and IPPAS.

Armenia voluntarily participates in the European stress test exercise.

CONCLUSION [4]
The IRRS team considers that appropriate actions have been taken. ANRA has been participating in the European "stress test exercise".

Module 3: Responsibilites and Functions of the Regulatory Body

Since 2008 ANRA has been an independent regulatory authority on nuclear and radiation safety reporting solely to the Prime Minister. In case of an accident ANRA is able to take immediate decisions and communicate it to the governance bodies.

Communication between the governmental organizations of the Republic of Armenia is organized via ultra-short waves and short waves, by cell phones, city phone and direct phone lines, which fact in case of a combination of storm with thunder and of earthquakes may potentially question the availability of emergency communication means.

CONCLUSION [5]
The IRRS team considers that the TEPCO Fukushima Daiichi accident had no significant impact on the regulatory activities of ANRA regarding its functions and responsibilities.

Module 4: Management System of the Regulatory Body

The ANRA process for measurement, assessment and improvement of the management system comprises the relevant provisions as required by GS-R-3, except the self-assessment which should be used to evaluate the performance of work and the improvement of safety culture. The existing performance indicators are not used to monitor the effectiveness of the management system. ANRA did not conduct any self-assessment and independent assessment of its management system. Self-assessment conducted prior to the IRRS missions may serve as a good reference for further self-assessment by ANRA.

ANRA has developed a strategy plan to address future competence needs and orientation for development of staff competence in order to be able to cope with the expected upcoming challenges, e.g., site approval and licensing process of a new NPP unit.

In ANRA's Quality Policy there is a clearly stated principle to promote safety culture together with achievement of high levels of safety performance. However, safety culture is not addressed elsewhere in the management system. In particular there are no arrangements to ensure a common understanding of the key aspects of safety culture within ANRA, and to develop and improve its safety culture.

ANRA publishes on its web pages its annual work-plan, its activities included in the annual program of the RA Government, and the plan of its annual priority measures and also their progress reports. ANRA also publishes the national report of the Republic of Armenia under the Convention on Nuclear Safety on its web page.

ANRA actively participates in the international activities including activities with the IAEA, EC projects and cooperation agreements with the regulators of different countries.

In evaluating the TEPCO Fukushima Daiichi accident for lessons learned ANRA did not implement any improvement actions to its management system. After the stress-test action plan finalization, ANRA intends to decide on the need for any changes regarding its management system, organizational structure or regulatory requirements.

CONCLUSION [6]
The IRRS team considers that at ANRA further actions are needed and are suggested in order to upgrade its management system in compliance with the GS-R-3 requirements to achieve and enhance safety.

Module 5: Authorization

ANRA is in the process of reviewing certain existing requirements related to the site-selection for a new NPP, design of a new NPP and seismic qualification in light of the experience generated in the aftermath of the TEPCO Fukushima Daiichi accident. ANRA following the guidelines of the European Commission required ANPP to carry out the stress test to assess the capabilities of ANPP to cope up with extreme events of external origin and if necessary, ANRA may order to implement measures to augment these capabilities.

The regulations and relevant regulatory processes established by ANRA have not been reviewed for any necessary modification pending submission of the 'stress-report'. The report submitted by RA in the 2nd Extraordinary Meeting of Convention on Nuclear Safety mentions a timeline for carrying out certain actions by different parties. It was observed that some of these actions have not been carried out by the responsible parties, including ANRA. ANRA indicated that it has not carried out any regulatory inspection specific to the regulatory aspects of the accident.

ANRA informed the IRRS team that ANPP has carried out a few safety upgrades and ANRA may require ANPP to implement additional safety upgrades based on ANRA's review of the stress test results.

CONCLUSION [7]
IRRS team considers that ANRA is committed to act in light of the experience generated in the aftermath of the TEPCO Fukushima Daiichi accident and necessary measures will be implemented once the review of the final report on the 'stress-test' is completed

Module 6: Review and Assessment

ANRA developed Design Safety Requirements for new NPPs to include severe accidents in the scope of safety analysis, and General Requirments on Application of European and Russian Requirements to include Design Extension Condition. ANRA also developed requirements for seismic harzard assessment of new NPPs in 2012.

NRSC has perfomed a comparative analysis to IAEA safety standards, and made a draft revision of Design Safety Requirements for new NPPs. ANRA is reviewing the draft revision and takes it into consideration in the amendmenf of the requirements. Further actions will be identified after finalizing the national report of the stress test.

ANRA reviewed the results of seismic hazard analysis for ANPP Unit 2 considering the experiences of TEPCO Fukushima Daiichi accident. The reevaluated PGA is higher than that considered in the design stage, but is within the capabilities of the main components of ANPP unit 2.

CONCLUSION [8]
The IRRS team considers that ANRA recognized the necessary actions to be taken in the light of the TEPCO Fukushima Daiichi accident, in some issues appropriate actions have been initiated. In other issues ANRA recognized that further actions should be identified after finalizing the national report of the stress test.

Module 7: Inspection

At the time of the IRRS mission no comprehensive post-Fukushima programme is going on for the enhancement of the inspection plan and programme of ANRA to improve its ability to detect and assess precursor events. Accordingly, ANRA has no practice to identify potential precursors.

Implementation of the lessons learned from the TEPCO Fukushima Daiichi accident has not yet been reflected in internal guidance and procedures of ANRA. Programs of specific and complex inspections were not changed following the accident.

ANRA requested ANPP to carry out a Stress Test exercise and the results of which are still being evaluated by ANRA.

CONCLUSION [9]
The IRRS team undestands that ANRA intends to change its existing inspection programme based on the results of the Stress Test exercise.

Module 8: Enforcement

ANRA has not performed any changes in its Enforcement Policy and enforcement practice as a consequence of the TEPCO Fukushima Daiichi accident. According to the actual practice ANRA requires licensee to submit program of corrective actions with clear indications of priorities and implementation.

CONCLUSION [10]
The IRRS team considers that the existing status of ANRA`s enforcement practice may need changes to cope with the implications of the TEPCO Fukushima Daiichi accident. The character and extent of these changes depend on the results of the assessment of the Stress Test exercise.

Module 9: Regulations and Guides

In 2012 ANRA developed Design Safety Requirements for New NPPs, which contain specific requirements for severe accident conditions.

ANRA considered the implementation of selected requirements for severe accident condition also for ANPP and has initiated review and revision of the national regulations in the light of the TEPCO Fukushima Daiichi accident. The TSO (NRSC) is revising the licensing procedure, design safety requirements for new NPP units, NPP siting safety evaluation requirements, requirements on format and content of ANPP safety assessment report, and detailed requirements on PSA. Development of new requirements for emergency preparedness and response for ANPP that take into account lessons learned from the TEPCO Fukushima Daiichi accident is planned.

CONCLUSION [11]
The IRRS team concludes that the RA Government recognized the necessary actions to be taken in the light of the TEPCO Fukushima Daiichi accident, in some issues appropriate actions have been initiated, in

CONCLUSION [11]
most cases appropriate actions have been planned.

Module 10: Emergency Preparedness and Response – regulatory aspects

During the accident that occurred in March 2011 at the TEPCO Fukushima-Daiichi NPP, ANRA's response focused mainly on monitoring the situation and informing the public of the accident status and prognosis of the emergency's evolution. After the event ANRA partially activated the emergency response organization, in order to perform assessments, consistent with its role in the national crisis management system.

The national Crisis Centre was not activated, nevertheless the various authorities belonging to the national crisis management system responded according to their roles in radiation emergency situations.

As the national contact point, ANRA has access to the USIE System of IAEA for notification and information exchange in radiation emergencies. Based on IAEA summaries, ANRA, with the support of its TSO, performed daily analyses of the accident progress and prepared for informing mass-media and the public.

In the first few weeks after the accident, daily interviews and press conferences were organized, in which the Chairman of ANRA explained to the media and the public the situation, implications for the Armenian population and aspects related to the nuclear safety of the Armenian nuclear installation. ANRA prepared a special summary for the Ministry of Foreign Affairs, international organizations and embassies in Armenia with information about the Armenian NPP, the differences compared to the Japanese situation, the current arrangements at the ANPP responding to any accidental event.

The results of the stress tests performed after the TEPCO Fukushima Daiichi accident will be incorporated in an Action Plan to be developed by ANPP and approved by ANRA (with additions as appropriate) with a detailed list of measures that ANPP has to perform in order to strengthen and enhance its EPR arrangements for severe accidents. Some activities of ANPP will need to be authorized by ANRA in the future, based on the stress tests results. In order to verify compliance of ANPP with the list of actions, ANRA will have to make changes within its organization.

CONCLUSION [12]
The IRRS team concludes that ANRA responded promptly and in accordance with its specific duties as a regulatory authority for nuclear safety. Consideration was given to public and media information with respect to the accident status and prognosis of the emergency evolution. Although no coordination was provided at the national level, the authorities cooperated for assessments and recommendations in reply to public concerns. Nevertheless, further assessment of lessons learned from the TEPCO Fukushima Daiichi accident (as also discussed in Chapter 10 of this report) needs to be performed at the level of ANRA and the Government. The results of these assessments and of the stress tests performed in 2011 should also be considered and the identified gaps should be highlighted for future enhancement of emergency preparedness and response arrangements.

APPENDIX I – LIST OF PARTICIPANTS

INTERNATIONAL EXPERTS:		
WANNER Hans	Swiss Federal Nuclear Safety Inspectorate (ENSI)	hans.wanner@ensi.ch
BROWN Frederick	U.S. Nuclear Regulatory Commission (NRC)	frederick.brown@nrc.gov
ABDEL-GELEEL Mohamed	Egyptian Nuclear and Radiological Regulatory Authority (ENRRA)	mageleel2000@gmail.com
BODIS Elizabeth	Hungarian Atomic Energy Authority (HAEA)	bodis@haea.gov.hu
DOSIEVA Deyana	Bulgarian Nuclear Regulatory Agency (BNRA)	d.dosieva@bnra.bg
GORODNICHA Olga	State Nuclear Regulatory Inspectorate of Ukraine	gorodnicha@inspect.snrc.gov.ua
KAPRALOV Evgeny	Federal State Unitary Enterprise (FSUE VO Safety); Rostechnadzor	kapralov@vosafety.ru
KELLER Bernd	Authority for Nuclear Safety and Radiation Protection (ANVS)	bernd.keller@anvs.nl
KHESHTPAZ Hossein	Iranian Nuclear Regulatory Authority (INRA); Atomic Energy Organization of Iran (AEOI)	hkheshtpaz@gmail.com
KIM Kyun Tae	Korea Institute of Nuclear Safety (KINS)	kkt@kins.re.kr
KRS Petr	State Office for Nuclear Safety (SÚJB)	pet.kr@seznam.cz
KUMAR Susheel	Atomic Energy Regulatory Board (AERB)	skumar@aerb.gov.in

SERENAITE Dovile	Radiation Protection Centre	dovile.serenaite@rsc.lt
TOMAS ZERQUERA Juan	Center for Radiation Protection and Hygiene	cphrjtomas@ceniai.inf.cu
ZACHARIASOVA Ivanka	State Office for Nuclear Safety (SÚJB)	ivanka.zachariasova@sujb.cz
NOEL Marc	Observer - European Commission (EC)	marc.noel@ec.europa.eu
MUELER-GERMANA Annatina	Swiss Federal Nuclear Safety Inspectorate (ENSI)	annatina.mueller@ensi.ch
IAEA STAFF		
JUBIN Jean-Rene	Division of Nuclear Installation Safety	j.jubin@iaea.org
HAILU Teodros	Division of Nuclear Safety and Radiation Waste	t.g.hailu@iaea.org
BACIU Adriana	Incident and Emergency Centre	a.c.baciu@iaea.org
LUX Ivan	Division of Nuclear Installation Safety	i.lux@iaea.org
REBIKOVA Olga	Division of Nuclear Installation Safety	o.rebikova@iaea.org
LIAISON OFFICERS		
MELKUMYAN Anna	Armenian Nuclear Regulatory Authority	a.melkumyan@anra.am

APPENDIX II – MISSION PROGRAMME

Time	SAT 30.05	SUN 31.05	MON 01.06	TUE 02.06	WED 03.06	THU 04.06	FRI 05.06	SAT 06.06	SUN 07.06
9:00	Arrival of Team Members	Team building meeting: • 5 minutes/TM self-intro • Refresher training	Entrance Meeting	Visit to NCO / Interviews	Visits to: ANPP radioactive waste & spent fuel facilities / Interviews	Interviews / EPR exercise / DTC writes introductory parts	TM write Report TL and DTL review introductory part **Draft text to TL**	• Discussing and improving Draft Report • Cross-Reading • TL, DTL, TC and DTC read everything	**Free day, Social Tour** / Reading, Cross-reading of the Report
10:00									
11:00			Interviews						
12:00		Team Lunch	Lunch with Host	Lunch	Lunch	Lunch	Lunch	Lunch	
13:00				Visit to Geopromining / Interviews	Visits to: ANPP radioactive waste & spent fuel facilities / Interviews	Interviews / EPR Exercise / DTC writes introductory parts	Policy Discussions	Finalisation of the Draft Report	
14:00		Initial Team Meeting: • IRRS process • Main objectives • Report writing • Schedule • First observations • In-Group discussions	Interviews				Secretariat edits the report **Preliminary Draft Report Ready** / Cross-reading by TM		
15:00									
16:00					**Written preliminary findings delivered**				
17:00			Daily Team Meeting	Daily Team Meeting	Daily Team Meeting: Discussion of findings	Daily Team Meeting	Daily Team Meeting		
18:00	Informal dinner	Team Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	Dinner	
20:00			Writing of the report	Writing of the report	Secretariat edits Report TM write Report	Writing of the report	TM Read Draft	Secretariat edits the report	

Time	MON 08.06	TUE 09.06	WED 10.06	THU 11.06	FRI 12.06
9:00	Individual discussions of Rs, Ss and GPs with counterparts	Cross-Reading TL, DTL, TC and DTC read everything Finalisation	Common read through and finalisation by the Team **Submission of the Draft to the Host**	**Written comments by the Host** Team meeting for finalisation of the Report	**Submission of the Final Draft** Exit Meeting Press Conference
10:00					
12:00	Lunch	Lunch	Lunch	Lunch	Lunch
13:00	Policy Discussions	Discussion of the report by the team / TC, DTC prepare Executive Summary and exit presentation	Host reads Draft / TL finalises Executive Summary and exit presentation / TC Drafts the Press Release	Discussion with Host	Team Member Departure
15:00	Individual discussions of Rs, Ss and GPs with counterparts				
17:00	Daily Team Meeting		Discussion of Executive Summary	Briefing of the DDG Finalisation of the press release	
18:00	Dinner	Dinner	Dinner	Farewell Dinner	
20:00	Secretariat includes changes	Secretariat finalises text	Free		
21:00				Free	

APPENDIX III – POLICY ISSUES

STAFFING WITH QUALIFIED PERSONNEL

The approved structure of ANRA includes 43 positions. Five are vacant, including four civil servant positions. By law, all inspectors have to be civil servants. These vacant positions have not been successfully filled for at least two years. ANRA explained the difficulty in filling the positions as being a general lack of qualified specialists in the nuclear field with at least five years' experience, and low salaries compared with similar positions at the ANPP. In addition to the existing vacancies, the average age of the ANRA professional staff is 56. In the coming years several senior staff will retire, leaving a significant gap. Retirees can be re-employed if their vacancies remain open, but cannot be used as inspectors. NRSC uses a commendable approach, which is the part time employment of talented and suitable students. By the time of their university degree, most of them stay with NRSC.

ANRA hopes to solve its staffing problem by training personnel through NRSC: Personnel hired by NRSC undergo extensive training and after 5 years they are allowed to apply for civil servant positions in ANRA as suitably experienced experts.

Maintenance of competence is an issue in many countries. When new builds are planned, applicants tend to hire experienced technical staff away from the regulator body. To face this issue, several models exist. A successful one is the direct cooperation with leading universities to identify and recruit candidates from school, similar to the model used by NRSC.

LONG TERM OPERATION AND LIFE EXTENSION

The operating license of ANPP-2 expires in 2016. The RA government decided in 2012 on lifetime extension for ANPP-2 and suspended the plans for new build. The lifetime extension will be coupled to a series of safety upgrades that will be financed from a $300 million support package from Russia, which has not been finalized. ANRA has not yet received the license application for lifetime extension and currently is uncertain about when they can expect that submission. Time for license application review is running short. ANRA has looked for help from other regulatory bodies, including USNRC, to prepare for the license application process. They will be looking for further assistance from foreign counterparts, including the Russian Federation and the USA, for the safety analysis review. It is anticipated that a six month period will be required for life extension modification work at ANPP-2. A longer outage would have national impact. ANPP-2 will have to shut down when the current license expires if there is no decision on an extension.

There is experience in other countries for similar NPPs, where the lifetime extension process lasted up to eight years. Several European countries have unlimited operating licenses but perform a Periodic Safety Review and long term safety assessments in ten-year intervals to determine and then to enforce necessary safety upgrades.

APPENDIX IV – LIST OF COUNTERPARTS

	IRRS Experts	COUNTERPART
1.	**RESPONSIBILITIES AND FUNCTIONS OF THE GOVERNMENT**	
	BROWN, Frederick **KRS**, Petr	KARMIRMIRUKYAN, Arshaluys MARTIROSYAN, Ashot
2.	**THE GLOBAL SAFETY REGIME**	
	BROWN, Frederick **KRS**, Petr	KARMIRMIRUKYAN, Arshaluys
3.	**RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY**	
	GORODNICHA, Olga	AMANYAN, Suren MARTIROSYAN, Ashot AMIRJANYAN, Armen
4.	**MANAGEMENT SYSTEM OF THE REGULATORY BODY**	
	BODIS, Elizabeth	MELKUMYAN, Anna AMANYAN, Suren MARTIROSYAN, Ashot
5.	**AUTHORIZATION**	
	GELEEL, Mohamed Abdel **KELLER**, Bernd **KUMAR,** Susheel **SERENAITE**, Dovile	MANOYAN, Gagik GRIGORYAN, Vahe KARMIRMIRUKYAN, Arshaluys AVETISYAN, Aida MNATSAKANYAN, Ashot AGHAJANYAN, Nelli
6.	**REVIEW AND ASSESSMENT**	
	GELEEL, Mohamed Abdel **KELLER**, Bernd **KIM,** Kyun Tae **SERENAITE**, Dovile	MANOYAN, Gagik GRIGORYAN, Vahe KARMIRMIRUKYAN, Arshaluys AVETISYAN, Aida MNATSAKANYAN, Ashot AGHAJANYAN, Nelli POGHOSYAN, Shahen
7.	**INSPECTION**	
	GELEEL, Mohamed Abdel **KELLER**, Bernd **KHESHTPAZ**, Hossein **SERENAITE**, Dovile	MANOYAN, Gagik HAKOBYAN, Andranik HOVHANNISYAN, Levon AVETISYAN, Aida MNATSAKANYAN, Ashot AGHAJANYAN, Nelli
8.	**ENFORCEMENT**	
	GELEEL, Mohamed Abdel **KELLER**, Bernd **KHESHTPAZ**, Hossein **SERENAITE**, Dovile	MANOYAN, Gagik HAKOBYAN, Andranik KARMIRMIRUKYAN, Arshaluys AVETISYAN, Aida

	IRRS Experts	COUNTERPART
		MNATSAKANYAN, Ashot AGHAJANYAN, Nelli
9.	**REGULATIONS AND GUIDES**	
	GELEEL, Mohamed Abdel **KAPRALOV,** Evgeny **KELLER**, Bernd **SERENAITE**, Dovile	KARMIRMIRUKYAN, Arshaluys MANOYAN, Gagik AVETISYAN, Aida MNATSAKANYAN, Ashot AGHAJANYAN, Nelli
10.	**EMERGENCY PREPAREDNESS AND RESPONSE – REGULATORY ASPECTS**	
	BACIU, Adriana	AVETISYAN, Aida MNATSAKANYAN, Ashot GEVORKYAN, Martun MARTIROSYAN, Ashot
11.	**ADDITIONAL AREAS**	
	DOSIEVA, Deyana **SERENAITE**, Dovile **TOMAS ZERQUERA**, Juan **ZACHARIASOVA**, Ivanka	AVETISYAN, Aida MNATSAKANYAN, Ashot BABAYAN, Armen POGHOSYAN, Lusine AGHAJANYAN, Nelli HAROYAN, Karen
12.	**INTERFACE WITH NUCLEAR SECURITY**	
	BROWN, Frederick	KIRAKOSYAN, Khachatur
13.	**REGULATORY IMPLICATIONS OF THE TEPCO FUKUSHIMA DAIICHI ACCIDENT**	
	LUX, Ivan	AMIRJANYAN, Armen BZNUNI, Surik

APPENDIX V – RECOMMENDATIONS (R), SUGGESTIONS (S) AND GOOD PRACTICES (GP)

AREA	R: Recommendations S: Suggestions GP: Good Practices	Recommendations, Suggestions or Good Practices
1. RESPONSIBILITIES AND FUNCTIONS OF THE GOVERNMENT	R1	Recommendation: The Government should promulgate a policy and corresponding strategy for safety with all the elements required by the respective IAEA safety requirements that would include necessary measures to demonstrate its long term commitment to safety.
	R2	Recommendation: The Government should ensure that the fundamental safety objective and fundamental safety principles of IAEA SF-1 are fully incorporated in to the Armenian framework for safety.
	R3	Recommendation: The Government should provide ANRA with human and financial resources to ensure adequate discharge of its statutory obligation for the regulatory control of safety.
	R4	Recommendation: The Government should promulgate a national policy for the final stage of spent nuclear fuel management and consequently finalize the National Strategy on Radioactive Waste and Spent Fuel Management.
	R5	Recommendation: The Government should establish requirements to authorize technical services.
2. THE GLOBAL SAFETY REGIME	GP1	Good practice: Armenia makes extensive use of international peer reviews and international support programs to improve its framework for safety.
	S1	Suggestion: ANRA should consider making all necessary arrangements to finalise the identification of the lessons learned from the TEPCO Fukushima Daiichi accident. As a result of this, ANRA should require appropriate corrective actions to be implemented by ANPP and should determine appropriate actions to improve the regulatory framework, in a timely manner.
3. RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY	R6	Recommendation: The Government should provide ANRA with the authorization to structure its organization and manage its available resources so as to fulfil its statutory obligations effectively.

AREA	R: Recommendations S: Suggestions GP: Good Practices	Recommendations, Suggestions or Good Practices
	R7	**Recommendation: ANRA should establish a formal process which ensures that the technical assistance provided by NRSC to a licensees including the ANPP is monitored so that any conflict of interest can be avoided.**
	R8	**Recommendation: ANRA should ensure that its staff has adequate technical competence to make informed decisions including the means to assess advice provided by NRSC.**
	GP2	**Good practice: The regular meeting of the Nuclear Safety Council is a good opportunity for ANRA to convey messages about the most important issues in nuclear safety directly to the President of RA.**
	S2	**Suggestion: ANRA should consider finalizing the development of adequate safety related records, including records that might be necessary for the decommissioning of ANPP, records of events, including non-routine releases of radioactive material to the environment.**
	S3	**Suggestion: ANRA should consider establishing a formal process to consult the interested parties including the public as appropriate.**
4. MANAGEMENT SYSTEM OF THE REGULATORY BODY	R9	**Recommendation: ANRA should upgrade its management system in compliance with the GS-R-3 requirements, and should implement, assess and continuously improve it, in particular with respect to safety culture, internal communication, organizational change management and human resources management.**
	R10	**Recommendation: ANRA Management should demonstrate its commitment to the implementation, assessment and continual improvement of the management system in line with the IAEA safety standard GS-R-3.**
	S4	**Suggestion: The ANRA senior management should consider revising its policy statement to place emphasis that safety is an overriding priority and to clarify the ANRA organizational values and expected staff behavior.**
	S5	**Suggestion: ANRA should consider conducting a regular review of its management system to ensure its continuing suitability and effectiveness.**

AREA	R: Recommendations S: Suggestions GP: Good Practices	Recommendations, Suggestions or Good Practices
5. AUTHORIZATION	S6	Suggestion: ANRA should consider identifying clear and explicit requirements, criteria and standards forming the licensing basis for specific types of facilities and activities.
	S7	Suggestion: Government should consider re-evaluating the adequacy of the current licence approval timelines with respect to the new NPP.
	R11	Recommendation: ANRA should establish a process and procedures for conducting verification of the safety assessment submitted with application for authorization of radiation sources, including during the amendment and/or renewal of the authorization.
	R12	Recommendation: ANRA should establish internal procedures for amendment or renewal of an authorization of radiation sources.
	S8	Suggestion: ANRA should consider establishing an internal procedure for the implementation of the legal provisions and make arrangements for regaining control over radioactive sources.
	R13	Recommendation: The Government should formally establish a mechanism to provide adequate financial resources for ensuring safe decommissioning of NPPs. The mechanism should also update the cost estimate in light of a periodic update of the decommissioning plan.
6. REVIEW AND ASSESSMENT	R14	Recommendation: ANRA should specify the principles, requirements and associated safety criteria applicable to the design lifetime extension in the regulatory documents.
	R15	Recommendation: ANRA should make the necessary arrangements to identify lessons from operating and regulatory experience in other States, in particular by extending the scope of operational experience feedback and by establishing a regulation on OEF for all operating stages. In addition, ANRA should require appropriate corrective actions to be implemented at the ANPP.
7. INSPECTION	S9	Suggestion: ANRA should consider establishing inspection guidance to ensure a systematic and consistent approach for inspection of facilities and activities.

AREA	R: Recommendations S: Suggestions GP: Good Practices	Recommendations, Suggestions or Good Practices
	S10	**Suggestion: ANRA should consider establishing a systematic mechanism for using feedback from inspections as input for improving the effectiveness of the regulatory processes.**
	R16	**Recommendation: ANRA should implement an inspection programme and planning process, related facilities and activities using radiation sources and transport of radioactive material, to that defines a baseline, includes frequency of inspections and areas and programmes to be inspected based on established criteria and should allow for prioritization.**
	R17	**Recommendation: ANRA should establish and implement in a systematic manner a programme to oversee licensee's safety culture, including during inspection.**
	R18	**Recommendation: The Government should authorise ANRA to have free access to any facility or activity to conduct inspection to verify safety and compliance with regulatory requirements.**
	R19	**Recommendation: ANRA should enforce compliance with the national regulatory requirements for quality assurance system in transport.**
8. ENFORCEMENT	S11	**Suggestion: The Government should consider amending the code on administrative offences so that ANRA is able to impose penalties on organizations.**
	R20	**Recommendation: ANRA should establish within Armenia's legal framework enforcement guidance and criteria for requiring corrective actions, and develop guidance for inspectors on the implementation of enforcement actions.**
9. REGULATIONS AND GUIDES	GP3	**Good Practice: The statutory commitment to comply with IAEA safety standards reflects a strong national commitment to the best international practice for nuclear safety.**
	S12	**Suggestion: ANRA should consider implementing a systematic approach to ensure that regulations and guides are reviewed and revised as necessary to keep them up to date.**

AREA	R: Recommendations S: Suggestions GP: Good Practices	Recommendations, Suggestions or Good Practices
	R21	Recommendation: ANRA should revise Decree 1411 to reflect the current IAEA safety standards on design extension conditions and establish the associated guidance.
	R22	Recommendation: ANRA should establish the requirements for the characterization of radioactive waste to facilitate its future disposal.
	R23	Recommendation: The Government should establish waste acceptance criteria for the storage and the disposal of radioactive waste packages.
	S13	Suggestion: ANRA should consider establishing specific regulatory requirements for different types of disposal facilities and setting out the procedures for meeting the requirements established.
	S14	Suggestion: ANRA should consider establishing the requirements to ensure financial provisions for safe management of high activity radioactive sources, once they have become disused, and verify these arrangements during the process of authorization.
	R24	Recommendation: ANRA should establish the regulatory requirements for decommissioning in line with the IAEA safety standards.
	R25	Recommendation: ANRA should review and revise the Transportation Decree to ensure that it is in compliance with the current IAEA Transport safety standards.
	S15	Suggestion: ANRA should consider providing guidance for users and applicants to meet the requirements of the transport regulations.
10. EMERGENCY PREPAREDNESS AND RESPONSE – REGULATORY ASPECTS	R26	Recommendation: ANRA should develop and promulgate regulatory requirements for EPR for all operating organizations covering all relevant general, functional and infrastructure aspects of IAEA GS-R-2 in relation to response to nuclear and/or radiological emergencies.
	S16	Suggestion: ANRA should consider developing guidelines to support the threat assessment of all operating organizations.

AREA	R: Recommendations S: Suggestions GP: Good Practices	Recommendations, Suggestions or Good Practices
	R27	Recommendation: ANRA should strengthen its regulatory control on EPR through comprehensive inspections, in order to ensure that the on-site EPR arrangements provide a reasonable assurance for an effective response.
	R28	Recommendation: ANRA should adopt a system and develop criteria for emergency classification that follows the requirements of IAEA GS-R-2.
	S17	Suggestion: ANRA should consider developing criteria for the termination of the emergency and the transition to long term recovery operations that follows the requirements of IAEA GS-R-2.
	S18	Suggestion: ANRA should consider elaborating an internal methodology for the evaluation of training and exercise programmes of all operating organizations; the methodology should include evaluation criteria needed to ensure that training and exercise programmes of operating organizations are periodically reviewed and updated in the light of experience gained.
	R29	Recommendation: ANRA should qualify and assign an increased number of personnel for each position within the Emergency Response Organization, so that ANRA can work in shifts during long term response in case of accident at the ANPP, in order to fulfil its responsibilities effectively and sustainably.
	S19	Suggestion: ANRA should consider developing an internal training programme, including initial and refresher training, for its staff for performing the response functions in case of a nuclear or radiological emergency; criteria should be adopted in order to evaluate the quality of the training. An annual periodicity should be considered for refresher training.
	S20	Suggestion: ANRA should consider conducting large scale emergency response exercises more frequently, in order to test its performance as response organization within the national crisis management system; special methodology for evaluating its performance during exercises should be developed as part of the exercise programmes of ANRA.
	S21	Suggestion: ANRA should consider structuring its organization so that an entity should be created within the organizational chart to be responsible for

AREA	R: Recommendations S: Suggestions GP: Good Practices	Recommendations, Suggestions or Good Practices
		ANRA's emergency planning and preparedness activities as regulatory body and as response organization.
	GP4	Good practice: The Government promotion of public education on the national TV channel and the engagement of ANRA to support with technical expertize the process are recognized to be a good practice.
11. ADDITIONAL AREAS	S22	Suggestion: The government should consider ensuring the establishment, in consultation with relevant bodies, of dose constraints for exposure of carers and comforters and for volunteers participating in the programme of biomedical research. The government should consider also establishing criteria for the release of patients with implanted sealed sources as well as guidelines for release of patients after therapeutic radiological procedure with sealed or unsealed sources.
	R30	Recommendation: The regulatory body should establish requirements for education, training and competence in protection and safety of all health professionals with responsibilities for medical exposure, including for any specialization required.
	S23	Suggestion: ANRA should consider establishing requirement for the responsibilities of registrants and licensees to ensure that no individual person incurs a medical exposure unless is justified and information for the expected benefits and risks are provided.
	R31	Recommendation: The regulatory body should establish requirements for the responsibilities of registrants and licensees for: a) appropriate radiation protection arrangements in place for medical exposure of pregnant or breast-feeding patients; b) taking measure and investigating unintended and accidental medical exposures; c) ensuring that radiological reviews are performed periodically at medical radiation facilities and records are maintained; d) ensuring that protection and safety is optimized for each medical exposure.

AREA	R: Recommendations S: Suggestions GP: Good Practices	Recommendations, Suggestions or Good Practices
	S24	Suggestion: ANRA should consider undertaking measures in order to enforce requirements for the protection of workers in existing exposure situations.
	R32	Recommendation: The Government should ensure that the conditions of service of radiation workers are independent of whether they are or could be professionally exposed.
	R33	Recommendation: The regulatory body should update current regulation for compliance with the requirements of GSR Part 3, specifically: a) the equivalent dose limit to the skin is applied to the most highly irradiated area of the skin; b) doses related to emergency exposure situation are to be distinguished from doses, exposures and intakes due to normal conditions of work; c) pregnant or breast feeding women are not automatically excluded from work but allow them to continue to work under specific adjustment of working condition; to establish provision for archiving of records of occupational exposure.
	R34	Recommendation: ANRA should incorporate modifications in the regulations for explicitly addressing the concept of clearance and establishing clearance criteria as specified in GSR Part 3.
	S25	Suggestion: ANRA should continue efforts for implementing an independent monitoring infrastructure, including laboratory capacities for verification of results of ANPP's monitoring program.
	S26	Suggestion: ANRA should consider implementing measures to ensure that studies related to radon levels and their impact on the public are completed and, where needed, implement an action plan for controlling public exposure due to radon indoors.
	R35	Recommendation: ANRA should establish reference levels for water, foodstuffs and selected commodities fully in compliance with relevant criteria in GSR Part 3.

AREA	R: Recommendations S: Suggestions GP: Good Practices	Recommendations, Suggestions or Good Practices
12. INTERFACE WITH NUCLEAR SECURITY	**S27**	**Suggestion: ANRA should consider ensuring that safety measures and nuclear security measures for new nuclear power plants are designed and implemented in an integrated manner so that neither negatively affects the other.**

APPENDIX VI – CONCLUSIONS ON THE REGUATRY IMPLICATION OF THE TEPCO FUKUSHIMA DAIICHI ACCIDENT

AREA	NO.	CONCLUSION
TECHNICAL AND OTHER ISSUES CONSIDERED IN THE LIGHT OF THE ACCIDENT	1	The IRRS team considers that the TEPCO Fukushima Daiichi accident had no essential impact in the regulatory activity of ANRA. Armenia voluntarily took part in the European Stress Test exercise. The National Report of Armenia on this is being finalized by ANRA at the time of the IRRS mission. Further lessons learned from the accident may follow from the implementation of the actions foreseen as a result of the Stress Test exercise.
PLANS FOR UPCOMING ACTIONS TO FURTHER ADDRESS THE REGULATORY IMPLICATIONS OF THE ACCIDENT	2	The IRRS team concludes that the Action Plan from the Stress Test exercise covers the topics considered important from the point of view of protection against extreme and low probability beyond design basis events similar to those occuring in the TEPCO Fukushima Daiichi accident. ANRA is in the process of determining requirements for completion of the Action Plan items and intends to include those requirements into the licensing conditions of the Armenian NPP.
1. RESPONSIBILITIES AND FUNCTIONS OF THE GOVERNMENT	3	The IRRS team considers that appropriate actions have been taken.
2. GLOBAL NUCLEAR SAFETY REGIME	4	The IRRS team considers that appropriate actions have been taken. ANRA has been participating in the European “stress test exercise”.
3. RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY	5	The IRRS team considers that the TEPCO Fukushima Daiichi accident had no significant impact on the regulatory activities of ANRA regarding its functions and responsibilities.
4. MANAGMENT SYSTEM OF THE REGULATRY BODY	6	The IRRS team considers that at ANRA further actions are needed and are suggested in order to upgrade its management system in compliance with the GS-R-3 requirements to achieve and enhance safety.

AREA	NO.	CONCLUSION
5. AUTHORIZATION	7	IRRS team considers that ANRA is committed to act in light of the experience generated in the aftermath of the TEPCO Fukushima Daiichi accident and necessary measures will be implemented once the review of the final report on the 'stress-test' is completed.
6. REVIEW AND ASSESSMENT	8	The IRRS team considers that ANRA recognized the necessary actions to be taken in the light of the TEPCO Fukushima Daiichi accident, in some issues appropriate actions have been initiated. In other issues ANRA recognized that further actions should be identified after finalizing the national report of the stress test.
7. INSPECTION	9	The IRRS team undestands that ANRA intends to change its existing inspection programme based on the results of the Stress Test exercise.
8. ENFORCEMENT	10	The IRRS team considers that the existing status of ANRA`s enforcement practice may need changes to cope with the implications of the TEPCO Fukushima Daiichi accident. The character and extent of these changes depend on the results of the assessment of the Stress Test exercise.
9. REGULATONS AND GUIDES	11	The IRRS team concludes that the RA Government recognized the necessary actions to be taken in the light of the TEPCO Fukushima Daiichi accident, in some issues appropriate actions have been initiated, in most cases appropriate actions have been planned.
10. EMERGENCY PREPAREDNESS AND RESPONSE – REGULATORY ASPECTS	12	The IRRS team concludes that ANRA responded promptly and in accordance with its specific duties as a regulatory authority for nuclear safety. Consideration was given to public and media information with respect to the accident status and prognosis of the emergency evolution. Although no coordination was provided at the national level, the authorities cooperated for assessments and recommendations in reply to public concerns. Nevertheless, further assessment of lessons learned from the TEPCO Fukushima Daiichi accident (as also discussed in Chapter 10 of this report) needs to be performed at the level of ANRA and the Government. The results of these assessments and of the stress tests performed in 2011 should also be considered and the identified gaps should be highlighted for future enhancement of emergency preparedness and response arrangements.

APPENDIX VII – COUNTERPART'S REFERENCE MATERIAL USED FOR THE REVIEW

1. Law on Safe Utilization of Atomic Energy for Peaceful Purposes (01.02.1999 HO-285)
2. Law of the RA on Licensing
3. Law of the RA on Legal Acts (03.04.2002 HO-320N)
4. Law of the RA on Population Protection in case of Emergencies (02.12.1998 HO-265)
5. Criminal Code of the RA (18.04.2003)
6. Code of the Republic of Armenia on Administrative Offences (extracts related to the ANRA's activity)
7. The Law of the Republic Of Armenia on Organizing and Conducting Audits in the Republic Of Armenia
8. Government Decree № 768 as of 22.12.1999 on approval of the list of activities and positions of authority important for safety in atomic energy utilization
9. Government Decree № 631 as of 4 June 2009 on approval of "Procedure on Radioactive Waste Management
10. Government Decree № 765 as of 16.08.2001 on approval of the procedure for registration of ionizing radiation sources
11. Government Decree № 2013-N as of 21.11.2002 on approval of the requirements to form and contents of the Safety Analysis Report of the Armenian NPP Unit 2
12. Government Decree № 1751-N as of 09.12. 2004 on approval of the licensing procedure and license form for use of radioactive materials, devices containing radioactive materials, or radiation generators
13. Government Decree № 1790-N as of 09.12. 2004 on approval of the licensing procedure, license and application form for import and export of radioactive materials, devices containing radioactive materials, or radiation generators
14. Government Decree № 258-N as of 10.02. 2005 on approval of the licensing procedure and licence form for manufacture of systems, structures and components important to safety of atomic energy utilization installation
15. Government Decree № 260-N as of 10.02. 2005 on approval of the procedure on licensing of installation and calibration of equipment containing radioactive materials or calibration of generators
16. Government Decree № 1791-N as of 09.02. 2005 on approval of the licensing procedure and licence form for transport of radioactive materials, devices containing radioactive materials, or radiation generators
17. Government Decree № 762-N as of 09.06. 2005 on approval of the licensing procedure and licence form for use of nuclear materials
18. Government Decree № 745-N as of 09.06.2005 on approval of the licensing procedure and licence form for storage of nuclear materials
19. Government Decree № 1203-N as of 11.08.2005 on Approval of Licensing Procedure and Form of Licence On Site Selection Of Radioactive Waste Storage Facilities
20. Government Decree № 1204-N as of 11.08. 2005 on approval of the licensing procedure and licence form for site selection of radioactive waste disposal facility
21. Government Decree № 652-N as of 19.05. 2005 on approval of the licensing procedure and licence form for operation of radioactive waste disposal facility
22. Government Decree № 702-N as of 19.05. 2005 on approval of the licensing procedure and licence form for operation of radioactive waste storage facility
23. Government Decree № 703-N as of 19.05. 2005 on approval of the licensing procedure and licence form for reprocessing of radioactive wastes
24. Government Decree № 985-N as of 07.07. 2005 on approval of the licensing procedure and licence form for designing of radioactive waste storage facility

25. Government Decree № 647-N as of 05.05.2005 on approval of the licensing procedure and licence form for storage of radioactive wastes
26. Government Decree № 416-N as of 31.03. 2005 on approval of the licensing procedure and licence form for construction of radioactive waste storage facility
27. Government Decree № 2141-N as of 01.12. 2005 on approval of the licensing procedure and licence form for decommissioning of radioactive waste storage facility
28. Government Decree № 417-N as of 31.03. 2005 on approval of the licensing procedure and licence form for construction of radioactive waste disposal facility
29. Government Decree № 640 as of 12.07.2001 on approval of the procedure for organization and conduct of safety expertise in the atomic energy utilization field
30. Government Decree № 746-N as of 09.06.2005 on approval of the licensing procedure and licence form for transport of nuclear materials
31. Government Decree № 400-N as of 24.03. 2005 on approval of the licensing procedure and license form for operation of nuclear installations
32. Government Decree № 401 as of 13 April 2003 on Approval of procedure on licensing physical protection of nuclear installations and nuclear materials and form of license
33. Government Decree № 608-N as of 12.05. 2005 on approval of the licensing procedure and license form for designing of nuclear installations
34. Government Decree № 609-N as of 12.05. 2005 on approval of the licensing procedure and license form for site selection of nuclear installations
35. Government Decree № 649-N as of 12.05. 2005 on approval of the licensing procedure and license form for construction of nuclear installations
36. Government Decree № 707-N as of 01.06. 2005 on approval of the licensing procedure and license form for decommissioning of nuclear installations
37. Government Decree № 1858-N as of 14.12.2006 on approval of the licensing procedure, license and application forms and qualification check of individuals implementing practices and holding positions important for safety of atomic energy utilization field
38. Government decree № 866-N as of 17 July 2008 on establishment of the State Committee under the Government of the RA on Nuclear Safety Regulation, approval of the statute and organizational structure, content and size of property of the State Committee under the Government of the RA on Nuclear Safety Regulation
39. Government Decree № 1411-N as of 08.11.2012 on approval of Design Safety Requirements to New NPP Unit(s).
40. Government Decree № 1546-N as of 13.12.2012 on approval of Method on Seismic Hazard Assessment for New Nuclear Unit Site
41. Government Decree № 1219-N as of 18.08.2006 on approval of radiation safety standards
42. Government Decree № 1489-N as of 18.08.2006 on approval of radiation safety rules
43. The RA Government Decree № 553-N as of 03.05.2007 on approval of the procedure for regaining control over radioactive materials and isolation
44. RA Government Decree № 461-n as of 19.04.2012 on approval of operation lifetime extension of unit 2 of "Haykakan AEK" CJS (armenian npp)
45. RA Government decree № 1231-N as of 11.09.2003 on approval of the concept of physical protection and security of Armenian NPP and nuclear materials and rules on physical protection of nuclear installations and nuclear materials

46. RA Government decree № 2328-N as of 22.12.2005 on approval of the national plan of the protection of population in case of a nuclear and (or) radiological emergency at the Armenian Nuclear Power Plant (off-site plan)
47. RA Government protocol decision №51 as of 13 December 2001 on approval of the "Basic requirements to planning and implementation of response actions to nuclear and radiation emergencies
48. RA Government protocol decision №43 adopted on 4 November 2010 on approval of the concept on safe management of radioactive waste and spent nuclear fuel in the Republic of Armenia
49. Procedure on issuing permissions for specific activities important in terms of safety at NPP operation
50. Procedure on inspection of atomic energy utilization installations implementing practices with radiation sources and ionizing radiation generators and of activities implemented there
51. Guidelines for licensing of practices with the use of ionizing generators, radioactive materials and equipment containing radioactive materials
52. The instruction on organization and conduction of inspections
53. ANRA'S Periodical Inspection Programm
54. Procedure for technical modification of nuclear installations
55. OPB-88/97 General Regulations on Safety of Nuclear Power Plants
56. 5th National Report of the Republic of Armenia under the Convention on Nuclear Safety
57. 6th National Report of the Republic of Armenia under the Convention on Nuclear Safety
58. National Report of the Republic of Armenia under the Joint Convention
59. List of legal acts applied in atomic energy utilization field in Armenia
60. ANRA QMS (including the folder with the emergency procedures)
61. ANRA's annual report for 2014
62. ANRA's annual plan for 2015
63. IRRS Summary Report
64. Action Plan
65. Final Report (SARIS)
66. Fukushima Module (Questionnaire, SWOT, Summary)

APPENDIX VIII – IAEA REFERENCE MATERIAL USED FOR THE REVIEW

1.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Fundamental Safety Principles, No SF-1, IAEA, Vienna (2006)
2.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Governmental, Legal and Regulatory Framework for Safety, General Safety Requirements Part 1, No. GSR Part 1, IAEA, Vienna (2010).
3.	**INTERNATIONAL ATOMIC ENERGY AGENCY** – The Management System for Facilities and Activities. Safety Requirement Series No. GS-R-3, IAEA, Vienna (2006).
4.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Preparedness and Response for Nuclear and Radiological Emergencies, Safety Requirement Series No. GS-R-2, IAEA, Vienna (2002).
5.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards, General Safety Requirements Part 3, No. GSR Part 3, IAEA, Vienna (2014).
6.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Safety assessment for facilities and activities, General Safety Requirements Part 4, No. GSR Part 4, IAEA, Vienna (2009)
7.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Predisposal Management of Radioactive Waste, General Safety Requirement Part 5, No. GSR Part 5, IAEA, Vienna (2009).
8.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Decommissioning of Facilities, Safety Requirement Series No. GSR Part 6, IAEA, Vienna (2014).
9.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Safety of Nuclear Power Plants: Design, Specific Safety Requirements No. SSR-2/1, IAEA, Vienna (2012).
10.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Safety of Nuclear Power Plants: Commissioning and Operation, Specific Safety Requirements Series No. SSR-2/2, IAEA, Vienna (2011).
11.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Site Evaluation for Nuclear Installations, Safety Requirement Series No. NS-R-3, IAEA, Vienna (2003).
12.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Safety of Research Reactors, Safety Requirement Series No. NS-R-4, IAEA, Vienna (2005).
13.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Safety of Nuclear Fuel Cycle Facilities, Safety Requirement Series No. NS-R-5, IAEA, Vienna (2014)
14.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Disposal of Radioactive Waste, Specific Safety Requirements No. SSR-5, IAEA, Vienna (2011)
15.	**INTERNATIONAL ATOMIC ENERGY AGENCY** – Regulations for the Safe Transport of Radioactive Material, Specific Safety Requirements No. SSR-6, IAEA, Vienna (2012)
16.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Organization and Staffing of the Regulatory Body for Nuclear Facilities, Safety Guide Series No. GS-G-1.1, IAEA, Vienna (2002).
17.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Review and Assessment of Nuclear Facilities by the Regulatory Body, Safety Guide Series No. GS-G-1.2, IAEA, Vienna (2002).

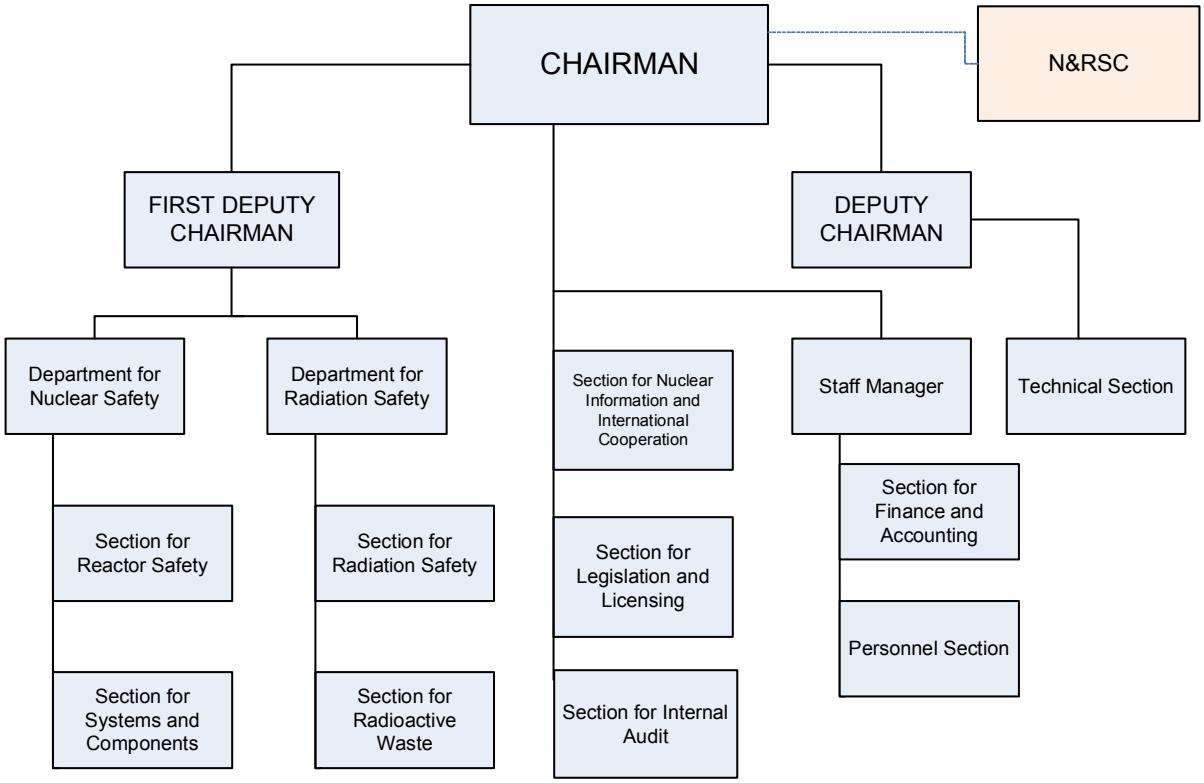
18.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Regulatory Inspection of Nuclear Facilities and Enforcement by the Regulatory Body, Safety Guide Series No. GS-G-1.3, IAEA, Vienna (2002).
19.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Documentation Used in Regulating Nuclear Facilities, Safety Guide Series No. GS-G-1.4, IAEA, Vienna (2002).
20.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Arrangements for Preparedness for a Nuclear or Radiological Emergency, Safety Guide Series No. GS-G-2.1, IAEA, Vienna (2007)
21.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Criteria for use in Preparedness and Response for a Nuclear or Radiological Emergency, General Safety Guide Series No. GSG-2, IAEA, Vienna 2011)
22.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Commissioning for Nuclear Power Plants, Safety Guide Series No. SSG-28, IAEA, Vienna (2014)
23.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Periodic Safety Review of Nuclear Power Plants, Safety Guide Series No. SSG-25, IAEA, Vienna (2013)
24.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - A System for the Feedback of Experience from Events in Nuclear Installations, Safety Guide Series No. NS-G-2.11, IAEA, Vienna (2006)
25.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Occupational Radiation Protection, Safety Guide Series No. RS-G-1.1, IAEA, Vienna (1999)
26.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Assessment of Occupational Exposure Due to Intakes of Radionuclides, Safety Guide Series No. RS-G-1.2, IAEA, Vienna (1999)
27.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Assessment of Occupational Exposure Due to External Sources of Radiation, Safety Guide Series No. RS-G-1.3, IAEA, Vienna (1999)
28.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Radiological Protection for Medical Exposure to Ionizing Radiation, Safety Guide Series No. RS-G-1.5, IAEA, Vienna (2002)
29.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Environmental and Source Monitoring for Purposes of Radiation Protection, Safety Guide Series No. RS-G-1.8, IAEA, Vienna (2005)
30.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Safety of Radiation Generators and Sealed Radioactive Sources, Safety Guide Series No. RS-G-1.10, IAEA, Vienna (2006)
31.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Deterministic Safety Analysis for Nuclear Power Plants, Specific Safety Guides Series No. SSG-2, IAEA, Vienna (2010)
32.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Development and Application of Level 1 Probabilistic Safety Assessment for Nuclear Power Plants, Specific Safety Guide Series No. SSG-3, IAEA, Vienna (2010)
33.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Development and Application of Level 2 Probabilistic Safety Assessment for Nuclear Power Plants, Specific Safety Guide Series No. SSG-4, IAEA, Vienna (2010)
34.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Safety of Conversion Facilities and Uranium Enrichment Facilities, Specific Safety Guide Series No. SSG-5, IAEA, Vienna (2010)
35.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Safety of Uranium Fuel Fabrication Facilities Specific Safety Guide Series No. SSG-6, IAEA, Vienna (2010)

36.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Safety of Uranium and Plutonium Mixed Oxide Fuel Fabrication Facilities, Specific Safety Guide Series No. SSG-7, IAEA, Vienna (2010)
37.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Licensing Process for Nuclear Installations, Specific Safety Guide Series No. SSG-12, IAEA, Vienna (2010)
38.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Geological Disposal Facilities for Radioactive Waste Specific Safety Guide Series No. SSG-14, IAEA, Vienna (2011)
39.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Storage of Spent Nuclear Fuel Specific Safety Guide Series No. SSG-15, IAEA, Vienna (2012)
40.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material, Specific Safety Guide No SSG-26, IAEA, Vienna, (2014)
41.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Planning and Preparing for Emergency Response to Transport Accidents Involving Radioactive Material, Safety Guide No TS-G-1.2 (2002)
42.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Radiation Protection Programmes for the Transport of Radioactive Material, Safety Guide No TS-G-1.3, IAEA, Vienna, (2007)
43.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - The Management System for the Safe Transport of Radioactive Material Safety Guide No TS-G-1.4, IAEA, Vienna, (2008)
44.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Compliance Assurance for the Safe Transport of Radioactive Material, Safety Guide No TS-G-1.5, IAEA, Vienna, (2009)
45.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Schedules of Provisions of the IAEA Regulations for the Safe Transport of Radioactive Material (2009 Edition), Safety Guide No TS-G-1.6 (Rev.1), IAEA, Vienna, (2014)
46.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Classification of Radioactive Waste, General Safety Guide No. GSG-1, IAEA, Vienna (2009)
47.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Regulatory Control of Radiation Sources, General Safety Guide No. GS-G-1.5, IAEA, Vienna (2004)
48.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Decommissioning of Nuclear Power Plants and Research Reactors, Safety Guide Series No.WS-G-2.1, IAEA, Vienna (1999)
49.	**INTERNATIONAL ATOMIC ENERGY AGENCY -** Decommissioning of Medical, Industrial and Research Facilities (1999) Safety Guide Series No.WS-G-2.2, IAEA, Vienna (1999)
50.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Regulatory Control of Radioactive Discharges to the Environment, Safety Guide Series No.WS-G-2.3, IAEA, Vienna (2000)
51.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Decommissioning of Nuclear Fuel Cycle Facilities, Safety Guide Series No.WS-G-2.4, IAEA, Vienna (2001)
52.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Predisposal Management of Low and Intermediate Level Radioactive Waste, Safety Guide Series No.WS-G-2.5, IAEA, Vienna (2003)
53.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Predisposal Management of High Level Radioactive Waste, Safety Guide Series No.WS-G-2.6, IAEA, Vienna (2003)

54.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Management of Waste from the Use of Radioactive Materials in Medicine, Industry, Agriculture, Research and Education, Safety Guide Series No.WS-G-2.7, IAEA, Vienna (2005)
55.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - The Management System for the Disposal of Radioactive Waste, Safety Guide Series No GS-G-3.4, IAEA, Vienna (2008)
56.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Safety Assessment for the Decommissioning of Facilities Using Radioactive Material, Safety Guide Series No.WS-G-5.2, IAEA, Vienna (2009)
57.	**INTERNATIONAL ATOMIC ENERGY AGENCY** - Storage of Radioactive Waste, Safety Guide Series No. WS-G-6.1, IAEA, Vienna (2006)

APPENDIX IX – ORGANIZATIONAL CHART

The ANRA organizational chart:



The NRSC organizational chart: