IAEA
International Atomic Energy Agency

Republic of Iraq
Ministry of Environment
Radiation Protection Centre
R . P . C

ANNuR
الشبكة العربية للهيئات الرقابية

The 15th ANNuR Annual Meeting

19 – 22 February 2024,

VIC, Vienna, Austria

Republic of Iraq
Achievement and Challenges of Nuclear Safety and Security

Dr. Sabah Al-Husseini
Director General
Radiation Protection Centre (RPC)/ Ministry of Environment
Chairman of Arab Network of Nuclear Regulators (ANNuR)

TOPICS and Contents

1. National Status of Nuclear and Radiation program;
2. Framework of Nuclear Safety and Security;
3. Recent Achievement and Changes;
4. Participation in the ANNuR;
5. Cooperation with the IAEA and others;
6. Review or Assessment on the national status;
7. Plan for review or assessment;
8. Challenges faced and Proposals for ANNuR.

National Status of Nuclear and Radiation program

Nuclear Power Plants (NPPs) and Research Reactors (RRs) programme



Tammuz-2 Research Reactor



IRT-5000 Research Reactor

Iraqi Decommissioning Programme (IDP)

- The Former research reactors (**IRT-5000 and Tammuz-II**) were destroyed by airforce raids in 1991 and 2003 and they are under decommissioning process along with all other nuclear facilities;
- **Currently, there are no NPPs or RRs under operation in Iraq;**
- **There are national steps for the introduction of modern nuclear technology in the production of electric power and the development of a national plan according to a short-term schedule to start work on building power plants Small Modular Reactors (SMRs) to fill the deficit in the electric power system.**

National Status of Nuclear and Radiation program

Radiation Application – Industry/Medical/Research etc.

- ✓ Large number of medical radiological activities for diagnostic and therapeutic applications; about (**5 Teletherapy centers; 6 Cyclotrons; 17 LINAC Centers; more than 20 Nuclear Medicine centers; and 16 PET/CT**); 1 Blood Irradiation centre; and more than 2000 Interventional and Conventional radiography centers.
- ✓ Use of Radioactive sources and X-ray Generators in the industrial application for industrial radiography and well logging;
- ✓ Use of radioactive sources, XRDs, and analytical uses of radiation generators in educational or research activities.

Framework of Nuclear Safety and Security

Legal Structure and Regulatory Systems in IRAQ

Organizations, Roles and responsibilities, work processes

The current legislative basis for nuclear and radiation safety and security in Iraq and the regulatory responsibilities lie with three entities:

A. **The Radiation Protection Centre (RPC)**, an executive tool for the Radiation Protection Commission under the Ministry of Environment, is responsible for regulating all activities relating to ionizing radiation, radioactive waste and nuclear safety according to the Law on the Protection from Ionizing Radiation **(No. 99 of 1980)**;

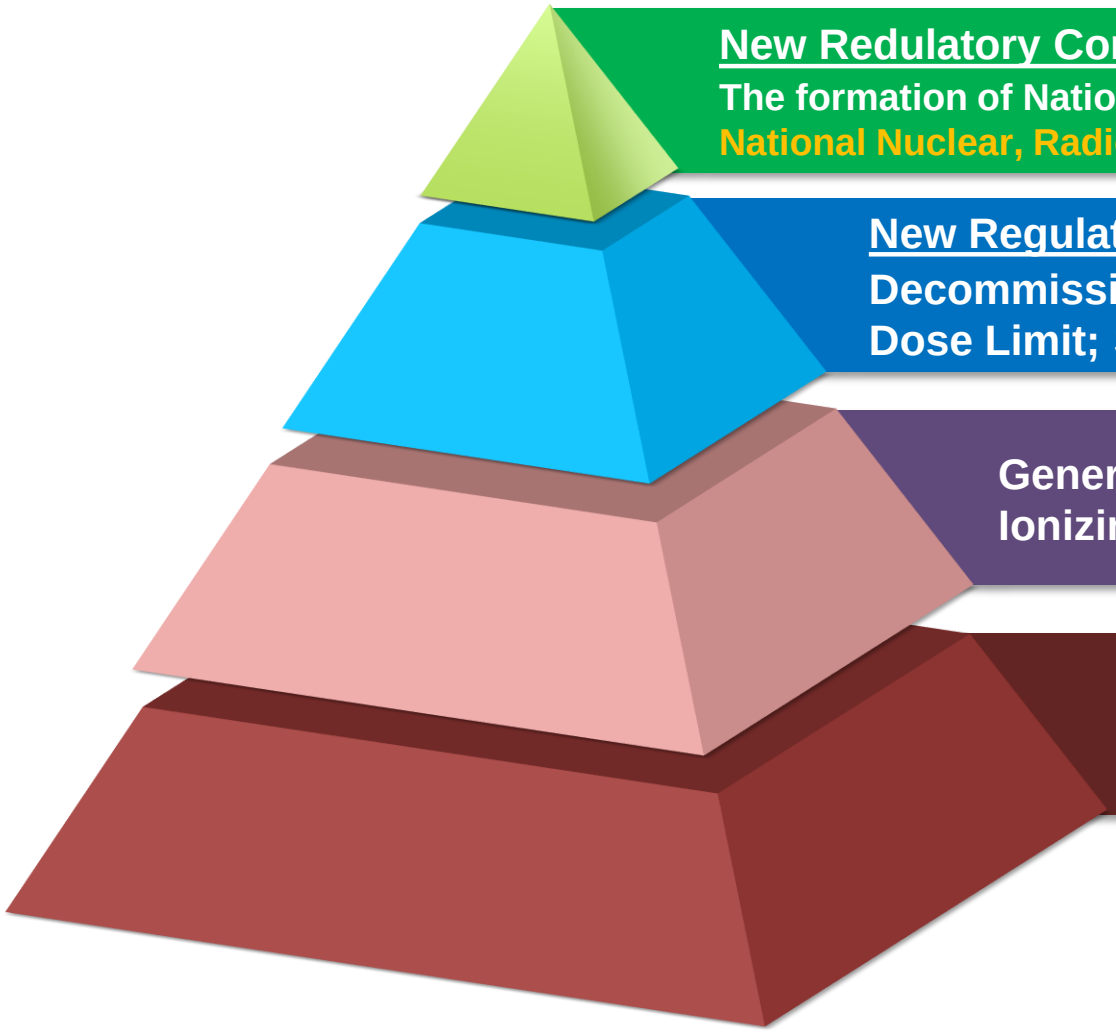
B. **The Iraqi Radioactive Source Regulatory Authority (IRSRA)**, under the Cabinet, is responsible for regulating sealed radioactive sources according to the Coalition Provisional Authority Order on the Iraqi Radioactive Sources Regulatory Authority **(No. 72 of 2004)**; and

C. **The Iraqi National Monitoring Authority (INMA)**, under the Ministry of Higher Education and Scientific Research, is responsible for regulating nuclear safeguards activities and materials as well as for chemical and biological activities according to the Law on the National Monitoring Authority on the Non–proliferation of Nuclear, Chemical, and Biological Weapons **(No. 48 of 2012)**.

Legislative and Regulatory Infrastructure in IRAQ

#	Category	Title	Date	Status
1	LAW	Law No. 99 “The Radiation Protection from Ionizing Radiation”	1980	In-Force
2	***ORDER***	***ORDER No. 72 “Iraqi Radioactive Source Regulatory Authority” (Coalition Provisional Authority)***	***2004***	***In-Force***
3	LAW	Law No. 37 Ministry of Environment	2008	In-Force
4	LAW	Law No. 27 “Protection and improvement of Environment”	2009	In-Force
5	ORDER	Prime Minister’s order and the Cabinet resolution clarify that: The responsibility of the Iraqi Radioactive Sources Regulatory Authority (IRSRA) is limited to regulate radioactive sealed sources exclusively. **The responsibilities of the Radiation Protection Center (RPC) in the Ministry of Environment include regulatory oversight of all types of ionizing radiation including radioactive waste**	2011	In-Force
6	ORDER	The Prime Minister’s order No. 169 and the Cabinet Resolution of 2011, the Council of Ministers approved the formation of a new ***National Nuclear Regulatory Authority to control nuclear and radiation in Iraq within the Ministry of Environment***	2011	In-Force
7	**LAW**	**Law of National Nuclear, Radiological Chemical, and Biological Regulatory Authority** The existing three authorities (formerly RPC, IRSRA, and INMA) were combined into a new entity	**2023**	**Approved by the Iraqi Parliament on October 16th, 2023**

Recent Achievement and Changes



New Redulatory Control Law:

The formation of National Nuclear and Radiological Regulatory Authority, "Law of National Nuclear, Radiological Chemical, and Biological Regulatory Authority";

New Regulations for:

Decommissioning; Radioactive Waste Management and Disposal; Dose Limit; Safe Transport of Radioactive Materials;

General Regulation for Radiation Protection and Safety of Ionizing Radiation, and Authorizations requirements; and

Integrated Management System, New safety Guidelines and more than 121 regulatory procedures and process flowchart for Authorization and Inspection.

Recent Achievement and Changes

New project or trends in terms of the Iraqi Nuclear and Radiation Programme

Drafting the **National Nuclear Law**,

This law was drafted according to the IAEA Handbook on Nuclear Law and Implementing Legislation and includes chapters for;

Regulatory oversight activities, Radiation protection, Radioactive sources, Safety of nuclear facilities and decommissioning, Emergency preparedness and response, Transport of radioactive material, Radioactive waste and spent fuel, Nuclear liability and coverage, Safeguards, Export and import controls, Nuclear security, Physical protection, and Illicit trafficking.

A preliminary virtual meeting was held on 30th October 2023 with IAEA experts to discuss and review the drafted nuclear law.

Recent Changes or achievement in terms of the regulatory system

The existing three authorities (RPC, IRSRA, and INMA) were combined into a new entity

The Republic of Iraq recently accessed

Convention on Nuclear Safety according to law No. 5 for 2023,

Joint Convention on the Safety of Spent Fuel Management, and on the Safety of Radioactive Waste Management according to law No. 7 for 2023, and officially submitted the accession request to the IAEA on 21 November 2023 and in Force on 24 February 2024.

Participation in the ANNuR

1. Participation in ANNuR operation

ANNuR Thematic Working Groups (8 TWGs)	IRAQ Representative	Position
1. Legislative and Regulatory Infrastructure	Mrs. Sama Ahmed Abdulrazzaq AL-TAWWASH	RPC_Head of Legal Affairs Department
2. Integrated Management System	Mr. Firas Dhannoon SULTAN	RPC_Head of Quality Management Division
3. Emergency Preparedness and Response	Mr. Hassanen Ahmed Abdulrazak AL-TAWWASH	RPC_Head of R&N Emergency Division
4. Radiation and Waste Safety	Mr. Hayder Hussein HADI	RPC_Deputy of Inspection Division
5. Nuclear Security	Mr. Ahmed YASSIN	INMA
6. Nuclear Safeguards	Mr. Mohammad Faouzi JOOMA	INMA
7. Transport of Nuclear and Radioactive Materials	Mr. Zuhair Sammer ABDULSADA	RPC_Head of Transport Unit
8. Safety Management of Nuclear Installations	Mr. Ahmed Farg Saleh AL-JOBOURI	RPC_Deputy of Radiological Control Department

Participation in the ANNuR

2. Participation in ANNuR capacity building activities

- ✓ Regional Meeting on the Establishment of the Arab Network for Environmental Radiation Monitoring (ANERM) 03 – 07 July 2022, Cairo, EGYPT;
- ✓ Interregional Workshop to Coordinate the Implementation of Integrated Nuclear Security Support Plans for the Members of the Arab Network of Nuclear Regulators, 31 January – 03 February 2023, Hammamet, TUNISIA;
- ✓ Regional Training Course on Authorization and Inspection of Radiotherapy Facilities with Linear Accelerators, 22 – 26 May 2023, Abuja, NIGERIA;
- ✓ IAEA–KINS Workshop on Radiation Safety and Emergency Response in Medical or Industrial Uses of Radiation, 19 – 23 June 2023, Daejeon, Republic of KOREA;
- ✓ Interregional Meeting for the implementation of the Road map on Emergency, Preparedness and Response (EPR) for the Participating Arab Member States 04 – 08 June 2023, Cairo, EGYPT;
- ✓ Meeting of Senior Arab Officials to Establish Arab Infrastructure in Radiological and Nuclear Emergency Preparedness and Response, 06 – 07 July 2023, Cairo, EGYPT; and
- ✓ Regional Meeting on Cooperation in Radiological and Nuclear Emergency Preparedness and Response, 26 – 30 November 2023, Aswan, EGYPT.

Cooperation with the IAEA and others

IAEA TC regional/National Projects

RAS/9/096: *Strengthening Radiation Safety Infrastructure;*

2022 ACTIVITIES

- ✓ *Train-the-Trainers Regional Training Course for First Responders to a Radiological Emergency, 24 – 28 July 2022, Amman, JORDAN.*

2023 ACTIVITIES

- ✓ *TC Regional Workshop on Strategic Directions for Establishing an Integrated Management System in Regulatory Bodies, 16 – 20 January 2023, Vienna, AUSTRIA;*
- ✓ *TC Meeting on School of Drafting Regulations – Radiation Safety Programme, 6 – 17 February 2023 Vienna, AUSTRIA;*
- ✓ *Regional Workshop on the Implementation of SSG-46: Radiation Protection and Safety in Medical Uses of Ionizing Radiation, for Radiotherapy, 06 – 10 March 2023 Jakarta, INDONESIA;*
- ✓ *TC Sponsored Participation in the Regional Training Course on Authorisation and Inspection of Radiotherapy Facilities using Linear Accelerators, 22 – 26 May 2023, Elsewhere, NIGERIA;*
- ✓ *EVT2301472: Regional Training Course on Authorization and Inspection of Linear Accelerator (LINAC) Facilities Used in Radiotherapy 11 – 15 September 2023, Daejeon, Republic of KOREA; and*
- ✓ *Mid-term coordination meeting 20 – 24 November 2023, Vienna, AUSTRIA.*

Enhancing National Capabilities in Occupational Radiation Protection

IAEA Technical Cooperation RAS/9/080

IAEA provided RPC with a grant consisting of (250 TLD cards and their holder for Extremity and whole-body doses) that are compatible with Harshaw 4500 TLD–Reader, IAEA Purchase Order 201907909







In the process, under IAEA national TC projects for IRAQ (IRQ/6/017, and IRQ/9/011), IAEA will provide RPC with a grant of Harshaw 6600 Plus TLD reader. The shipment will start to IRAQ after the US-NRC grants the license of the Radioactive source (C-14 and Sr90/Y90)

Enhancing National Capabilities in Occupational Radiation Protection

RAS/9/093: ***Strengthening Technical Services in Occupational Radiation Protection in Compliance with the International Basic Safety Standards***

2022 ACTIVITIES

- ✓ *TC Sponsored Participation on 3rd Conference on ORP, 05 – 09 September 2022 Started: 2022-09-05, Ended: 2022-09-09 Duty Station: Geneva, SWITZERLAND*;
- ✓ *Regional Workshop on the Implementation of Management System by Technical Services Providers, 05 – 09 December 2022, Dhaka, BANGLADESH;*
- ✓ *TC Regional Workshop on Strategies for Proper Implementation of General Safety Requirements (GSR) Part-3 Requirements for Occupational Exposure, 18 – 22 December 2022, Amman, JORDAN;*

2023 ACTIVITIES

- ✓ *Regional Workshop on External Dosimetry with particular focus on Extremity and Monitoring of the Eye, 07 – 11 May 2023, Doha, QATAR;*
- ✓ ***EVT2301119: TC Expert Mission on calibration, dose assessment and QC procedures for Radiation Protection of Workers and Patients, 21 – 25 May 2023;***

Proposed TC Meeting on mid-term review 17 – 19 January 2024 Vienna, AUSTRIA.

Enhancing National Capabilities in Occupational Radiation Protection

IAEA Technical Cooperation RAS/9/093



In May 2023, IAEA supported RPC in Enhancing National Capabilities in Iraq on Occupational Radiation Protection in Compliance with Requirements of the New International Basic Safety Standards by, ***EVT2301119: TC Expert Mission on calibration, dose assessment and QC procedures***

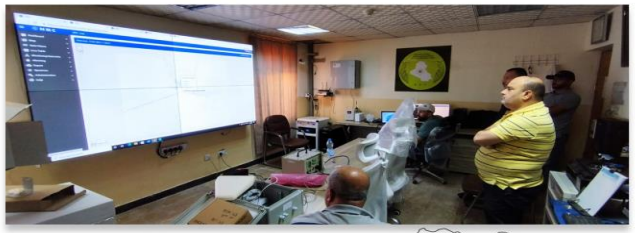
Objective: to train the RPC individual monitoring laboratory staff in the field of:

- ✓ Calibration of the Harshaw TLD reader and dosimeters;
- ✓ Read out of TL dosimeters, dose assessment, and dose reporting;
- ✓ Quality control checks for the Harshaw reader; and
- ✓ Reader performance tests.



Cooperation with the IAEA and others

INT/9/185: ***Establishing an Arab Network for Environmental Radiation Monitoring and Early Warning***



Central Station

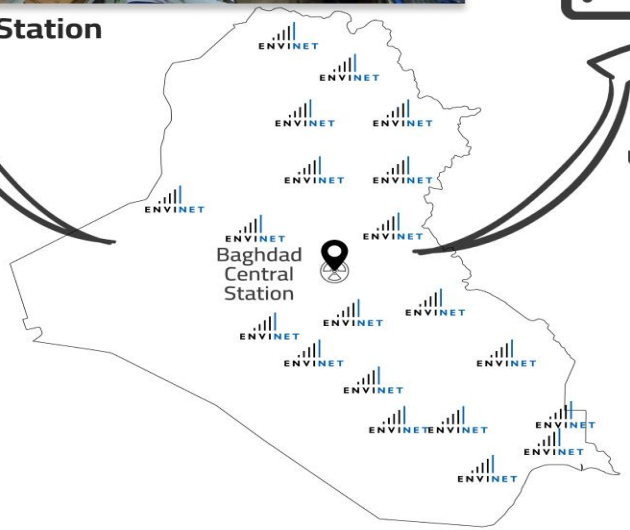
NMC Cloud Servers

ENVINET

SFTP Data Sharing

IAEA Cloud Servers

Data Upload



National Radiation Monitoring and Alarm Center
RPC - Radiation Protection Center
Ministry of Environment - IRAQ



ENVINET Remote Monitoring Stations in Middle East

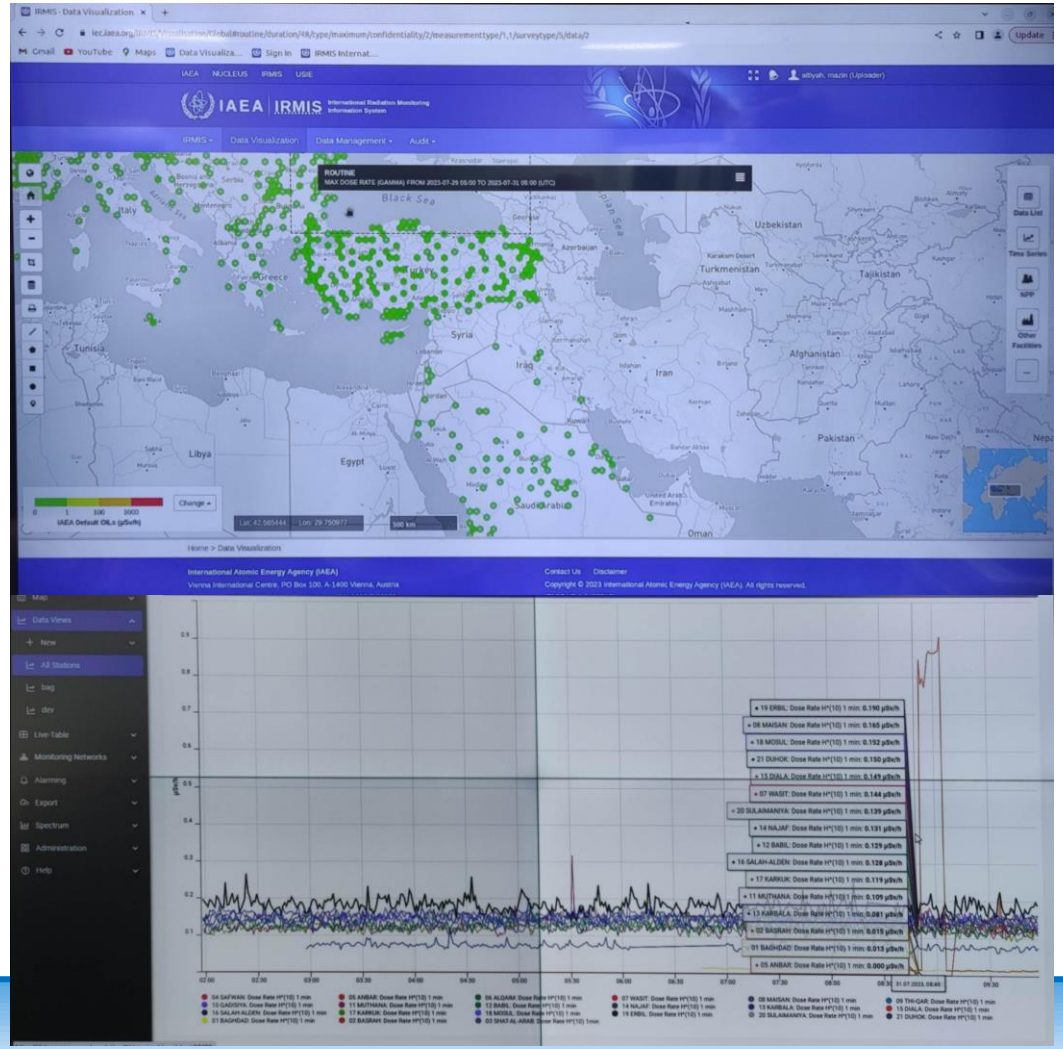
Cooperation with the IAEA and others

INT/9/185: ***Establishing an Arab Network for Environmental Radiation Monitoring and Early Warning***

- ✓ *Virtual First Coordination Meeting, 02 – 04 September 2020;*
- ✓ *Virtual Interregional Training Course on Radiation Monitoring and Data Sharing through IRMIS in Nuclear and Radiological Emergencies, 05 – 09 September 2021;*
- ✓ *Final Coordination Meeting, 28 November – 02 December 2021, Cairo, EGYPT;*
- ✓ *INT9185 Project Final Coordination Meeting, 06 – 10 November 2022, Amman, JORDAN;*
- ✓ *Regional Meeting on the Establishment of the Arab Network for Environmental Radiation Monitoring (ANERM), 03 – 07 July 2022, Cairo, EGYPT;*
- ✓ *Interregional Meeting for the implementation of the Road map on Emergency, Preparedness and Response (EPR) for the Participating Arab Member States, 04 – 08 June 2023, Cairo, EGYPT; and*
- ✓ *Workshop on the Implementation of the International Radiation Monitoring Information System (IRMIS), , 11 – 14 December 2023, Vienna, AUSTRIA.*
- ✓ ***Regional Meeting on Cooperation in Radiological and Nuclear Emergency Preparedness and Response, 26 – 30 November 2023, Aswan, EGYPT.***

Cooperation with the IAEA and others

INT/9/185: ***Establishing an Arab Network for Environmental Radiation Monitoring and Early Warning***



As the third Arab Country, Iraq recently joined the IAEA's International Radiation Monitoring System (IRMIS)

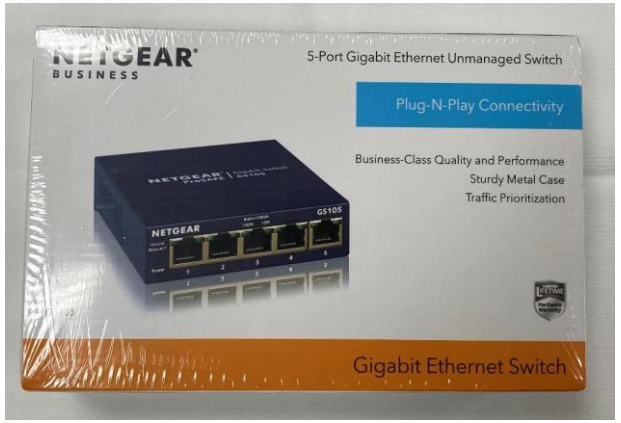
Cooperation with the IAEA and others

INT/9/185: ***Establishing an Arab Network for Environmental Radiation Monitoring and Early Warning***

Gamma Dose Rate System with **21** Monitoring Stations and Accessories (**Gamma TRACER XL2-2 RS232 for Early Warning Radiation Monitoring**)









Cooperation with the IAEA and others

Support and Cooperation with European Commission (PHASE II)

Provision of Assistance to Radiation Protection Center in Iraq for Capacity Building in the Field Radioactive Waste Management.

Kick-off Meeting 23 November 2022

Project Duration (Three Years)

- ***End Users:*** ***Radiation Protection Centre***
- ***Contractor:*** ***Consortium members***

- **Expertise France** ***(France, Consortium Leader)***
- **Andra** ***(France)***
- **IRSN** ***(France)***

Cooperation with the IAEA and others

Support and Cooperation with European Commission (PHASE II)

Project Main Objectives:

Task 1: Training in the subject of site licensing application

Task 2: Evaluation of input data robustness of radioactive inventory, characterization methods and waste acceptance criteria

Task 3: Regulatory standards operation procedures (SOPs) for authorization and inspection of decommissioning, remediation, radioactive waste treatment, storage and disposal facilities

Task 4: Development of the inspection programme

Task 5: Development of safety guides and standards operation procedures for regulatory review and assessment of the authorization document of nuclear installations

Task 6: Development “Quality assurance and quality control programme” for ALPHA spectroscopy in the nuclear analytical laboratory at RPC laboratory

Review or Assessment on the national status

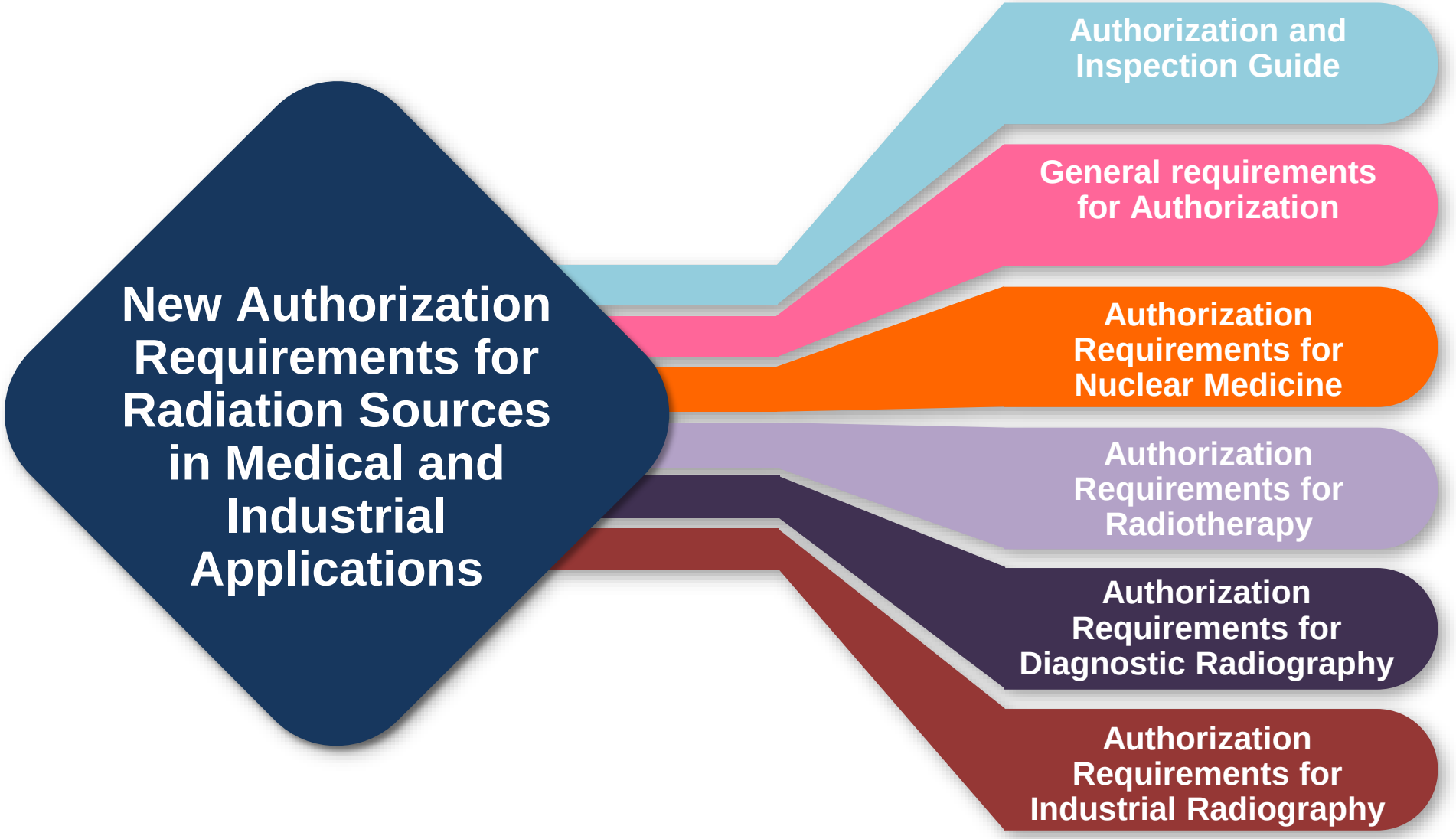
From 2016 to 2020, RPC participate in the IAEA Regional TC project ***RAS/9/083 Establishing an Integrated Management System for Regulatory Bodies of ARASIA State Parties***.

RPC conducted Self-Assessment to identify priorities, challenges, and gap analysis, by using the IAEA self-assessment tool (Self-Assessment of Regulatory Infrastructure for Safety (SARIS) software).

Based on the self-assessment results, RPC define the action plan to establish an integrated management system (IMS), which includes the following activities:

- ***Define the objective of nuclear safety and activities;***
- ***Define responsibilities;***
- ***Review and assess all existing documents related to IMS to identify gaps in alignment with IAEA requirements then define the required actions;***
- ***Assess and improve RPC Vision, Mission, Core Values, Objectives, Strategic Plan, Safety Policy, and Operation Manual (Master List) for each procedure in RPC; and***
- ***Establishing specific procedures and guidelines requirements and documentation of new procedures and development of the existing ones which cover all RPC activities; (121 procedures) according to the ISO 9001:2015***

RPC Regulatory Oversight Standard Operational Procedures (SOPs)



Review or Assessment on the national status

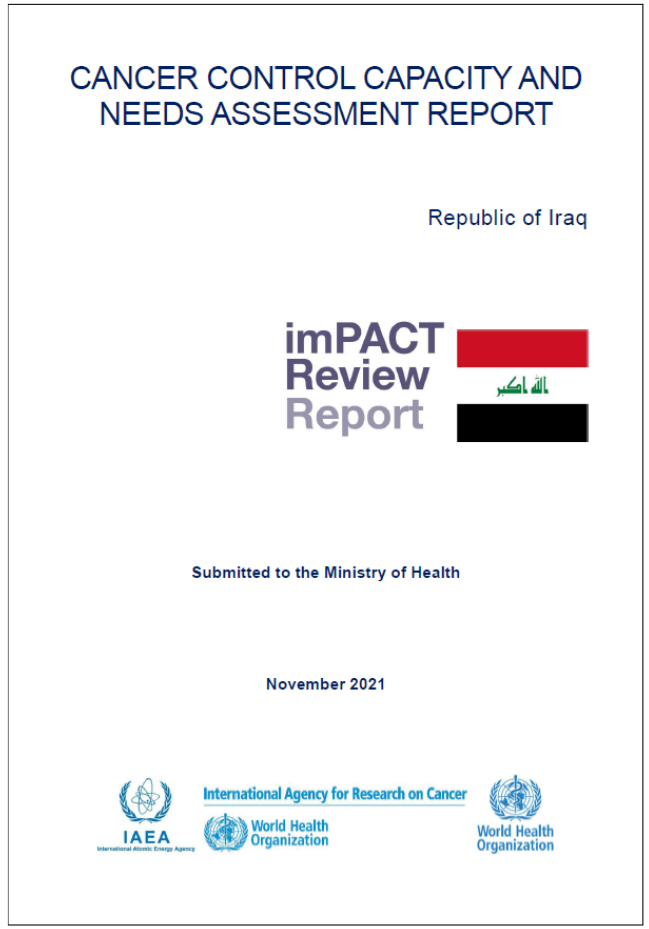
IAEA integrated mission Programme of Action for Cancer Therapy (imPACT)

Recommendations for the Government:

- ✓ Enact the draft nuclear law to strengthen the existing governmental, legal, and regulatory framework for radiation safety;
- ✓ Complete the regulatory framework for safety by establishing regulations to complement the law;
- ✓ Take appropriate measures to improve cooperation and communication of the existing authorities with responsibilities for safety;
- ✓ Make provisions for the availability of technical services in relation to safety; and
- ✓ Make provisions in the legal framework for the qualification, training, roles and responsibilities, and formal recognition of medical physicists within their required specialty.

Recommendations for the Regulatory Bodies :

- ✓ Take measures for further separating regulatory functions and technical services to minimize the potential for a conflict of interests, and not compromise its effective independence;
- ✓ Establish criteria to ensure that all occupationally exposed workers are under radiation monitoring programme;
- ✓ Complete records relating to the safety of facilities and activities, including the register of radiation sources and records of doses from occupational exposure;
- ✓ Arrange additional training for its staff to build and maintain expertise in the disciplines necessary for regulatory control of new radiation technologies; and
- ✓ Ensure the establishment of national DRLs.



Plan for review or assessment

plan for the IAEA review/advisory services or self-assessment

Based on national needs, Iraq requested an Expert Mission for Government Officials on GSR Part-1 and GSR Part-3 to facilitate the further enhancement of the regulatory regime in Iraq with special emphasis on the national need to issue the new nuclear law and to have a national policy and strategy on radiation safety and the effective independence of Regulatory Body, in addition to an expert mission to provide guidance on how to draft regulatory guides. However, no actions have been set for the implementation of the Expert Advisory Mission from 2020 tell now.

Challenges faced and Proposals for ANNuR

The main challenges are:

1. Strengthening the infrastructures and capacity building to establish a nuclear power plants programme in Iraq and Assessing Nuclear Power Reactor Technologies to Make a Knowledgeable Decision for the First Nuclear Power Plant (Small Modular Reactor);
2. Strengthening Nuclear Infrastructure and Capacity Building to Support the Establishment of New Nuclear Research Reactor;
3. Regulatory oversight of Nuclear Installations (RRs, NPPs, waste management and disposal facilities); Development of national requirements for site selection of NNPs and RRs;
4. Regulatory oversight of Naturally Occurring Radioactive Materials (NORM);
5. Review the new drafted nuclear law;
6. Many of Iraq's nuclear and contaminated sites have been characterized and now require significant efforts toward decommissioning, remediation, and radioactive waste management;
7. Technologies are needed to be acquired and applied to the characterization and decommissioning of the highly contaminated facilities (IRT-5000 research reactor, radiochemistry laboratories RCL);
8. Establishment of national Diagnostic Reference Levels (DRLs); and
9. Improve the regulatory system of authorization, inspection, and enforcement for non-medical imaging for security purposes.

Challenges faced and Proposals for ANNuR

Proposals for the ANNuR cooperation:

1. Development of national policy and strategy for safety;
2. Development of human competencies related to the safety and security of nuclear installations;
3. Participating in the IAEA Integrated Regulatory Review Service (IRRS) to review the evaluate the National Regulatory Infrastructure;
4. Drafting national authorization and inspection regulations of nuclear installations starting from siting and site selection to the commissioning and operation according to the new IAEA Safety Standard Requirement;
5. Improve the regulatory capabilities in the authorization and inspection of cyclotron and (PET/CT) facilities;
6. Optimization of radiation protection and safety in high-dose medical radiation modalities (e.g. radiotherapy or interventional procedures) and in diagnostic imaging; and
7. Emergency preparedness and response.

RPC proposed IAEA Future Technical Cooperation (TC) Projects

Concept Number: IRQ2022005
Title: Establishing a Secondary Standards Dosimetry Laboratory (SSDL) and Enhancing Maintenance of Radiological Equipment
Overall Objective: To improve the safety of ionising radiation uses in Iraq through ensuring accurate calibration services of radiation measuring instruments and strengthening the national capacity for maintenance of radiological equipment
Project proposed duration (Total number of years): 4 Years, **(Start date):** 2024-01-02

Concept Number: IRQ2022006
Title: Establishing a Quality Assurance and Quality Control Programme for the Nuclear Analytical Laboratories
Overall Objective: To contribute towards improving the performance of national laboratory testing capabilities for enhanced safety and environmental protection through the development and implementation of a Quality Management System (QMS) for nuclear analytical techniques (Alpha, Gamma, and Beta spectrometry) according to the ISO 17025 standard.
Project proposed duration (Total number of years): 2 Years, **(Start date):** 2024-01-02

Thank You for Your Listening

