Current Status of Nuclear Safety in Egypt

EGYPT

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1. ETRR-2 Research Reactor

Description of ETRR-2

- ETRR-2 is a Material Testing Research Reactor (MTR)
- Open Pool Type Reactor
- 22 MW Thermal Power
- Cooled and Moderated by Light Water
- Reflected by Beryllium Blocks
- The Reactor went Critical in 1997
- Modified for Molybdenum-99 Production in 2007

Description of ETRR-2 (Cont.)

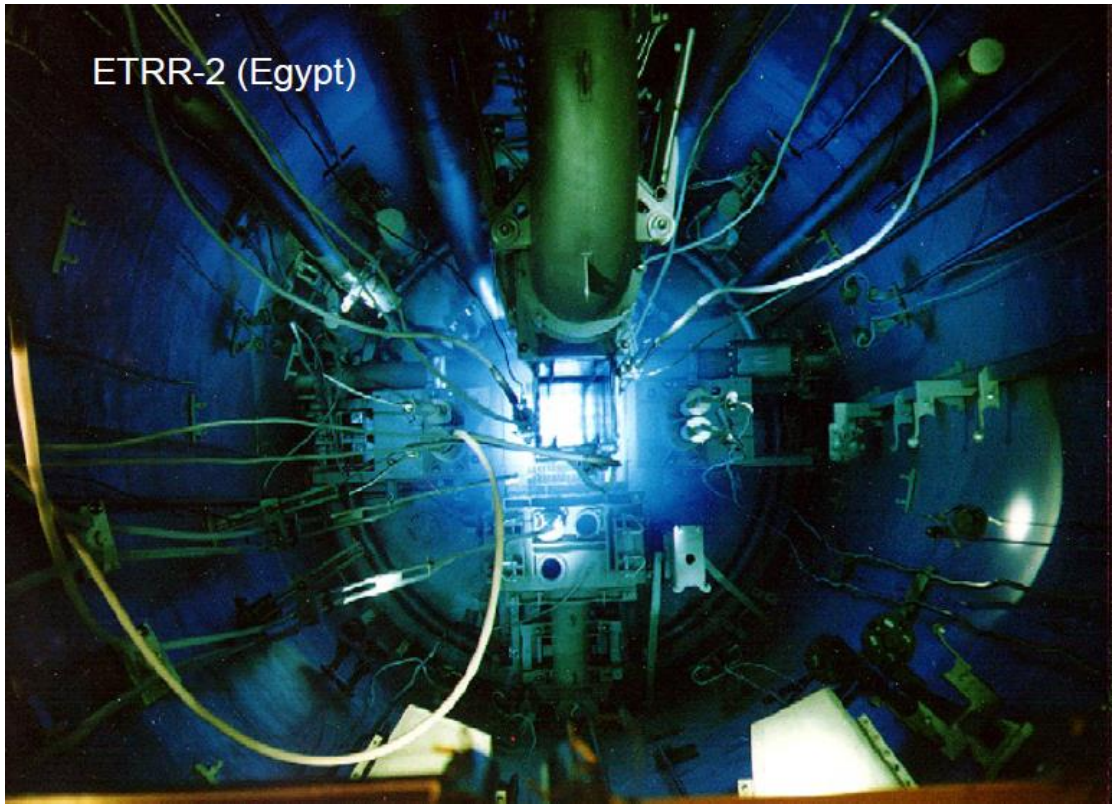
Safety Systems in ETRR-2

- First shutdown system; Six (Cd-In-Ag) alloy Control Plates
- Second shutdown system; Four Gd $(NO_3)_3$ Chambers
- Chimney water injection system; Four demineralized water tanks
- Evacuation alarm

ETRR-2 Facilities

1. Material Testing Facility
2. Neutron Radiography Facility
3. Activation Analysis Laboratory
4. Material Irradiation Facility
5. Several hot cells designated for radioisotopes production where irradiated samples will be handled

ETRR-2 Main Pool



It houses the reactor core, reactor internal components, irradiation positions, beam tubes and connected to an auxiliary pool for spent fuel and radioactive material storage through transfer channel

ETRR-2 Utilization

- The ETRR-2 has flexible irradiation positions
- Free access of operating personnel to conduct experimentals during full power operation
- Irradiation of uranium plates for Mo-99 Production
- Development of the static neutron radiography to be dynamic (real time process), it comes more suitable for more applications

Current State of ETRR-2 Nuclear Safety

- Update of ETRR-2 Emergency Preparedness and Response (EPR) plan
- Update of the quick reference emergency guide that can be used by the reactor operation group to verify the safety functions easily and quickly in case of emergency
- Reactor full power hours has been increased from 110 to 220 hr/month
- Update of radiation protection program

Current state of ETRR-2 nuclear safety (cont.)

Reactor Availability

- In spite of the importance of reactor availability, it must be limited to levels that keep the reactor operation in safe mode. This limitation of availability is very important to avoid the human errors

- This principle is very clear in the design of the logic systems of ETRR-2. It makes the reactor operation impossible without verifying all of the safety conditions

Future Recommendations for Nuclear Safety Improvements

1. Using Mobile diesels for emergency

2. Using submarine doors for perfect isolation of electric system rooms

2. Radioisotopes Production Facility (RPF)

Radioisotopes Production Facility (RPF)

- RPF is a facility for the production of radioisotopes from irradiation of Low Enriched Uranium (LEU) in the same site of Egyptian Second Research Reactor (ETRR-2) Complex

- RPF was commissioned during October and November 2011

- The produced radioisotopes are used in medicine, industry and research activities for domestic market

Radioisotopes Production Facility (RPF)

- It is equipped with necessary hot cells and equipment for production of ^{99}Mo from the irradiated LEU and loading of ^{99m}Tc

- RPF now cover about 70 % of ^{99m}TC and 90 % of ^{131}I of the Egyptian local market

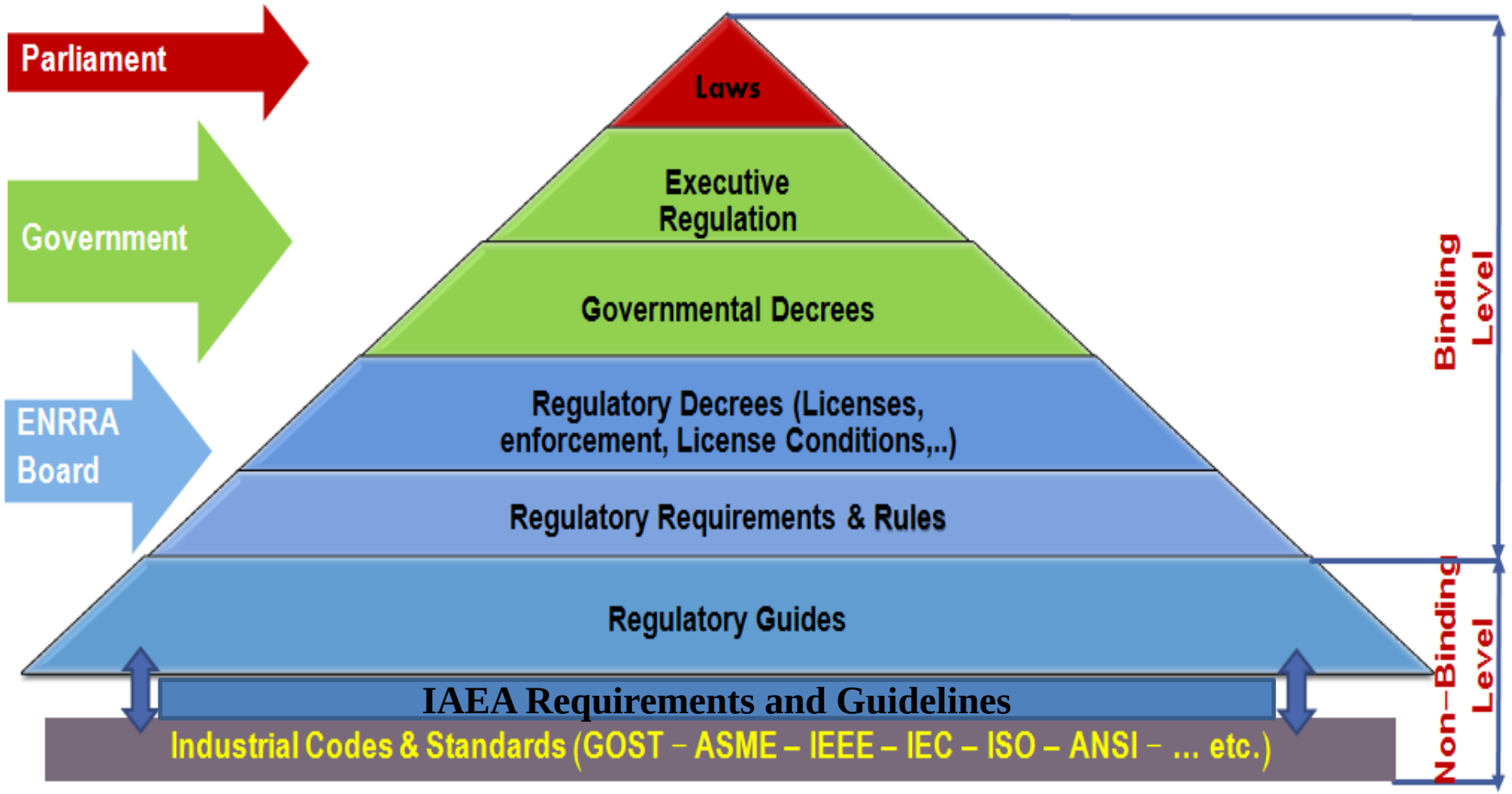
Radioisotopes Production Facility (RPF)

RPF is capable of producing the following:

1. Chromium-51, which is used as injectable medical product
2. Iodine-131, which is used for nuclear medicine
3. Iridium-192, which is used for industrial gamma radiography
4. Iridium-192 wire, which is used for brachytherapy
5. Molybdenum-99, which is used for medical diagnosis

3. Nuclear Safety Regulation System

Legal Pyramid of Nuclear Safety Regulation System



Nuclear Installation Safety Sector

Types of permits and licenses for Nuclear Facilities

- Site Permit
- Construction Permit
- Pre-operation test Permit
- Fuel loading & reach to criticality Permit
- Operation License
- Decommissioning and release from regulatory control license

- Operation license is effective for 40 years, in condition that full periodic safety review to be conducted every 10 years.
- Validity of each permit or license should be identified within the permit or license itself.

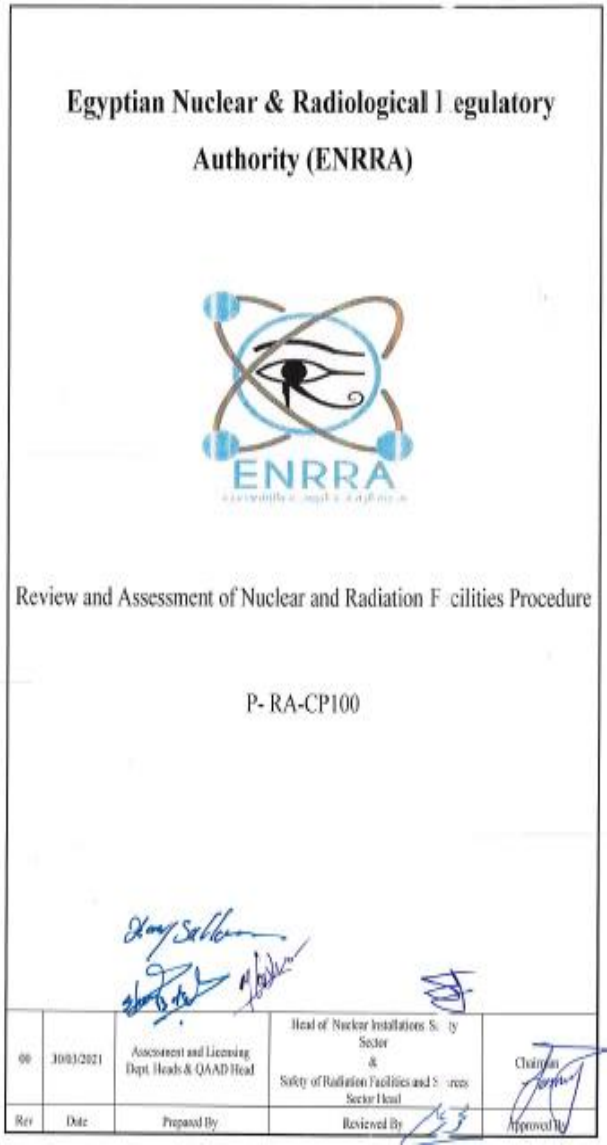
Review and Assessment Procedures & Regulations

Purpose

- is to describe, step-by-step, ENRRA's review and assessment procedure for nuclear and radiation facilities license documentation under the integrated management system and to define the methodology implemented by ENRRA to perform reviews and assessment

Scope

- Assessment and licensing departments of the relevant ENRRA sectors, scientific and technical support organizations of ENRRA
- Review and assessment of nuclear and radiation safety analysis documents as defined in regulatory and control duties of ENRRA by Law no. 7/2010 (Article 12)



Egyptian Nuclear & Radiological Regulatory Authority (ENRRA)

ENRRA

Review and Assessment of Nuclear and Radiation Facilities Procedure

P- RA-CP100

Rev	Date	Prepared By	Reviewed By	Approved By
00	30/03/2021	Assessment and Licensing Dept. Heads & QAAD Head	Head of Nuclear Installations Safety Sector & Safety of Radiation Facilities and Sources Sector Head	Chairman

Inspection Procedures & Regulations

Purpose

- is to describe, step-by-step, regulatory inspection procedures for nuclear and radiological facilities and activities under the integrated management system

Scope

- Planning, preparation, procedures and inspection report
- Including responsibilities and qualifications of inspectors

Egyptian Nuclear & Radiological Regulatory Authority (ENRRA)

ENRRA
هيئة الرقابة النووية والإشعاعية

Regulatory Inspection of Nuclear and Radiation Facilities and Activities Procedure

P- IN-CP1001

00	15/03/2021	Inspection and Enforcement Dept. Heads & QAAD Head	Safety of Nuclear Installations Sector Head & Safety of Radiation Facilities and Sources Sector Head	Chairman
Rev	Date	Prepared By	Reviewed By	Approved By

THANK YOU