

The Philippine Research Reactor-1

Thelma P. Artificio

Philippine Nuclear Research Institute

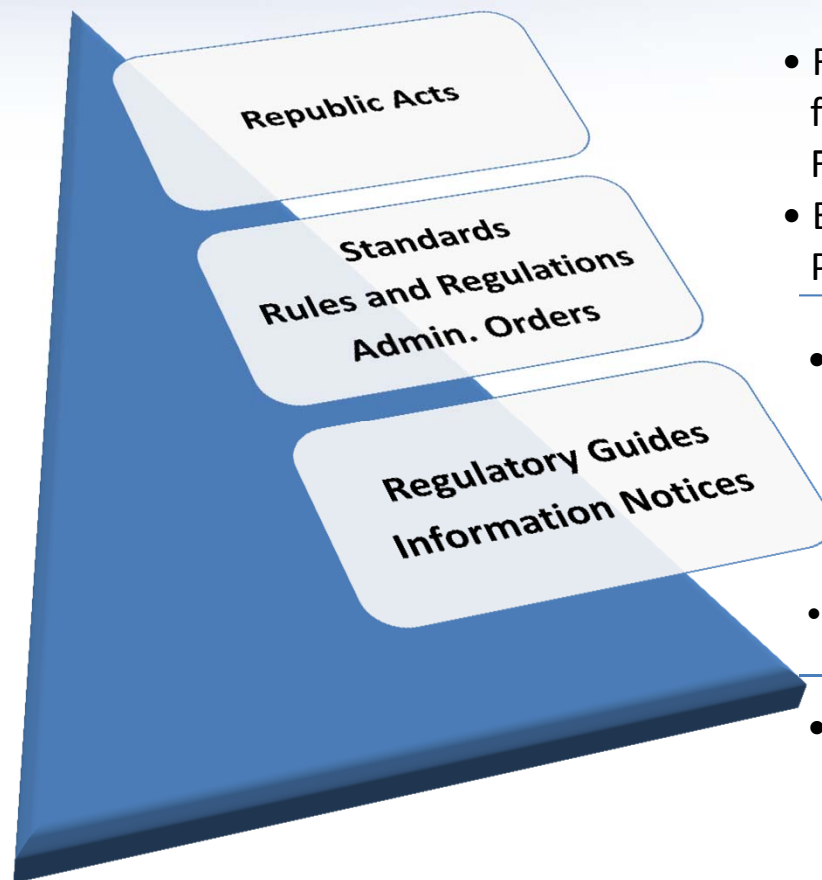


Presented during the Third Annual Meeting of the Regional Advisory Safety Committee for Research Reactors in Asia and the Pacific (RASCAP) , 31 August-4 September 2015, Serpong, South Tangerang, Indonesia

Presentation Outline

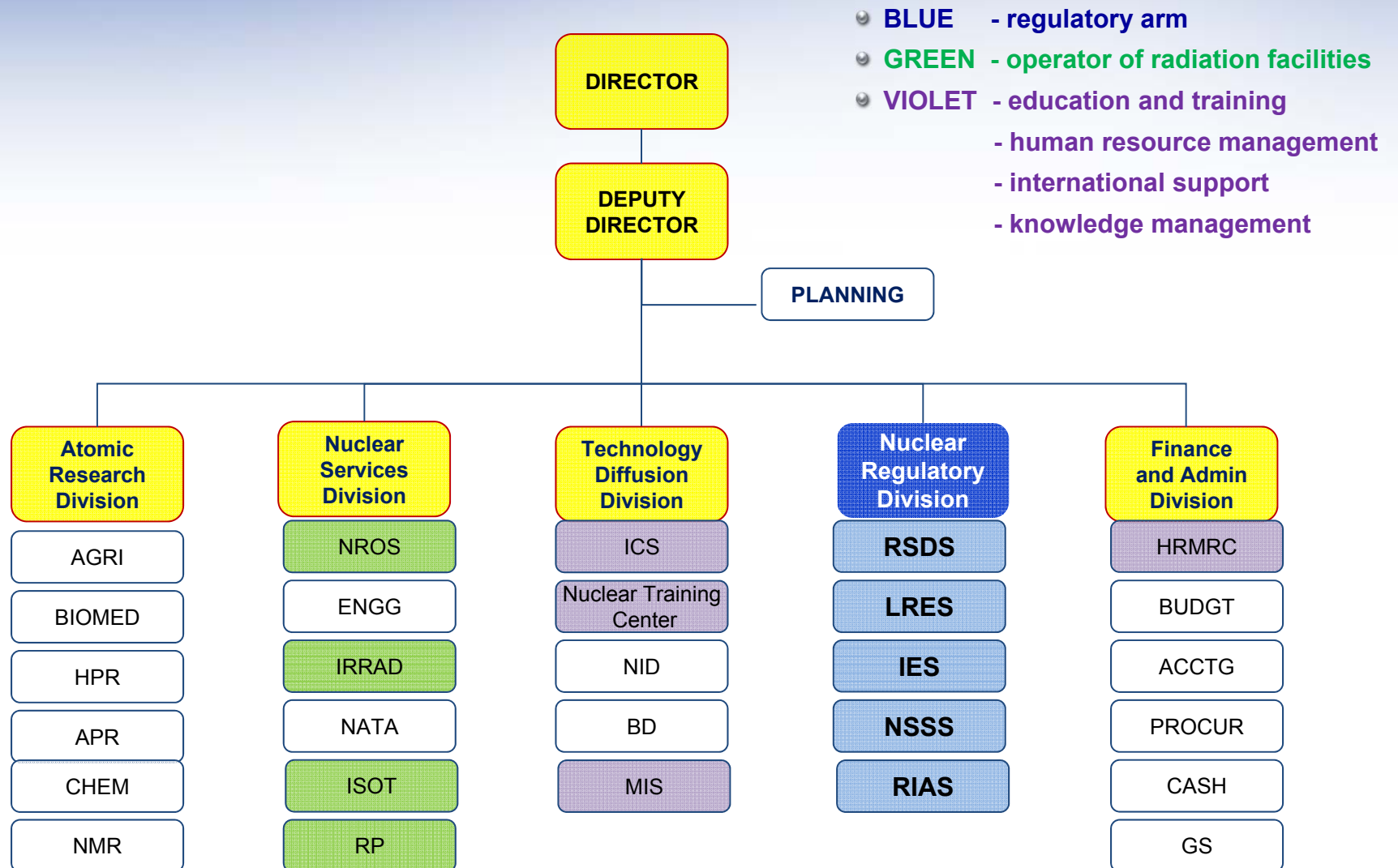
- Legislative Framework
- PNRI Organizational Structure
- PNRI Internal Regulatory Control Program
- Legal Framework Update
- The PNRI Internal Regulatory Control Program
- The Radiation Safety and Security Board
- Human Resource Development Program
- Plan for PRR-1

LEGISLATIVE FRAMEWORK



- Republic Act 2067 known as the Science Act of 1958, created PAEC
 - Republic Act 5207 of 1968 known as An Act Providing for the Licensing and Regulation of Atomic Energy Facilities and Materials
 - Executive Order 128 of 1987 reorganizes PAEC to PNRI
-
- Code of PNRI Regulations - consists of Parts 0-27; covers radiation protection, transport, safety and security, fees and charges, waste and practice –specific regulations
 - Administrative Orders
-
- Regulatory guides; information bulletins and notices; incidents and lessons learned

PNRI Organizational Structure



Legal Framework Update

Proposed Nuclear Law

House Bill No. 147 entitled “Comprehensive Nuclear Regulation Act of 2015”, creating an effectively independent nuclear regulatory authority. This proposed Act aims to rationalize and strengthen the regulatory powers of the State over Nuclear Energy Facilities and the Peaceful Applications of Ionizing Radiation Sources thru the creation of the Philippine Nuclear and Radiation Safety Commission.

PNRI INTERNAL REGULATORY CONTROL PROGRAM

- PNRI Office Order No. 02 dated February 20, 2004 entitled “Regulatory Control Program for PNRI Nuclear and Radiation Facilities and Laboratories”
 - Created the Radiation Safety and Security Board (RSSB) and
 - Delegated to the Nuclear Regulatory Division (NRD) the regulation of PNRI research reactor, Co-60 irradiation facilities, laboratory facilities and radioactive material

Note: RA 5207 (Section 29) exempts atomic energy facilities and materials owned and operated by PAEC/PNRI from the requirement of a license.

The Radiation Safety and Security Board (RSSB)

- Undertakes review and advise of all applications for authorization prior to submission to the Nuclear Regulatory Division.
- Reviews the PNRI Radiation Safety and Security Manual which shall contain safety and security procedures, measures and programs that will ensure compliance with the code of PNRI regulations, IAEA safety standards and requirements and international obligations and commitments of PNRI

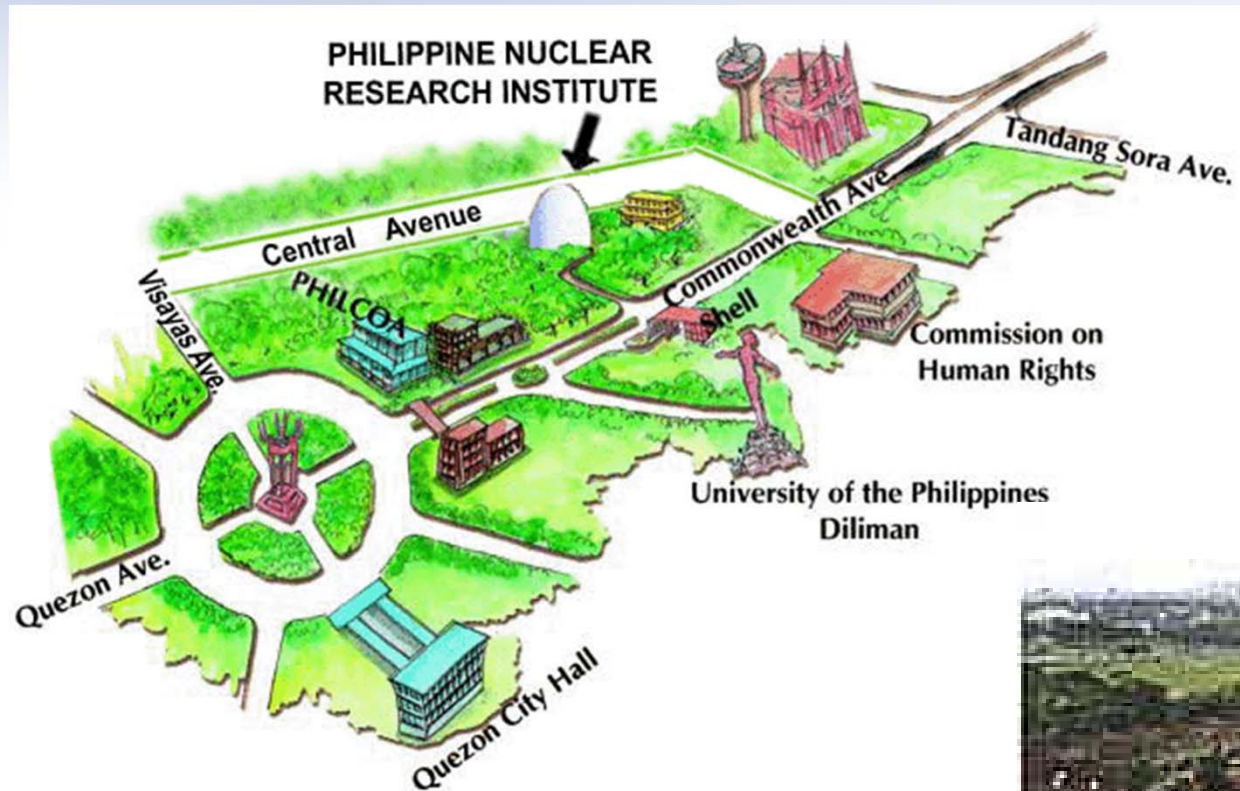
Composition of RSSB

- Facility Radiation Safety Officers (RSOs),
- Philippine Research Reactor (PRR-1) Manager
- Co-60 Irradiation facility Manager
- Other duly designated facility and laboratory managers and
- Representative of the Finance and Administrative Division

PNRI Regulation of PRR-1

- Internally regulated by the Nuclear Regulatory Division based on PNRI Office Order 2
- Granted authorization by NRD in 2007

The Philippine Nuclear Research Institute (PNRI)- Location

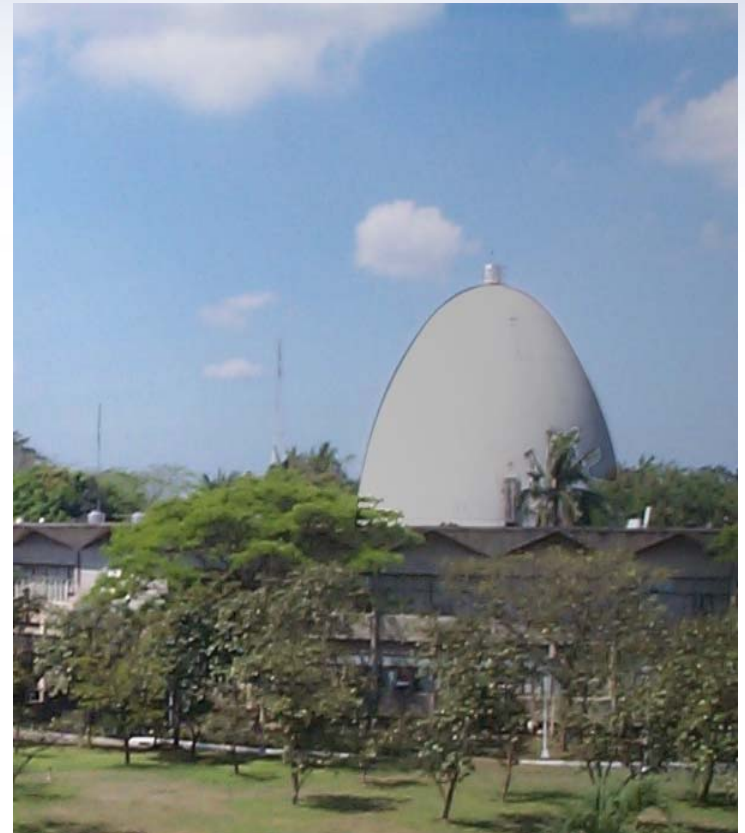


The Philippine Research Reactor (PRR-1)

26 Aug 1963 - First criticality

**26 Oct 1964 -Operation began
at 1 MW**

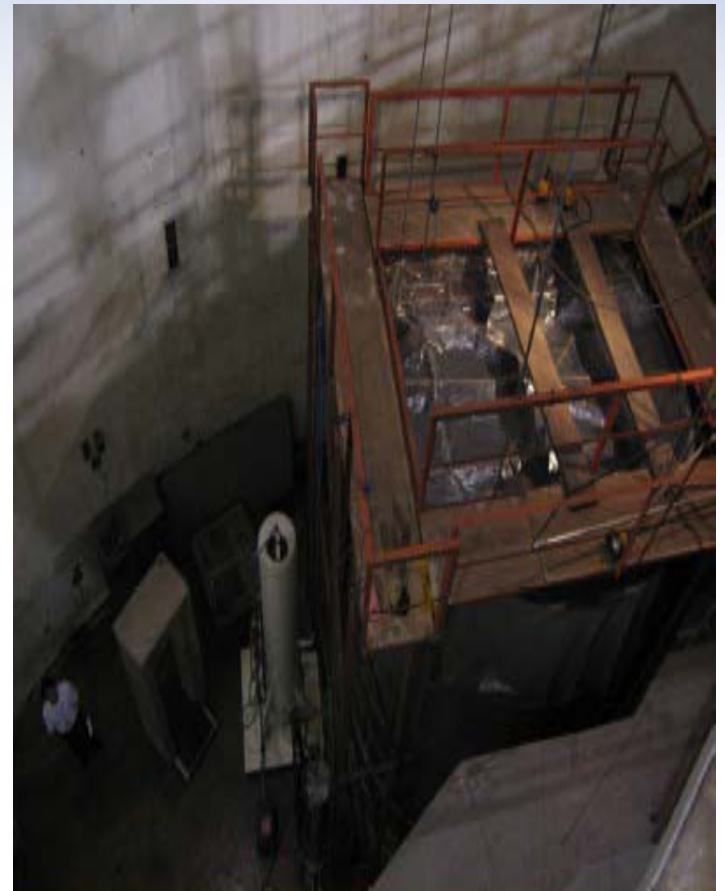
**18 Apr 1988 - Shut down
because of pool liner
leak, other problems
subsequently appeared**



Decommissioning of PRR-1

2005- the Philippine Nuclear Research Institute (PNRI) decided to decommission the Philippine Research Reactor (PRR-1).

The core has been disassembled. All of the fuel assemblies and other movable radioactive materials have been transferred to a storage tank outside of the reactor pool, and the pool has been emptied of water.



Description of fuel storage tank



- a free-standing cylindrical tank made of stainless steel, 4.9 m (16 ft.) high and containing up to 51.1 m³ (13,500 gal) of demineralized water.

- intended to be a temporary storage location for irradiated nuclear fuel elements and other radioactive material that were removed from the Reactor Pool while the pool liner was being repaired in the 1990s.

Monitoring of water condition



Taking and recording the water conductivity in the storage tank after operation of the demineralizer pump (attached to the fuel storage tank) which takes 5 to 6 hours running.

- uses a hand held conductivity meter, with range of about 0- 200 micro siemens.
- readings taken every other day vary from 0.3 to 0.8 within the desired limit.
- the average reading of 1.3 was due to degradation of the ion exchange resin.

Demineralizer System



- uses mix bed demineralizer containing both cation and anion resins to remove of ionic substances, reduced of conductivity and control of pH. The water is treated with an ion exchange resin. These resins will replace undesirable ions with those which are more acceptable within an aqueous process stream under a specific set of operating conditions. Its main process is to control the purity and pH of the reactor coolant, which eventually minimizes corrosion, which is enhanced by impurities.

Human Resource Development

Internal Human Resource Support

- **Training courses* at the PNRI Nuclear Training Center (NTC)**
 - Radiation Safety Courses
 - Sealed sources in industrial devices
 - Commercial sale of radioactive sources and low activity sources
 - Industrial radiography
 - Medical use of radioisotopes
 - Radiation Safety Refresher Course
 - Seminar on Nuclear Science for Teachers (High School and University Teachers)
 - Course on Medical Use of Radioisotopes
 - Course on Radioisotope Technology
 - Non-destructive Testing (NDT) Courses

Human Resource Development (2)

External human Resource Support

- International Atomic Energy Agency (IAEA) and Asian Nuclear Safety Network (ANSN)
 - Technical cooperation projects, workshops, training courses, on-the-job
 - Regional workshops, meetings in the ANSN Topical Groups
 - Hosting of regional events on education and training
- EC/INSC projects
- Japan Atomic Energy Agency (JAEA) and MEXT
- Korea Atomic Energy Institute (KAERI) & Korean Institute of Nuclear Safety (KINS)

Training and Qualification of Operating Personnel

- Well defined requirements for initial training and certification should exist
- Internal training and re-training policies and programme for operating personnel, users and support staff should be established
- The frequency of requalification of operators should be clearly defined

PLAN FOR PRR-1

PNRI is planning to reuse the TRIGA fuel at a zero power level, and thus pursuing to design and construct a subcritical assembly.

The subcritical reactor is designed mainly for the purpose of education, training, and experimental research. This will provide students with practical training in nuclear fission process, in a safe laboratory setting and with a minimum exposure to radiation.

*Thank You for Your
Attention!*