

# PRR-1 Decommissioning Project : Waste Management



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- Estimated volume of decommissioning waste
- Clearance Limit for decommissioning waste

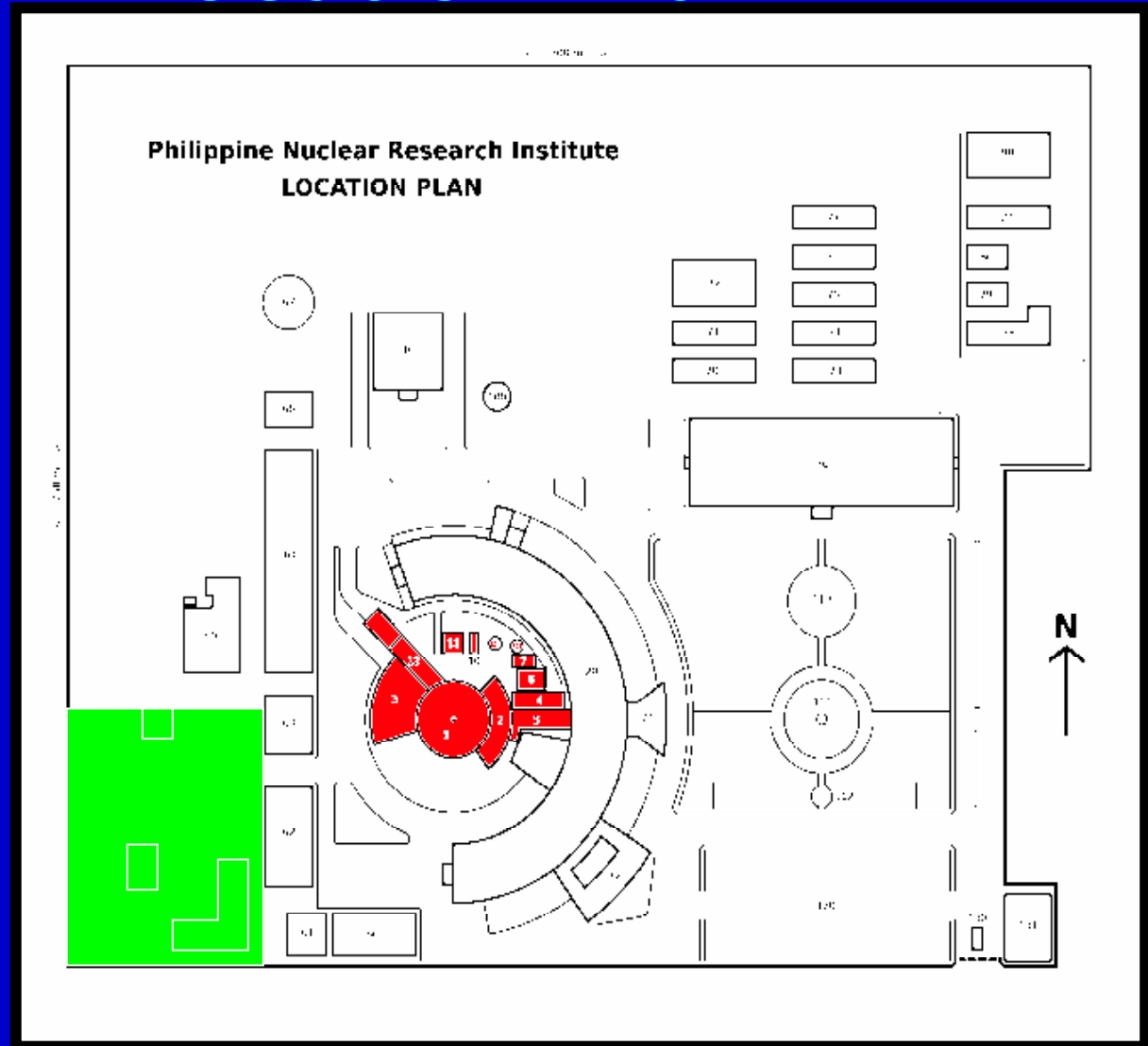
# PNRI Radioactive Waste Management Facility (RWMF)

- Established through the technical assistance of IAEA and the Department of Science & Technology (DOST)
- Operated by the Radiation Protection Unit (RPU) under the Nuclear Services & Training Division (NSTD)
- Land area of about 0.4 hectares and floor area of 600m<sup>2</sup>

# RWMF Location Plan

■ Reactor Area

■ RWMF Area



# Radioactive Waste Management Facility (RWMF)

- centralized low-level radioactive waste treatment and storage facility
- waste from industrial, medical, educational & research institutions
- Charge a minimal fee for managing the radioactive waste


# RWM Facility

- Radiochemical laboratory, chemical precipitation plant, batch type cement mixer, RAM Flat compactor, compressive test equipment, forklift, decay storage room and two concrete lined storage areas
- Operated and maintained by 5 part time technical personnel and 1 part time non-technical personnel

# PNRI Regulatory Control Program

- *Radioactive Waste Management Facility (RWMF) - authorized to receive, treat and condition waste from nuclear applications*
- *plan for amendment of authorization to include decommissioning waste*

# QA Program

- drafted under the IAEA INT/4/131  
“Sustainable Technologies for  
Managing Radioactive Waste”
    - procedures from receipt to  
storage
- 



## RWMF acceptance criteria (1/4)

- NSTD Service Bulletin 06-01 entitled “Guidelines for the Acceptance of Low-Level Radioactive Waste by the PNRI from Waste Generators”

<http://www.pnri.dost.gov.ph> go to

*Download forms*

- Plan to revise the Service Bulletin to include decommissioning waste in the scope

# RWMF acceptance criteria (2/4)

- Request for waste management services
  - written request w/ necessary information
- Transport expenses
  - waste generator shoulder the delivery cost
- Unacceptable waste
  - contaminated pressurized container
  - contaminated materials with explosive chemicals
  - waste not segregated

# RWMF acceptance criteria (3/4)

- Transport requirements
  - must conform w/ CFR Part 49 “Regulations for the Safe Transport of Radioactive Materials”
  - blocking or bracing of heavy or bulky waste material ( i.e. disused sealed sources) inside the waste package to prevent a shift of waste during transport & handling

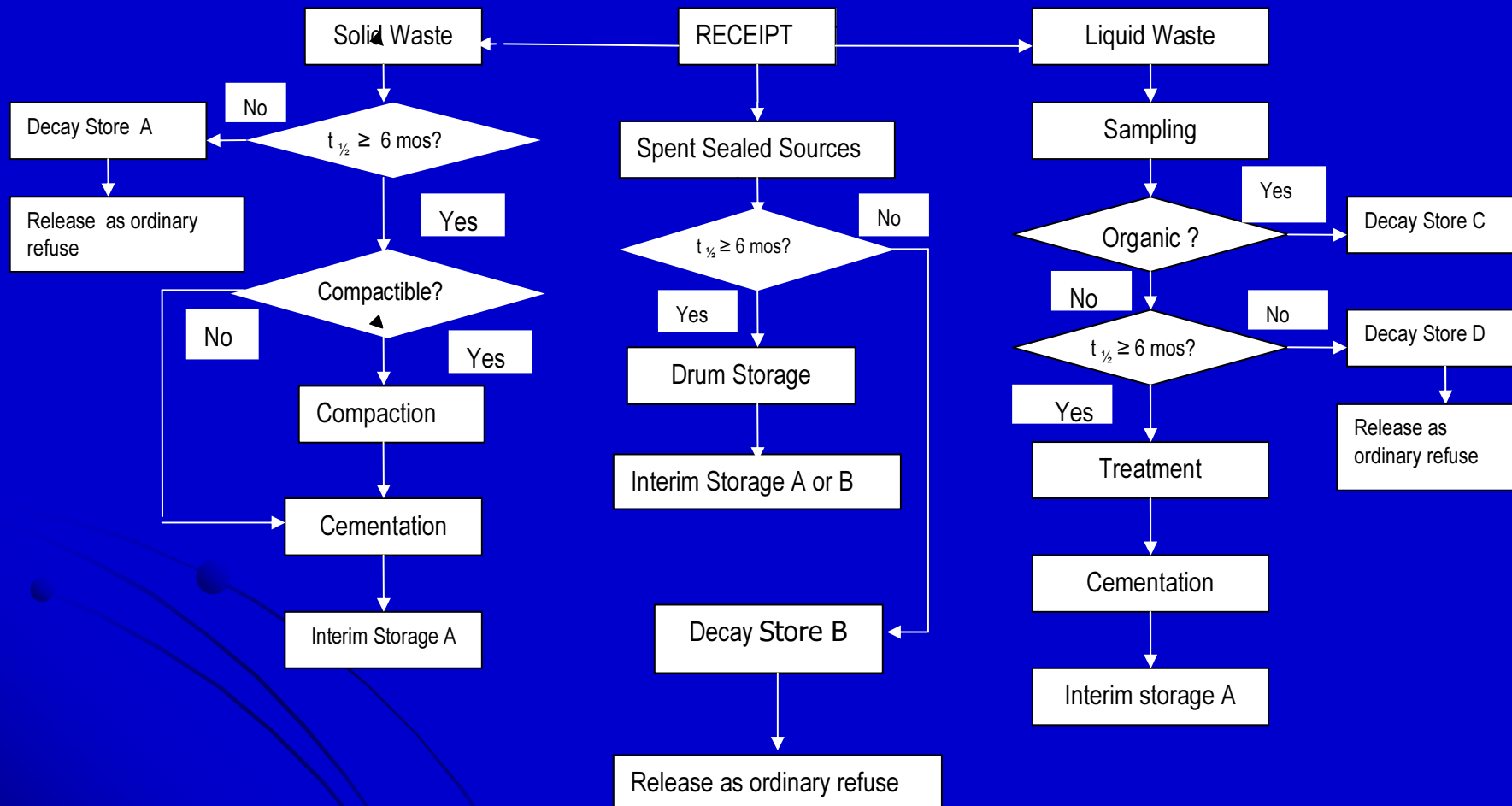
# RWMF acceptance criteria (4/4)

- Waste characterization, segregation & packaging
  - solid waste ( plastic lined 100 L steel drum
  - liquid waste ( organic in glass bottle)
- Transport Container
  - std. 200L steel drum
  - steel box that can withstand  $73.30\text{g/cm}^2$  ( $150\text{lbs/ft}^2$ ) , max. wt. 1000kgs

# RWM Current Strategy

- Decay storage and release/ dispose within the clearance limits (CPR Part 3)
- Treatment and/or conditioning and storage in 200L steel drum
- Storing of disused sealed sources with original shielding material in 200L steel drum

# PNRI Radioactive Waste Management Schematic Diagram



# Equipment for Characterization



Exploranium "Identifier" for gamma identification



Radiagem for radioactivity measurement ( $\alpha, \beta, \gamma$ )



Canberra Inspector 1000 w/ helium filled detector for neutron detection and NaI detector for gamma identification



Liquid Scintillation Counter for  $\beta$  activity measurement

# Interim Storage Enclosures



**Front View**



**Top View**



# Interim Storage Enclosure



**Trench A**

**5m W x 3.5m H x 18m L**



**Trench B**

**3.5m W x 3.5m H x 18m L**

# Decommissioning Waste Management Strategy

- Materials below clearance levels
  - release as ordinary waste
  - recycled/reused for materials with value
- Radioactive waste packaging :
  - 200L steel drums i.e. rubbles, metallic materials
  - custom made waste stainless steel container (core box, thermal column)
- Waste packages will be transported to the RWMF by a forklift

# Decommissioning Waste from PRR-1

- ~ 360m<sup>3</sup> estimated volume
  - depends on free release
  - further treatment of waste
  - depends on the dismantling strategy
- Plan additional storage facility

# Expected Waste

- Biological shield ( rubbles, metal materials)
- Treatment tank ( liquid waste, ion-exchange resins, pipes)
- Reactor pool ( rubbles, metal liner, pipes)
- Reactor core (core box, in-core irradiation rigs & baskets, neutron sources)
- Beam ports, beam tubes
- Thermal column
- Contaminated protective clothing

# Biological shield



# Reactor platform & bridge



# Reactor Pool Power Section



Low power section



High power section

# Treatment Room



Workshop on Safety of Research Reactor Decommissioning Activities : Project Planning Management,  
Regulatory Review and Safety Assessment , 15-19 September 2008



# Processing Room



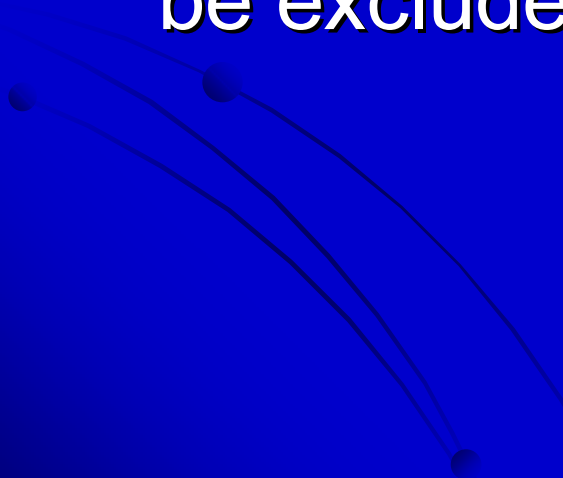
# Clearance levels for decommissioning waste

- NRLSD was directed by PNRI AO 01-2007 to adopt the following for the regulation and control of bulk amounts of radioactive materials from decommissioning of PRR-1:
  1. IAEA Safety Series Guide No. RS-G-1.7 “Application of the Concepts of Exclusion, Exemption and Clearance”
  2. IAEA Safety Report Series No.44 “ Derivation of Activity Concentration Values for Exclusion, Exemption and Clearance”

# Clearance Levels

- **IAEA Safety Series Guide No. RS-G-1.7**
  - guides on the concepts of exclusion, exemption and clearance
  - provides specific values of activity concentration for radionuclides (natural and artificial) origin that may be used for bulk amount of solid materials

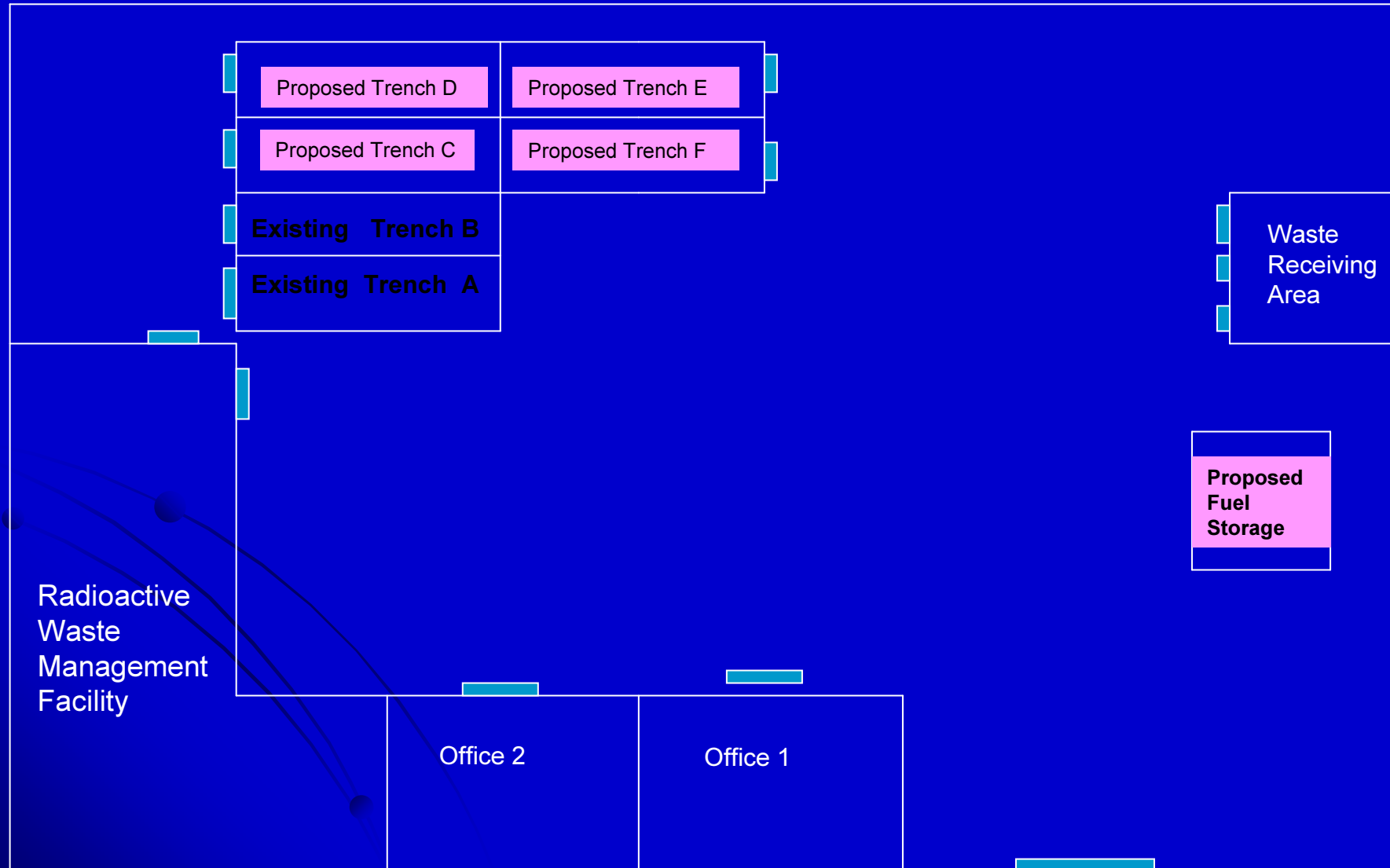
# Clearance Levels

- Safety Report Series No.44
    - supports IAEA Safety Guide No. RS-G1.7 and derives activity concentration levels for deciding should the materials be excluded, exempted or cleared
- 

# Management of PRR-1 Fuel

- all spent fuel (plate type) shipped back to USA in March 1999
- 130 TRIGA cluster elements ( 115 slightly irradiated and 15 fresh)
- construction of dry storage vault, above ground for the TRIGA fuel elements at RWMF

# RWMF Area



# Proposed Fuel Storage Area



# RWMF Security

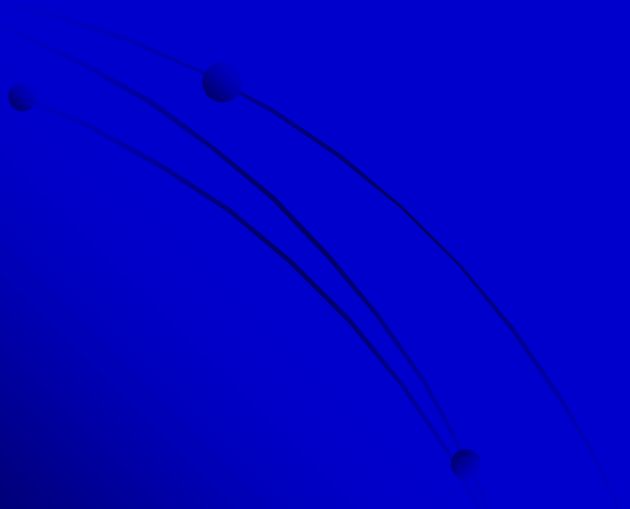
- Surveillance camera monitors the area.
- All access to RWMF are locked and sealed.
- System alarms on unauthorized entry into the waste facility.
- Keys to the facility are securely kept inside the vault and limited personnel has an access to the vault combination.
- Public entry is not allowed unless authorized by the Head of RPU.



# Documentation

- Radioactive Waste Management (RWM) Registry developed by IAEA (ACCESS environment)
- RWMF Waste Inventory ( EXCEL environment)
  - data from the accomplished collection form submitted by waste generators

*THE END*



# Batch type chemical precipitation



# One-Bagger Cement Mixer



# RAM Flat Compactor



- Drum compaction
- In-drum compaction
- 3,000 psi pump pressure



# Compressive Testing Equipment for concrete specimens



# Forklift

