Decommissioning in South Africa: A Regulatory Perspective

Shumani Masia-Raivhogo, NNR South Africa

For the protection of persons, property and the environment against nuclear damage.

2019 RESRAD Technical Meeting Rockville

28 October – 30 November 2019

DISCLAIMER

- The information presented is not an official record of the NNR;
- The NNR makes no warranties, whatsoever, either express or implied, concerning the accuracy, completeness, reliability, or suitability of the information. Neither does it warrant that use of the information is free of any claims of copyright infringement;
- The use of particular designations of countries or territories does not imply any judgment by the NNR as to the legal status of such countries or territories, of their authorities and institutions or of the delimitation of their boundaries;
- The mention of names of specific companies or products (whether or not indicated as registered) does not imply any intention to infringe proprietary rights, nor should it be construed as an endorsement or recommendation on the part of the NNR.

CONTENTS

- Regulatory Framework
- Regulated Activities
- Regulations on Safety Standards and Regulatory Practices
- Regulatory Document and Guide on Decommissioning
- NNR regulated activities
- Decommissioning at AngloGold Ashanti: EGAF Plant
- Lessons learned
- Way Forward
- Conclusion

REGULATORY FRAMEWORK

LEGISLATIVE

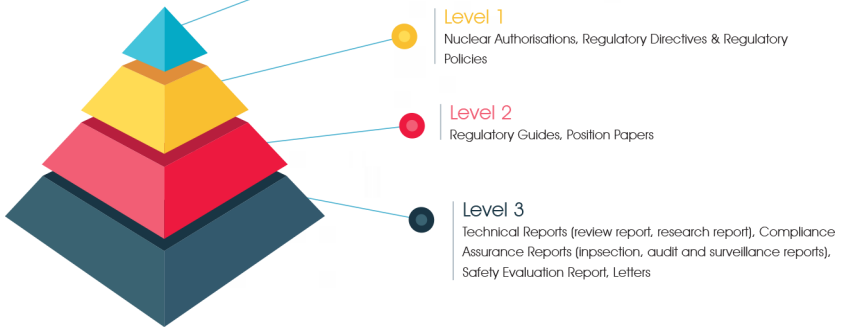
NATIONAL

- Nuclear Energy Act, Act 46 of 1999 (NEA)
- National Nuclear Regulator Act, Act 47 of 1999 (NNRA)
- Hazardous Substances Act, Act 15 of 1973 (HSA), provides for control of Group III hazardous substances and Group IV hazardous substances

SCOPE

REGULATORY CONTROL

- The siting, design, construction, operation, manufacture of component parts, and the decontamination, decommissioning and closure of nuclear installations;
- Vessels propelled by nuclear power or having radioactive material on board which is capable of causing nuclear damage, through the granting of nuclear authorisations, and
- Any action which is capable of causing nuclear damage as defined in the NNR Act.



REGULATORY FRAMEWORK cont.

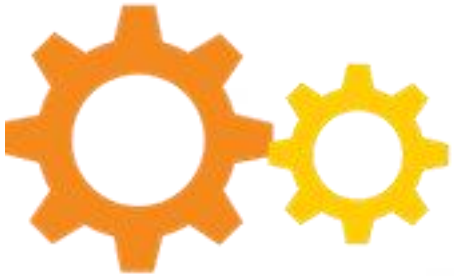
LEGISLATIVE

NATIONAL

- Nuclear Energy Act, Act 46 of 1999 (NEA)
- National Nuclear Regulator Act, Act 47 of 1999 (NNRA)
- Hazardous Substances Act, Act 15 of 1973 (HSA), provides for control of Group III hazardous substances and Group IV hazardous substances

REGULATORY FRAMEWORK cont.

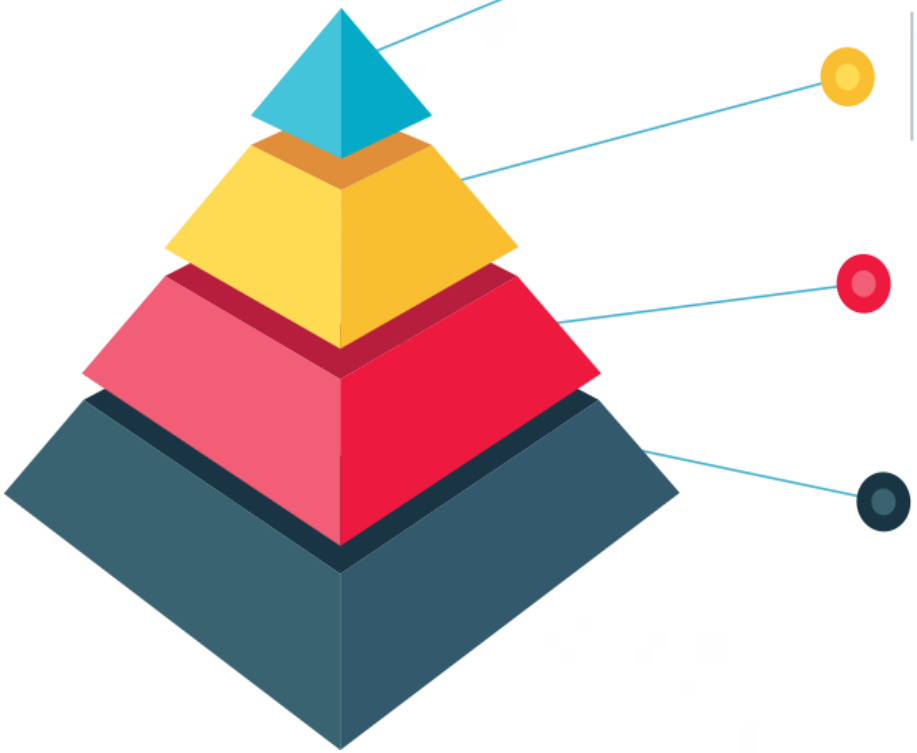
SCOPE



REGULATORY CONTROL

- The siting, design, construction, operation, manufacture of component parts, and the decontamination, decommissioning and closure of nuclear installations;
- Vessels propelled by nuclear power or having radioactive material on board which is capable of causing nuclear damage, through the granting of nuclear authorisations, and
- Any action which is capable of causing nuclear damage as defined in the NNR Act.

REGULATORY FRAMEWORK cont.



Level 0

NNR Act, Regulations

Level 1

Nuclear Authorisations, Regulatory Directives & Regulatory Policies

Level 2

Regulatory Guides, Position Papers

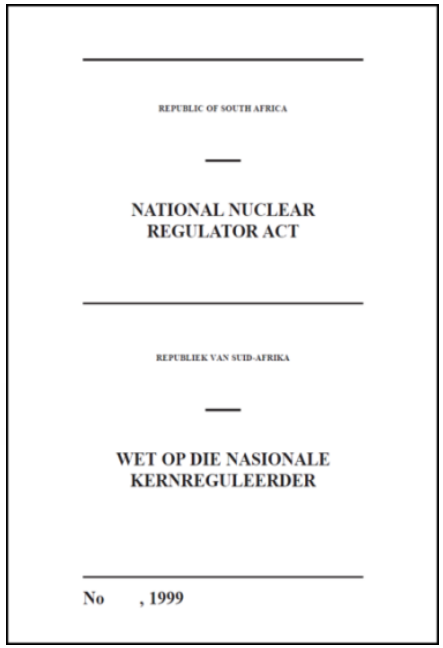
Level 3

Technical Reports (review report, research report), Compliance Assurance Reports (inpsection, audit and surveillance reports), Safety Evaluation Report, Letters

REGULATORY FRAMEWORK cont.

At present the nuclear sector is mainly governed by the: -

- National Nuclear Regulator Act (Act 47 of 1999) (NNRA), and
- Nuclear Energy Act (Act 46 of 1999)



REPUBLIC OF SOUTH AFRICA

NATIONAL NUCLEAR REGULATOR ACT

REPUBLIEK VAN SUID-AFRIKA

WET OP DIE NASIONALE KERNREGULEERDER

No , 1999

The Objects of the Regulator:

5. The objects of the Regulator are to—

(a) provide for the protection of persons, property and the environment against nuclear damage through the establishment of safety standards and regulatory practices;

(b) + (c) exercise regulatory control ….. through the granting of nuclear authorisations;

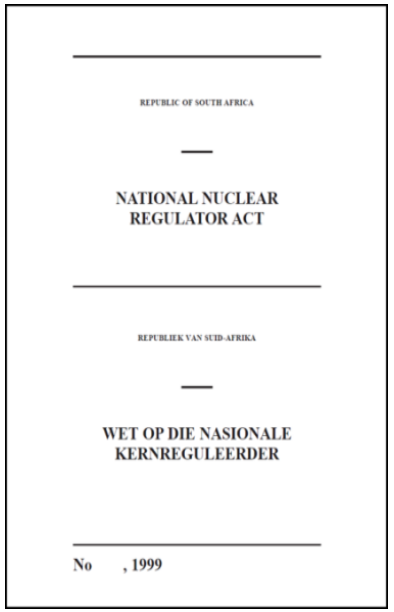
(d) provide assurance of compliance with the conditions of nuclear authorisations through the implementation of a system of compliance inspections.

REGULATORY FRAMEWORK cont.

In Particular NNR Act:

- In terms of Section 20 (1), No person may site, construct, operate, decontaminate or **decommission** a nuclear installation, except under the authority of a nuclear installation licence.
- Section 23 (2) of the NNR Act states that: the CEO may, impose any conditions in a nuclear installation or vessel licence or certificate of registration which –

b) Provides for the rehabilitation of the site.



REPUBLIC OF SOUTH AFRICA

—

NATIONAL NUCLEAR REGULATOR ACT

REPUBLIEK VAN SUID-AFRIKA

—

WET OP DIE NASIONALE KERNREGULEERDER

No , 1999

Section 31(1) of NNR Act:

- The minister must, on the recommendation of the board, make regulations regarding safety standards and regulatory practices.

REGULATION ON SAFETY STANDARDS AND REGULATORY PRACTICES

Safety Standards and Regulatory Practices **(R.388)** was published in April 2006 and **Section 5** deals with **Decommissioning requirements**

5.1 Decommissioning strategy and planning

- Strategy submitted with prior safety assessment
- Plan specifying phases of decommissioning and institutional controls required to maintain radiation safety.

5.2 Availability of resources

- Must demonstrate sufficiently that resources will be available.

5.3 Requirements for decommissioning operations

- Decommissioning must comply with applicable requirements.

5.4 Release of radioactively contaminated land

- Must demonstrate that the release criteria for land have been met

REGULATORY DOCUMENT:RD-0026

The document aims to provide more details to regulatory requirements in order to complement Section 5 of SSRP and the following is covered

Decommissioning Strategy

- Part of conceptual plan and be updated throughout
- Re-use, recycling as well as alternate use of Buildings and Land must be considered.

Decommissioning Plan

- Different Phases must be identified
- Submitted to NNR for approval
- Demonstration of safety for strategy chosen

Funding

- Funds must be available when needed
- Amount must be reviewed periodically
- Additional cost such as for waste storage or C&M must be considered

Management

- Management and implementation organization must be established
- Personnel must be suitable trained, qualified and competent.

Decommissioning Implementation

- Only activities authorized or phases approved may be implemented
- Adequate level of safety must be maintained throughout

Completion of Decommissioning

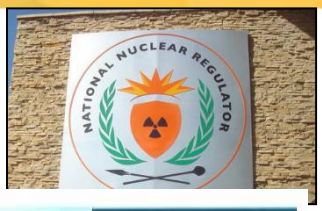
- Surveillance clearance programme must be implemented
- Release of land & building criteria
- Final decommissioning report for approval

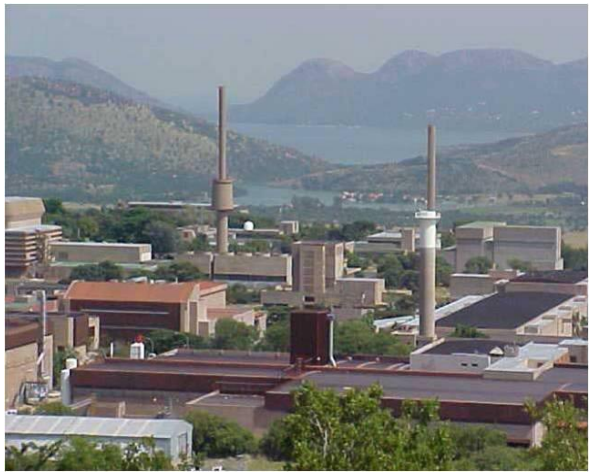
REGULATORY GUIDANCE :RG-0026

- Provides details on site Decommissioning for Planned exposure and criteria applicable to release of land from regulatory control following decommissioning in planned exposure situation
- The criteria for the release of land in planned exposure situations is based on a **public dose limit of 1 mSv/a**
- When considering release of land from regulatory control, **optimisation of dose to members of the public** needs to be demonstrated.
- Criteria is based on **Level of radioactivity concentration of each radionuclide in material** as follows:

0.5 Bq/g for naturally occurring radioactive nuclides of uranium and thorium and their progeny except for radon	**10 Bq/g** for potassium-40 in materials that are used in building construction or disposed of	**50 Bq/g** for potassium-40 in all other materials

NNR REGULATED ACTIVITIES





DECOMMISSIONING AT ANGLOGOLD ASHANTI (AGA)- VAAL RIVER OPERATION

A CASE OF EAST GOLD ACID AND FLOTATION (EGAF) PLANT

ANGLO GOLD ASHANTI-EGAF PLANT

- The **East Gold, Acid and Flotation Plant** is part of the Vaal River Operations
- Vaal river operation consist of Kopanong Gold Plant, EGAF Plant, Waste Rock dumps, Est Gold TSF and Central Salvage Yard
- Situated in Orkney, North West Province

ANGLO GOLD ASHANTI-EGAF PLANT

DECOMMISSIONING OF AGA- EGAF PLANT

- EGAF Plant of AngloGold Ashanti Vaal River operation was decommissioned recently
- The plant and associated structures were deemed redundant and approval to decommission was provided
- Chosen strategy was **Dismantling** of the plant
- The list of buildings and structure to be decommissioned were provided

Timelines and Process

- 2014 — NNR received the decommissioning plan for all redundant areas at EGAF Plant
- NNR Approval was granted for the implementation of the plan
- 2015 — An updated plan with **decommission schedule** was presented
- The decommissioning was planned to start 2016 until 2017

DECOMMISSIONING OF AGA-EGAF PLANT

- **The submitted Plan included the following suite of Documents:**
  - The site location (with Maps) and description of the facility
  - The **updated decommissioning plan and Strategy** which included safety assessment with indication of the considered strategy and different phases
  - **Physical security** measures to be put in place
  - The **Waste Management Programme** including the waste streams that will be generated and disposal options
  - **Quality Management Programme** specifically dealing with Record keeping and Reporting requirements

EGAF PLANT: BEFOFE DECOMMISSIONING

DECOMMISSIONING PHASES: EGAF PLANT

Demolition

- A **mechanized** demolition to limit dose and optimise exposure.
- Structures demolished to ground floor concrete foundation level by specialised mechanical demolition equipment, tools and **machinery such as**:
    - High reach hydraulic shears and hammers
    - Front end loaders

EGAF PLANT: DURING DEMOLITION

DECOMMISSIONING PHASES: EGAF PLANT

Segregation and Categorisation of Waste

- **Segregation of radioactively contaminated material was done :**
  - Repairable equipment,
  - Stainless steel and steel,
  - Rubber lined material
  - Rubber and plastics
  - Fiberglass,
  - Timber/ wood,
  - Clay Bricks

EGAF PLANT: WASTE MANAGEMENT

Waste Categories used for EGAF Plant

Category I

Nuclide Specific Contents is 0.5-100 Bq/g

Surface Contamination is <0.4 Bq/cm^2 α and <4 Bq/cm^2 β or gamma

Category II

Nuclide Specific Contents 100-1000 Bq/g ,

Surface Contamination is >0.4 Bq/cm^2 α and <4 Bq/cm^2 β or gamma

Category III

Nuclide Specific Contents >1000 Bq/g

EGAF PLANT: WASTE MANAGEMENT

- Waste generated was transported to the **Central Salvage Yard** of AGA and managed as follows:
  - Decontamination of waste material
  - Screening of waste material
  - Waste release following the below criteria:

Category I- mostly scrap were released to Authorized Facilities

- Others such as wood were **cleared**

NB! All waste released or cleared were accompanied by **Consignors note or Clearance Certificate**

Category II - mostly stored on site temporarily , to be reprocessed or decontaminated further to meet **release criteria for Category I**

Category III – is stored on site as Restricted waste

EGAF PLANT: WASTE SEGREGATION

Segregated Steel scrap material at the Decontamination Bay

DECOMMISSIONING PHASES: EGAF PLANT

Decontamination

- **Decontamination** was done onsite at the decontamination bay equipped with the following
  - Concrete lining
  - Pump and Sump
  - High pressure water
- **Footprint areas** was washed with the effluent collected in **trenches and sumps** where it accumulates in the plant **containment dam.**
- Then it was pumped to the adjacent slimes dams

EGAF PLANT: WASTE DECONTAMINATION

EGAF PLANT: WASTE STORAGE

Storage for Category II material

EGAF PLANT: WASTE STORAGE

Storage for Category III material

EGAF PLANT: BEFORE AND AFTER DEMOLITION

Before Demolition

After Demolition

EGAF PLANT: AFTER DEMOLITION

LESSONS LEARNED

- **Dedicated resources** from the Regulator to ensure verification of Compliance
- **Monthly progress reports** were submitted - required urgent review and sometimes verification on site
- **Project was too long** dependent on the contractors and they needed to undergo Training, Medical Surveillance before the start of the project. Proper planning is key

WAY-FORWARD

Post decommissioning report still to be submitted by AGA should include (but not limited to) the following :

- Facility History and Decommissioning Techniques applied
- Results of the Decommissioning process
- **Dose report** of accrued dose by workers-**Radiological survey results**, Personal doses
- **Waste Report-** Quantities, Classification and methods of disposal
- **Final decommissioning Report**-Demonstrate satisfaction of the end criteria
- Report to include **lessons learnt** on the project

CONCLUSION

- Decommissioning projects will increase in South Africa
- The strategy must be well thought through and Plan be frequently updated.
- All the lessons learnt must be plowed back into new projects
- Waste management must be carefully considered from initial design
- Waste minimization is important and re-use should be considered where possible

The End – Thank You

NATIONAL NUCLEAR REGULATOR	
Physical Address	Eco Glades Office Park Eco Glades 2Block G Witch Hazel Avenue Highveld Ext 75 Eco Park Centurion
Postal Address	PO Box 7106 Centurion 0046
Telephone	+27 (12) 674 7100
Facsimile	+27 (12) 663 5513
E-mail	enquiry@nnr.co.za

MAP TO NNR CENTURION OFFICES