



# Implementation of Ageing Management Programme (AMP) at NIRR-1 Facility

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***N. Abubakar, I. Yusuf & I. M. Umar  
Centre for Energy Research and Training (CERT)  
Nigeria Atomic Energy Commission (NAEC)  
Ahmadu Bello University (ABU)  
Zaria, Nigeria***



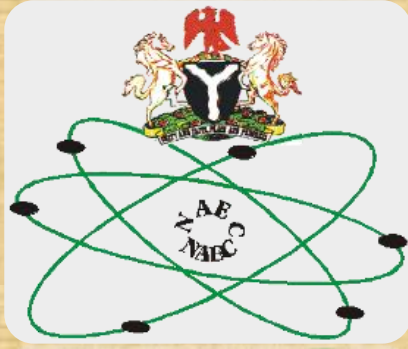


# *Outline of presentation*

- † Introduction
- † Overview of AMP for NIRR-1 Facility
- † NIRR-1 Ageing Mitigation Strategy
- † Some Recent Ageing Mitigation Activities in NIRR-1
- † Concluding Remarks



# Acknowledgement

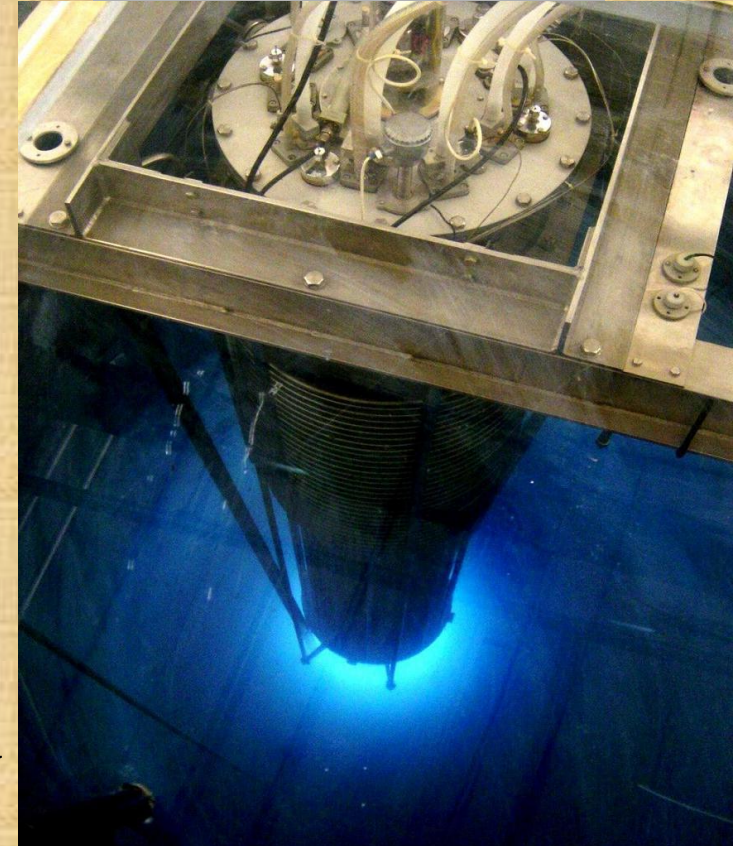


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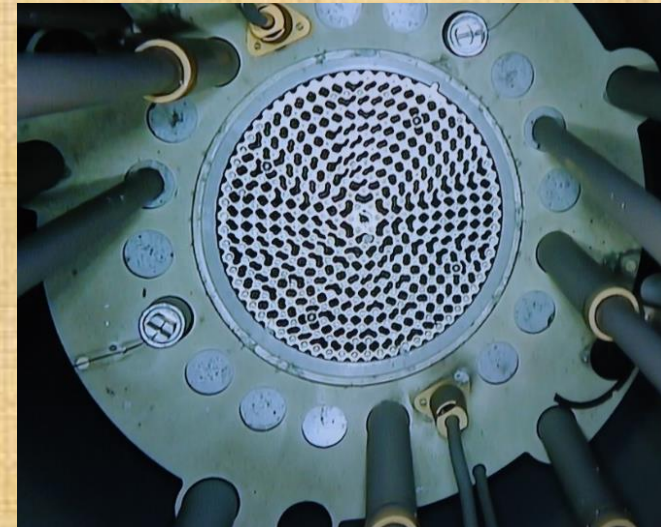
# Introduction

- 🏛️ Nigeria Research Reactor-1 (NIRR-1)
  - 🏛️ Miniature Neutron Source Reactor (MNSR)
  - 🏛️ Operated by Centre for Energy Research and Training (CERT)
- 🏛️ First criticality was on 03 February, 2004
  - 🏛️ 90.2% High Enriched Uranium (HEU) fuel
  - 🏛️ Nominal power was 31 kW
- 🏛️ Second criticality was on 02 November, 2018
  - 🏛️ Converted to 13.0% Low Enriched Uranium (LEU) fuel
  - 🏛️ Nominal power is 34 kW
- 🏛️ Separate AMP is recently developed for NIRR-1 Facility
  - 🏛️ Harmonically interfaced with existing programmes
  - 🏛️ Systematically prompt the necessity for review of other programmes
  - 🏛️ Incorporated in the IMS of NIRR-1
  - 🏛️ Integrates adequate feedback by practicing a mixed top-down and bottom-up approach

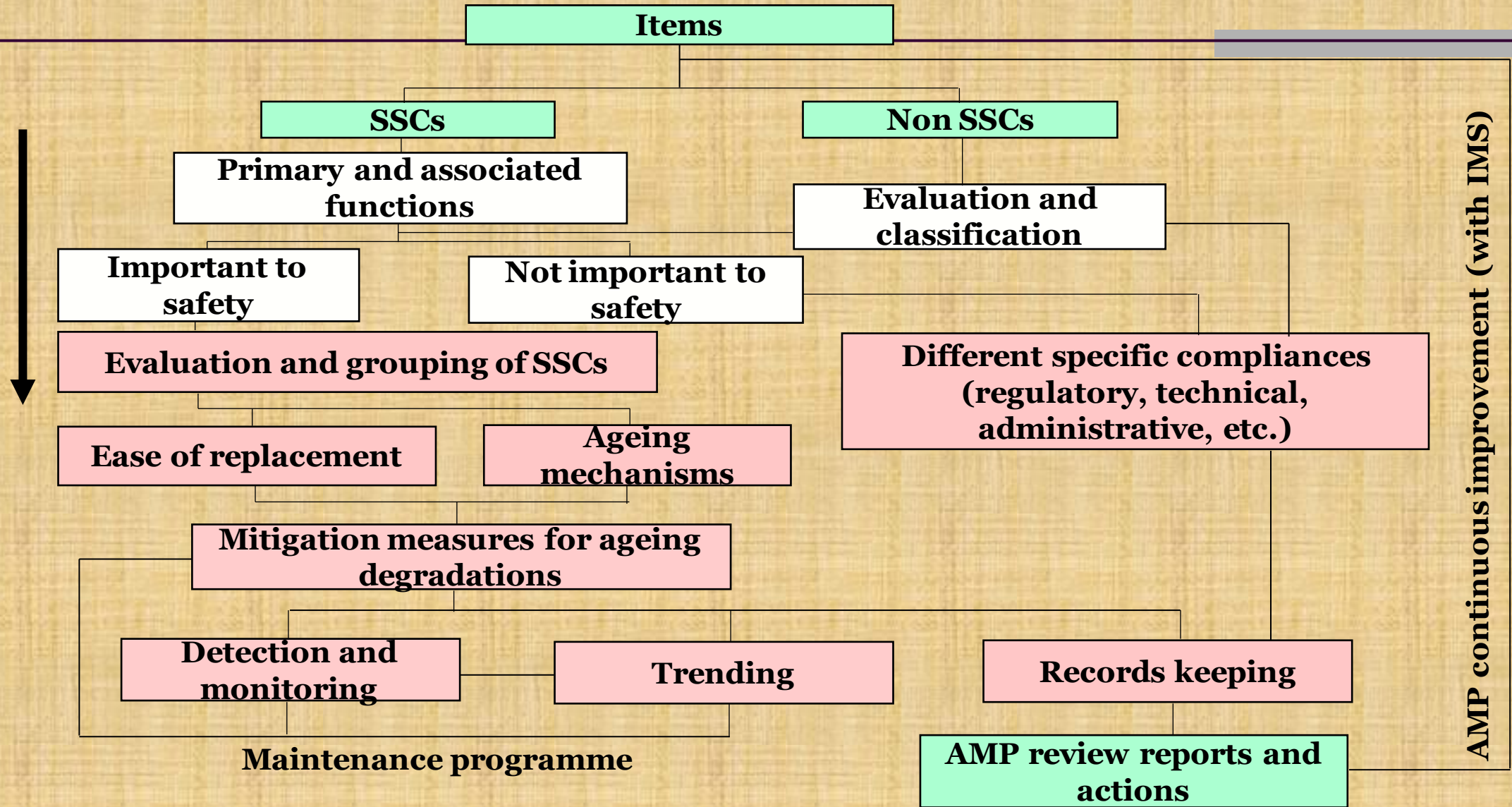


# Introduction

- 🏛️ Prior to NIRRR-1 fuel conversion exercise;
  - 🏛️ There was no separate AMP for the facility
  - 🏛️ Ageing of SSCs was managed in Maintenance Programme (MP)
- 🏛️ During the fuel conversion exercise;
  - 🏛️ It was noticed that the reactor vessel and its internals were kept intact and good
  - 🏛️ This encouraged separate AMP for SSCs in a graded approach
  - 🏛️ This, in addition to the regulatory requirement, led to the development of the AMP for NIRRR-1
- 🏛️ After the fuel conversion exercise;
  - 🏛️ Ageing Management Programme was developed
  - 🏛️ There was development and update of various safety documents



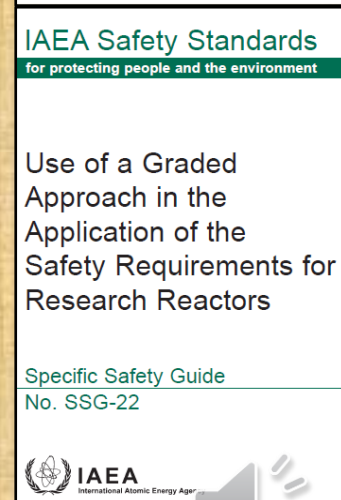
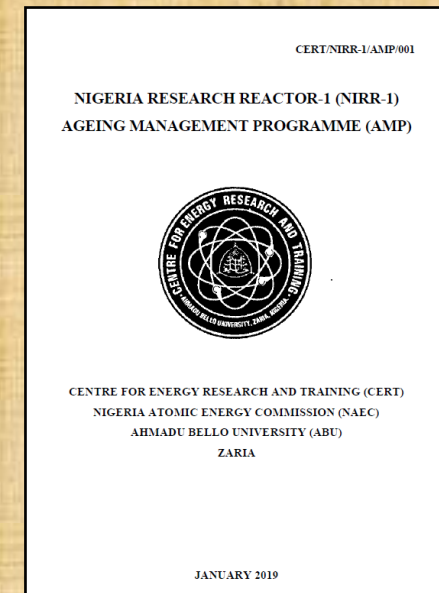
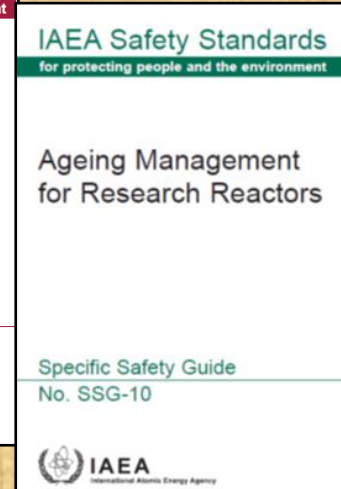
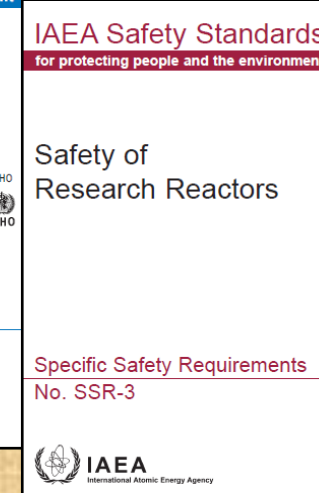
# Overview of AMP for NIR-1 Facility





# Overview of AMP for NIRR-1 Facility

- † The AMP Documentation was recommended to be developed in details by IAEA-INSARR Mission to NIRR-1 in 2019;
- † AMP was developed in a graded approach using IAEA Safety Standards, taking into account:
  - † National Regulatory Requirements;
  - † Project and Supply Agreement ;
  - † Provisions in the Safety Analysis Report (SAR);
  - † Design Requirements and Assumptions;
  - † Operational Limits and Conditions (OLCs); and
  - † CERT Established Administrative Requirements.





# NIRR-1 Ageing Mitigation Strategy

No.	Mitigation Measures	Items Affected	Activities	Frequency
1.	Structural integrity assessments	SSCs	Visual inspection and examination by human eye and using cameras	Annually
2.	Water quality measurements and monitoring		Purification	Weekly
			Chemistry, nuclides and activity detection and measurements	Quarterly
3.	Assessments during maintenance activities		Surveillance and inspection	Weekly
			Periodic testing	Quarterly
			Maintenance and periodic testing	Annually
4.	Life time assessments		Trending through records of service and reports	Annually
5.	Programmes assessments	Non SSCs	Periodic Reviews	Annually
6.	Assessments and reviews of documentation		Review due to modifications or changes	As required
7.	Succession plan		Review	Annually



# Some Resent Ageing Mitigation Activities in NIRR-1 from Lessons Learned



2019

- ↑ Replacement of hand and foot radiation monitor
- ↑ Replacement of limiting switches on the control rod mechanism
- ↑ Replacement of reactor personnel entrance door
- ↑ Refurbishment of external coating of the reactor building
- ↑ Updates and development of documentations (SAR, etc.)

2020

- ↑ Upgrade of physical security systems (doors, cameras, sensors, etc.)

2021

- ↑ Replacement of fire safety gadgets (extinguishers and hose reels)
- ↑ Replacement of computer control system (in view)
- ↑ Upgrade of ventilation system (installation of new effluent monitor)
- ↑ Development and review of some documentations (e.g. DP, IMS)



# Concluding Remarks

- † AMP implementation in NIRRR-1 systematically calls for the review and improvements of interface programmes and vice versa
- † Organised in a graded approach, the activities in the AMP lead to replacement or update of obsolete documentation
- † To ensure good practice in ageing management, NIRRR-1 facility requires more expertise some of which can be acquired by exploring opportunities in;
  - † Participation in Trainings, Workshops, Conferences and Technical Meetings  
*(Organized by IAEA and other international and national Institutions)*
  - † Scientific visits to learn from facilities implementing the relevant programme in place
  - † Expert Missions to the facility on the relevant areas



# *End of Presentation*



# *Thank you for listening*

