

CHALLENGES FOR PHYSICAL PROTECTION OF INDONESIA EXPERIMENTAL POWER REACTOR



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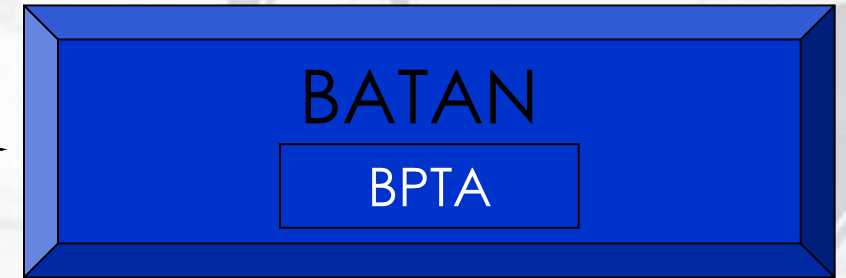
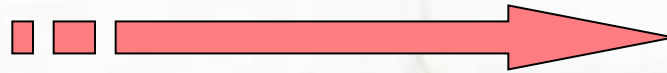




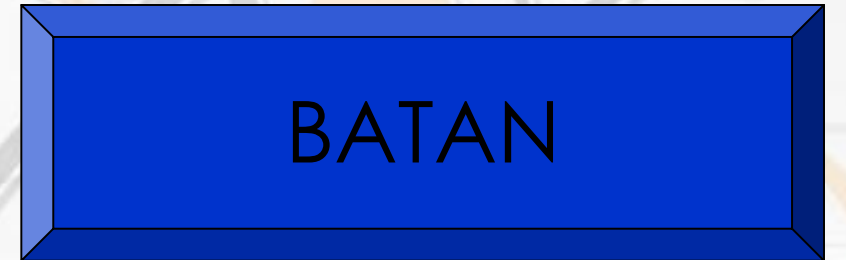
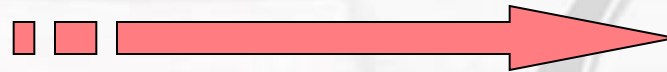
INTRODUCTION

National Organizations

ACT No 31/ 1964
Main Provision of Atomic
Energy



ACT No 10/ 1997
Nuclear Energy



BATAN : NATIONAL NUCLEAR ENERGY AGENCY
BPTA : ATOMIC ENERGY CONTROL BUREAU
BAPETEN : NUCLEAR ENERGY REGULATORY AGENCY

Regulatory Aspects



REGULATORY ASPECTS

SAFETY

To prevent harmful effect of radiation to personnel, public and environment

SECURITY

To protect, detect and responds to any unlawful act and unauthorized removal and/or sabotage of nuclear material, radioactive substance and facilities

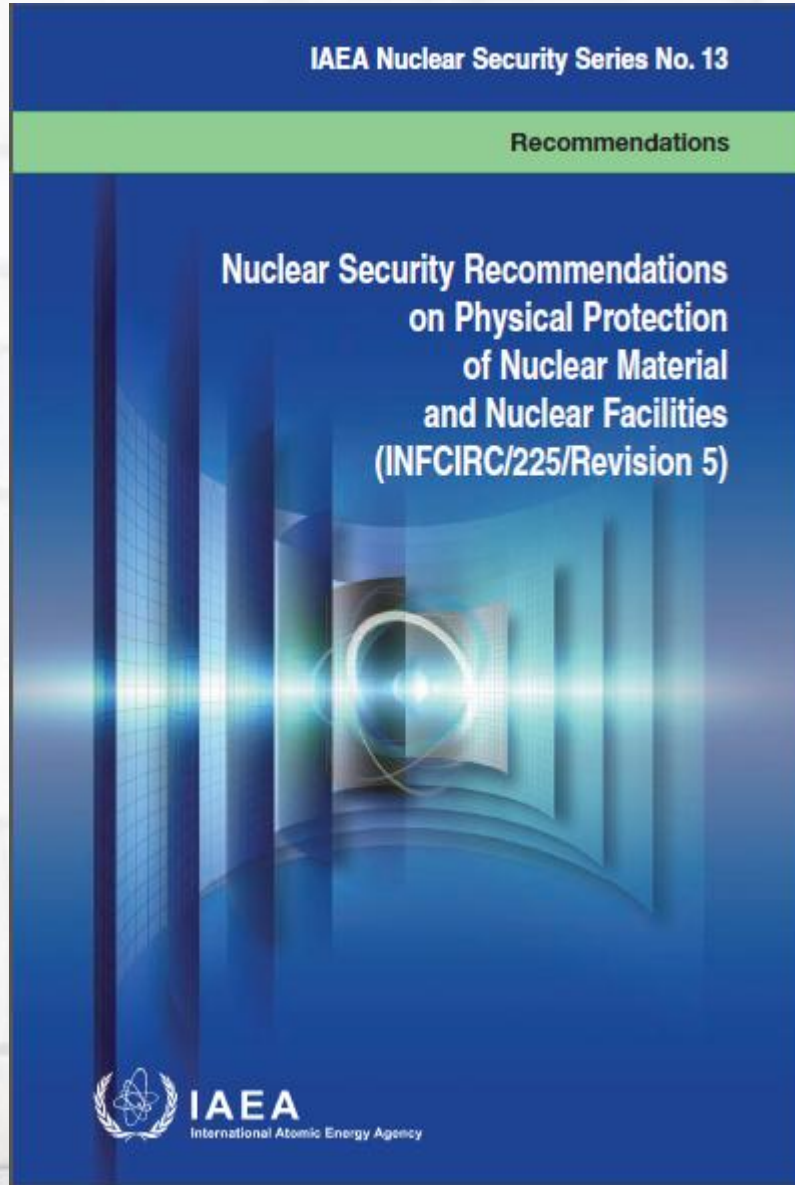
SAFEGUARDS

To prevent diversion use of nuclear material from peaceful purposes

IAEA Security Series

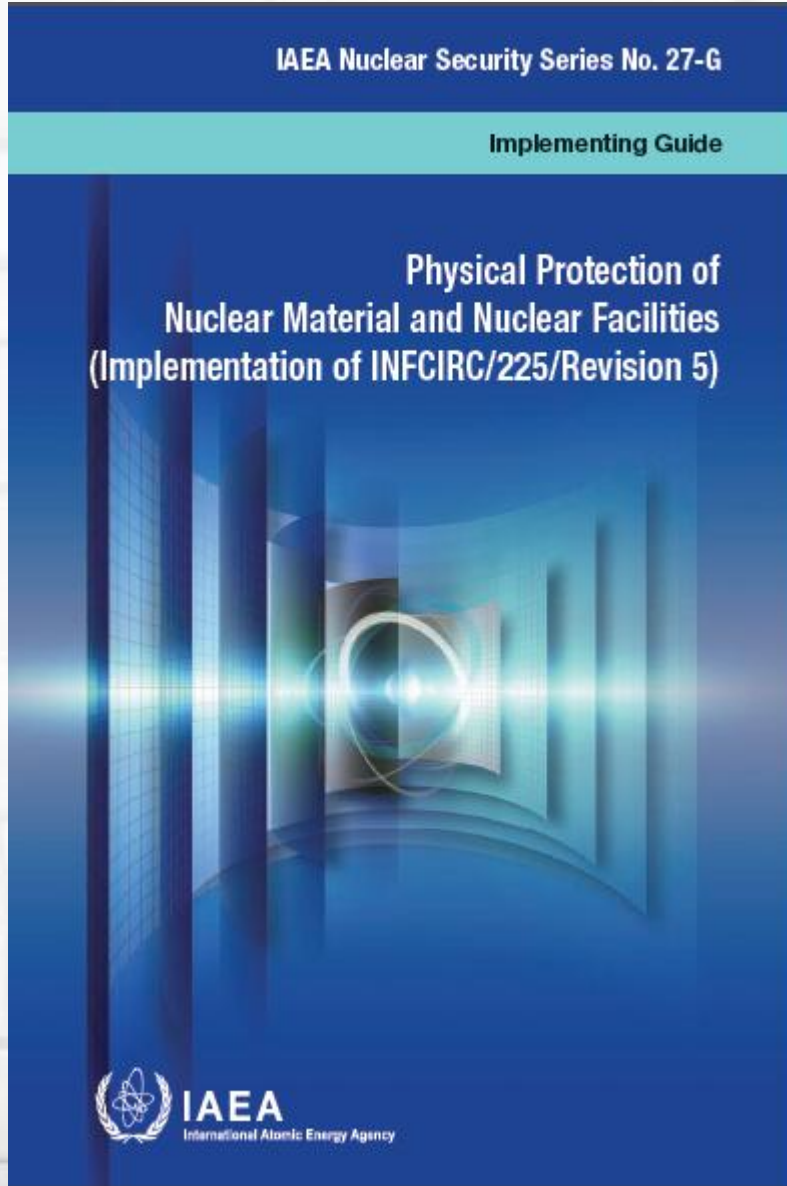


IAEA Nuclear Security Series No. 13, Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5), 2011



The purpose of this publication is to provide guidance to States and their competent authority on how to develop or enhance, implement and maintain a physical protection regime for nuclear material and nuclear facilities, through the establishment or improvement of their capabilities to implement legislative and regulatory programmes to address the protection of nuclear material and nuclear facilities in order to reduce the risk of malicious acts involving that material or those facilities.

IAEA Nuclear Security Series No. 13, Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5), 2011

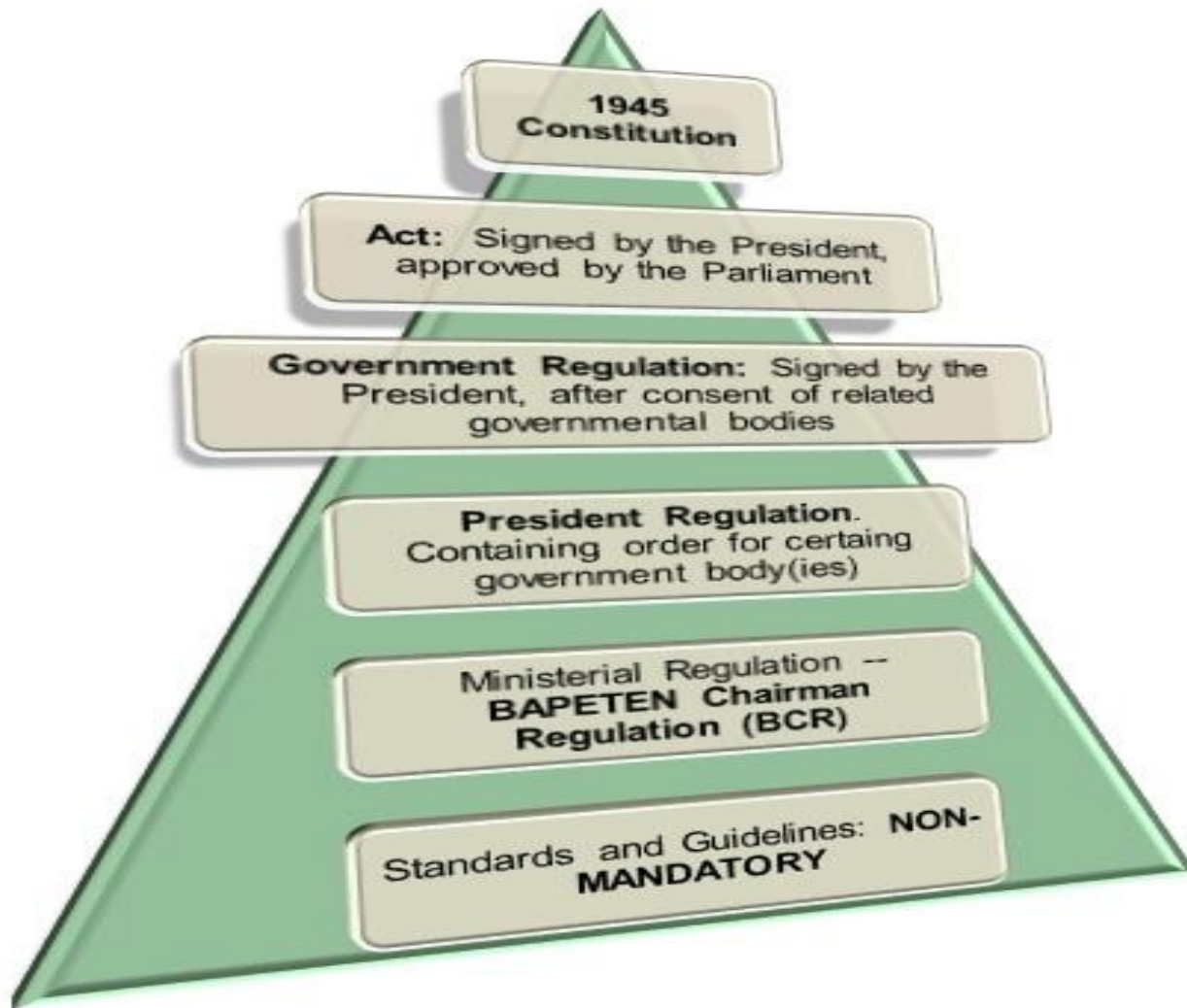


The objective of this publication is to provide guidance and suggestions to assist States and their competent authorities in establishing, strengthening and sustaining their national physical protection regime and implementing the associated systems and measures, including operators' physical protection systems.



REGULATORY FRAMEWORK

Regulatory Framework



Act No. 10 Year 1997 on Nuclear Energy

- GR No. 54/2012 on Nuclear Installation Safety and Security
- GR No. 2/2014 on Licensing of Nuclear Reactor and Utilization of Nuclear Material

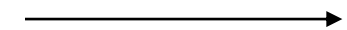
President Regulation No. 46/2009 on the Ratification of Amendment to the Convention on the Physical Protection of Nuclear Material

- BCR No. 1/2009 on Provision for Physical Protection System of Nuclear Installation and Material
- Working Instruction

Act

GOV. REGULATION

BAPETEN CHAIRMAN REGULATIONS



GR No.33 Year 2007
Safety of Ionizing Radiation & Security of radioactive sources

BCR No.4 Year 2008
Geotechnical aspect of Site Evaluation And Foundation for NPP
NS-G-3.6

BCR No.3 Year 2010
Design of Fuel Handling and Storage System For NPP
NS-G-1.4

BCR No...Year....
Construction for NPP

GR No.29 Year 2008
Licensing the use of Ionizing Radiation Sources and Nuclear Materials

BCR No.8 Year 2013
Seismic aspect of Site Evaluation for Nuclear Installation
SSG-9

BCR No.3 Year 2011
Safety for NPP Design
NS-R-1

GR No.46 Year 2009
Nuclear Liability

BCR No.6 Year 2014
Meteorological and Hydrological aspect of Site Evaluation for Nuclear Installation
SSG-18

BCR No.7 Year 2011
Design of Emergency Power System for NPP
NS-G-1.8

Act No.10
1997

GR No.54 Year 2012
Safety and Security of Nuclear Installation

BCR No.5 Year 2015
Volcanology aspect of Site Evaluation for Nuclear Installation
SSG-21

BCR No. 1 Year 2012
Protection Against Internal Fires and Explosion In the Design of NPP
NS-G-1.7

GR No.61 Year 2013
Management of Radioactive Waste

BCR No.4 Year 2018
Safety Provision of Site Evaluation for Nuclear Installation
NS-R-3 Rev I

BCR No.6 Year 2012
Software for Computer Based System Important to Safety in NPP
NS-G-1.1

GR No.2 Year 2014
Licencing on Nuclear Installation And Nuclear Material Utilization

BCR No.4 Year 2019
Dispersion of Radioactive Material in Air and Water aspect of Site Evaluation for Nuclear Installation
NS-G-3.2

BCR No.2 Year 2012
Protection against Internal Hazard Other Than Fire and Explosion Design of NPP
NS-G-1.11

GR No.58 Year 2015
Radiation Safety and Security in Transport of Radioactive Source

BCR No.6 Year 2019
External Human Induced Event aspect of Site Evaluation for Nuclear Installation
NS-G-3.1

Draft BCR No....Year....
Design Safety of NPP

BCR No...Year....
Format and Content of NPP Safety Analysis Report

Legend

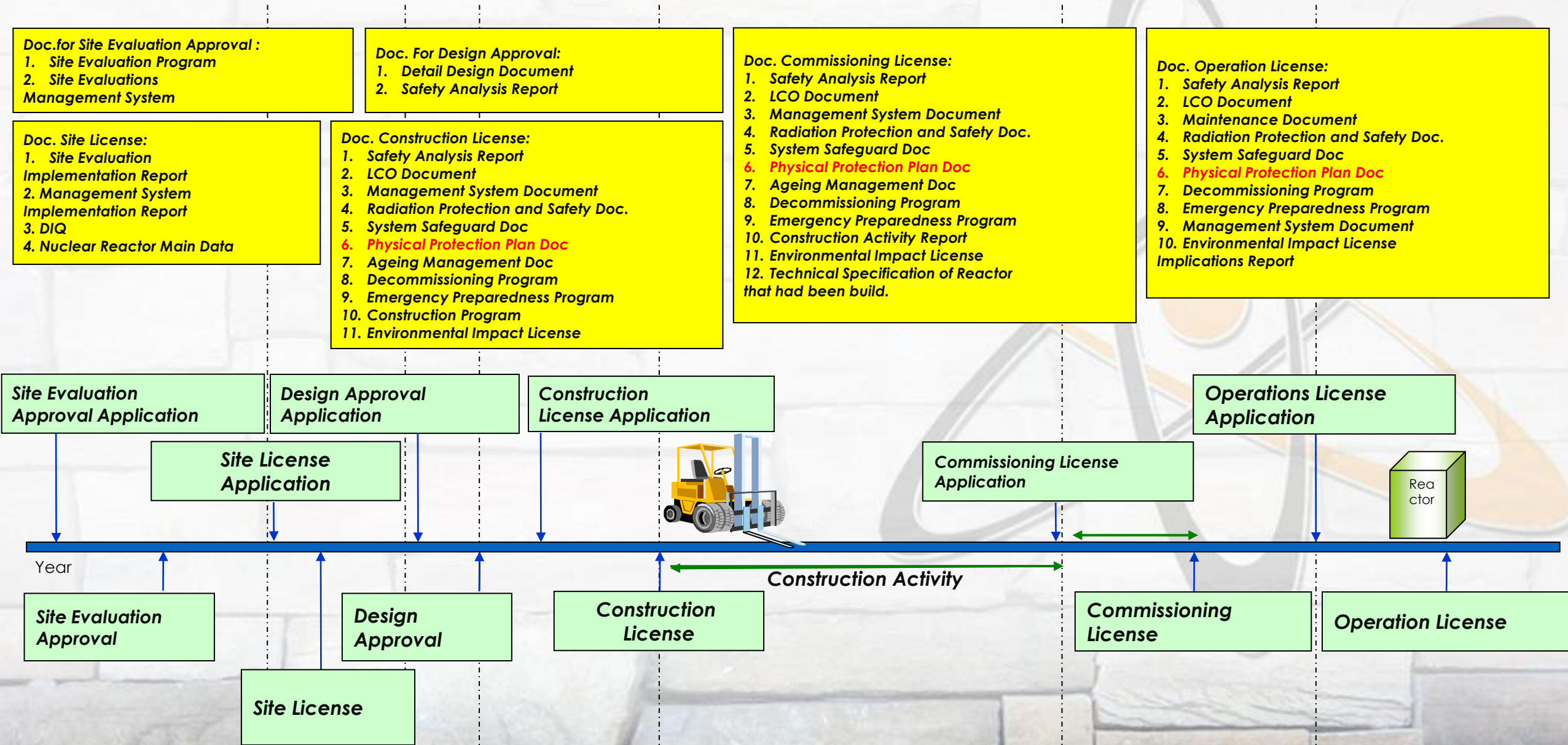
- In Preparation
- Published

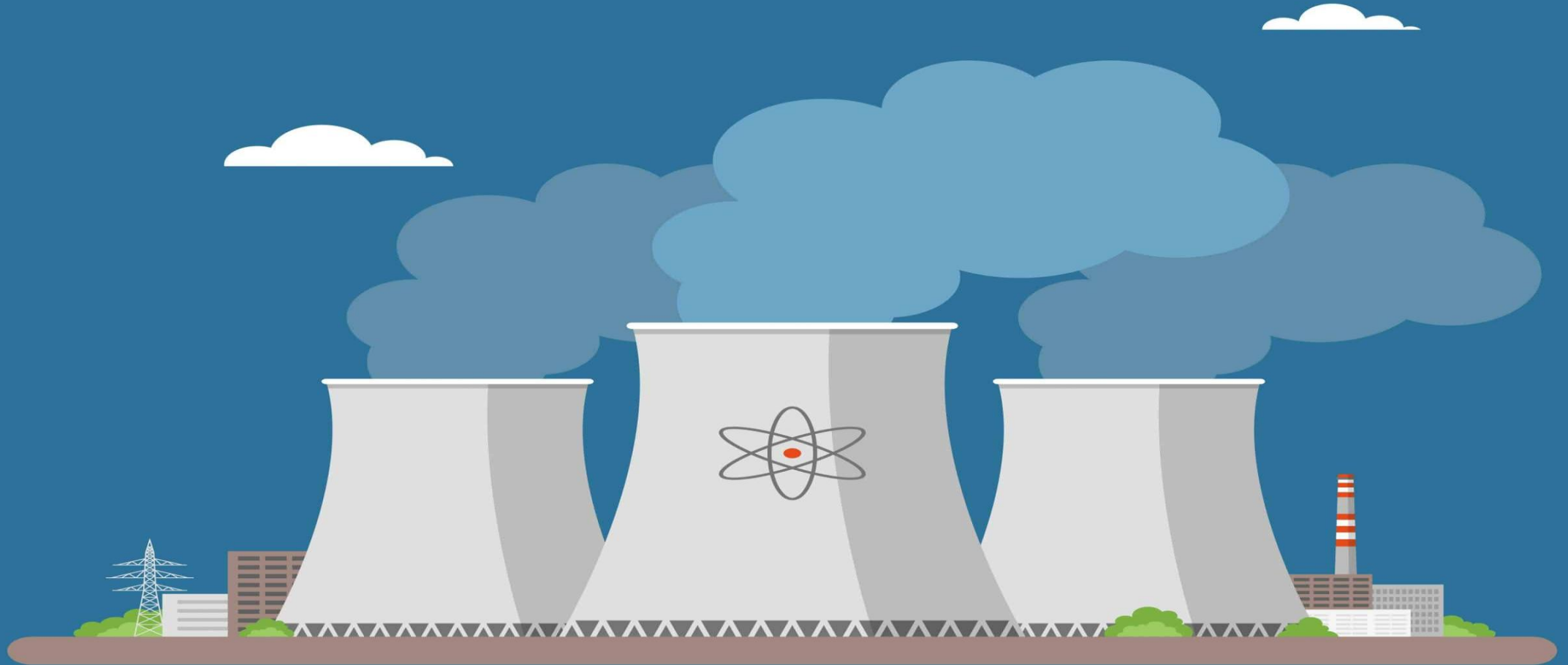
SITING

DESIGN

CONSTRUCTION

Licensing Applications



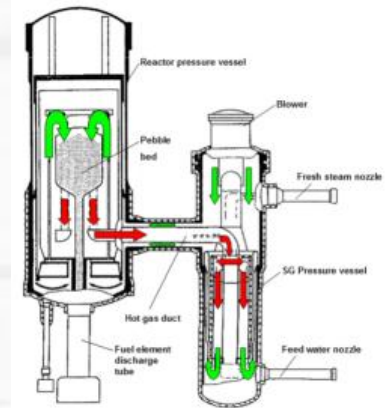


I-EPR PROJECT

BATAN Research Locations



Serpong Nuclear Complex



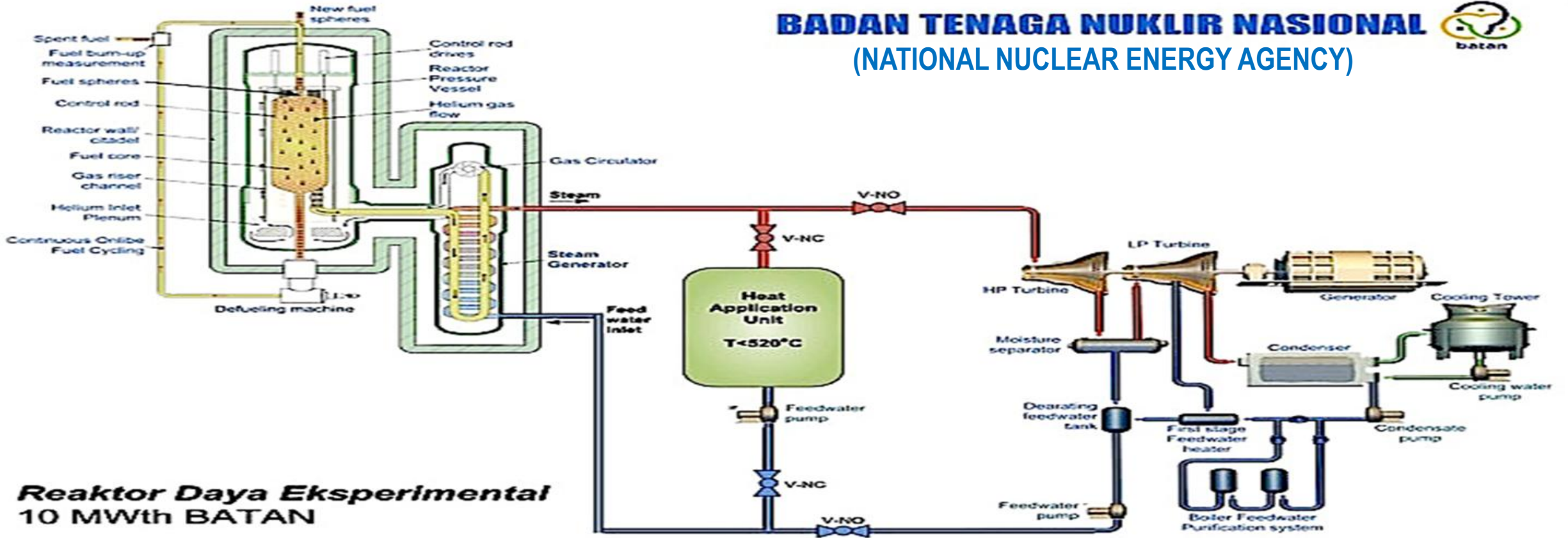
❑ Other Nuclear Cycle Facilities:

- Research Reactor Fuel Element Fabrication Installation
- Experimental Fuel Element Installation
- Radiometallurgy Installation
- Transfer Channel-Interim Spent Fuel Storage Facility

❑ Indonesia Experimental Power Reactor Site

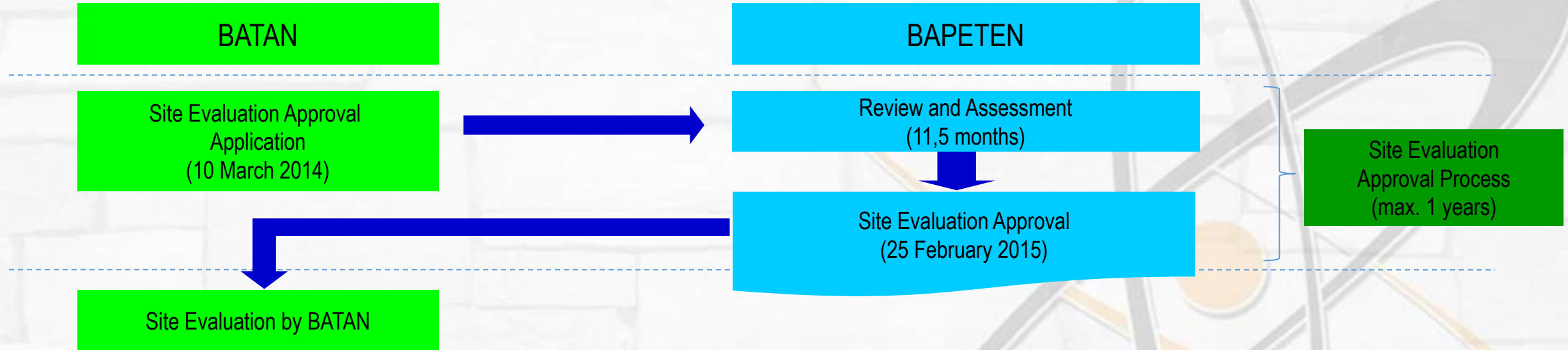
I-EPR Design

BADAN TENAGA NUKLIR NASIONAL
(NATIONAL NUCLEAR ENERGY AGENCY)



**Reaktor Daya Eksperimental
10 MWth BATAN**

Site Evaluation Approval Process



Technical Requirements:

- Site Evaluation Program
- Site Evaluation Management System

Site License Process

BATAN

BAPETEN

Administrative Requirements:

- Land rights, suitability with urban or land use planning

Technical Requirements:

- Site Evaluation Report, Management System Implementation Report
- Design Information Questionnaire
- Reactor Main Data

Site License Application
(27 October 2015)

Pre SEED Mission
(14-18 December 2015)

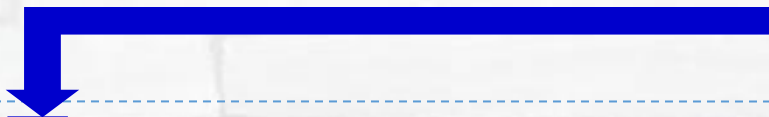
Review and Assessment
(1 year 3 months)

Site License
(23 January 2017)

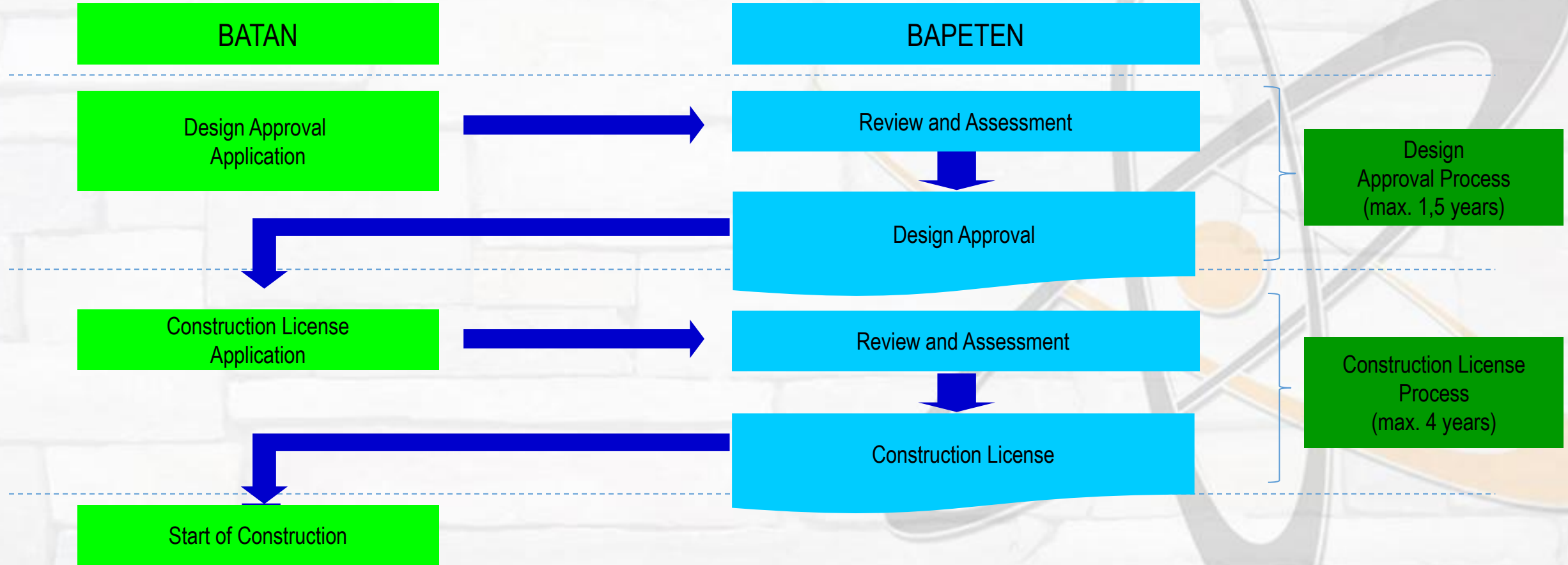
SEED Mission
(20-24 March 2017)

Site Characterization for
Design purposes

Site License
Process
(max. 5 years)



Construction Licensing



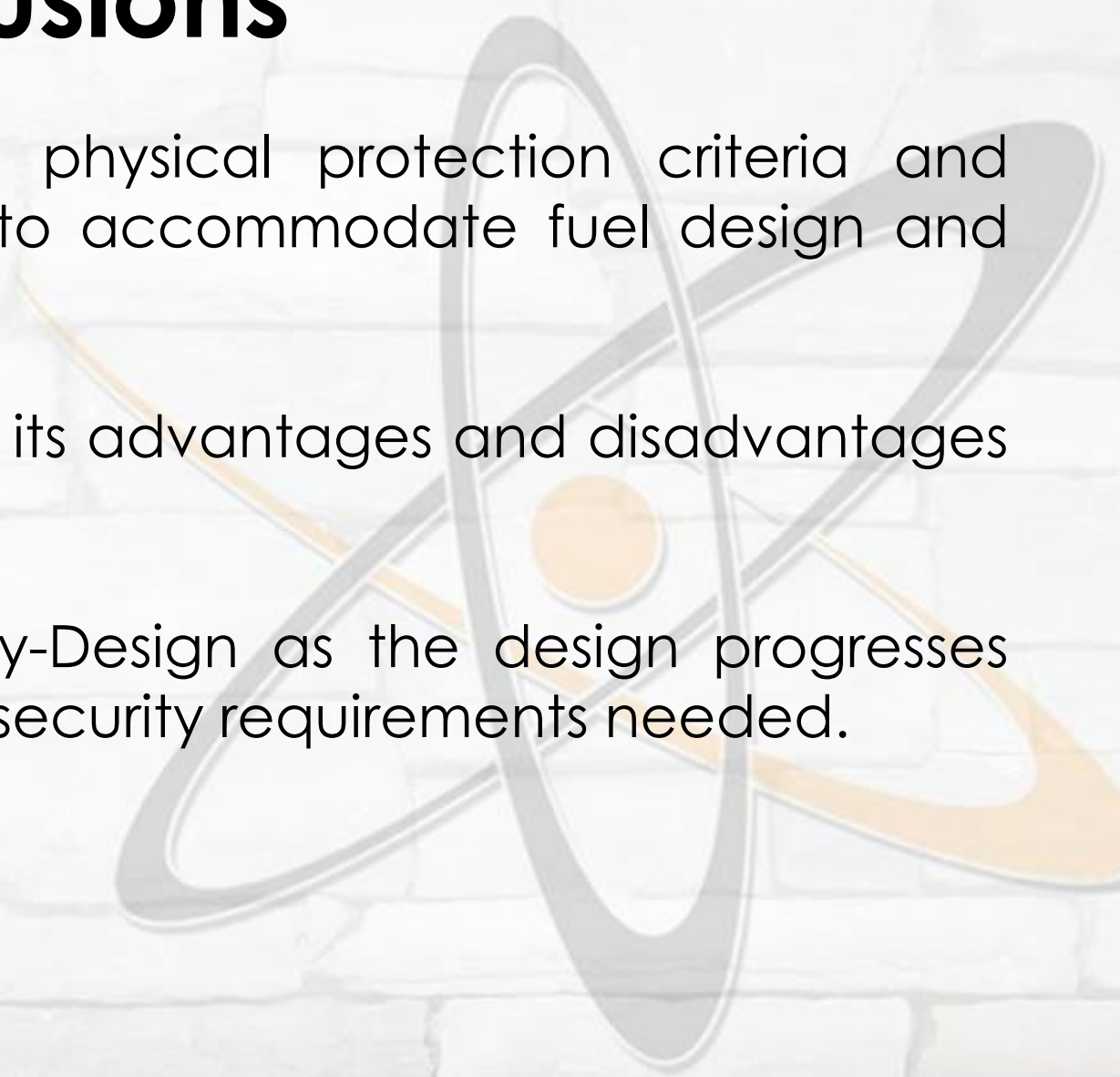
Challenges for I-EPR



Challenges for I-EPR

- ❑ The fuel design of the reactor is pebble bed where the fuel is a collection of nuclear material inserted in small sized spheres containing structural and moderating material and a pebble bed core that will contain a bulk load of spherical fuel elements.
- ❑ The refuelling scheme will use continuous multi-pass cycle where each pebble fuel will go through operation cycles before taken out of the core as a spent fuel.
- ❑ Modularity and size of the reactor which will be a small modular type of reactor will also have impact on the implemented physical protection.

Conclusions

- ❑ There is a need to consider a physical protection criteria and approach more suited specifically to accommodate fuel design and fuel cycle management of EPR.
 - ❑ Modularity and size of the EPR has its advantages and disadvantages compared to common type of NPP.
 - ❑ The implementation of Security-by-Design as the design progresses provides an approach to meets the security requirements needed.
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Thank you

Thank you!

THANK YOU!

Thank you for your attention!

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