



**BADAN PENGAWAS TENAGA NUKLIR**  
Nuclear Energy Regulatory Agency



# **The Status of Decommissioning in Indonesia**

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**Workshop on R2D2P: Cost Estimates**

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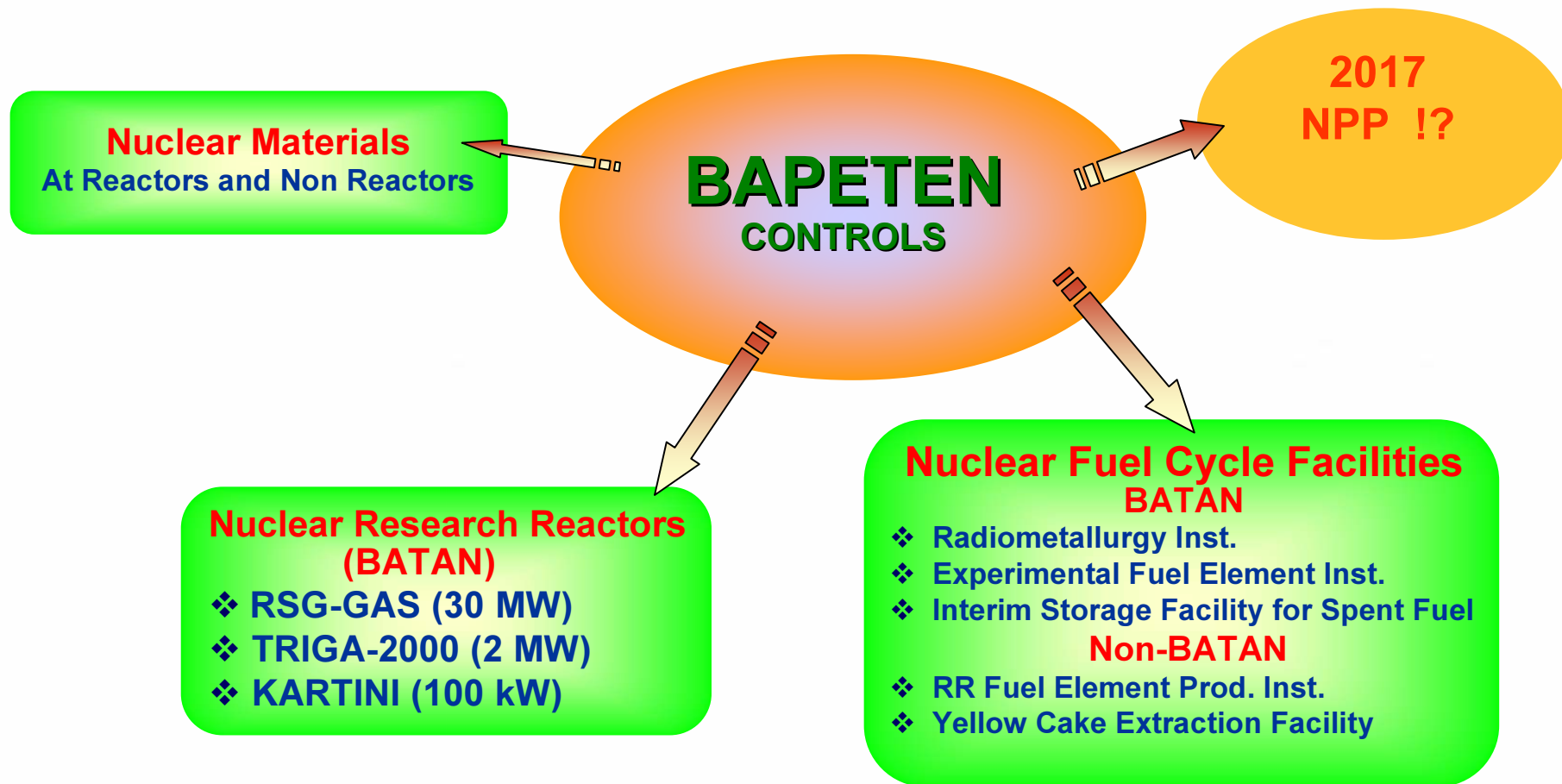
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# Introduction

(1)





# Introduction

(2)

## Research Reactors in Indonesia (Operated by BATAN)

Name of Research Reactors	Reactor Type	Start of Operation	Power	License	
				Type	Year of Expiration
RSG –GAS	MPR	1987	30 MW	Operating	2020
TRIGA 2000	TRIGA	1964 1971 2000	250 kW 1000 kW 2000 kW	Operating	2016
Kartini	TRIGA	1979	100 kW	Operating	2010



# Introduction

(3)

## Hierarchy of Nuclear Regulations

**Act No. 10 / 1997 on “Nuclear Energy”**

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**Government Regulation No. 43 / 2006 on  
“Licensing of Nuclear Reactors”**

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### **BAPETEN Chairman Regulations**

- **No. 07-P / 2002 on “Decommissioning of Nuclear Fuel Cycle Facilities” (Adopting IAEA WS-G-2.4, 2001)**
- **No. 04 / 2009 on “Decommissioning of Nuclear Reactors” (Adopting IAEA WS-G-2.1, 1999)**
- **Draft of Regulation on Exclusion, Exemption & Clearance**



# Regulations on Decom. (1)

## Act No. 10 / 1997 on Nuclear Energy

### Institutions

- ☞ Separation of nuclear regulatory body (BAPETEN) from nuclear executing body (BATAN)

### Regulatory

- ☞ Any utilization of nuclear energy is subject to licensing

### Radioactive Waste

- ☞ Management of radioactive wastes is the responsibility of executing body



# Regulations on Decom. (2)

## Government Regulation No. 43 / 2006 on “Licensing of Nuclear Reactors”

### Article 24:

- The application for decom. approval shall be submitted **within 3 (three) years** before the operation licence expires.
- Documents required:
  - Decommissioning Program,
  - Quality Assurance Program.



# Regulations on Decom. (3)

## Government Regulation No. 43 / 2006 (cont'd)

### Article 27:

- Decom. shall be started within 2 (two) years after decom. approval is granted.

### Article 28:

- Upon completion of the decommissioning activities, the licensee may apply for declaration of release from the regulatory control for unrestricted use.
- Documents required:
  - Decommissioning Report;
  - Radioactive Waste Management Report; &
  - Radiological Survey Report.





# **BAPETEN Chairman Regulation (BCR) on Decommissioning (1)**

## **article 4:**

- 1) The operator shall provide the summary of decom. program in the SAR when applying for operating license.
- 2) The decom. program shall be detailed in a separate document during the operation stage.



## **BCR on Decommissioning (2)**

### **article 5:**

The operator shall review & update the decom. program every 5 years by considering:

- a. changes in an operational process
- b. Decomm. technological developments
- c. New or revised safety requirements
- d. the fluctuation in currency rate.



## **BCR on Decommissioning (3)**

### **article 13:**

The operator shall estimate decom. cost since the preparation stage of the decom. plan.

- (1) The decom. cost shall cover all activities from the planning stage to the final radiological survey.
- (2) In case of deferred dismantling or entombment, the operator shall take into account the additional cost for personnel qualification, surveillance & maintenance, and security.



## **BCR on Decommissioning (4)**

### **article 14:**

- (1)** the operator shall provide the financial guarantee for decom. when applying for commissioning permit.
- (2)** The operator shall adjust the financial guarantee for decom. to the fluctuation in currency rate.



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# **Case Study: Decommissioning of Uranium Purification Facility**



## **Description of the Facility (1)**

- ❑ Operator: Petrokimia Gresik Company
- ❑ Constructed in 1988
- ❑ Production capacity: 60 tons/year
- ❑ To extract uranium from the by-product of Phosphate Acid Production Installation
- ❑ Operation started : April 1989
- ❑ Operation stopped: August 1989, due to no market
- ❑ Yellow cake produced: 8.8 tons



## Result of Characterization Survey








(2)

Zone	Average Ext. Dose Rate ( $\mu\text{Sv/h}$ )	Estimated Int. Dose ( $\mu\text{Sv/y}$ )	Radioactive Material	Chemical Material
I	0.12	15.9	-	37.5 m <sup>3</sup> lime
II	0.18	43.4	1.8 m <sup>3</sup> radioactive slag	76 m <sup>3</sup> solvent 12 m <sup>3</sup> gunk 0.4 m <sup>3</sup> Fe powder
III	0.65	66.3	5.3 m <sup>3</sup> radioactive slag 21.93 m <sup>3</sup> yellow cake	10.5 m <sup>3</sup> solvent
IV	5.73	347.0	1.6 tons (10 drums) yellow cake 6.56 m <sup>3</sup> yellow cake	10 m <sup>3</sup> gunk + solvent 35.7 m <sup>3</sup> gunk



## Decommissioning Schedule

(3)

Activities	Year 1	Year 2	Year 3	Year 4	Year 5
Packaging & Transport of 10 drums yellow cake					
Dismantling of Zone I					
Dismantling & Decont. of Zone II					
Dismantling & Decont. of Zone III					
Dismantling & Decont. of Zone IV					
Packaging & Transport of Rad waste					
Final Radiological Survey					





## **Status of Licensing Requirements**

**( 4 )**

- ❑ The decommissioning activities have been completed, the licensee has already submit the application for release from the regulatory control to the Chairman of BAPETEN.
- ❑ The application has been submitted to the Chairman of BAPETEN by enclosing the following technical documents :
  - ❑ **decommissioning activities implementation report;**
  - ❑ **radioactive waste management activity report; and**
  - ❑ **the report on the implementation of environment monitoring programme, including reports on radiological monitoring and contamination on nuclear installation surroundings.**



## **FINAL DECOMISIONING REPORT (5)**

- Description of the facility**
- Description of the decom. activities;**
- Final radiation survey report;**
- Inventory of materials, equipment premises released from regulatory control;**
- Summary of any abnormal events that occurred during decom.**
- Summary of the occupational and public doses resulting from decom.**
- Lesson learned**



## Cost Estimate

(6)

No.	Items	Cost	
		Billion Rupiahs	Million US\$
1	Salaries	3.03	0.33
2	Waste Transportation & Treatment	12.79	1.41
3	Tools & Materials Procurement	2.50	0.27
4	Contingency (20 %)	3.66	0.40
5	Tax (15%)	3.30	0.36
	<b>Total</b>	<b>25.28</b>	<b>2.79</b>



## **SUMMARY**

- The BAPETEN Regulation which requires the operator (BATAN) to prepare the decommissioning plan during operation phase has been established since Februari 2009.
- BATAN is now preparing the decommissioning programs for the 3 research reactors.
- Decommissioning is very costly. Hence, the planning of decommissioning should start as early as possible.



***Thank you***

***Maraming Salamat***

***Terima Kasih***

