The IAEA 3rd Technical Meeting on the Research Reactor Decommissioning Demonstration Project (R2D2P), Manila, Philippines, 15-19 September 2008

Decommissioning Plan for Research Reactors in Indonesia

OPERATING STATUS OF THE REACTORS

Currently, there are three research reactors operating in Indonesia. Those are Bandung Triga 2000 (2000 kW), Kartini Research Reactor (100 kW), and Siwabessy Multipurpose Reactor (30 MW).

Table 1. Operating data of the research reactors in Indonesia

Reactor	**Bandung Triga 2000**	**Kartini Reactor**	**GA Siwabessy Reactor (RSG-GAS)**
Power [kW]	2000	100	30,000
Type	Triga II	Triga II	MTR
Fuel	UZ_rH	UZ_rH	U_3Si_2-Al (plate)
First Critical	Year 1964	Year 1979	Year 1987
Operator	BATAN	BATAN	BATAN
Application	Research, training and isotope production	Research and training	Research, training and isotope production
Location	Bandung, West Java	Yogyakarta, Central Java	Serpong, Banten, West Java

All the three reactors are in operation

Table 1 shows the data for the three reactors

However, they have different operating experiences, since they were built in different periods.

As from Table 1, Bandung Triga 2000 reactor is the oldest among them.

DECOMMISSIONING PLAN FOR RESEARCH REACTORS
GA Siwabessy Reactor (RSG-GAS)

BASIC DESIGN

Basically, during the reactor design period, the RSG-GAS is designed based on at least some reasons namely, the reactor should be easily safely operated, maintained and decommissioned.

This principle was focused not only to mechanical point of view but also to fuel design, reactor pool, reactor core, instrumentation and control and electrical design. Indeed, most parts of the RSG-GAS plant would easily, safely handled once the commissioning activities to be taken place

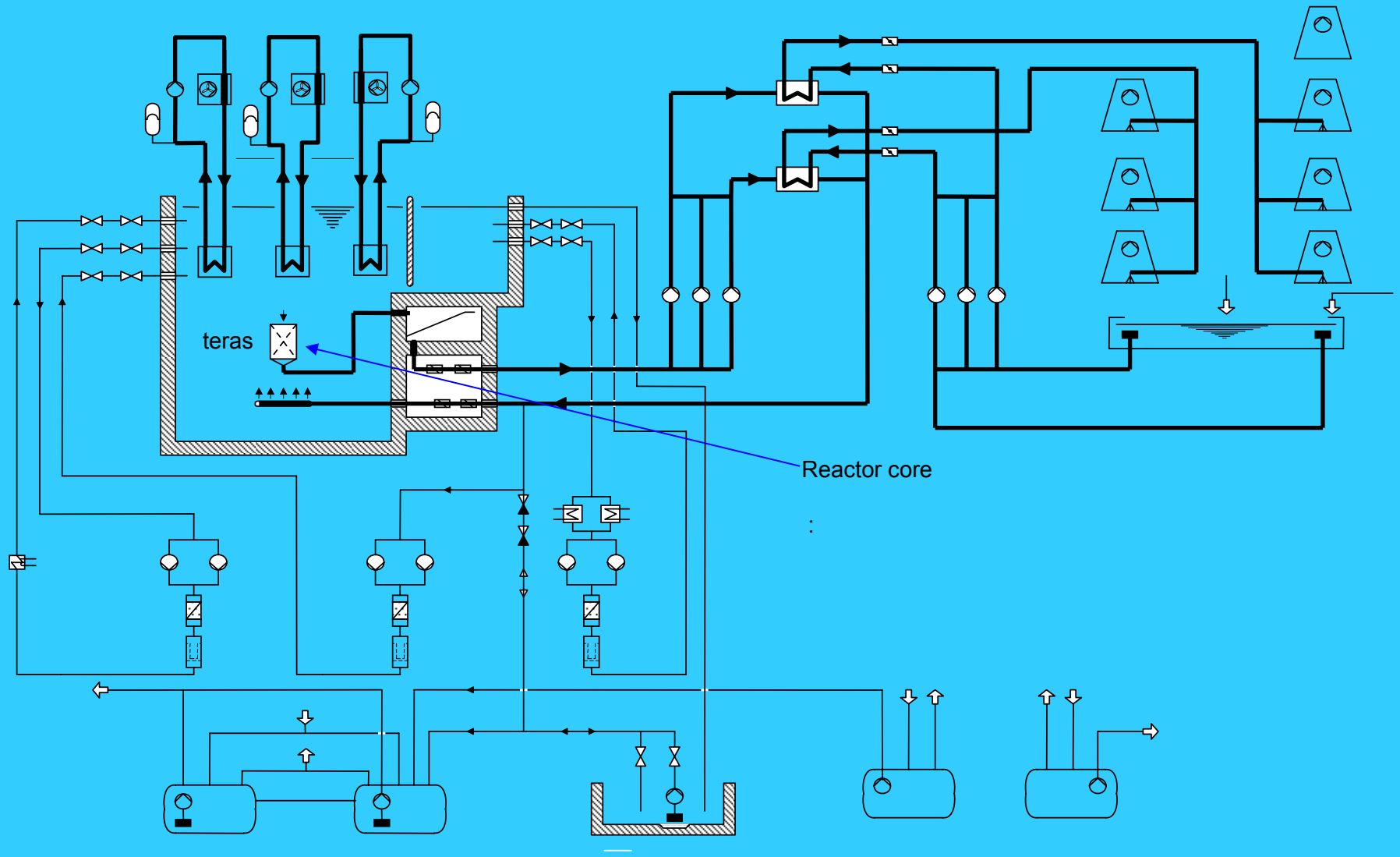
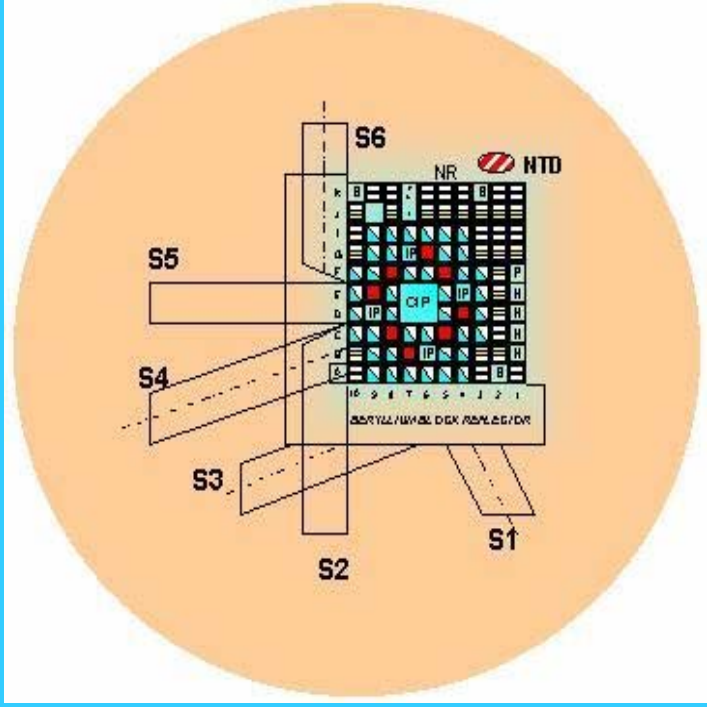
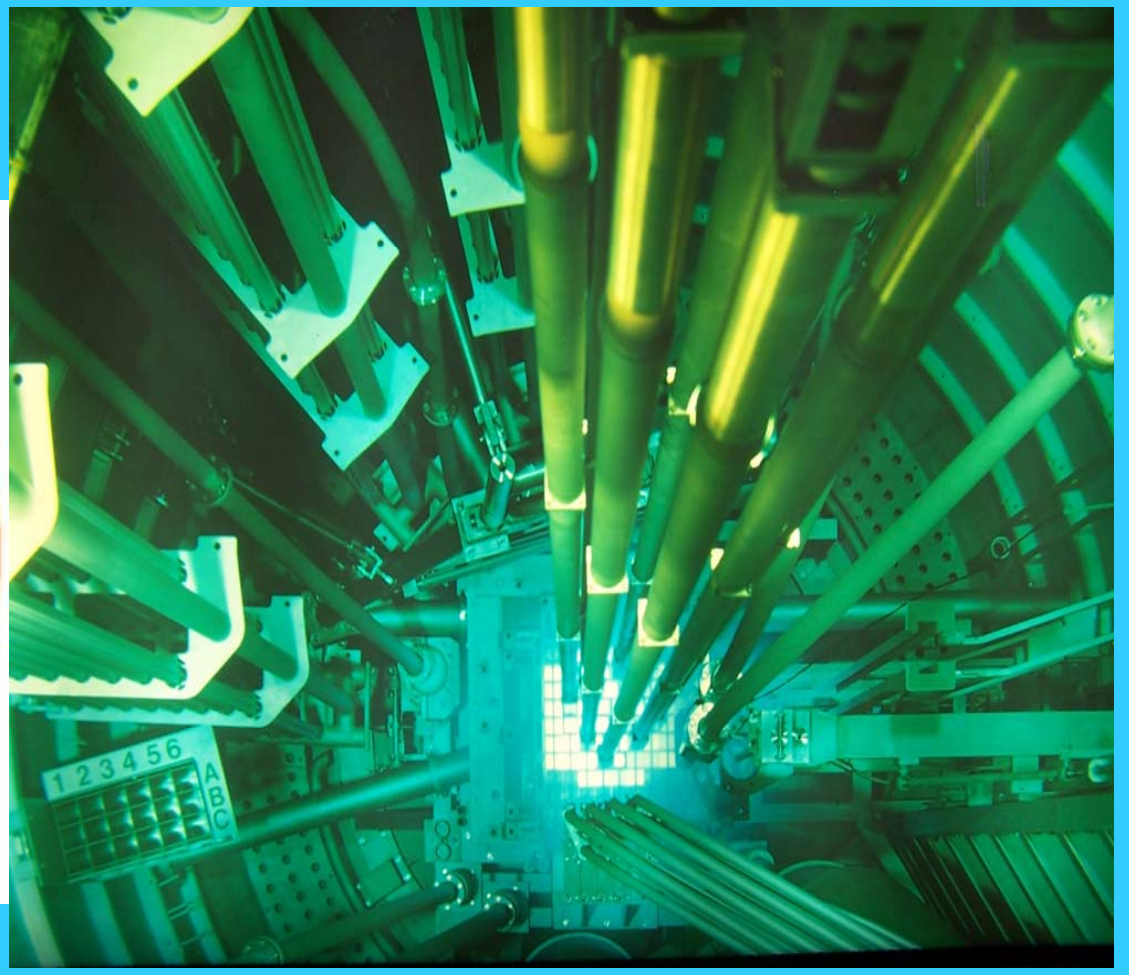


Fig. : Overview of the Main System of RSG-GAS

Reactor Hall

Reactor Core





FACILITY DESIGN OF RSG-GAS

The RSG-GAS pool as well as the core itself can be dismantled partly, and hence making easier to be decommissioned

The RSG-GAS building houses the crane with the capacity of 30 tons.

By using this crane and the space available in the reactor building, the decommissioning of the reactor core plant would be easily handled out of the building through material access available in 0.00 m level of the reactor building.

Indeed, once the policy of decommissioning of the reactor plant will be carried out, the reactor plants will be safely handled

FACILITY OPERATION

To enclose some reactor plants decommissioned, the decommissioned plant can be buried in the waste treatment center area since the center has facility to store medium and high active waste with the capacity of 200 m3.

The reactor building has also a big space available in the level of –9.50 m of reactor building and could be used for burial of the small-size decommissioned reactor plant.

Principally, there are enough facilities in the Puspiptek area which can accommodate decommissioning activities, such as, the burial of the decommissioned reactor plant either completely or partly.

The following components will be the basic sources of activity due to activation and contamination :

Core restraint with core support plate

Beryllium reflector

Beam tubes

Structural material

Parts of the aluminum pool lining

Parts o the heavy concrete of the biological shield

Primary coolant circulating pumps

Heat exchanger

Pipes, valves and components of the primary water purification system

Tubes of the rabbit system and of the in-pile loop

All radioactive waste occurring within the scope of decontamination plus the parts and components which can not be decontaminated are conditioned and conveyed to a storage position.

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Format and Content of DECOMMISSIONING PLAN for Research Reactors in Indonesia (*Under developing*)

Based on IAEA Safety Reports Series No. 45

Chapter	Contents
1	Intrroduction
2	Facility description
3	Decommissioning strategy
4	Project management
5	Decommissioning activities
6	Surveillance and maintenance
7	Waste management
8	Cost estimate and funding mechanisms
9	Safety assessment
10	Environmental assessment
11	Health and safety
12	Quality assurance
13	Emergency planning
14	Physical security and safeguards
15	Final radiation survey

REGULATORY CONTROL

By the law on nuclear energy, any activity of research and promotion of utilization of nuclear energy is conducted by BATAN.

On the other hand, regulatory control of the nuclear energy utilization is under authority of the Nuclear Energy Regulatory Agency (BAPETEN).

For technical aspects, BAPETEN has provided several safety provisions in the form of BAPETEN Chairman Decrees and guidelines.

In the near future, therefore BAPETEN has to prepare the more detail and specific regulations for decommissioning

Table 2 indicates the list of regulations relevant to the research reactor construction and operation.

Table 2. List of regulations relevant to construction and operation of the research reactors

Hirarchy of Regulation	No.	Number/Year of Issue	Topics
Act	1	Act No. 10/1997	Nuclear energy
Governmental Regulation	2	GR No. 63/2000	Safety and health against the utilization of radiation
	3	GR No. 26/2002	Transport safety of radioactive materials
	4	GR No. 27/2002	Radioactive waste management
Pres. Decree	-	-	-
BAPETEN Chairman Decree	5	BCD No. 01/1999	Safety provision on working against radiation
	6	BCD No. 02/1999	Radioactivity limitation in the environment
	7	BCD No. 03/1999	Safety provision on radioactive waste management
	8	BCD No. 04/1999	Safety provision on radioactive transport
	9	BCD No. 05/1999	Safety provision on design of research reactor
	10	BCD No. 07/1999	Quality assurance of nuclear installation
	11	BCD No. 10/1999	Safety provision on operation of research reactor
Guidelines	12	Guide No. 01-P/1999	Safety guide on site evaluation of nuclear reactor
	13	Guide No. 06-P/2000	Safety guide on preparation of safety analysis report for research reactor
	14	Guide No. 04-P/2003	Guide for training the research reactor operator and supervisor
	15	Guide No. 05-P/1999	Guide for emergency response planning

CONCLUDING REMARKS

Currently, there are three research reactors operating in Indonesia.

These reactors are operated by BATAN under control by BAPETEN.

To control all reactors, BAPETEN has provided several numbers of regulations in the form of act, governmental regulation, presidential decree, BAPETEN Chairman decree and guidelines.

However, the regulation specifically concerning decommissioning of the research reactors is still in developing.

REFERENCES

[1] PRSG, Multipurpose Reactor G.A. Siwabessy, Safety Analysis Report, Rev. 9

[2] CRDNT, Safety Analyses Report of the Bandung Triga 2000 Reactor, Rev. 2, 2001

[3] Act No. 10/1997 on Nuclear Energy.

[4] Presidential Decree No. 76/1998 on Establishment of Nuclear Energy Regulatory Agency.

[5] Governmental Regulation on Licensing of Nuclear Reactor (final draft).