



**ANSN Annual Meeting on Regional Advisory Safety Committee for Research Reactors in
Asia Pacific Region (RASCAP) 31 August -4 September 2015 Serpong, Tangerang
Selatan, Indonesia**

Function and role of Safety, Health and Environment Committee at Malaysian Nuclear Agency with Regard to Research Reactor

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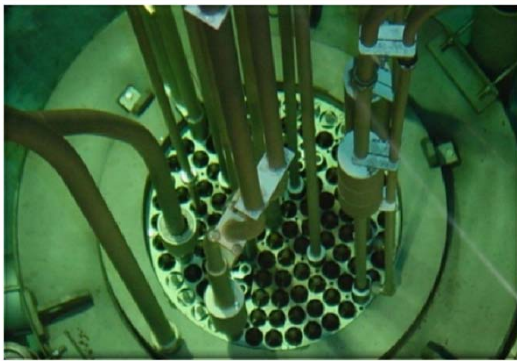
PUSPATI TRIGA Reactor (RTP)

1 MW PUSPATI TRIGA MkII Reactor

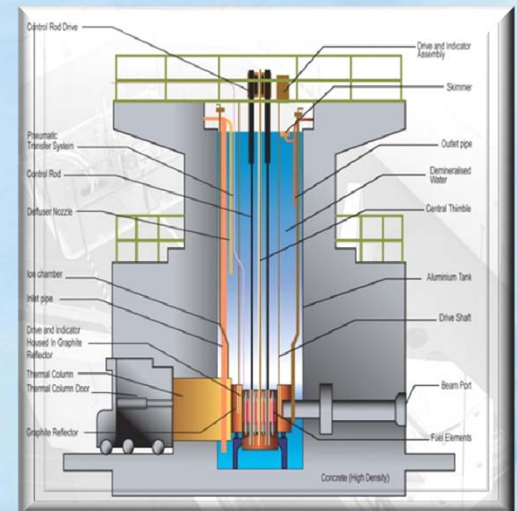
LEU Fuel: UZrH
Control Rod: B₄C
Coolant/Moderator:
H₂O
Reflector: Graphite
No Fuel: 112
No CR: 4
Facilities: 4 beamport,
Incore PTS, Rotary
Rack, DNA, Dry Tube

Utilization:

Training & Education
R & D
Isotope Production
Public Awareness
Programme



Operational since 28 June 1982



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Introduction to Nuklear Malaysia

Established on 19 Sept 1972

Functions

Under Ministry of Science,
Technology and Innovation

Conduct research and development (R&D), services and training in nuclear technology for national development. Promote the application, transfer and commercialization of nuclear technology

Coordination and management of nuclear affairs at national and international levels and as liaison agency for the International Atomic Energy Agency. National Authority for the Comprehensive Nuclear Test-Ban Treaty (CTBT) since 1998



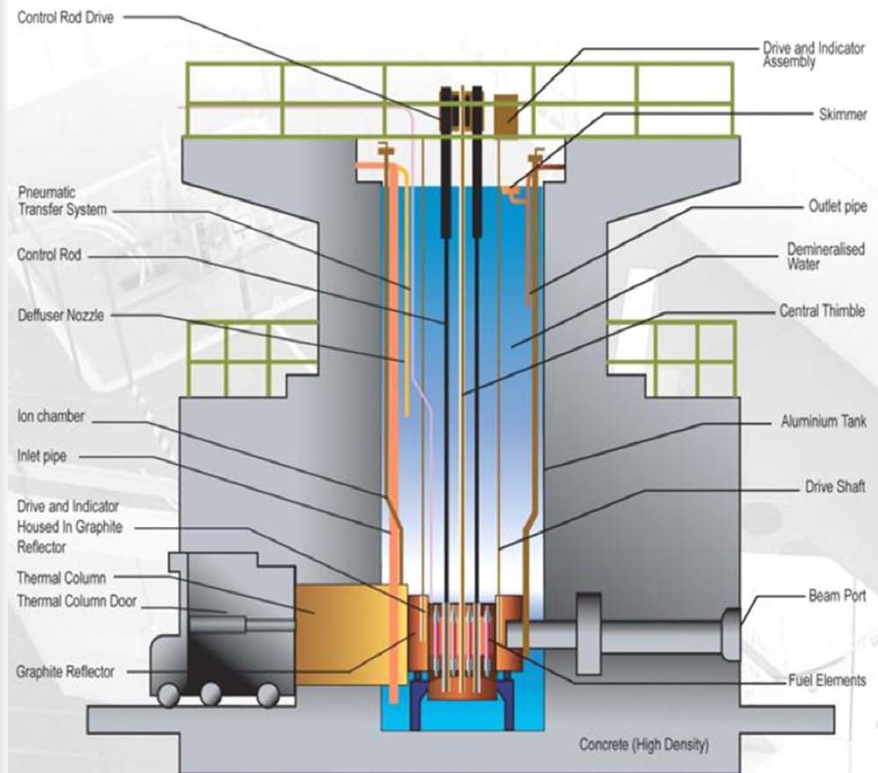
Reactor TRIGA PUSPATI (RTP)

Nuclear research and
development

Radioisotope production

Experimental and training
facilities

Vertical cross section of
reactor TRIGA PUSPATI



Progress at RTP



1982

Criticality

Since June 1982, the reactor has been operated for more than 25,000 hours with energy released of about 16,700 MWhours.

1984 - 1996

New Experimental Facility

Neutron Activation Analysis facility



1984 - current

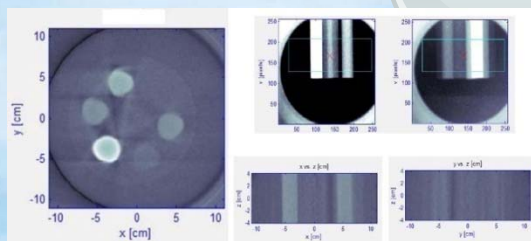
Utilization

2000 - current

Refurbishment & Replacement



Current agenda is mainly on education and training to support NPP



Neutron imaging facility



Primary cooling system upgrading (2010)



Control Console upgrading (2013):

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Organization Chart of Nuklear Malaysia

Director General

Research & Development

Medical Technology

Industrial Technology

Radiation Processing

Agrotech & Bioscience

Waste & Environmental
Technology (BAS)

Research & Innovation
Management

Technical Service

Radiation Safety &
Health (BKS)

**Reactor Technology
Centre (RTC)**

Technical Support

Engineering

**Commercialisation &
Technology Planning**

Irradiation Facilities

Technology
Commercialisation

• SSDL
• Training Centre

Management

Planning &
International
Relations

Administration

Human Resource
Development

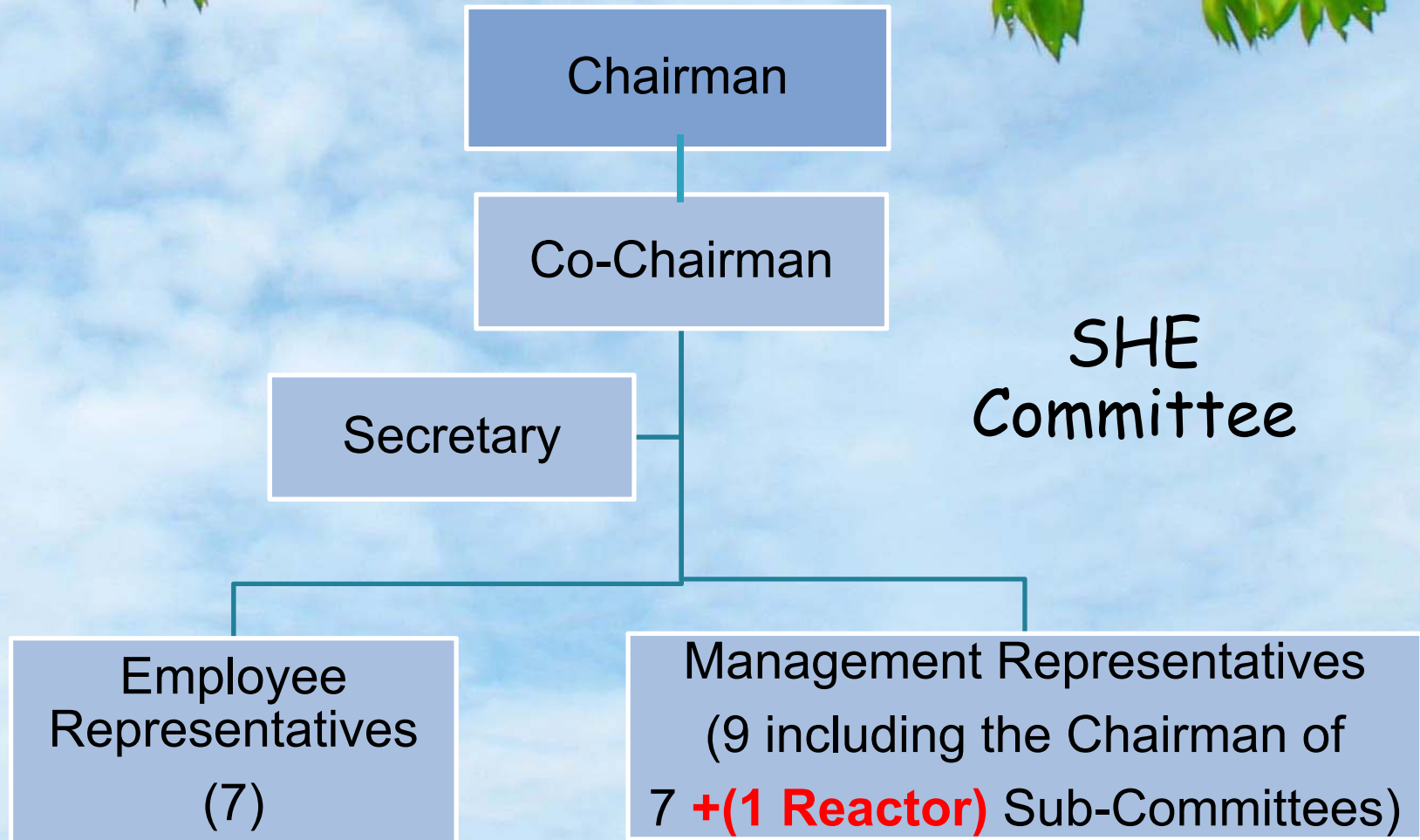
Information
Management



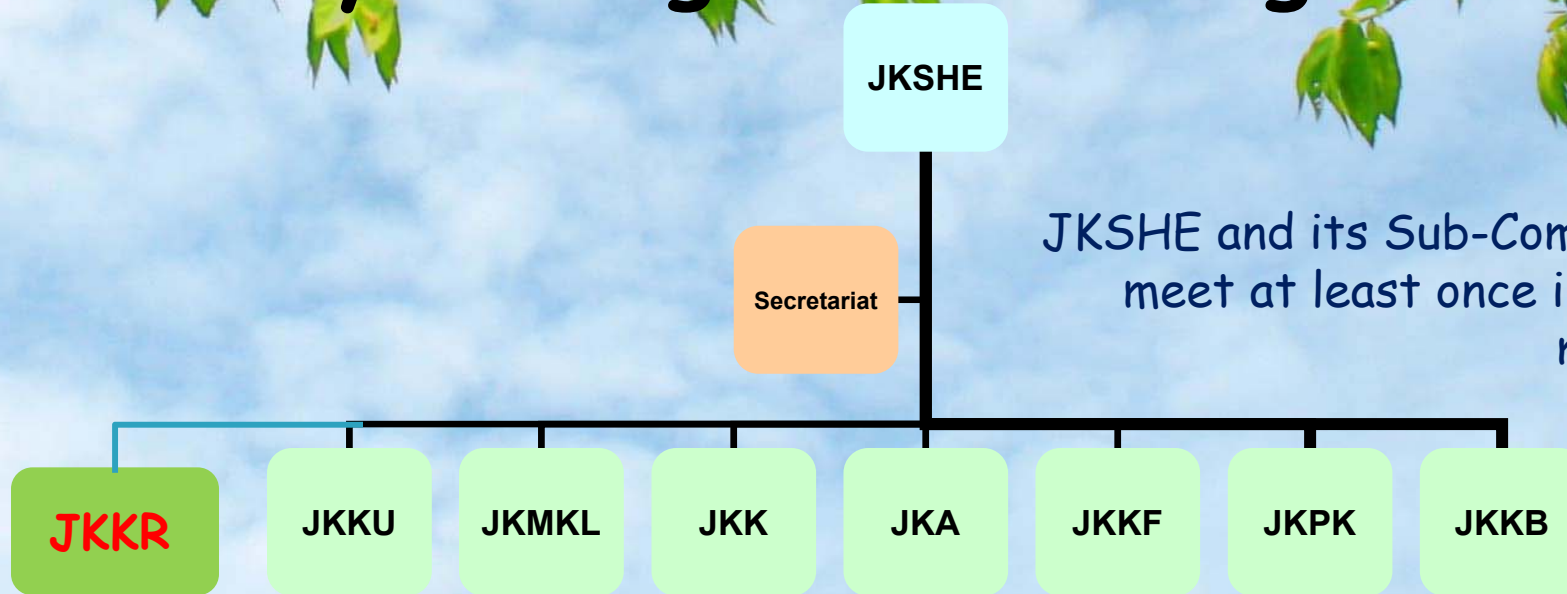
PUSPATI TRIGA Reactor

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Safety Management & Organisation



Safety Management & Organisation



JKSHE and its Sub-Committee meet at least once in three months.

JKKU: Sub-Committee on Major Facilities

JKMKL: Subcommittee on Laboratory facilities and Fieldworks

JKK: Sub-Committee on Emergency

JKA: Sub-Committee on Audit

JKKF: Sub-Committee on Physical Security

JKPK: Sub-Committee Area Supervisor

JKKB: Sub-Committee on Biosafety

JKKR: Sub-Committee on Reactor Safety (Newly established)

Example of Safety Assessment of RTP : For Utilization and Modification

Work Permit : RTP-F37 Rev : 0 2007

Request for Modification -checklist : RTP-F36 Rev : 0 2007

Classification of Work for Work permit and checklist as in IAEA Safety Series No. 35-G2, "Safety in the Utilization and Modification of Research Reactors," IAEA, 1994.

(A) Changes that present a hazard that could have a major safety significance; (Requires approval of **JK-SHE** and **AELB**)

(B) Changes that present a hazard that could have a significant effect on safety; (Requires approval of **JKKU**)

(C) Changes that present a hazard that can only have a minor effect on safety; (Requires approval of **Reactor Manager**)

(D) Changes that present no hazard and have no impact on safety. (Requires approval of **Reactor Manager**)

Safety Assessment of RTP

Experiments

- New experiments / procedures
- Safety significant experiments

Modification

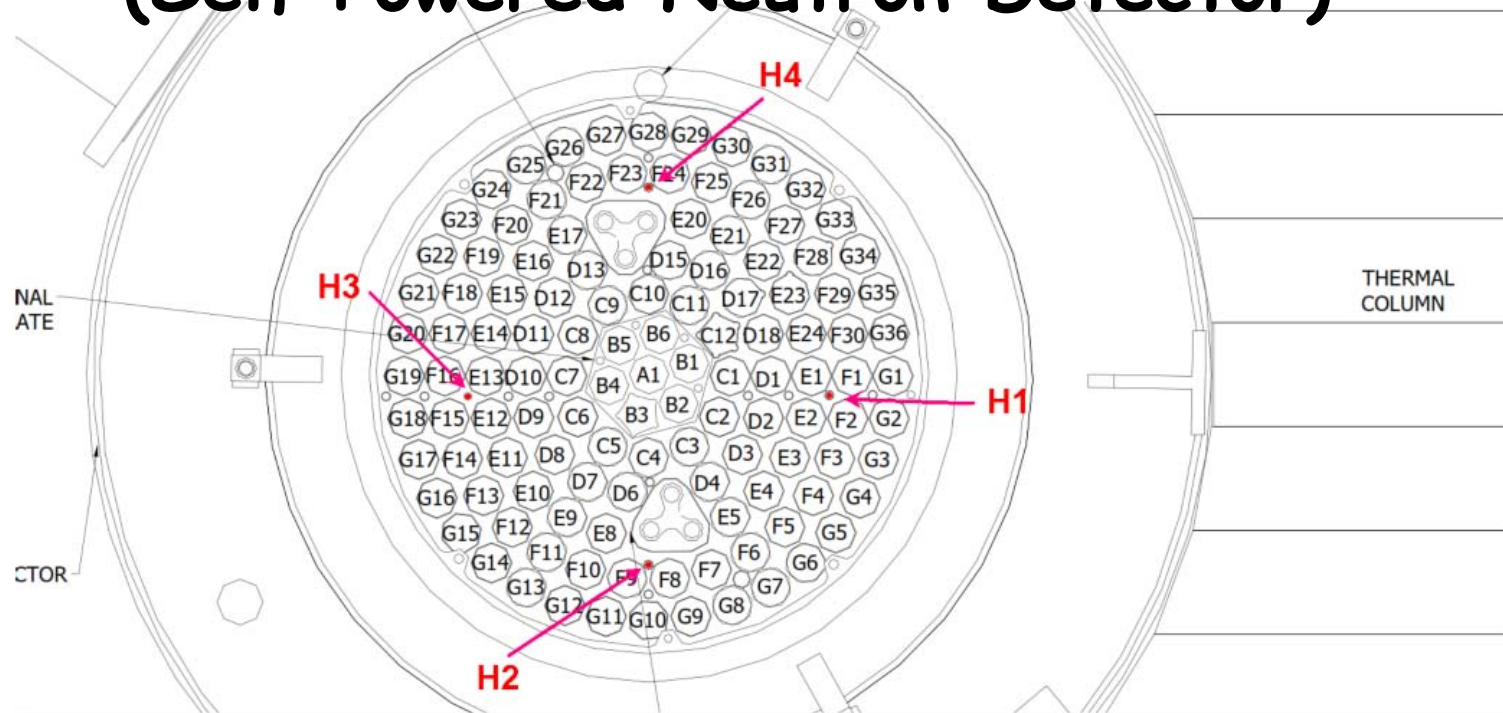
- Affects safety and safety related reactor systems, structures and component

Abnormality

- Safety Significant Events

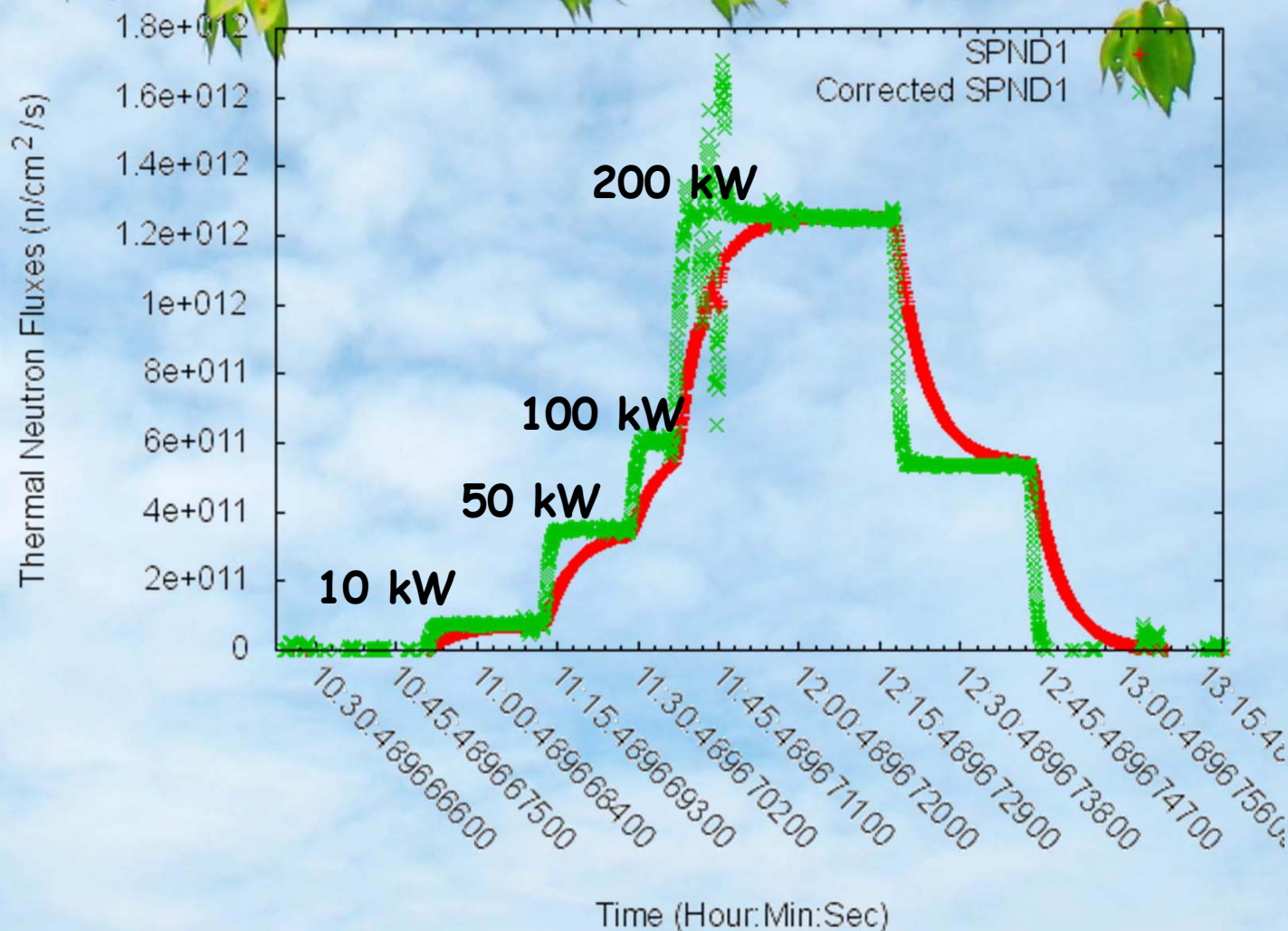
Note: For routine or non safety significant activities/events, evaluation is carried out by the Reactor Supervisor and Manager

Neutron Fluxes Monitoring Facility (Self Powered Neutron Detector)

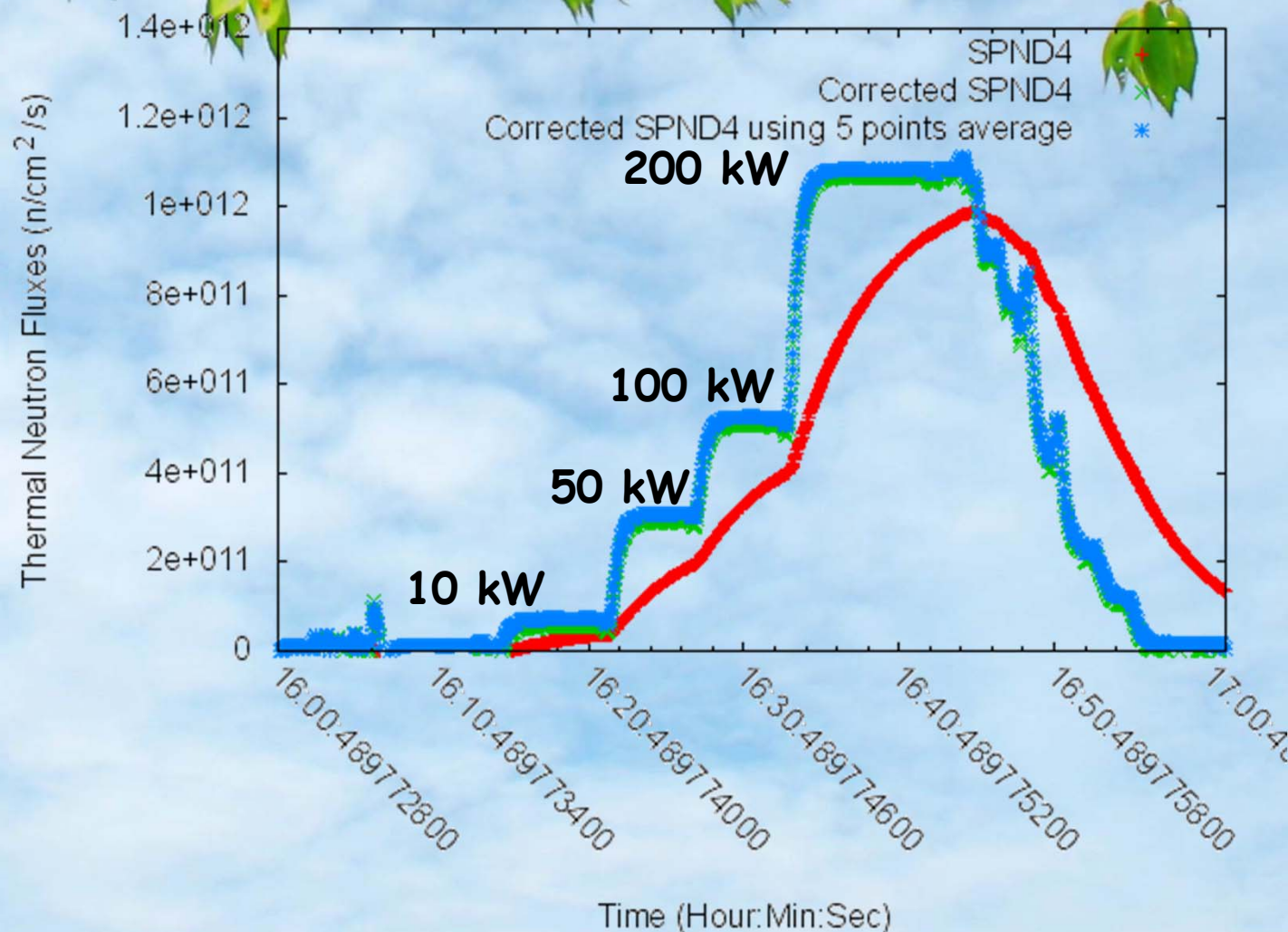


The detector tip is made of Vanadium, fixed onto the Aluminium holder which inserted into the fluxes hole (H1).

Thermal neutron fluxes measured at H1 using SPND1



Thermal neutron fluxes measured at H1 using SPND4



Irradiation Facilities



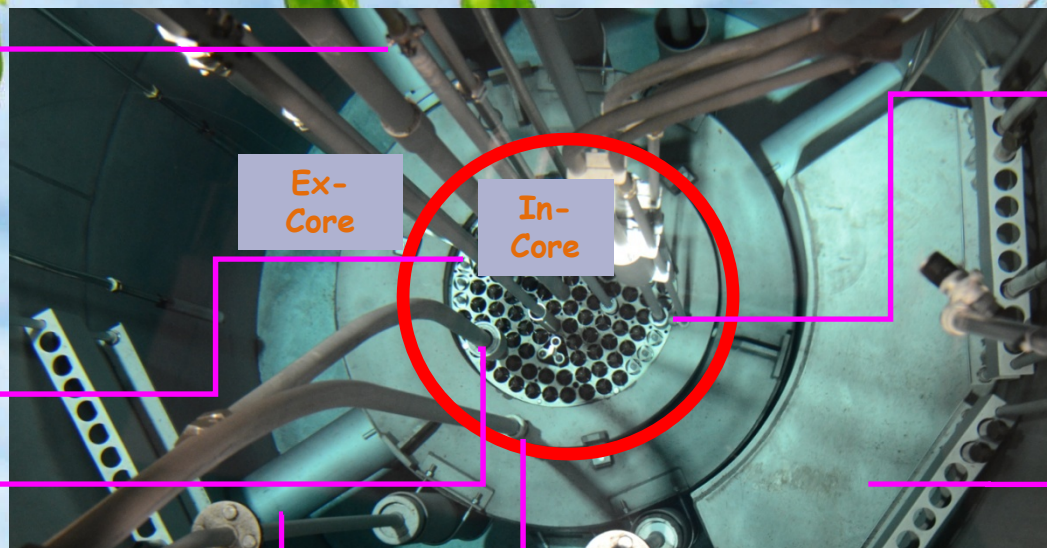
SANS

Pneumatic Transfer System (PTS)

Dry tube



Neutron Imaging



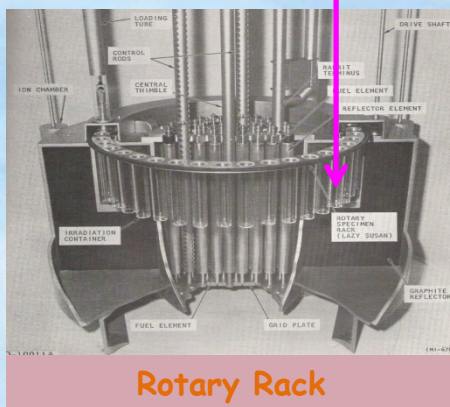
Ex-Core

In-Core

Delay Neutron
Activation
Analysis



Thermal Column



Rotary Rack

Thermal Neutron Flux ($n/cm^2/s$)

In-core	Central timble	1.8×10^{13}
	Rotary rack	1.0×10^{12}
	PTS	4.8×10^{12}
Out-core	SANS	1.0×10^5
	NUR	1.0×10^5

RTP UTILIZATION (cont)

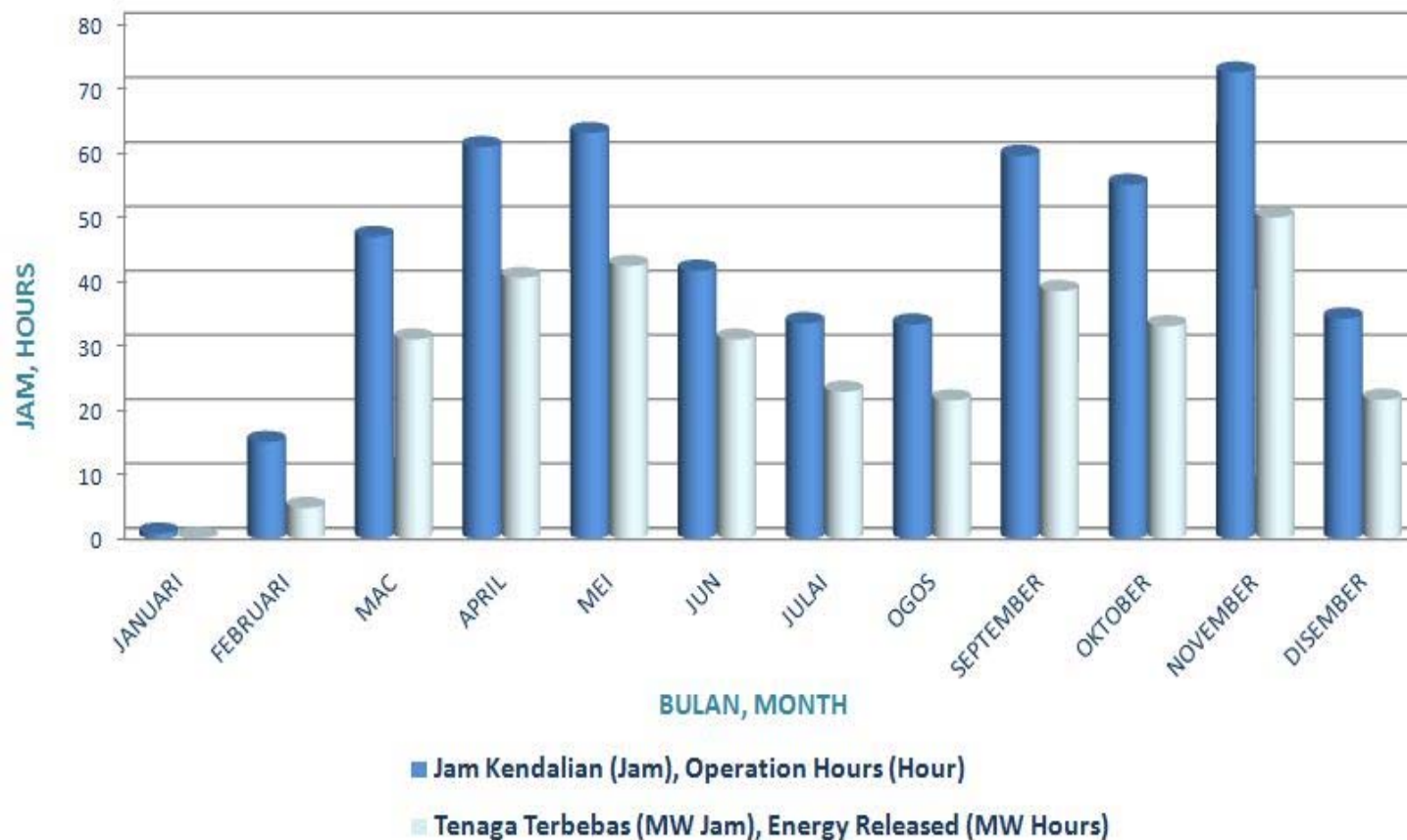
Number of Application for irradiation and Irradiated Samples, 2013

MONTH	Number of Irradiation Application						Number of Sample Irradiated					
	RR	PTS	NuR2	SANS	TC	IC	RR	PTS	NuR2	SANS	TC	IC
Jan	26	19	-	2	1	-	530	339	-	2	3	-
Feb	-	-	-	-	1	-	-	-	-	-	3	-
Mac	21	6	-	-	3	-	289	112	-	-	18	-
Apr	32	21	3	8	2	-	647	346	6	8	6	-
Mei	40	7	1	-	-	5	857	83	1	-	-	55
Jun	-	-	-	-	-	-	-	-	-	-	-	-
Jul	-	-	-	-	-	-	-	-	-	-	-	-
Ogo	-	-	-	-	-	-	-	-	-	-	-	-
Sep	-	-	-	-	-	-	-	-	-	-	-	-
Okt	-	-	-	-	-	-	-	-	-	-	-	-
Nov	-	-	-	-	-	-	-	-	-	-	-	-
Dis	-	-	-	-	-	-	-	-	-	-	-	-
Sub-Total	119	53	4	10	7	5	2323	880	7	10	30	55
Total	198						3305					

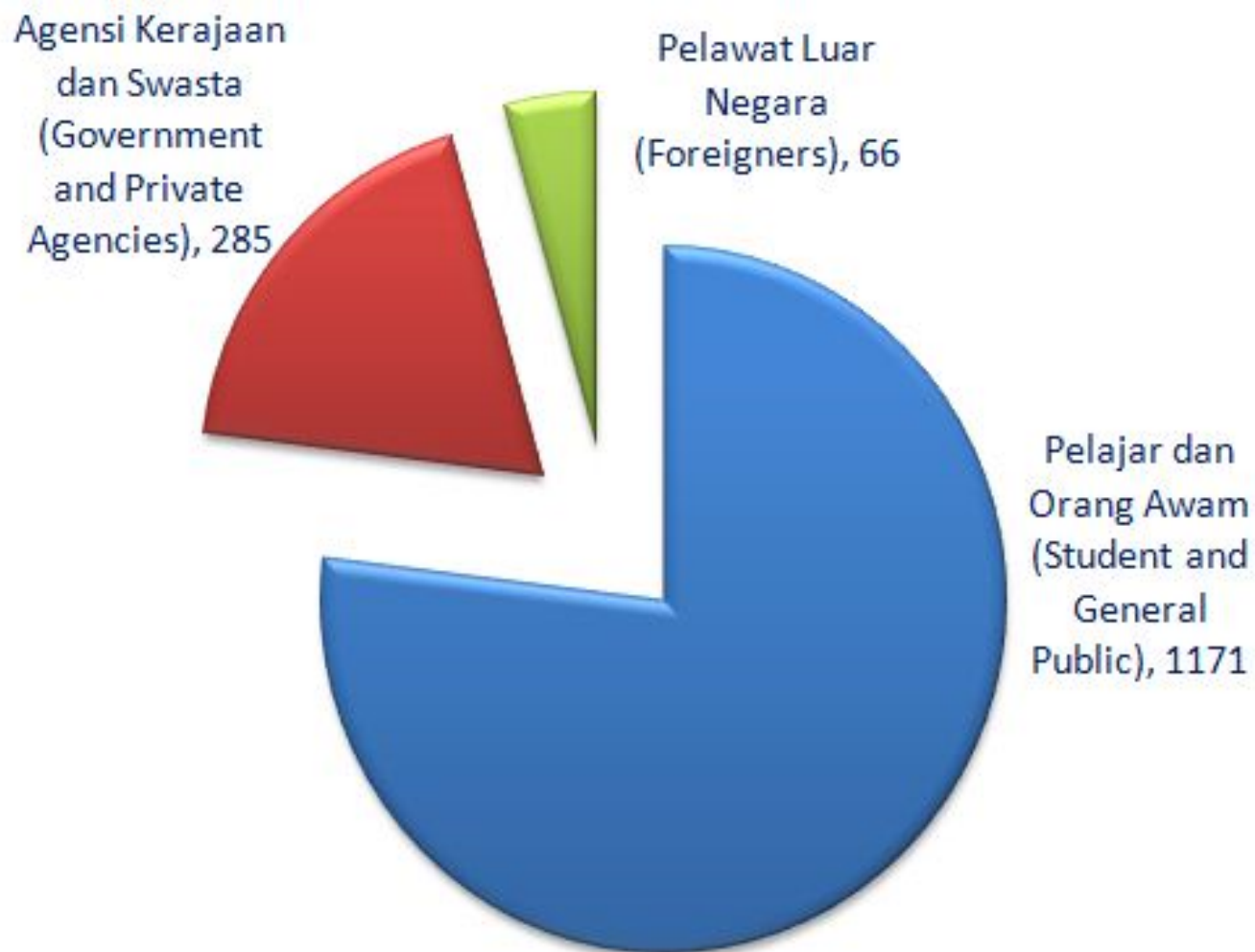
RR: Rotary Rack; PTS: Pneumatic Transfer System ; NuR2 : Neutron Radiography
SANS : Small Angle Neutron Scattering ; TC : Thermal Column ; IC : In Core

Operation and irradiations record in 2014

- RTP has been operated up to **517** hours with a total energy released of **338,000** kWh after 7 months shutdown.
- Within same period, a total of **5483** samples have been irradiated.



Number of visitor to RTP in 2014





Physical and radiation leak test inspection on graphite pile is conducted at thermal column irradiation facilities.



Reactor water temperature device calibration is performed at the platform of RTP.



The gauge for fuel integrity inspection is being installed of its holder.

Fuel and Core;

- core has large prompt negative temperature coefficient of reactivity (excess reactivity insertion causes fuel temperature to automatically terminate power excursion before any core damage occurs. Zirconium hydride possesses a basic mechanism to produce this desired characteristic.

Cooling;

- Convection, large volume of reactor pool water

Control system;

- automatic scram due to limit of fuel temperature, reactor power, power rate, supply cut to the control system; control rod drop by gravity

Reactor building radiation confinement/Ventilation System;

- negative pressure for radiation confinement
- HEPA filter at exhaust with radiation detectors to monitor fission products in case of fuel cladding failure.

Safety Analysis

The postulated accidents considered to occur at RTP are categorized as follows:

- Loss of electrical power supplies
- Reactivity Insertion Accident (RIA)
- Loss of Flow Accident (LOFA)
- Loss of Coolant Accident (LOCA)
- Erroneous handling or malfunction of equipment or components
- Special Internal Events
- External Events
- Human Error Factor

Acknowledgements

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