

IMPLEMENTATION OF SAFETY AND SECURITY CULTURE AT G.A. SIWABESSY MULTIPURPOSE REACTOR (RSG-GAS)



*Technical Meeting on the Safety and Security
Interface – Approaches and National Experiences,
IAEA, 29 Oct – 1 Nov. 2018*

DICKY TRI JATMIKO



**Center for Multipurpose Reactor -
National Nuclear Energy Agency
(BATAN)**

OUTLINE



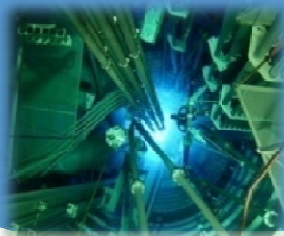
INTRODUCTION



IMPLEMENTATION OF SAFETY AND SECURITY CULTURE at RSG-GAS



THE INTERFACE BETWEEN SAFETY AND SECURITY CULTURE at RSG-GAS



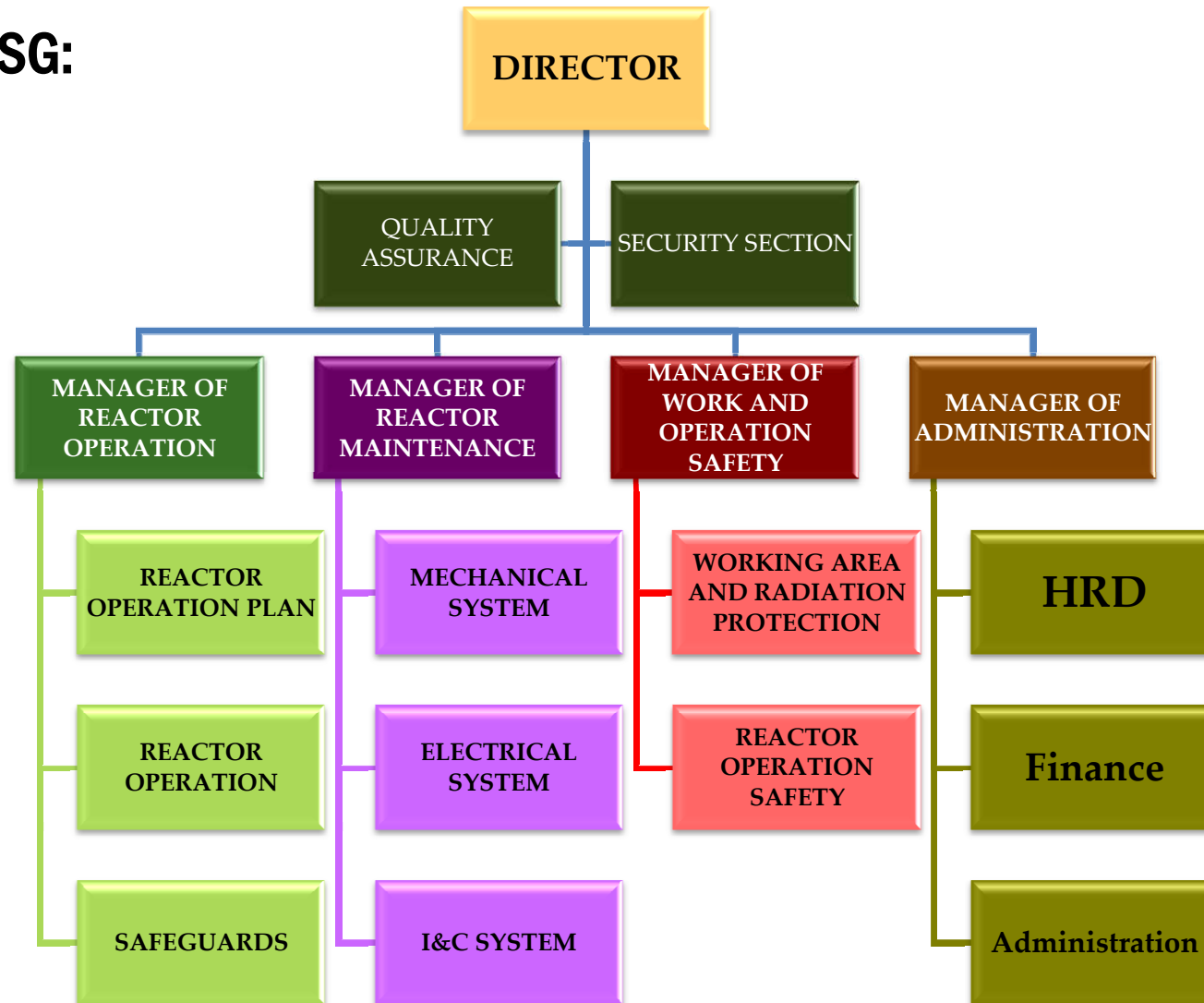
CONCLUSION

**Center for Multipurpose Reactor (PRSG) has the task of carrying out the formulation and control of technical policy, implementation, and guidance in the field of utilization of G.A. Siwabessy Multipurpose Reactor (RSG-GAS)
(BATAN Chairman Reg. No. 21/ 2013)**

Introduction



Structure of PRSG:



- PRSG is responsible for operation of G.A. Siwabessy Multipurpose Reactor (RSG-GAS);
- RSG-GAS is one of three RRs operated by BATAN;
- RSG-GAS as a multipurpose reactor was designed and built by Interatom GmbH, Germany in 1982;
- RSG-GAS is utilized in fulfilling the need of research and application on nuclear technology in Indonesia and regional;
- Indonesia is in cooperation with regional countries and International using RSG-GAS for workshop and other research purposes.

Historical Moment of RSG-GAS



Location

Serpong, West of Java

Construction

1982

Commissioning

1985

First Criticality

1987

Silicide Conversion

1995

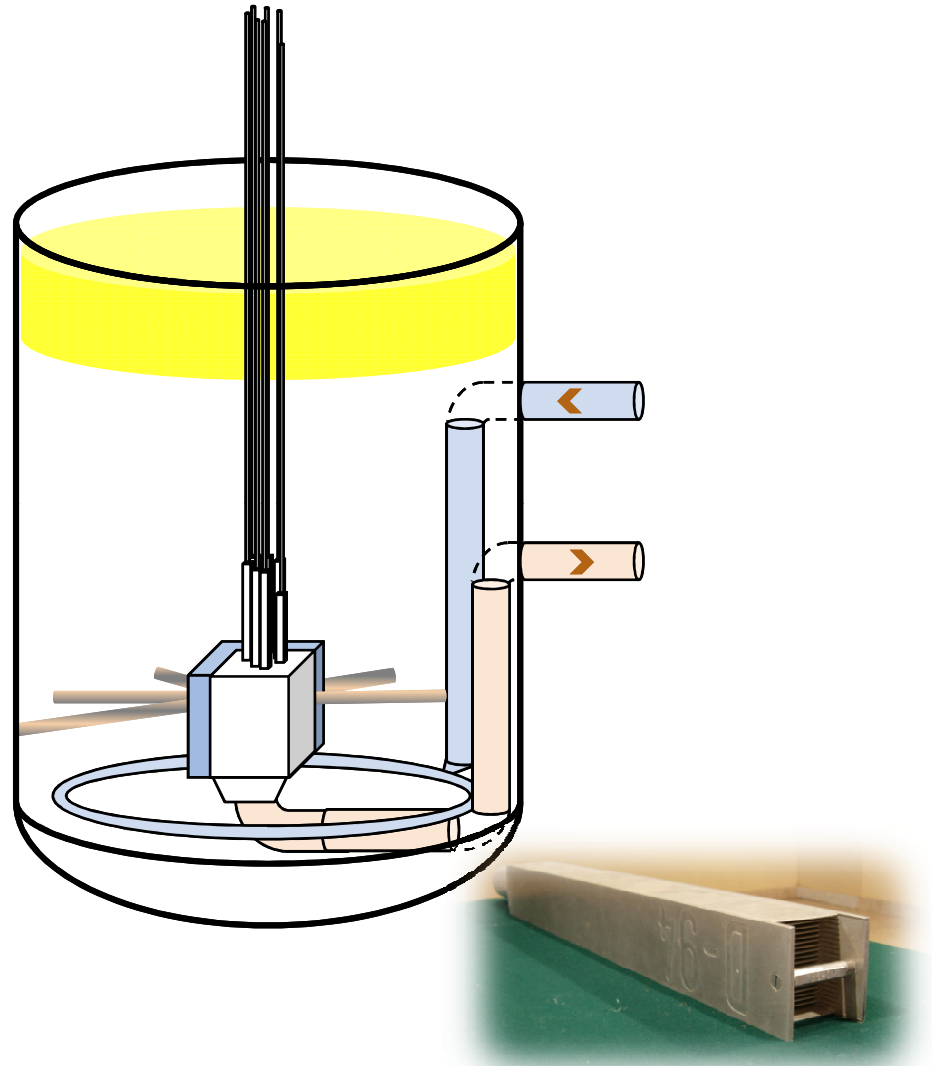
Ageing Program

2000

Reactor Specification



Power	30 MW
Neutron Flux	2.10^{14} n/cm ² .s
Cooling Material	Light Water
Fuel Type	MTR
Fuel Material	U ₃ Si ₂ Al
²³⁵ U Enrichment	19.75 %
²³⁵ U Density	2.96 gr/cm ³
Absorber	Ag -In-Cd
Number of Control Rod	8
Reflector	Beryllium
Number of Neutron Beam	6
Radiation Protection Facility	Warm Water Layer Facility



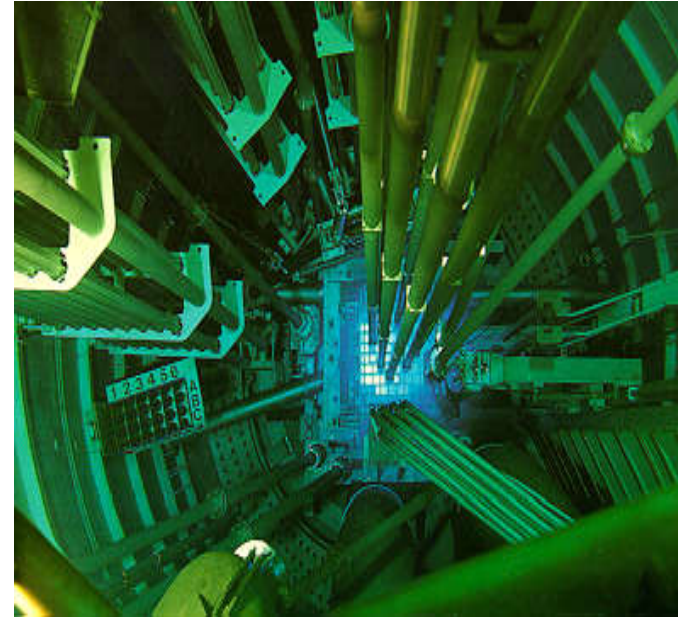
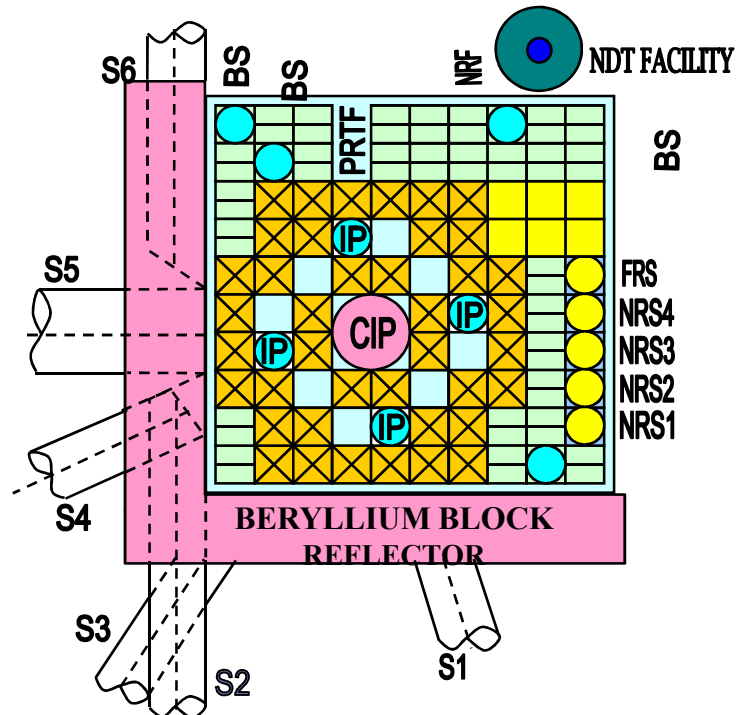
MONTH	DATE																														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
JANUARY	Refuelling (Core 95), Criticality, Rod Calibration, Maintenance (1-M, 1-Y)											Operation I (Core 95)					Stand By	Operation II (Core 95)					Stand By	Operation III (Core 95)							
FEBRUARY		Operation IV (Core 95)					Maintenance (1-M)								Operation V (Core 95)					Stand By	Operation VI (Core 95)										
MARCH		Operation VII (Core 95)					Maintenance (1-M, 3-M)								Operation VIII (Core 95)					Stand By	Operation IX (Core 95)					Stand By					
APRIL	Operation X (Core 95)		Stand By			Maintenance (1-M) Refuelling (Core 96), Criticality, Rod Calibration																	Operation I (Core 96)								
MAY		Stand By	Operation II (Core 96)					Stand By	Operation III (Core 96)				Maintenance (1-M)						Operation IV (Core 96)				Stand By								
JUNE	Operation V (Core 96)					Maintenance (1-M, 3-M, 6-M), Eid Al-Fitr 1439 H																									Operation VI
JULY	Operation VI (Core 96)		Stand By	Operation VII (Core 96)				Stand By	Operation VIII (Core 96)				Maintenance (1-M)						Operation IX (Core 96)												
AUGUST	Stand By	Operation X (Core 96)					Maintenance (1-M), Refuelling (Core 97), Criticality, Rod Calibration											Operation I (Core 97)				Stand By									
SEPTEMBER	Operation II (Core 97)			Maintenance (1-M, 3-M), Revitalization, Supervisor and Operator Training																											
OCTOBER	Maintenance (1-M), Revitalization, Supervisor and Operator Training																														
NOVEMBER		Operation III (Core 97)					Stand By	Operation IV (Core 97)				Stand By	Operation V (Core 97)					Maintenance (1-M)													
DECEMBER	Operation VI (Core 97)		Stand By	Operation VII (Core 97)				Stand By	Operation VIII (Core 97)				Maintenance (1-M, 3-M, 6-M, 1-Y)																		

 Stand By
  Maintenance
  Operation
  Refuelling

 30 MW Operation
  Addition Operation

Drs. R. Heru Umbara

Irradiation Position



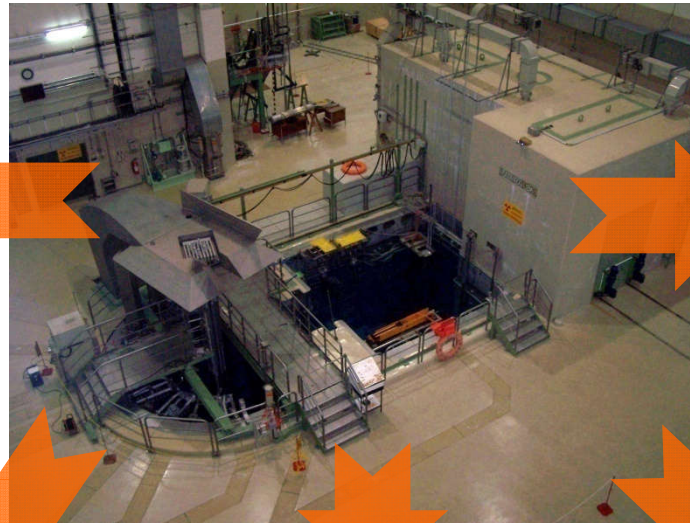
-  Fuel Assembly
-  Beryllium Reflection Element
- BS = Beryllium Stopper (reflector)
- NRS = Normal Rabbit System
- S = Beam Tube
- NRF = Neutron Radiography Facility (out of core)
- PRTF = Power Ramp Test Facility

- CIP = Central Irradiation Position
- IP = Irradiation Position
- FRS = Fast Rabbit System

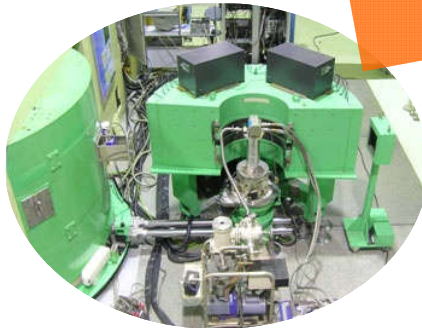
Utilizations of RSG-GAS



RI Production



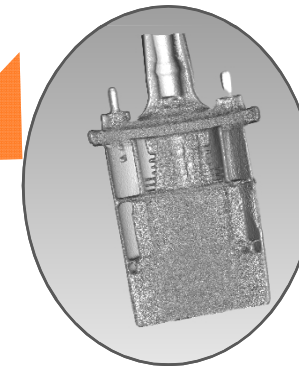
Power Ramp Test



**Neutron Spectrometer and
Diffractometer**



**Neutron Activation
Analysis**



Neutron Radiography

Nuclear Material in RSG-GAS



LEU powder



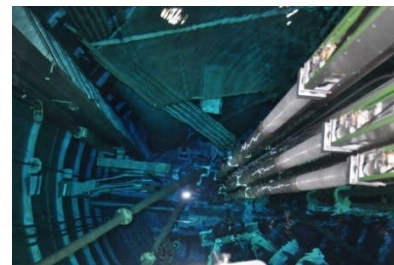
RA source



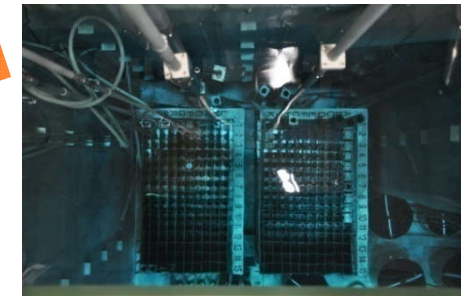
Capsule target



Fuel Element



Irradiated Fuel



Spent Fuel

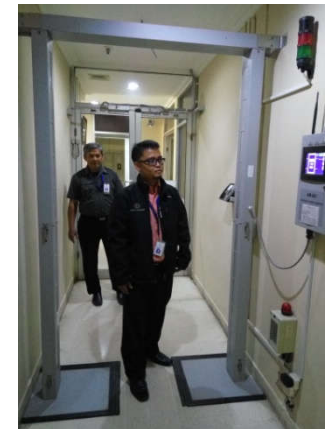
So, in this
case ...



RSG-GAS should be Implement



Safety Culture



Security Culture

Nuclear Security Series No.20; Fundamentals

(1.2) Nuclear security and nuclear safety have in common the aim of protecting persons, property, society and the environment. Security measures and safety measures have to be designed and implemented in an integrated manner to develop synergy between these two areas and also in a way that security measures do not compromise safety and safety measures do not compromise security.



Nuclear Security Series No.20; Fundamentals

E.E.12: ... each competent authority and authorized person and other organizations with nuclear security responsibilities contribute to the sustainability ... by:

- (a) Developing, implementing, and maintaining appropriate and effective integrated management systems including quality management systems;
- (b) 'Demonstrating leadership in nuclear security matters at the highest levels; ...

An Integrated Approach



At Legal Framework

✓ The application of a Safety Culture that is integrated with a security culture that is outlined in the form of guidelines based on cultural values at the National Nuclear Energy Agency

At Regulatory Requirements

✓ Integrating to implementation of 3S at nuclear facility

At Operational Level

✓ All activities rely on that level of action at RSG-GAS

Focusing :

- Plant Operations Review with RSG-GAS Safety Committee
- Work planning and control by Quality Assurance Unit in RSG-GAS
- Design control and configuration management by Safety Operation Sub Div.
- Periodic of Management assessment by Quality assurance and audit

LEGAL ASPECT



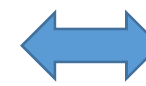
- IAEA-SVS-32
- IAEA NSS
- CPPNM
- CPS



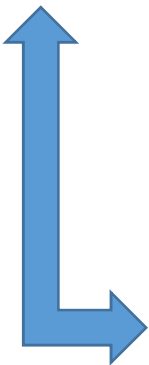
- Act No. 10 of 1997 of Ketenaganukliran;
- GR No. 33 in 2007 about ionizing Radiation Sources Safety and Nuclear Materials Security



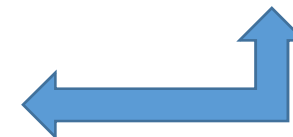
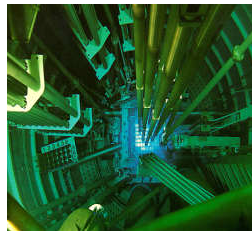
- BCR No. 4 of 2013 about ttg Protection and Radiation Safety in Nuclear Energy Utilization;
- BCR No. 6 of 2015 Safety of Radioactive Source



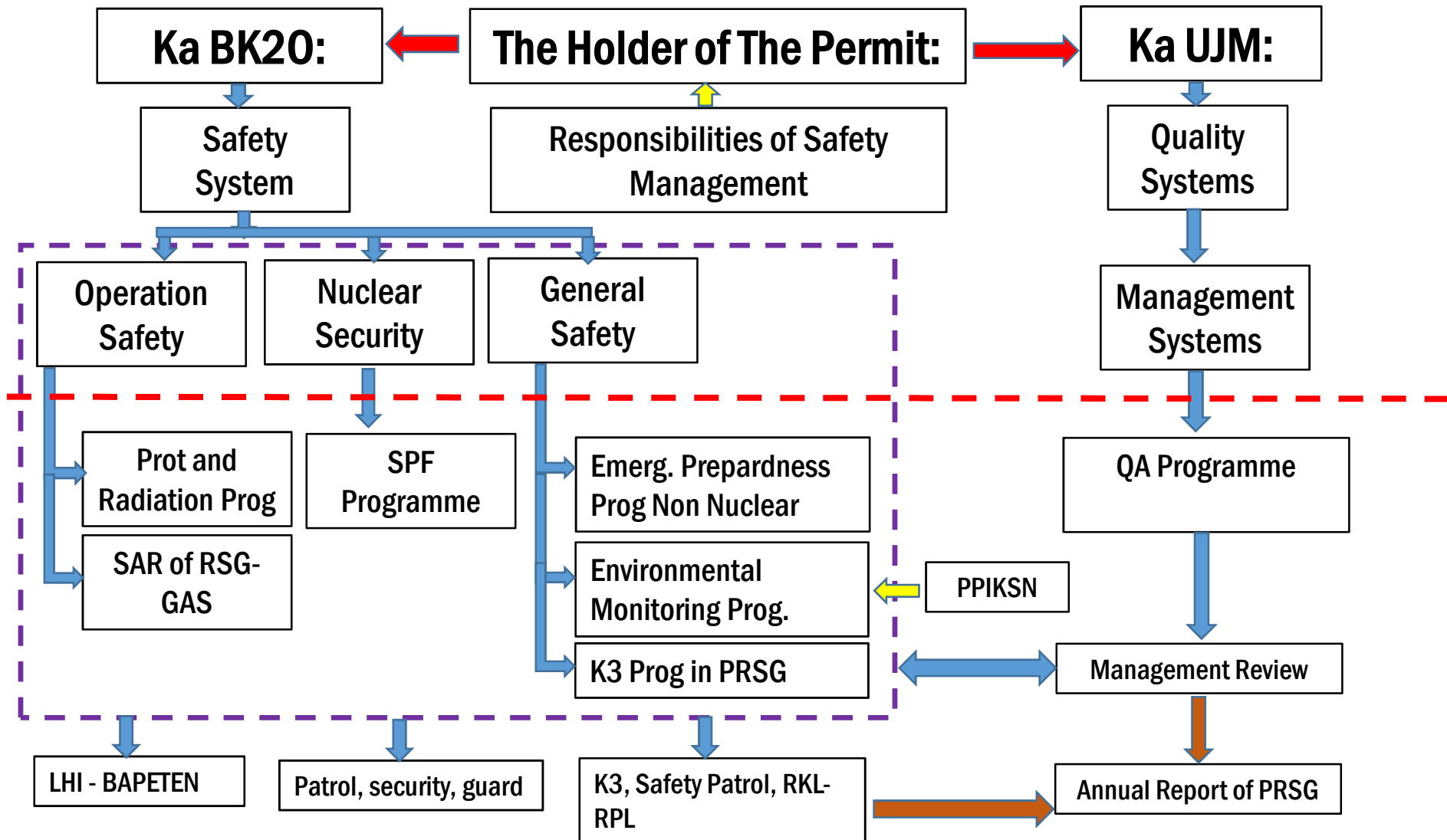
- BCR No. 200/KA/X/ 2012 about Implementation of safety culture
- SB 016 BATAN of 2014 about Protection and Radiation safety in BATAN



RSG-GAS
OPERATION AND
UTILIZATION



MANAGEMENT of SAFETY in RSG-GAS



IMPLEMENTATION OF SAFETY AND SECURITY CULTURE at RSG-GAS



NUCLEAR SAFETY (IAEA SAFETY GLOSSARY):

The achievement of proper operating conditions, prevention of accidents and mitigation of accident consequences, resulting in protection of workers, the public and the environment from undue radiation risks.



NUCLEAR SECURITY (IAEA Security Glossary):

The prevention and detection of and response to, theft, sabotage, unauthorized access, illegal transfer or other malicious acts involving nuclear material, other radioactive substances or their associated facilities.

IMPLEMENTATION OF SAFETY AND SECURITY CULTURE at RSG-GAS



NUCLEAR SAFETY CULTURE

“That assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, nuclear plant safety issues receive the attention warranted by their significance.”



NUCLEAR SECURITY CULTURE

The achievement of proper operating conditions, prevention of accidents and mitigation of accident consequences, resulting in protection of workers, the public and the environment from undue radiation risks.

Safety Culture in RSG-GAS

Implementation of safety management in RSG-GAS refers to several regulations regarding the safety of the operation of the research reactor established by IAEA safety standard and BAPETEN as a regulatory body including the BAPETEN Chairman Regulation No. 4 of 2013 concerning to protection and radiation safety in nuclear energy utilization.



IMPLEMENTATION OF SAFETY CULTURE at RSG-GAS



The occupational safety and operation policy established by the Management of RSG-GAS through the protection and radiation safety program is a legal aspect for the implementation of safety culture in every activity carried out. Compliance with standard operational procedures, supplementing with personal protective equipment and prioritizing the safety of radiation workers, society and the environment is a priority in the implementation of safety culture in RSG-GAS.



IMPLEMENTATION OF SAFETY CULTURE at RSG-GAS



To support the implementation of safety culture in RSG-GAS, the safety equipment used to control radiation exposure doses of radiation workers includes:

- 1. Total Body Monitor (TBM);**
- 2. Hand and Foot Monitor;**
- 3. Radiation Portal Monitor (RPM);**
- 4. Surveymeter;**
- 5. Pen Dosemeter;**
- 6. Thermoluminisence Dosemeter (TLD).**

IMPLEMENTATION OF SAFETY CULTURE at RSG-GAS



Hand and Foot
Monitor



Thermoluminisence
Dosemeter (TLD)



Total Body Monitor (TBM);



Pen Dosimeter



Surveymeter

IMPLEMENTATION OF SAFETY CULTURE at RSG-GAS



Monitoring of contamination and radiation exposure obtained by radiation workers is measured using TBM and RPM. This device is installed at the reactor exit so that it can directly monitor the level of contamination and exposure received by radiation workers. The use of this safety equipment will ensure the application of safety principles in accordance with the procedures established in RSG-GAS.



IMPLEMENTATION OF SECURITY CULTURE at RSG-GAS



Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5) and Bapeten Chairman Regulation No. 1 of 2009 concerning to Provisions for Physical Protection Systems for Nuclear Installation and Materials requires the implementation of a physical protection system against nuclear installations and materials effectively and efficiently.



IMPLEMENTATION OF SECURITY CULTURE at The RSG-GAS



The implementation of the physical protection system in RSG-GAS has the purpose:

1. Minimize or eliminate the possibility of illegally taking nuclear material and sabotage of nuclear materials and facilities ;
2. Counteract the threats faced and localize and rediscover lost nuclear material .



IMPLEMENTATION OF SECURITY CULTURE at RSG-GAS



Furthermore, to support the implementation of the physical protection system, RSG-GAS management also establishes a security culture for all radiation workers in the operation of the reactor. Some of the implementation of security culture carried out in PRSG include the following:



IMPLEMENTATION OF SECURITY CULTURE at RSG-GAS



- 1. Nuclear material must be stored in the area in a protected area ;**
- 2. Entrance as little as possible ;**
- 3. Every person who enters the protection area must be limited to as little as possible ;**
- 4. Everyone who enters must be recorded and checked ;**
- 5. Maintenance is carried out 24 hours ;**
- 6. Monitoring activities continuously .**

IMPLEMENTATION OF SECURITY CULTURE at RSG-GAS



To facilitate the implementation of physical protection, the physical protection system of RSG-GAS is equipped with the following tools. :

- 1. CCTV;**
- 2. Seismic Sensor;**
- 3. Door opening contactor;**
- 4. Passive Infra Red Sensor;**
- 5. Metal Detector;**
- 6. Halogen lamp;**



IMPLEMENTATION OF SECURITY CULTURE at RSG-GAS

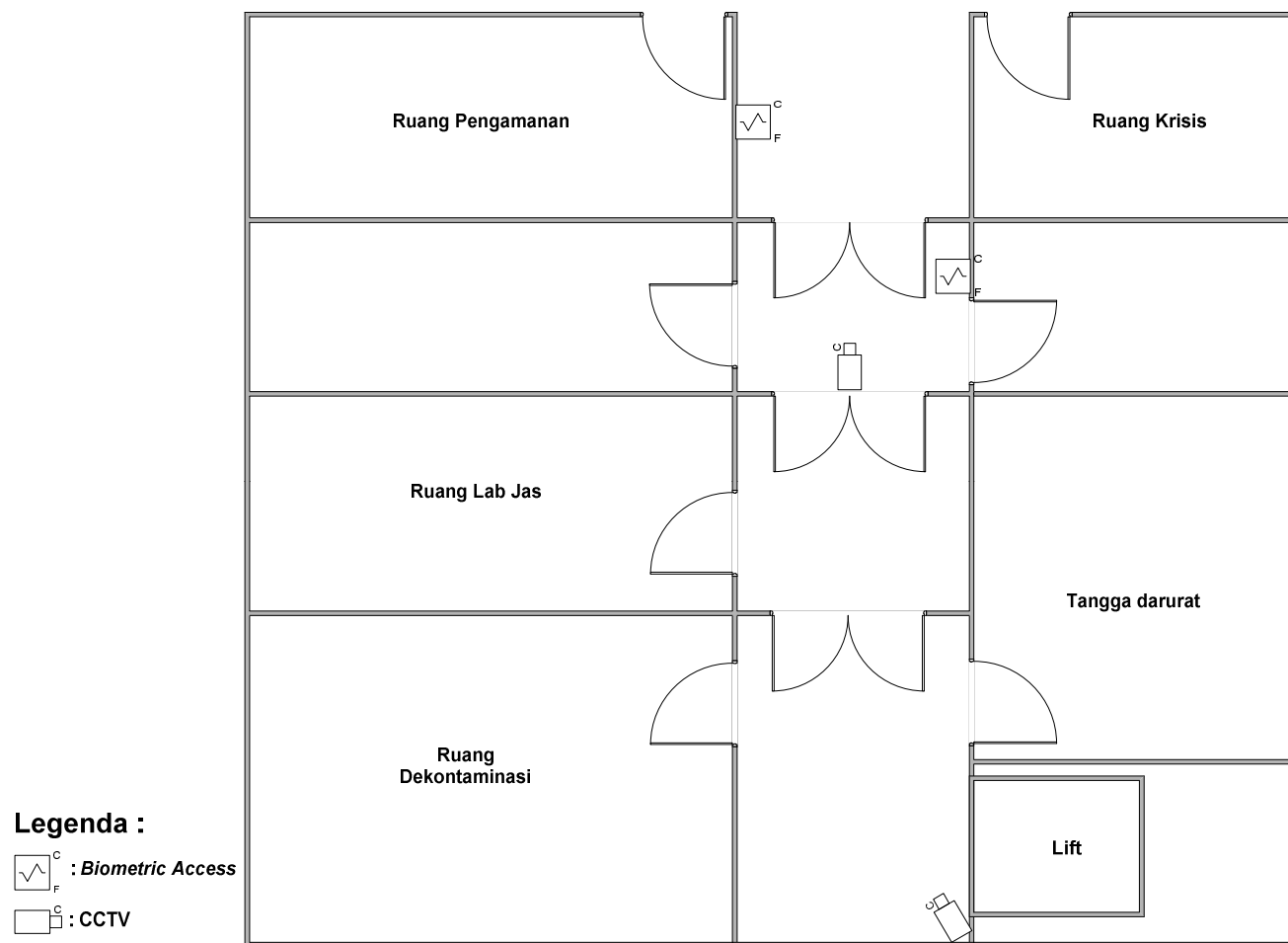


To enter RSG-GAS facility must go through 2 (two) doors, each of which is supervised by:

1. Nuclear Security Unit (NSU) at RSG-GAS

At Door I, every person entered was observed by NSU guard through a camera installed at the entrance. The entrance can only be opened by using an identity card owned by the radiation worker and security officer. Supervision of every personnel who enters using CCTV according to Figure.





Monitoring System to enter facility by MCR

IMPLEMENTATION OF SECURITY CULTURE at RSG-GAS



IMPLEMENTATION OF SECURITY CULTURE at RSG-GAS



2. Main Control Room (MCR),

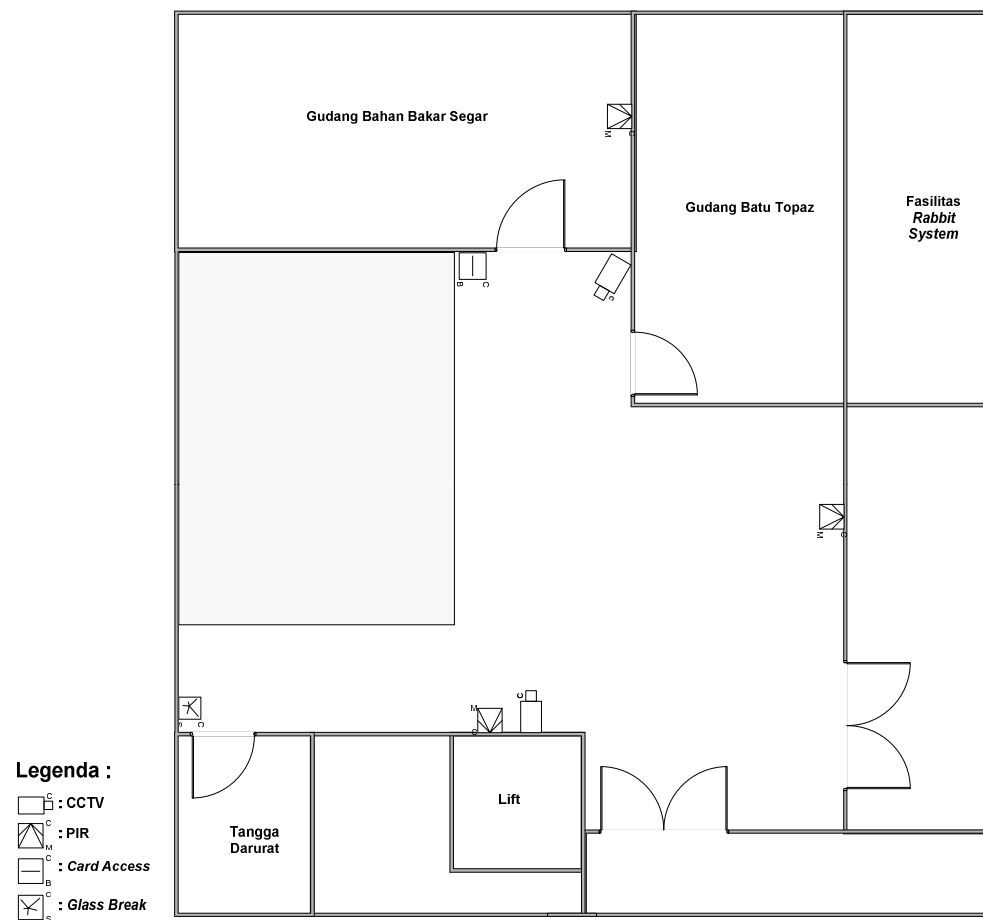
At Door II, every person who will enter must report to the operator and explain the purpose of entering the reactor building, the operator records the person who will enter, then the door to enter the reactor building is released by the operator. Likewise, when out, every person must report to the operator at MCR.



IMPLEMENTATION OF SECURITY CULTURE at RSG-GAS



The fresh fuel storage uses one entrance which is equipped with 2 (two) different key pieces, which are held by different Heads of Sub Division, so that not everyone can enter the fresh fuel storage. In addition to using 2 (two) key pieces, the fresh fuel storage is also equipped with a door opening contactor, so that when the fresh material storage door is opened, the indicator light on the BSS will turn on and the computer will print when the door opens as described in Figure .



Monitoring System for Fresh Fuel Storage

Magnetic Card



2 Keys

Monitoring System for Fresh Fuel Storage

1. Management policy

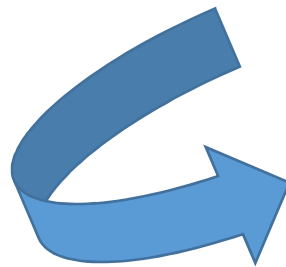
The management of RSG-GAS has established occupational health and safety policies that must be adhered to and implemented for each level of workers. The policy was also enacted to control nuclear material security and RSG-GAS facilities by referring to the security provisions required by BAPETEN. With the determination of management policies for safety and security, it is expected that the operation of the reactor can run safely and securely.



Interface Safety and Security at RSG-GAS



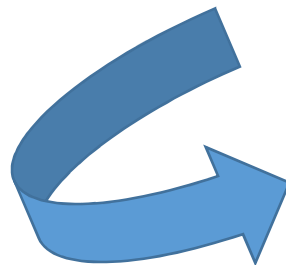
Top Management as the Permit Holder has determined the goals, strategies, plans and objectives of the organization in accordance with the organization's safety and security policy



Interface Safety and Security at RSG-GAS



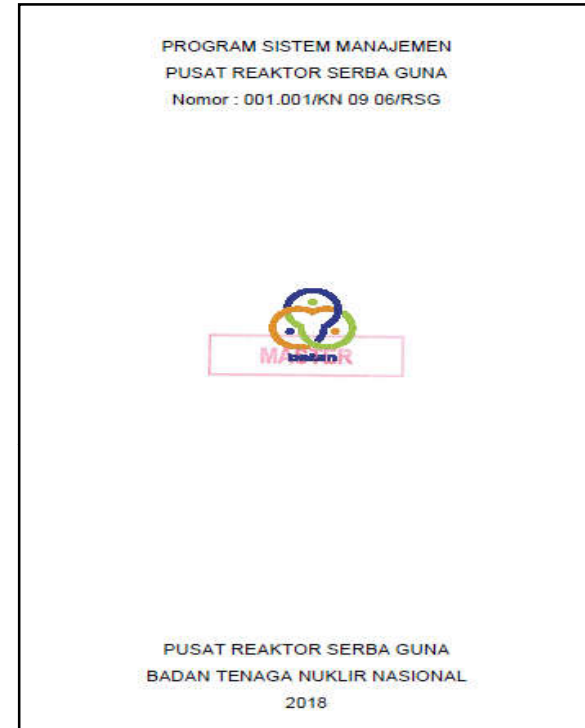
**Top Management as the Permit Holder
continues to develop and manage processes
and activities effectively to achieve
organizational goals without sacrificing safety
and security. (i.e. Daily meeting)**



2. Quality management system

Safety and security procedures have been made to be carried out by each radiation worker and security personnel who work directly or indirectly in operating the reactor. Both safety and security procedures require that every activity in the RSG-GAS must be carried out by a minimum of 2 (two) radiation workers or security personnel consisting of executors and supervisors of activities. This besides **functioning as a radiation protection safety officer also functions as a security guard** to avoid theft, destruction, sabotage or other matters.

(BCR No. 6/ 2015 concerning to Security for RA source, art. 17)



3. Equipment

Safety equipment owned by the RSG-GAS that functions to detect and to control contamination in radiation workers, including Total Body Monitor and Portal Monitor. This equipment is installed at the entrance gate and exits RSG-GAS so that every radiation worker who will enter and exit the reactor must go through this device. Monitoring of incoming and outgoing radiation workers through the monitor in the Main Control Room. Detected radiation workers are contaminated through this equipment then decontamination must be carried out and not allowed to come out of the reactor. In addition to the existing safety equipment, there are also security equipment installed at certain points to detect every person who will enter and exit the RSG-GAS facility. Determination of restrictions on personnel access is also applied as part of RSG-GAS physical protection system.





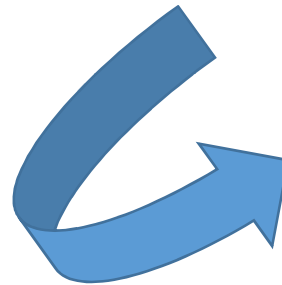
4. Safety and Security Culture

Internalization of the implementation of a safety culture and security culture is an important part of RSG-GAS operation. Workers have strong belief values to implement a safety and security culture and are implemented in every aspect of the reactor's operating activities.

Interface Safety and Security at RSG-GAS



Top Management has integrated its elements, including elements of safety, health, environment, security, quality, human-and-organization, society and economy, so that safety is not compromised.



Interface Safety and Security at RSG-GAS



Top Management has made arrangements with vendors, contractors and suppliers to determine, monitor and manage the supply of goods, products and services that can affect safety and security.



Witness for receive of FE

Interface Safety and Security at RSG-GAS



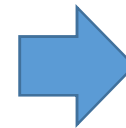
Top Management continues to instill, encourage and maintain a strong safety culture at every level of individuals in the organization.



Jadwal Program K3 – PRSG Tahun 2018



No.	Kegiatan	Jan	Feb	Mar	Apr	Mei	Jun	Jul	Agt	Sept	Okt	Nop	Des
1	Sosialisasi Program K3												
2	Sosialisasi Pengendalian daerah Kerja												
3	Sosialisasi Pemadam Kebakaran												
4	Sosialisasi Pedoman Penilaian Risiko K3												
5	Sosialisasi Pengendalian Personil												
6	Sosialisasi Specific Performance Ind. RSG -GAS												
7	Keg. 5R di Reaktor dan Pemasangan Rambu-rambu												
8	Pengukuran Lux cahaya												
9	Pemantauan Kebersihan Ruangan												
10	Sosialisasi Budaya Keselamatan Pegawai Baru												
11	Workshop Budaya Keselamatan												
12	Sosialisasi Bud. Keselamatan Seluruh Pegawai PRSG												
13	Kaji Diri Budaya Keselamatan PRSG												



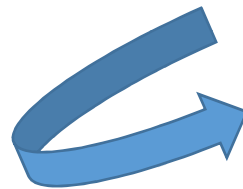
Schedule of K3 at RSG-GAS in 2018

Internalization of Safety

Interface Safety and Security at RSG-GAS



Top Management has held leadership assessments for safety and safety culture in its own organizational environment.



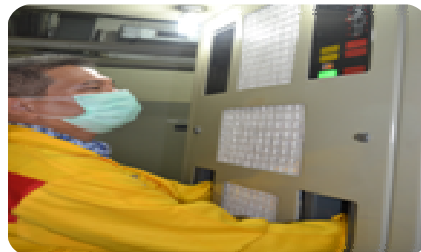
Safety and Security Self Assessment

Access PERSONIL Entrance to RSG-GAS



1. Report (provide information) before doing activity
2. Entrance access with Finger print
3. Used Jas Lab
4. Write number Pen-dosemeter
5. Zero setting
6. Permit to MCR for entrance RSG-GAS

Access PERSONIL Extrance from RSG-GAS



1. Wash your hands

2. Drying Hand

3. Open your shoes cover and placed in the box

4. Measure your Contamination

5. Go Out

6. Permit to MCR for leave RSG-GAS

MATERIAL ACCESS TO REACTOR RSG-GAS



1. Call Main Control Room for obtaining permission to open out door
2. Release the door from MCR
3. Open the Out door

4. Call Main Control Room for obtaining permission to open in door
5. Release the door
6. Open the In door

Indicator to Implementation of Interface Safety and Security at RSG-GAS



1) Management Meeting with Radiation Protection Officer and Safety Guard



2) Accident analysis meeting

Indicator to Implementation of Interface Safety and Security at RSG-GAS



3) Emergency Preparedness Response Nuclear and Non Nuclear



Indicator to Implementation of Interface Safety and Security at RSG-GAS



4) Management meeting for User & Contractor



5) Self assessment



6) Human Resources

CONCLUSION



1. **Implementation of safety culture and security culture in RSG-GAS will create an interface. However, the approach taken by management in the RSG-GAS is in the form of a synergy policy between safety and security resulting in harmonization both of them.**
2. **Safety and security interfaces in such a way that security measures do not compromise safety and that safety measures do not compromise security at RSG-GAS. Thus the gap that may exist between safety and security at RSG-GAS can be minimized and the safety and security interface will support the operation of RSG-GAS so that it can safely and securely.**

Terima Kasih



BADAN TENAGA NUKLIR NASIONAL



Jl. Kuningan Barat, Mampang Prapatan Jakarta, 12710



(021) 525 1109 | Fax. (021) 525 1110



humas@batan.go.id



Humas Batan



@humasbatan



badan_tenaga_nuklir_nasional



Humas Batan



-  Jl. Kuningan Barat, Mampang Prapatan Jakarta, 12710
-  (021) 525 1109 | Fax. (021) 525 1110
-  humas@batan.go.id
-  [@humasbatan](https://twitter.com/humasbatan)
-  [Humas Batan](https://www.facebook.com/HumasBatan)
-  [badan_tenaga_nuklir_nasional](https://www.instagram.com/badan_tenaga_nuklir_nasional)
-  [Humas Batan](https://www.youtube.com/HumasBatan)