CAPACITY BUILDING FOR THE PHYSICAL PROTECTION SYSTEMS STRENGTHENING OF BATAN'S NUCLEAR FACILITIES

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Y. Hasan, I. H. Purnomo, J. Jumadiono

Nuclear Security and Physical Protection Division, BATAN

Email: yhasan@batan.go.id

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INTRODUCTION

R&D of nuclear technology in Indonesia has been operating since the late 1950s, and has contributed in various sectors of life.

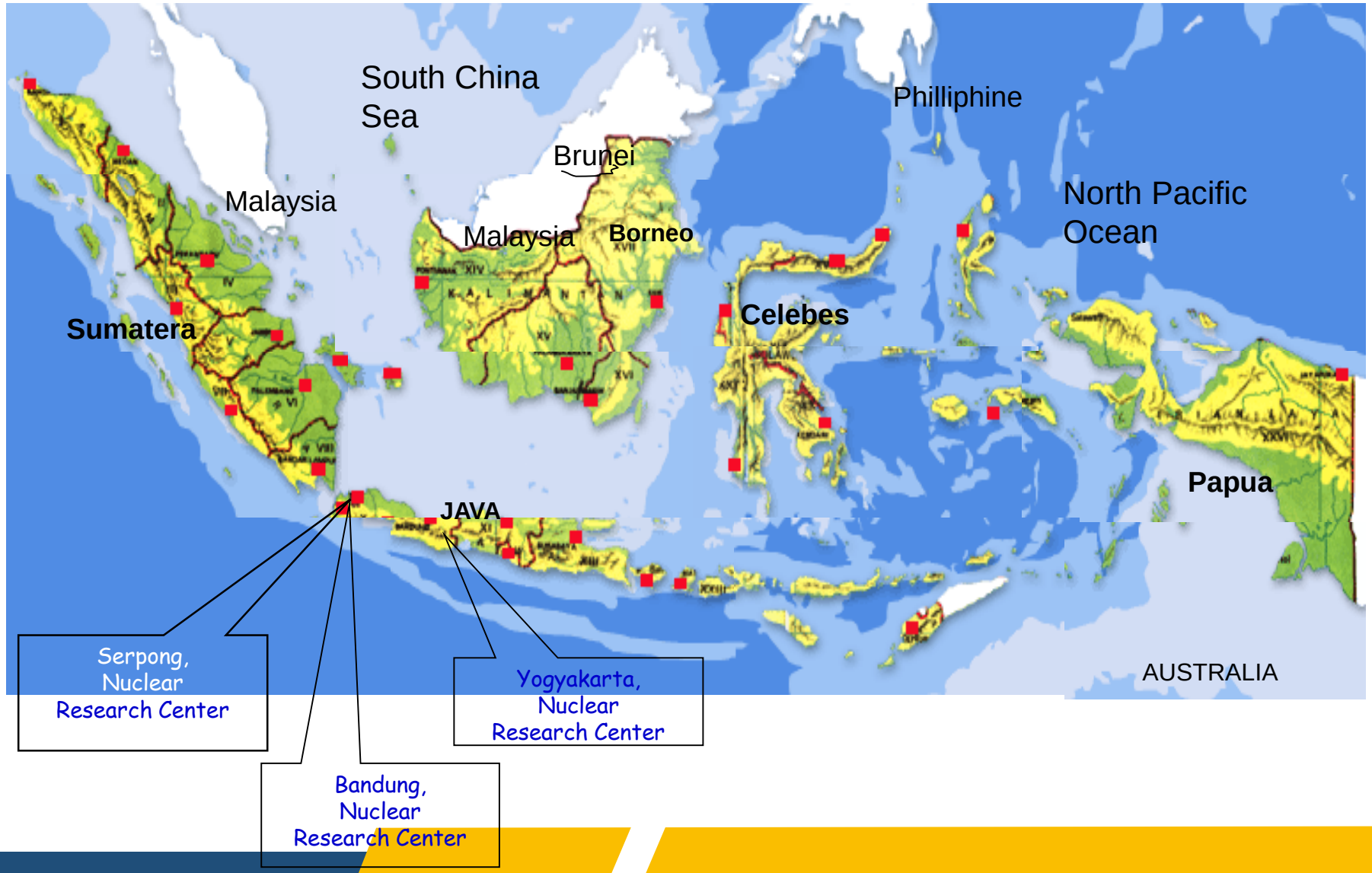
Nuclear R&D is mainly carried out by the National Nuclear Energy Agency of Indonesia (BATAN).

R&D activities are focused on: energy, food, health and medicine, natural resources and environment, industry, and advanced materials. All activities are carried out professionally for peaceful purposes only by taking into account the principles of safety, security, and environment protection.

BATAN, established in 1958, has several decades of experience with operating research reactors: 2MW TRIGA Mark II reactor in Bandung; 100kW Kartini reactor in Yogyakarta; and 30MW G.A. Siwabessy multipurpose research reactor in Serpong.

To ensure the security of nuclear materials and nuclear facilities from various threats, BATAN has implemented physical protection systems according to existing standards developed by IAEA, and maintained and strengthened the system through, among others, capacity building activities.

BATAN'S Nuclear Facilities



BATAN Nuclear Installation and Facility

1. Trigamark 2000, Bandung, start operation since 1965.
2. Pasar Jum'at, built in 1966.
3. Kartini Reactor, 250 kW, in Yogyakarta, built in 1974
4. GA Siwabessy Reactor, 30 MW, Serpong, start operation since 1987

Total : 2800 employees

NATIONAL LEGISLATIVE AND REGULATORY FRAMEWORK ON NUCLEAR SECURITY

- Indonesia is a party to the Convention on the Physical Protection of Nuclear Material (CPPNM) and its Amendment. Indonesia recognizes its responsibility for establishing, implementing and maintaining a physical protection regime against theft and sabotage for all its nuclear facilities.
- Indonesia is also a party to some treaties and conventions on nuclear safety, security, and safeguards, such as Convention on Nuclear Safety, Joint Convention of the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, Convention on Early Notification of a Nuclear Accident, Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency, International Convention for the Suppression of Acts of Nuclear Terrorism, and Treaty on the Non-Proliferation of Nuclear Weapons.
- Indonesia has established and maintained a national legislative framework to govern physical protection of nuclear material and associated facilities.
- The framework for the regulation of nuclear security within Indonesia consists principally of Act No 10/1997 on Nuclear Energy, and Government Regulation (GR) No 54/2012 on the safety and security of nuclear installations. Other regulations relevant to nuclear security are GR 33/2007 on the safety of ionizing radiation and security of radioactive sources, GR 29/2008 on the licensing of ionising radiation sources and nuclear materials utilisation, GR 2/2014 on licensing of nuclear installations, and GR 58/2015 on radiation safety and security in transport of radioactive materials, and BAPETEN's Chairman Regulation (BCR) 1/2009 on the requirement of physical protection of nuclear materials and nuclear facilities, BCR 1/2010 on emergency preparedness and response, and BCR 6/2015 on security of radioactive sources.

STRENGTHENING OF NUCLEAR SECURITY IN INDONESIA

- The threat of nuclear security is increasingly real. Many events that are related to national security threats have recently occurred at some public areas.
- Strengthening of nuclear security basically implies taking the necessary measures to minimize the probability of, prevent the occurrence of, and carry out precautionary actions to mitigate the subsequent damage of, malicious acts involving attacks or sabotage to nuclear facilities or misuse of nuclear material. Such measures are directed to provide adequate physical protection from attacks and irresponsible hands.
- Indonesia has hosted three IAEA International Physical Protection Advisory Service (IPPAS) missions that were conducted in 2001, 2007, and 2014. The missions reviewed legal and regulatory basis for the physical protection of nuclear activities, and the implementation of physical protection in three research reactors of BATAN. The missions gave some recommendations for developing the design basis threat and training in sabotage and vital area analysis, upgrading and improving physical protection of nuclear material and nuclear facilities.

- BATAN has undertaken various efforts to maintain and strengthen the physical protection systems and measures in order to fulfil national regulation and the IPPAS recommendations. BATAN has conducted physical protection upgrades mainly at the three research reactors in cooperation with U.S. Department of Energy (USDOE). Physical protection upgrades include heavily improvement to motion detector sensors and security cameras to detect unauthorized access, and fortified central alarm stations that allow on-site guards the ability to monitor alarms and security cameras and communicate with response forces.
- Additionally, in organizational aspects, BATAN has since 2014 re-organized itself to emphasise nuclear security by establishing a special division devoted to nuclear security, physical protection, and safeguards. This division is to coordinate all activities in nuclear security, physical protection, and safeguards in BATAN.
- In addition, in September 2014, BATAN opened a Center for Security Culture and Assessment (CSCA) to promote research on nuclear security culture and its assessment method, to give expert support for dissemination of security culture, and to build networking and collaboration with external organizations at the national, regional and international level.

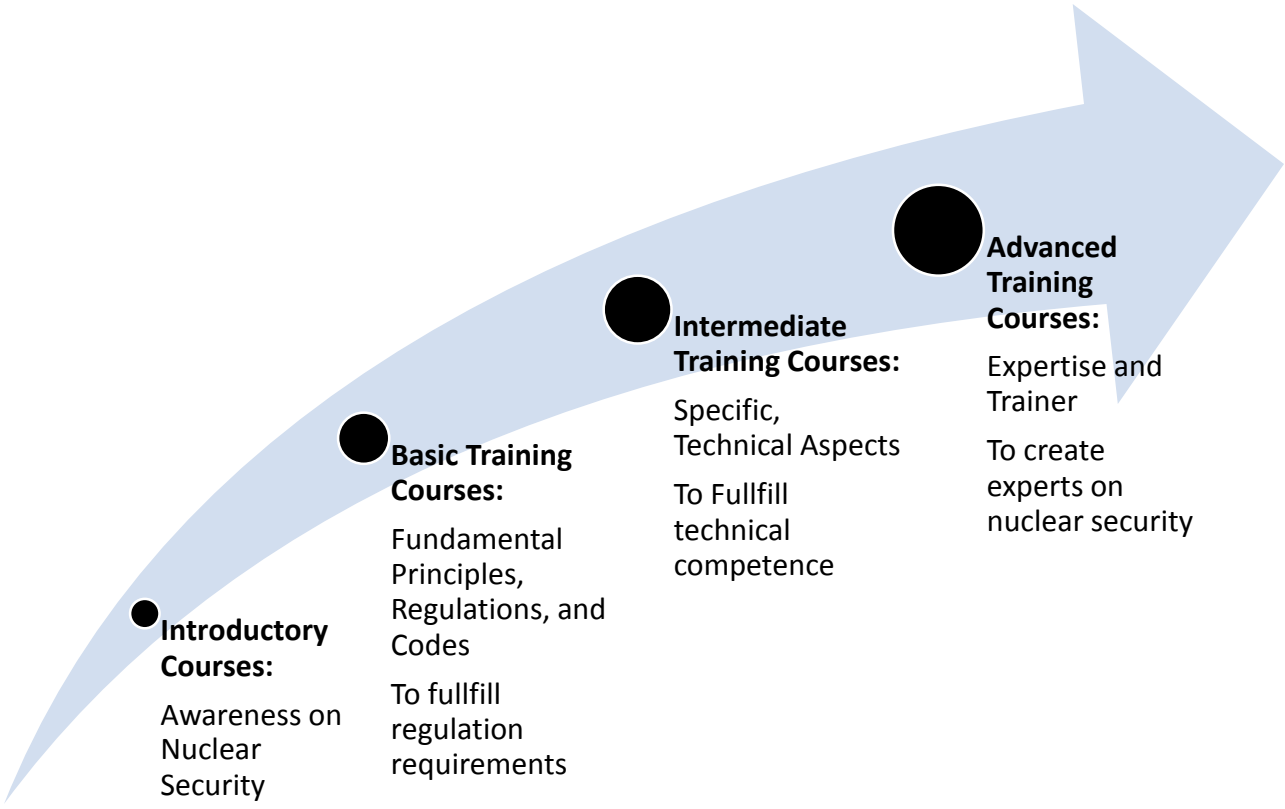
CAPACITY BUILDING ON PHYSICAL PROTECTION SYSTEMS

- An effective nuclear security system must be capable of preventing, detecting and responding to a criminal or unauthorized act with nuclear security implications, involving nuclear or other radioactive material. This goal can be reached, among others, through the establishment of the activities that aims at building competences and skills of security personnel through the implementation of a training programme and the establishment of sustainable technical and scientific support services.
- One of the highest priority on nuclear security activities is the development of personnels capability in nuclear security. Such activities are integrated as far as possible with the development of human resources. BATAN is working on human resource development, and conducting training courses, workshops, and briefings to anchor nuclear security as an aspect of daily life for relevant personnel, especially those involved with physical protection.
- Nuclear use can across generations in which the sustainability efforts for maintaining and improving capabilities on the implementation of physical protection systems are required. Elements of capacity building consists of training, human resource development, knowledge management, and networking. Capacity building is done by training the personnel of physical protection in the expertise of designing, implementing and evaluating the physical protection system.
- BATAN's policy on nuclear HRD stated that R&D on nuclear energy shall be conducted in order to comprehend nuclear science and technology for the purpose of the human welfare by taking into account the safety, security, and safeguards aspects. Every personnel who works in nuclear R&D should be provided with a certain level of competence.

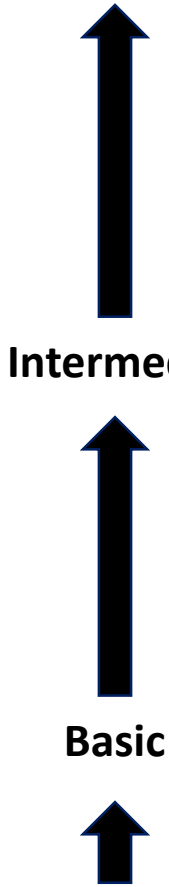
- Capacity building constitutes an essential factor for the sustainability of the nuclear security systems on a long-term basis. Highest priority is placed on the development of competent and dedicated human resources. HRD in nuclear security is aimed at building, upgrading and strengthening the knowledge and skills of personnel working at the nuclear facilities. BATAN through its Education and Training Center has developed a scheme and strategy for capacity building in nuclear security from introductory to advanced level, with its associated training material is shown in the figure.

- Introductory and basic levels are designed to provide the whole staffs, especially the junior ones, with the topics on nuclear security awareness in order to fullfill the regulation requirements. Intermediate level is designed to give security personnels the knowledge and skills on nuclear security in order to fullfill the competence requirements. Meanwhile, advanced level is designed to provide some senior security personnels with the expertise in nuclear security in order to be the instructors or trainers. The trainings in basic level are delivered by BATAN's instructors itself and some others in intermediate and advanced levels are delivered with the support of international experts of the IAEA or other organizations.

- International cooperation and expert supports are essential for maintaining and strengthening nuclear security. To this end, BATAN has developed a broad network for strengthening its nuclear security systems: IAEA, USDOE, U.S. Department of States (USDOS), University of Georgia (UGA) of USA, King's College London (KCL) of UK, ANSTO of Australia, and JAEA of Japan.



Scheme and strategy for capacity building in nuclear security from introductory to advanced level



Advanced

ITC on Physical Protection System Design, Evaluation, and Inspection; TOT for Self-Assessment on Security Culture; TOT on Physical Protection System and Security Management; TOT on Vulnerability Analysis

Intermediate

Physical Protection System and Security Management for Research Reactor; Protection and Preventive Measures against Sabotage; PP Measures against Insider Threat; Contongency Plan, PPS Perfonce Testing; PPS Inspection: PPS Evaluation; NMAC for Supervisor; Computer Security; Inteligent Security; Nuclear Forensics; Security Investigation; Security Transport of Nuclear Material and Radioactive Sources; Nuclear Secuirty Management Systems; Physical Protection System Equipment

Basic

Physical Protection of Nuclear Material and facility; Security of Radioactive Sources; Nuclear Materian Accounting and Control, INFCIRC/225 Rev 5; School on Nuclear Security

Introductory

Introduction to Nuclear Security; Nuclear Security Culture

In the period of 2010-2017, BATAN has organized several activities related to capacity building for nuclear security. A series of capacity building activities has been conducted with the assistance and support of international partners, such as IAEA, USDOE, Japan, and UK, as represented in Table.

Training Activity	Date	Participant	Partner
Physical Protection for Nuclear Material and Facilities	22-26 March 2010	20	USDOE
Physical Protection and Nuclear Security Management for Officers	13-17 June 2011	25	USDOE
Vulnerability Analysis	25-29 June 2012	25	USDOE
Insider Threat and Human Reliability Program	18-22 November 2013	25	USDOS
Gap Analysis on INFCIRC Rev. 5	9-12 September 2014	26	USDOE
Physical Protection and Security Management of Research Reactor	29 Sept-3 Oct 2014	30	IAEA
Human Reliability Program (HRP)	1-3 October 2014	22	USDOS
Regional School on Nuclear Security	13-27 October 2014	30	IAEA
Nuclear Security Management System	23-27 February 2015	30	USDOS
Nuclear Security Culture	23-27 March 2015	25	KCL
Performance Testing 1	6-12 April 2015	23	USDOE
Self-Assessment of Security Culture	27-30 April 2015	25	UGA
Performance Testing 2	28-29 July 2015	15	USDOE
Performance Testing 3	1-2 September 2015	23	USDOE
HRP Implementation in Indonesia	20-21 October 2015	31	USDOS
Nuclear Security Culture and Emergency Preparedness	14-18 March 2016	24	KCL
Performance Testing of Response Personnel	18-22 April 2016	31	USDOE
HRP Roadmap for Research Reactor	27-28 April 2016	25	USDOS
Nuclear Security Culture	23-27 May 2016	25	JAEA
Implementation of Physical Protection System on Nuclear Facilities	8-12 August 2016	25	USDOS
Contingency Plan	5-8 September 2016	25	USDOE
Regional School on Nuclear Security	17-28 October 2016	40	IAEA
Design and Evaluation of PPS	October 2016	25	JAEA
Cyber Security	15-19 May 2017	30	USDOE
Radiological Sources Security	10-14 July 2017	25	KCL
Nuclear Security Plan	28-31 August 2017	25	USDOE

Workshops on PPS

One of the important activities to be described is the implementation of a series of workshops on PPS that conducted in the period of 2014-2017, in cooperation with the experts of Sandia National Laboratory (SNL) and Pacific Northwest National Laboratory (PNNL) of the USDOE.

The workshops consist of:

- a gap analysis in 2014;
- performance testing and contingency plan in 2015-2016; and
- nuclear security plan in 2017.

The main objective of the workshops is to improve the capability of BATAN's nuclear security personnel in the framework of strengthening the physical protection system of its nuclear material and nuclear facilities.

The workshops participants are security, safety, and reactor operation personnels and the police.

Workshop on Gap Analysis (September 2014)

- The workshop objectives to give the participants :
  - how to understand the recommended physical protection requirements found in INFCIRC/225/Rev.5,
  - the ability to conduct a gap analysis on elements of physical protection system against the security recommendations documented in INFCIRC/225/Rev.5, and
  - how to determine whether regulatory changes will recommend or require associated modifications of physical protection system at the BATAN's Serpong Nuclear Research Complex.
- The main topics included protection recommendations for materials in use, storage, and during transport; recommendations for protecting nuclear material against sabotage; use of a performance based approach for physical protection system; elements of a physical protection regime relative to state responsibilities; and license holder responsibilities.
- The workshop began with an introduction of the global nuclear security framework and IAEA guidance, followed by an overview of physical protection concepts, such as definition, design, implementation, and evaluation of a physical protection system.

- After understanding the recommended requirements, the participants conducted a site gap analysis to evaluate existing regulations and physical protection system against the recommendations contained in INFCIRC/225/Rev.5, with the objective is to determine whether INFCIRC/225/Rev.5 recommendations will require associated modifications of physical protection system at the site.
- The participants were asked to determine what type of information needs to be gathered in order to conduct an assessment; to gather information from the respective sources; to assess the site perimeter, limited access area perimeter, entry control points, and protected areas; to use check-lists to determine compliance or gaps; and to develop a draft summary of the assessment results reflecting strengths and weaknesses found during the assessment.

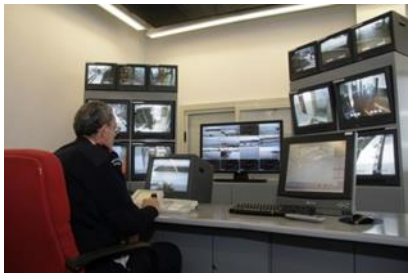
Workshops on Performance Testing (April, July, August 2015; April 2016)

- The workshops are designed as a follow-up to the gap analysis workshop to provide a practical understanding of performance testing of all three elements of a physical protection system: detection, delay and response.
- The workshops consisted of lectures, exercises, and a facility visit. Exercises provided the participants with the opportunity to apply the lecture material to practical situations.
- The main topics of the course were performance testings of all three elements of a physical protection system: detection, delay and response.
- The goal of performance testings is to test people, procedures and equipment to determine if the various elements of a physical protection system are effective in defeating the threat.

- The goal of the workshop is how to understand the purpose and importance of performance testing and how to gain practical experience conducting different types of performance tests on the physical protection system in accordance with INFCIRC/225/Rev.5 recommendations.
- The performance testing exercises are directed at eventually informing the decision making process as the sites evaluate potential upgrades related to implementation of INFCIRC/225/Rev.5.
- The activities comprised of classroom training and field exercises. The field exercises helped the participants how to conduct performance testing of people, procedures and equipment related to access control and prohibited articles detection: searches/inspections; detection equipment: step test specific sensors in the reactor facility and test camera coverage; delay: evaluate delay at various security area boundaries; and response: conduct time motion studies in support of timely response determination.

Three Functions of Physical Protection Systems

Detection



The first step in stopping a security threat.

Delay

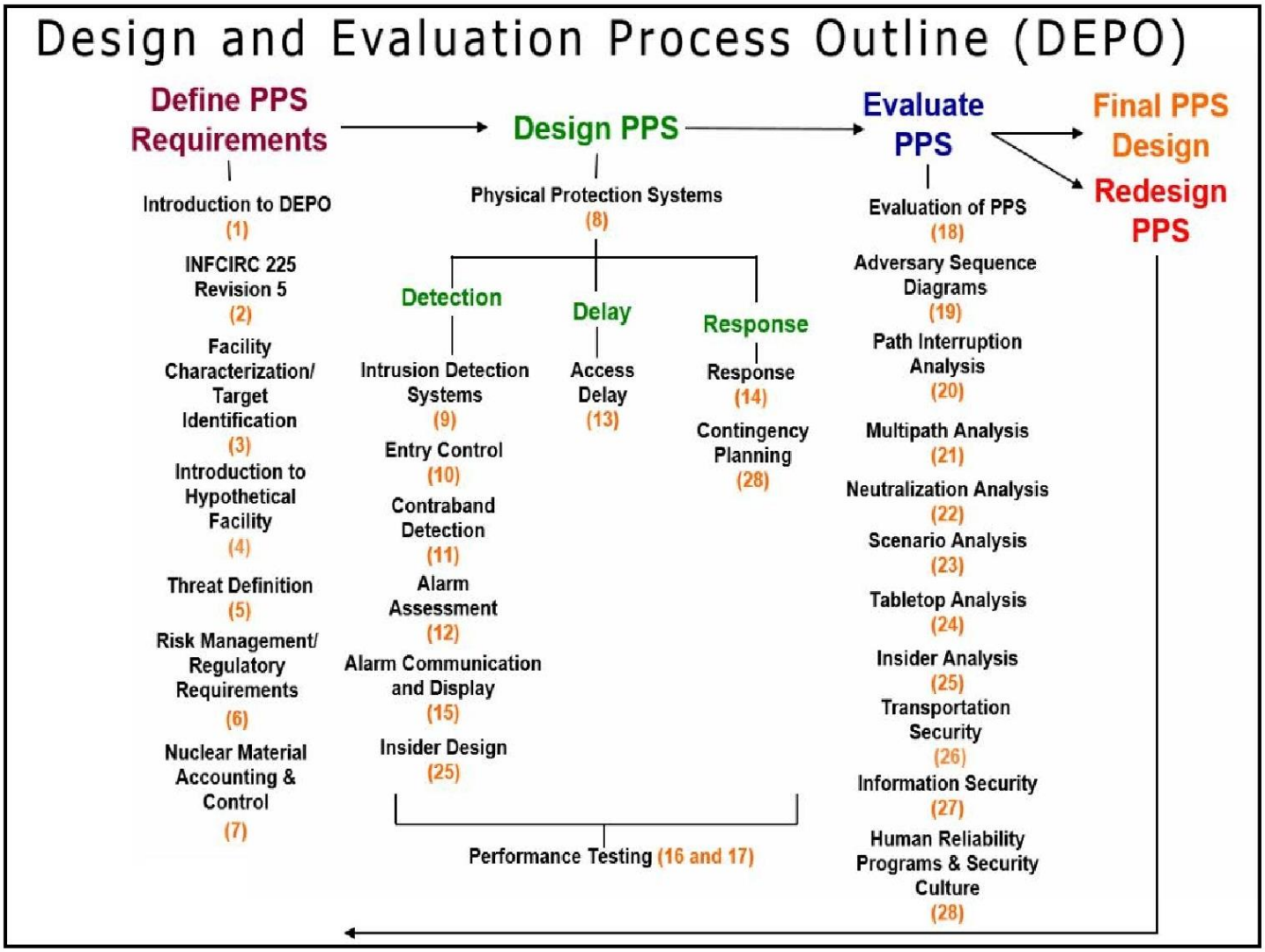
Delay measures slow the threat to give the response force time to arrive.

Response

Security guards or law enforcement arrive and neutralize the threat.

Basic Security Functions

Security Functions	Purpose	How?
DETER	• Discourage easy access • Define boundaries	• Fences, walls • Barriers, gates, locks • Physical constraints
DETECT	• Provide early warning of unauthorized entry	• Intrusion detection sensors
DELAY	• Slow down access to key assets • Delay intruder for assessment	• Fences, barriers • Audio/visual alerts • Delay devices
ASSESS	• Provide positive confirmation of valid alarm	• Direct visual • CCTV, central control • Thermal Camera
RESPOND	• Take appropriate action	• Communication • Guards (local, backup) • Sanctuary rooms • Police/other


Design and Evaluation Process Outline (DEPO)
Define PPS Requirements
Introduction to DEPO (1)
INFCIRC 225 Revision 5 (2)
Facility Characterization/ Target Identification (3)
Introduction to Hypothetical Facility (4)
Threat Definition (5)
Risk Management/ Regulatory Requirements (6)
Nuclear Material Accounting & Control (7)
Design PPS
Physical Protection Systems (8)
Detection
Intrusion Detection Systems (9)
Entry Control (10)
Contraband Detection (11)
Alarm Assessment (12)
Alarm Communication and Display (15)
Insider Design (25)
Delay
Access Delay (13)
Response
Response (14)
Contingency Planning (28)
Performance Testing (16 and 17)
Evaluate PPS
Evaluation of PPS (18)
Adversary Sequence Diagrams (19)
Path Interruption Analysis (20)
Multipath Analysis (21)
Neutralization Analysis (22)
Scenario Analysis (23)
Tabletop Analysis (24)
Insider Analysis (25)
Transportation Security (26)
Information Security (27)
Human Reliability Programs & Security Culture (28)
Final PPS Design
Redesign PPS

Workshops on Contingency Plan (September 2016)

The workshop is to provide the participants with an introductory understanding of the recommended requirements for security contingency plans, the predefined set of actions for response to unauthorized acts indicative of attempted unauthorized removal or sabotage to a nuclear facility and is designed to counter such acts. GA Siwabessy reactor facility at Serpong Nuclear Research Complex as the basis for this activity. The participants were personnel representing the guard force, police and other physical security, operations, and safety personnel that have the role in responding to a security incident at the site.

Workshops on Nuclear Security Plan (August 2017)

- The workshop is designed to provide the participants with an introductory understanding of how to evaluate a site-specific security plan as an important part of the documentation necessary for licensing a nuclear facility by the state. The main topics of the course were nuclear security overview; evaluation process; security plan topics; programme management; nuclear material accounting and control; define physical protection system and its description; response planning; performance testing of physical protection; contingency plan overview; and policies, supporting documentation, and supplementary information.
- The purpose of the whole workshops from gap analysis to nuclear security plan as mentioned above is to provide the security personnel with the knowledge and the skills to take performance testing of physical protection elements in order to be able to evaluate and up-grade the physical protection system. Performance testing needs to be done periodically by the physical protection management in each nuclear facility. With this performance testing, BATAN as the operator has implemented best practices on the physical protection system as recommended by INFCIRC/225/Rev.5, though national regulation on physical protection system, which now under process of revision, still refer to INFCIRC/225/Rev.4.

BATAN's NUCLEAR SECURITY POLICY STATEMENT

KEBIJAKAN KEAMANAN NUKLIR
BADAN TENAGA NUKLIR NASIONAL

BATAN menjamin keamanan terhadap kawasan kerja, instalasi dan bahan nuklir, sumber radioaktif, fasilitas, pegawai, pekerja, anggota masyarakat, kegiatan, dan informasi penting di lingkungan BATAN dari setiap ancaman dan gangguan keamanan melalui penerapan Sistem Manajemen Keamanan Nuklir yang efektif, terpadu, dan menyeluruh sesuai peraturan perundang-undangan. Setiap Pegawai BATAN wajib mengupayakan tercapainya tujuan keamanan nuklir, menerapkan dan menumbuhkembangkan budaya keamanan nuklir sesuai tanggung jawab dan peran masing-masing.

Jakarta, 30 Januari 2015

Kepala Badan Tenaga Nuklir Nasional,

Djarot Sulistio Wisnubroto

NUCLEAR SECURITY POLICY

NATIONAL NUCLEAR ENERGY AGENCY

BATAN is committed to ensure the security of its nuclear materials and installations, radioactive sources, facilities, employees, workers, visitors, activities and important information from any security threats through the implementation of an effective, integrated, and comprehensive Nuclear Security Management System in accordance with the laws and regulations. Every BATAN's employee shall strive for the achievement of nuclear security objectives, and shall implement nuclear security culture according to his or her respective roles and responsibilities.

Jakarta, January 30, 2015
Chairman of BATAN,
Djarot Sulistio Wisnubroto

CONCLUSION

- Indonesia acknowledges the importance of promoting the nuclear security objectives through collaboration with international organizations, and affirms its international commitment to support the strengthening of global nuclear security.

- In line with this commitment, BATAN has performed some workshops and trainings in order to develop the capability in nuclear security, particularly in physical protection system of nuclear material and nuclear facilities, through cooperation with the international partners.

- The capabilities obtained are expected to strengthen the effectiveness of existing physical protection systems, according to the performance based approaches, of its nuclear facilities. BATAN's experiences in conducting nuclear security trainings and workshops could be shared with other operators.

THANK YOU

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