

**INTEGRATED
REGULATORY
REVIEW SERVICE (IRRS)
MISSION
TO
INDONESIA**

Jakarta, Indonesia

2 to 14 August 2015

DEPARTMENT OF NUCLEAR SAFETY AND SECURITY



Integrated
Regulatory
Review Service
IRRS





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INDONESIA**

Mission dates: *2 - 14 August 2015*
Regulatory body visited: *BAPETEN*
Location: *Badan Pengawas Tenaga Nuklir (BAPETEN) Jakarta, Indonesia*
Regulated facilities and activities in the mission scope: *All regulated nuclear installation and radiation facilities and activities*
Organized by: *International Atomic Energy Agency*

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IAEA-2015

The number of recommendations, suggestions and good practices is in no way a measure of the status of the national infrastructure for nuclear and radiation safety. Comparisons of such numbers between IRRS reports from different countries should not be attempted.

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EXECUTIVE SUMMARY

At the request of the Government of Indonesia, an international team of senior safety experts met with representatives of the regulatory body of Indonesia (the Nuclear Energy Regulatory Agency of Indonesia - BAPETEN) from 2 to 14 August 2015 to conduct an Integrated Regulatory Review Service (IRRS) mission. The mission took place mainly at the BAPETEN Headquarters in Jakarta.

The purpose of the peer review was to review the Indonesian regulatory framework for nuclear and radiation safety. The review compared the Indonesian regulatory framework for nuclear and radiation safety and its effectiveness against the IAEA safety standards as the international benchmark for safety. The mission was also used to exchange information and experience between the IRRS Team members and the Indonesian counterparts in the areas covered by the IRRS.

The IRRS Team consisted of fourteen senior regulatory experts from fourteen IAEA Member States, three IAEA staff members, and one IAEA administrative assistant.

The IRRS Team carried out the review in the following areas: responsibilities and functions of the government; the global nuclear safety regime; responsibilities and functions of the regulatory body; the management system of the regulatory body; the activities of the regulatory body including the authorization, review and assessment, inspection and enforcement processes; development and content of regulations and guides; emergency preparedness and response; decommissioning; transport of radioactive materials; control of medical exposure; occupational radiation protection; public and environmental exposure control; waste management; and selected policy issues.

The IRRS review addressed all facilities and activities regulated by BAPETEN, including research reactors, nuclear fuel cycle facilities, radioactive waste management facilities, and radiation sources facilities and relevant activities. In addition, the IRRS review addressed preparations for the development of the nuclear power program from regulatory framework point of view.

Based on the IRRS evaluation against the IAEA safety standards, the IRRS Team concluded that Indonesia, through the BAPETEN, is implementing a framework that provides for protection of public health and safety. The IRRS Team also identified areas where further improvement can be achieved by implementing an appropriate action plan.

One month prior to the mission, BAPETEN provided the IRRS Team with advanced reference material and documentation including the results of the self-assessment in all areas within the scope of the mission.

Review of advance reference material and a series of interviews and discussions with BAPETEN were mainly used to evaluate the Indonesian regulatory framework as well as to assess the effectiveness of the regulatory infrastructure. The IRRS Team's activities included visits to at a research reactor, a fuel cycle facility, a waste facility, a hospital, an irradiator and industrial radiography facility. During these visits, the IRRS Team members observed BAPETEN's working practices during inspections and held discussions with licensee personnel and management.

Throughout the mission, the IRRS Team was extended full cooperation in regulatory, technical, and policy issues by all parties; in particular, the staff of BAPETEN provided the fullest practicable assistance and demonstrated extensive openness and transparency.

Meetings were held with officials of the Ministry of Research, Technology and Higher Education, the Ministry of State Secretariat, Ministry of Health and the Ministry of Energy and Mineral Resources.

The IRRS review team made the following general observations:

- BAPETEN is expanding its program to address the regulation of nuclear power plant safety, while maintaining its focus on the safety of current facilities and activities in the country.
- BAPETEN is considered to have a clear and unambiguous focus on its safety mission; and a good recognition of the challenges ahead.
- BAPETEN participates in many regional and international activities concerning nuclear and radiation safety and has established effective cooperation with a number of countries through bi-lateral agreements.
- BAPETEN is implementing various programs for human resources development and to enhance the capabilities of its staff to meet challenges related to prospective nuclear power plants.

The IRRS Team observed the following good practices:

- The Government and BAPETEN make extensive use of bilateral and multilateral international cooperation for training and competence building.
- BAPETEN has developed a comprehensive database management for authorization, reviewing and assessment, inspection, transport approval and occupational dose register. The system is fully implemented for the review and assessment process.
- Public information on environmental monitoring data supports the collaboration with interested parties.

The IRRS Team identified certain issues warranting attention and believes that consideration of these would enhance the overall performance of the regulatory system:

- The Government should develop and document a national policy and strategy for safety, supported by a national co-ordinated plan, to ensure the appropriate national infrastructure for safety is implemented
- The Government should ensure that all essential elements, particularly the fundamental safety principles of the IAEA, are fully incorporated into the legal and regulatory framework for safety.
- The Government and BAPETEN should ensure that national legislation for safety, including relevant regulations and guides, are kept up to date with the current IAEA Safety Standards.
- The Government should provide BAPETEN with human and financial resources to ensure adequate discharge of its statutory regulatory obligation.
- The Government should ensure an appropriate coordination and liaison between BAPETEN and other relevant authorities in medical application of radiation and in transport of radioactive material.
- BAPETEN should strengthen its communication and consultation system regarding its authorization activities with interested parties.
- The Government and BAPETEN should conduct all necessary preparatory activities to establish the necessary infrastructure in a timely manner for potential future nuclear power plants.

The IRRS team's specific findings are summarized in Appendix V.

An IAEA press release was issued following the mission.

I. INTRODUCTION

At the request of the Government of Indonesia, an international team of senior safety experts met representatives of the regulatory body of Indonesia (the Nuclear Energy Regulatory Agency of Indonesia - BAPETEN) from 2 to 14 August 2015 to conduct an Integrated Regulatory Review Service (IRRS) mission. The purpose of this peer review was to review the Indonesian regulatory framework for nuclear and radiation safety. The review mission was formally requested by the Government of Indonesia in 5th of December 2011. A preparatory mission was conducted 29 – 30 August 2013 at BAPETEN Headquarters in Jakarta to discuss the purpose, objectives and detailed preparations of the review in connection with regulated facilities and activities in Indonesia and their related safety aspects and to agree the scope of the IRRS mission. Where specific facilities and / or activities would not be included in the scope of the IRRS mission, Indonesia undertook to provide explanation for the exclusion.

The IRRS review team consisted of 14 senior regulatory experts from 14 IAEA Member States, 3 IAEA staff members and 1 IAEA administrative assistant. The IRRS review team carried out the review in the following areas: responsibilities and functions of the government; the global nuclear safety regime; responsibilities and functions of the regulatory body; the management system of the regulatory body; the activities of the regulatory body including the authorization, review and assessment, inspection and enforcement processes; development and content of regulations and guides; emergency preparedness and response; occupational radiation protection, control of medical exposures, environmental monitoring associated with authorized practices for public radiation protection purposes, transport of radioactive material, waste management and decommissioning, control of radioactive discharges and materials for clearance, control of chronic exposures (radon, NORM and past practices) and remediation, and the tailored module for countries embarking on nuclear power.

In addition, policy issues were discussed, including: long term operation and ageing nuclear facilities; new build reactors (NPP and RR); new radiation technology in medical applications; and regulatory control of TENORM.

BAPETEN conducted a self-assessment in preparation for the mission and prepared a preliminary action plan. The results of BAPETEN self-assessment and supporting documentation were provided to the IRRS review team as advance reference material for the mission. During the mission the IRRS review team performed a systematic review of all topics within the agreed scope through review of the Indonesia advance reference material, conduct of interviews with management and staff from BAPETEN and direct observation of BAPETEN regulatory activities at regulated facilities. Meetings with the Ministry of State Secretariat, the Ministry of Research, Technology and Higher Education, Ministry of Energy and Mineral Resources, and Ministry of Health were also organized.

All through the mission the IRRS team received excellent support and cooperation from BAPETEN.

II. OBJECTIVE AND SCOPE

The purpose of this IRRS mission was to review Indonesia's radiation and nuclear safety regulatory framework and activities against the relevant IAEA safety standards to report on regulatory effectiveness and to exchange information and experience in the areas covered by the IRRS. The agreed scope of this IRRS review included all facilities and activities regulated in Indonesia. It is expected this IRRS mission will facilitate regulatory improvements in Indonesia and other Member States, utilising the knowledge gained and experiences shared between Indonesia and IRRS reviewers and the evaluation of the Indonesian regulatory framework for nuclear safety, including its good practices.

The key objectives of this mission were to enhance the national legal, governmental and regulatory framework for nuclear and radiation safety, and national arrangements for emergency preparedness and response through:

- a) providing an opportunity for continuous improvement of BAPETEN through an integrated process of self-assessment and review;
- b) providing Indonesia and BAPETEN with a review of its regulatory technical and policy issues;
- c) providing Indonesia and BAPETEN with an objective evaluation of its regulatory infrastructure with respect to IAEA safety standards;
- d) promoting the sharing of experience and exchange of lessons learned among senior regulators;
- e) providing key staff in Indonesia and BAPETEN with an opportunity to discuss regulatory practices with IRRS Review Team members who have experience of other regulatory practices in the same field;
- f) providing Indonesia and BAPETEN with recommendations and suggestions for improvement;
- g) providing other states with information regarding good practices identified in the course of the review;
- h) providing reviewers from Member States and IAEA staff with opportunities to observe different approaches to regulatory oversight and to broaden knowledge in their own field (mutual learning process);
- i) contributing to the harmonization of regulatory approaches among states;
- j) promoting the application of IAEA Safety Requirements; and
- k) providing feedback on the use and application IAEA safety standards.

III. BASIS FOR THE REVIEW

A) PREPARATORY WORK AND IAEA REVIEW TEAM

At the request of the Government of Indonesia, a preparatory meeting for the Integrated Regulatory Review Service (IRRS) was conducted from 29 to 30 August 2013. The preparatory meeting was carried out by the appointed Team Leader Mr Carl-Magnus Larsson, Deputy Team Leader Mr Sukho Lee and the IRRS IAEA Team representatives, Mr Ahmad Al-Kathibeh, Team Coordinator, Mr Ugur Bezdeguemeli, Deputy Team Coordinator and Mr Rorigo Salinas, IEC Representative.

The IRRS mission preparatory team had discussions regarding regulatory programmes and policy issues with the senior management of the Nuclear Energy Regulatory Agency of Indonesia (BAPETEN) represented by Dr. As Natio Lasman, Chairman of BAPETEN, other senior management and staff. It was agreed that the regulatory framework with respect to the following facilities and activities would be reviewed during the IRRS mission in terms of compliance with the applicable IAEA safety requirements and compatibility with the respective safety guides

- Research Reactors;
- Fuel cycle facilities;
- Waste management facilities;
- Radiation sources facilities and activities;
- Decommissioning;
- Transport of radioactive materials;
- Control of medical exposure;
- Occupational radiation protection;
- Public and environmental exposure control;
- Waste management (policy and strategy, predisposal and disposal);
- Preparations for the regulation of nuclear power plants; and
- Selected policy issues.

BAPETEN senior managers made presentations on the national context, the current status of Indonesian regulatory framework, BAPETEN and the self-assessment results to date.

IAEA staff presented the IRRS principles, process and methodology. This was followed by a discussion on the tentative work plan for the implementation of the IRRS in Indonesia in 9-21 March 2014.

The proposed composition of the IRRS Review team was discussed and tentatively confirmed. Logistics including meeting and work places, counterparts and Liaison Officer identification, proposed site visits, lodging and transportation arrangements were also addressed.

The Indonesia Liaison Officer for the IRRS mission was confirmed as Ms Dahlia C. Sinaga.

Due to funding reasons, the mission was postponed from 9-21 March 2014 to 2-14 August 2015. Indonesia started providing IAEA with the advance reference material (ARM) for the review at the end of June 2015 and continued till the 10th of July. In preparation for the mission, the IAEA review team members reviewed the Indonesia advance reference material and provided their initial impressions to the IAEA Team Coordinator prior to the commencement of the IRRS mission.

B) REFERENCES FOR THE REVIEW

The relevant IAEA safety standards and the Codes of Conduct on the Safety and Security of Radioactive Sources and Safety of Research Reactors were used as review criteria. The complete list of IAEA publications used as the references for this mission is provided in Appendix VII.

C) CONDUCT OF THE REVIEW

The initial IRRS Review team meeting took place on Sunday, 2 August, 2015 in Jakarta, directed by the IRRS Team Leader and the IRRS IAEA Team Coordinator. Discussions encompassed the general overview, the scope and specific issues of the mission, clarified the bases for the review and the background, context and objectives of the IRRS programme. The understanding of the methodology for review was reinforced. The agenda for the mission was presented to the team. As required by the IRRS Guidelines, the reviewers presented their initial impressions of the ARM and highlighted significant issues to be addressed during the mission.

The host Liaison Officer was present at the initial IRRS Review team meeting, with other BAPETEN staff members, in accordance with the IRRS Guidelines and presented logistical arrangements planned for the mission.

The IRRS entrance meeting was held on Monday, 3 August, 2015, with the participation of BAPETEN's senior management and staff., Ministry of Transport, Ministry of Environment and Forestry, National Disaster Management Agency and representatives from hospitals and industry. Opening remarks were made by Prof. Jazi Eko Istiyanto, Chairman of BAPETEN and Mr Ahmad Al-Kathibeh, Team Coordinator. Mr Carl-Magnus Larsson, IRRS Team Leader and Mr Yudi Pramono Director of Regulation Development for Nuclear Installations and Material of BAPETEN gave an overview of the Indonesia context, BAPETEN activities and the action plan prepared as a result of the pre-mission self-assessment.

During the IRRS mission, a review was conducted for all review areas within the agreed scope with the objective of providing Indonesia and BAPETEN with recommendations and suggestions for improvement and where appropriate, identifying good practices. The review was conducted through meetings, interviews and discussions, visits to facilities and direct observations regarding the national legal, governmental and regulatory framework for safety.

The IRRS Review team performed its review according to the mission programme given in Appendix II.

The IRRS exit meeting was held on Friday, 14 August, 2015. The opening remarks at the exit meeting were presented by Prof. Jazi Eko Istiyanto, Chairman of BAPETEN and were followed by the presentation of the results of the mission by the IRRS Team Leader Mr Carl-Magnus Larsson. Closing remarks were made by Mr Pil-Soo Hahn, Director, Division of Radiation, Transport and Waste Safety, IAEA.

A joint IAEA and BAPETEN press conference took place at the end of the mission.

An IAEA press release was issued.

1. RESPONSIBILITIES AND FUNCTIONS OF THE GOVERNMENT

1.1. NATIONAL POLICY AND STRATEGY FOR SAFETY

BAPETEN has started drafting a document describing national policy and corresponding strategy for safety in cooperation with involved government departments and agencies. However, the Government has not yet established the national policy and strategy. The objective of producing such a document is to demonstrate the Government's commitment to safety and to provide a national co-ordinated plan for ensuring the appropriate national infrastructure for safety, including education; training; planning and co-ordination for the development or construction of new facilities; financial provision for existing and proposed facilities including decommissioning, and spent fuel and waste management; development of regulation and guidance; and research which will need to be put in place to secure its delivery.

In a newly developed white paper, the portion of "new and renewable energy" in the total electricity generation is targeted to 25% by year 2025, including a contribution of 5 GW from nuclear power. The white paper was developed after discussions and consultations with the relevant national organizations, and was recently signed by the Minister of Energy and Mineral Resources. The document will be submitted to the President when the Ministry has completed the necessary administrative steps. Based on available information, the IRRS Team has conducted its review on the basis that there was no clear and knowledgeable decision yet to embark on nuclear power as of the date of the IRRS mission.

The Indonesian nuclear programme is currently facing a number of challenges, such as long term operation and decommissioning of existing research reactors, application of modern nuclear technologies (medicine, science, etc.), long term management of radioactive waste and spent fuel, and provision of appropriate number of qualified experts for all parties with responsibility for safety. Construction of a new 10 MWt test reactor is being considered by the National Nuclear Energy Agency (BATAN). It is the view of the IRRS Team that promulgation of the national policy and strategy for safety should ensure that appropriate focus and commitment to safety is maintained in the long term.

The Act No. 10 of 1997 on Nuclear Energy (the Act) states that "any activity related to the utilization of nuclear energy shall maintain the safety, the security, the peace, the health of the workers and the public, and the environmental protection". To achieve this objective, fundamental safety principles as defined by the IAEA in its SF-1 publication need to be embedded in appropriate parts of the framework for safety. Full application of the IAEA fundamental safety principles into the framework for safety would, among other things, ensure more consistent application of a graded approach throughout the regulatory functions and would support clear demonstration of long term commitment to safety.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: An explicit national safety policy and corresponding strategy that reflect the existing situation and development plans for use of nuclear energy and ionising radiation, and the long term commitment to safety of the Government, are not in place.

(1)

BASIS: GSR Part 1 Requirement 1, para. 2.3 states that "*The government shall establish a national policy and strategy for safety, the implementation of which shall be subject to a graded approach in accordance with national circumstances and with the radiation risks associated with facilities and activities, to achieve the fundamental safety objective and to*

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

	<i>apply the fundamental safety principles established in the Safety Fundamentals”.</i>
(2)	<p>BASIS: GSR Part 1 Requirement 1, para. 2.3 states that <i>“The national policy and strategy for safety shall express a long term commitment to safety. The national policy shall be promulgated as a statement of the government’s intent. The strategy shall set out the mechanisms for implementing the national policy. In the national policy and strategy, account shall be taken of the following:</i></p> <p>...</p> <p><i>(c) The specification of the scope of the governmental, legal and regulatory framework for safety;</i></p> <p><i>(d) The need and provision for human and financial resources;</i></p> <p><i>(e) The provision and framework for research and development;</i></p> <p><i>(f) Adequate mechanisms for taking account of social and economic developments;</i></p> <p><i>(g) The promotion of leadership and management for safety, including safety culture.</i></p>
(3)	<p>BASIS: GSR Part 1 Requirement 1, para. 2.4 states that <i>“The national policy and strategy for safety shall be implemented in accordance with a graded approach, depending on national circumstances, to ensure that the radiation risks associated with facilities and activities, including activities involving the use of radiation sources, receive appropriate attention by the government or by the regulatory body.</i></p>
R1	<p>Recommendation: The Government should develop and document a national policy and strategy for safety, supported by a national co-ordinated plan, to ensure the appropriate national infrastructure is implemented.</p>
<p>Observation: Fundamental safety principles (as per SF-1) such as responsibility for safety, leadership and management for safety, and optimization of protection are not fully embedded in the framework for safety. A graded approach based on these principles is not explicitly defined in the Act or in implementing regulations and it is not applied consistently throughout the regulatory practices.</p>	
(1)	<p>BASIS: GSR Part 1 Requirement 2, para. 2.5 states that <i>“The government shall promulgate laws and statutes to make provision for an effective governmental, legal and regulatory framework for safety. This framework for safety shall set out the following:</i></p> <p><i>1) The safety principles for protecting people — individually and collectively — society and the environment from radiation risks, both at present and in the future;</i></p> <p>...</p> <p><i>(8) Provision for the review and assessment of facilities and activities, in accordance with a graded approach;</i></p> <p>...</p> <p><i>(10) Provision for the inspection of facilities and activities, and for the enforcement of regulations, in accordance with a graded approach;</i></p>
R2	<p>Recommendation: The Government should ensure that the fundamental safety principles of the IAEA SF-1 are fully incorporated into the legal and regulatory framework for safety.</p>

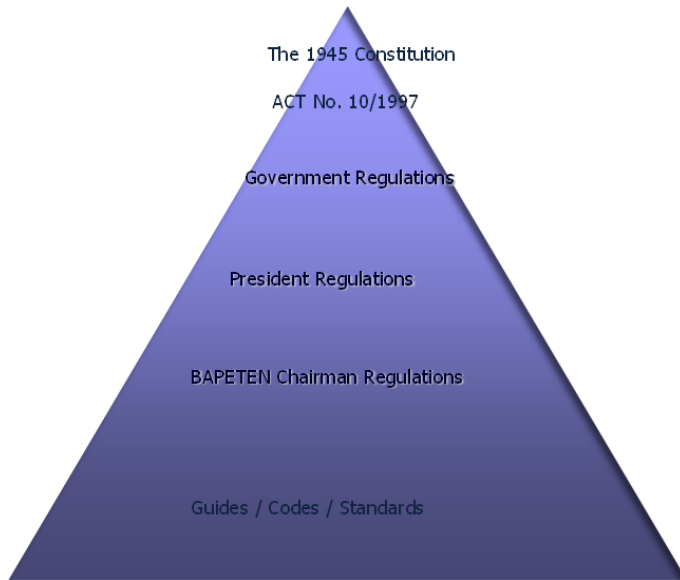
RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

S1

Suggestion: The Government and BAPETEN should consider ensuring that all regulatory functions are implemented in a graded approach.

1.2. ESTABLISHMENT OF A FRAMEWORK FOR SAFETY

The Act and corresponding regulations enacted by the President, the Government and the Nuclear Regulatory Authority (BAPETEN) Chairman, constitute the legally binding framework for safety in Indonesia. This hierarchy is illustrated below.



The Act and implementing regulations cover all types of activities and facilities relevant for Indonesia as well as the scope of the IRRS mission review. However, in certain areas, the existing framework for safety needs to be updated to comply with the latest IAEA requirements including the new Basic Safety Standards. Detailed discussion of these cases and conclusions of the team are given in appropriate subsequent sections of this Report.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: The legal and regulatory framework for safety is not fully aligned with the latest IAEA requirements, such as GSR Part 3, Part 4, Part 5 and Part 7, or is still under development.

(1)

BASIS: GSR Part 1 Requirement 2, para. 2.5 states that “The government shall promulgate laws and statutes to make provision for an effective governmental, legal and regulatory framework for safety”.

R3

Recommendation: The Government and BAPETEN should ensure that the legal and regulatory framework is kept up to date and corresponds to the current IAEA standards.

1.3. ESTABLISHMENT OF A REGULATORY BODY AND ITS INDEPENDENCE

The Act and Presidential Decree No 76 of 1998 on nuclear energy regulatory authority establishes BAPETEN as the independent governmental organization for the regulatory control of the use of nuclear energy. Its responsibilities are clearly set out in law and implementing regulations. The concept of a central nuclear regulatory body positioned under the President minimises the possibility of conflicting responsibilities and should provide this authority with effective independence. The Ministry of Research, Technology and Higher Education plays a co-ordinating role for the President in relation to BAPETEN and seven other “non-ministerial” government agencies. The main goal of this coordination is to assist BAPETEN and other agencies in ensuring effective use of resources. Based on the discussion with ministry representatives, the IRRS team concluded that there is no evidence of conflicting competencies. The Minister of the Secretary of State is another interface for BAPETEN within the governmental structure.

The IRRS Team also reviewed independence in relation to budget and human resources.

The Act and several implementing regulations of the President and the Government provide a wide range of responsibilities to BAPETEN that require appropriate human and financial resources to ensure adequate and effective regulatory control of safety. In several areas within BAPETEN’s mandate the IRRS Team observed what appeared to be a misbalance between functions to be performed and resources provided. In addition, the Indonesian nuclear programme is currently facing a number of challenges, such as long term operation and decommissioning of existing research reactors, application of modern nuclear technologies (medicine, science, etc.). Construction of a new 10 MWt test reactor is being considered by BATAN.

BAPETEN is funded from two sources: a) direct State funding; and b) charges on the licensees. The State Ministry of National Development Planning (BAPPENAS), the Ministry of Finance, and the Parliament approve the annual budget proposed by BAPETEN. The annual budget for 2015 corresponds to approx. 13,5 million EURO. Only 10% of the revenue of BAPETEN is recovered directly from the licensees. Increased recovery of regulatory costs from licensees may offer an opportunity to ensure financial sustainability of BAPETEN.

In accordance with general legal provisions, the BAPETEN Chairman can adjust the organizational structure only after consultation with the relevant Government institution(s). This may result in a lack of flexibility and effectiveness of the regulatory functions of BAPETEN. See section 3.3 for more detailed discussion and for conclusions of the IRRS team on this subject.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: The human resources of BAPETEN appear to be insufficient in several areas. In addition, lack of resources may adversely affect essential processes such as long term competence building, basic and refreshment training and development of regulations and guides.

(1) **BASIS: GSR Part 1 Requirement 3, states that** “The government, through the legal system, shall establish and maintain a regulatory body, and shall confer on it the legal authority and provide it with the competence and the resources necessary to fulfil its statutory obligation for the regulatory control of facilities and activities.

BASIS: GSR Part 1, Req. 18 states that “The regulatory body shall employ a sufficient number of qualified and competent staff, commensurate with the nature and the number of facilities and activities to be regulated, to perform its functions and to discharge its

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

	<i>responsibilities”.</i>
R4	Recommendation: The Government should provide BAPETEN with human and financial resources to ensure adequate discharge of its statutory regulatory obligations.

1.4. RESPONSIBILITY FOR SAFETY AND COMPLIANCE WITH REGULATIONS

The responsibility for safety is explicitly defined, to a certain extent, but not for all activities and facilities. Responsibility for safety in case of activities is partially covered in Government Regulation No. 33/2007 “on the safety of ionizing radiation and the security of radioactive sources”. The principle that responsibility for safety also covers all stages of a facility or activity is not fully addressed in the legal and regulatory framework. In addition, the principle that compliance with regulatory requirements does not relieve licensees from their prime responsibility for safety is missing.

In general, BAPETEN has the authority under the Act to require demonstration of compliance with safety requirements. Specific provisions are then given in specific regulations.

A general process for appeals against regulatory decisions is in place through Act 30/2014 on Government Administration, which includes provisions for filing appeals against decisions of state authorities. Appeals can be made at two levels, to BAPETEN and subsequently to the independent Court of Justice.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: The principle of prime responsibility for safety is not completely addressed in the legal framework for safety.

(1)	BASIS: GSR Requirement 5 states that <i>“The government shall expressly assign the prime responsibility for safety to the person or organization responsible for a facility or an activity, and shall confer on the regulatory body the authority to require such persons or organizations to comply with stipulated regulatory requirements, as well as to demonstrate such compliance.”</i>
(2)	BASIS: GSR Requirement 6 states that <i>“The government shall stipulate that compliance with regulations and requirements established or adopted by the regulatory body does not relieve the person or organization responsible for a facility or an activity of its prime responsibility for safety.”</i>
R5	Recommendation: The Government, through the legal framework, should ensure that prime responsibility of safety is assigned to the person or organization responsible for a facility or an activity.

1.5. COORDINATION OF AUTHORITIES WITH RESPONSIBILITIES FOR SAFETY WITHIN THE REGULATORY FRAMEWORK

To discharge its regulatory responsibilities, BAPETEN cooperates with a number of other authorities.

Specific acts set out general rules and procedures for coordination and cooperation between state/government authorities and agencies.

Cooperative agreements are concluded between BAPETEN and counterparts for ensuring coordination and liaison among authorities where appropriate. BAPETEN has concluded agreements that outline the division of responsibilities and interfaces between BAPETEN and the following counterparts:

- National Agency for Geospatial Information (BIG)
- National Disaster Management Agency (BNPB); and
- Maritime Security Agency (Bakamla).

BAPETEN also cooperates with other Government departments and agencies such as Police, Customs Service, BAPPENAS, and Ministry of Finance (MoF) and Ministry of Transport (MoT).

The IRRS Team observed duplication of regulatory activities between BAPETEN and the Ministry of Health (MoH) in the area of regulation of medical applications of radiation. Duplicity is introduced through the Act No 44 of 2009 on hospitals that stipulates obligatory requirements for authorization of medical applications of radiation by MoH. For more information see section 5.5 of this Report. In the case of transport of radioactive materials there are no formal arrangements for coordination between all authorities responsible for regulation. This may lead to inefficiencies and unsafe situations during transport. For more information see relevant sections of the Report related to transport. Some inconsistencies in coordination between different authorities was also observed in the area of emergency preparedness and response. For more information and conclusions of the IRRS team, see section 10 of this Report.

In addition, co-operation with several local governments is intended to strengthen the coordination on specific issues such as radiation safety and management of TENORM, prevention of illicit trafficking, and human resource development. For this purpose BAPETEN has signed MoUs with:

1. Provincial Government of Bangka Belitung;
2. Municipal Government of Batam;
3. Municipal Government of West Bangka Regency; and
4. Municipal Government of Karimun.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: In areas such as regulation of medical radiation applications and transport of radioactive materials there appears to be insufficient coordination between BAPETEN and other relevant government authorities.

(1)	BASIS: GSR Part 1 Requirement 7 states that <i>“Where several authorities have responsibilities for safety within the regulatory framework for safety, the government shall make provision for the effective coordination of their regulatory functions, to avoid any omissions or undue duplication and to avoid conflicting requirements being placed on authorized parties”</i> .
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R6	Recommendation: The Government should ensure there is appropriate coordination and liaison between BAPETEN and other relevant authorities in the areas of medical application of radiation and transport of radioactive material.
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1.6 SYSTEM FOR PROTECTIVE ACTIONS TO REDUCE EXISTING OR UNREGULATED RADIATION RISKS

Unregulated sources of natural or artificial origin as well as contamination from past activities and events may cover a wide range of scenarios, referred to as existing exposure situations in the radiation protection framework.

The government has not established a system for protective actions or to address radiation risks of contamination from past events. For more information and conclusions of the IRRS team on this subject see section 11.4 of this Report. BAPETEN only covered the part of unregulated sources in GR 33/2007. BAPETEN had already carried out number of search and recovery activities for orphan sources and conducted awareness among a limited number of scrap metal recyclers and has appropriate cooperation with customs in case detecting radiation at the ports.

1.7. PROVISIONS FOR THE DECOMMISSIONING OF FACILITIES AND THE MANAGEMENT OF RADIOACTIVE WASTE AND OF SPENT FUEL

The responsibility for centralized management of radioactive waste is given to BATAN by the Act. There are no specific documents establishing a national policy and corresponding strategy for radioactive waste management and decommissioning. The Act includes only a very short and general policy statement on radioactive waste management.

Government Regulations 27/2002 and 61/2013 provide detailed regulatory requirements on management of radioactive waste generated from activities. GR 2/2014 requires applicants for construction of nuclear installations to demonstrate proof of adequate financial resources for decommissioning. However, there is no mechanism defined by the Government which would guarantee financing of the decommissioning of any nuclear power plants to be built, including consideration of potential decommissioning of a facility before the end of its design life. The Act requires that the producers of radioactive waste and spent fuel make a payment to BATAN when they transfer their radioactive waste and spent fuel to it for storage or disposal. The amounts to be payed are determined in GR 29/2011 and published on the BATAN website.

There is no mechanism for ensuring the financing of long term needs for radioactive waste management, spent fuel management or decommissioning.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: A specific document establishing a national policy and strategy for radioactive waste management and decommissioning is not in place.

(1)	BASIS: GSR Part 5 Requirement 2 states that <i>“To ensure the effective management and control of radioactive waste, the government shall ensure that a national policy and strategy for management are established.”</i>
(2)	BASIS: GSR Part 6 para.3.4 states that <i>“The responsibilities of the government include: —Defining the national policy for decommissioning and for management of the resulting radioactive waste; —Defining the legal, technical and financial responsibilities of organizations to be involved in decommissioning”</i>
R7	Recommendation: The Government should establish and promulgate a national policy

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

and strategy for radioactive waste management and decommissioning.

Observation: There are no provisions in the Act and corresponding Government regulations that take into account the long- term nature of radioactive waste and spent fuel management, decommissioning including decommissioning of nuclear installations before the end of its design life, and the establishment of appropriate financial provisions for such activities.

(1) **BASIS: GSR Part 1 R10 states that** *“The government shall make provision for the safe decommissioning of facilities, the safe management and disposal of radioactive waste arising from facilities and activities, and the safe management of spent fuel.”*

(2) **BASIS: GSR Part 1 R10, para.2.3 states that** *“ Appropriate financial provision shall be made for:*
(a) Decommissioning of facilities;
(b) Management of radioactive waste, including its storage and disposal;
(c) Management of disused radioactive sources and radiation generators;
(d) Management of spent fuel.

R8 **Recommendation: The Government should establish provisions, in the legal framework, governing long-term radioactive waste management, spent fuel management and decommissioning, including funding of such activities.**

1.8. COMPETENCE FOR SAFETY

The Government is taking different measures to ensure that appropriate competence levels are developed and maintained for all parties having responsibility for nuclear and radiation safety.

One of the key players in this effort is the Ministry of Research, Technology and Higher Education. This ministry is the provider/promoter of education, training and research opportunities for all areas of nuclear energy utilization.

There is a network of universities with programme designed to develop or improve the competence of Indonesian experts and organizations in different areas important to nuclear and radiation safety. This includes:

1. Bandung Institute of Technology (ITB), Bandung;
2. Gadjah Mada University (UGM), Yogyakarta;
3. Diponegoro University (UNDIP), Semarang;
4. North Sumatera University (USU), Medan;
5. University of Indonesia (UI), Jakarta;
6. Environmental Engineering Academy (STTL), Yogyakarta; and
7. Sebelas Maret State University (UNS), Solo.

Indonesia is extensively using international cooperation in securing appropriate competence for achieving safety of nuclear energy utilization. For details, see section 2.1 of this Report.

A dedicated Government policy and strategy for safety, supported by the execution of a national co-ordinated plan, would provide for a more systematic approach to ensuring the appropriate technical competence of authorized parties and the regulatory body, especially in case of a significant nuclear project such as construction of a new nuclear reactor. This should also include specific research and development programmes. For more information and conclusions on this subject, see section 1.1 of this Report.

For more information and conclusions on staffing and competence management specifically for the regulatory body see section 3.3 and parts of sections 5 to 12 of this Report.

1.9. PROVISION OF TECHNICAL SERVICES

BCR 1 of 2006 states that all dosimetry services and calibration laboratories should have an accreditation or, in the absence of this accreditation, the laboratory should apply to BAPETEN for a permit.

External dosimetry

According to GR 33 of 2007, results from dose monitoring of workers shall be evaluated by an accredited dosimetry laboratory; dose monitoring evaluation results shall be submitted by the dosimetry laboratory to the license holder and to BAPETEN.

There are two service providers for external dosimetry approved by BAPETEN in Indonesia;

1. BATAN's Centre for Safety Technology and Radiation Metrology (PTKMR) provides personal monitoring mainly for industrial and research facilities and activities. The dosimeter used is thermoluminescence dosimeter (TLD). The monitoring period is three months for all activities (does not depend on the risk associated with the activity). The approximate number of monitored workers is about 1000 workers from BATAN and 20000 workers in the industrial field.
2. The Ministry of Health has five centres called "the Centre for Security of Facility and Health (BPFK)". These centres provide personal dosimetry services for people working in the medical field in the regions of Surabaya, Makassar, Jakarta, Medan and Surakarta. They use TLD and film badge dosimeters. Here too, all workers are monitored on a three month basis for all practices. The approximate number of monitored workers by all the MoH service providers is about 20000 workers in the medical field.

All the above service providers have accreditation and consequently, according to BCR 1 of 2006 they are recognised by BAPETEN.

Internal dosimetry

BATAN is the only service provider in Indonesia in this area. BATAN has a whole body counter (WBC) and bioassay methods. It evaluates internal doses for their own staff and for other staff in the medical or industrial field upon request from BAPETEN.

National Dose Register

According to GR 33 of 2007, dose monitoring evaluation results are submitted by the dosimetry laboratory to BAPETEN and the license holder. BAPETEN is maintaining the national dose register for all radiation workers.

Calibration services

The Secondary Standards Dosimetry Laboratory (SSDL) is operated by BATAN – PTKMR. This Centre provides all types of radiation calibration including dose rate meters for different types of radiation and calibration for the TLD services.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: The current practice is that all workers are monitored on a three month basis in all different practices.

(1)	BASIS: RS-G-1.3 para. 3.16 states that <i>“The frequency of dosimeter exchange should be established by the dosimetry service depending on the type of work being performed and the anticipated exposure associated with the work, and the characteristics of the dosimeters and the overall limit of detection of the dosimetry system. Exchange frequencies can range from daily, in special operations, to every six months, if the exposure is expected to be very low, but exchange periods of one to three months are typical.”</i>
S2	Suggestion: BAPETEN should consider requiring the appropriate individual monitoring periods commensurate with the exposure condition.

1.10. SUMMARY

Indonesia has put in place a comprehensive framework for safety for use of nuclear energy. Opportunities for improvement were identified mainly for:

- Establishment of documented policies and strategies for safety at the level of Government that would be supported by a long term plan for their implementation;
- Development and promulgation of a national policy and corresponding strategy for radioactive waste and spent fuel management;
- Full incorporation of the fundamental safety principles of IAEA SF-1 into the legal and regulatory framework for safety including application of a graded approach and the principle of prime responsibility for safety;
- Full implementation of IAEA standards in the legal and regulatory framework;
- Coordination between BAPETEN and other authorities concerned with safety, including those involved in the use of radiation in medicine and in transport of radioactive material;
- Adjusting the frequency of dosimeter exchange by dosimetry services depending on the type of work being performed and the anticipated exposure associated with that work.

2. THE GLOBAL SAFETY REGIME

2.1. INTERNATIONAL OBLIGATIONS AND ARRANGEMENTS FOR INTERNATIONAL COOPERATION

International conventions and Codes of Conduct

Indonesia is party to all major international conventions related to safety and security of use of nuclear energy. These include:

- Convention on Early Notification of a Nuclear Accident;
- Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency;
- Vienna Convention on Civil Liability for Nuclear Damage;
- Convention on the Physical Protection of a Nuclear Material;
- Comprehensive Nuclear-Test-Ban Treaty;
- Convention on Nuclear Safety;
- Treaty on the Non-Proliferation of Nuclear Weapons;
- Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management;
- Amendment to Convention on Physical Protection of a Nuclear Material;
- International Convention for the Suppression of Acts of Nuclear Terrorism;
- Treaty on the Southeast Asia Nuclear Weapon-Free Zone.

Indonesia is committed to implement the provisions of the Codes of Conduct on Safety of Research Reactors and on Safety and Security of Radioactive Sources.

International peer reviews

Indonesia is extensively using IAEA peer review services in seeking opportunities to enhance safety in the use of nuclear energy and ionising radiation. Review missions used by Indonesia include: Integrated Safety Assessment of Research Reactors (INSSAR) Missions in 1999 and 2005; International Regulatory Review Team (IRRT) Mission in 1999 and follow-up in 2003; International Physical Protection Advisory Service (IPPAS) Missions in 2001, 2007 and 2014; International Nuclear Security Advisory Service (INSServ) Mission in 2004; Emergency Preparedness Review (EPREV) Mission in 2004; Radiation Safety and Security Infrastructure Appraisal (RASSIA) Mission in 2004; Integrated Nuclear Security Support Plan (INSSP) Mission in 2009; Integrated Nuclear Infrastructure Review (INIR) Mission in 2009; Education and Training Review Service (ETReS) Mission in 2012; and, Expert Mission on Leadership and Management for Safety for Regulatory Body - Review of the BAPETEN Management System in 2012.

Multilateral cooperation

BAPETEN strives to strengthen its international co-operation in of nuclear safety. The main partner is the IAEA. In recent years BAPETEN requested the Agency to provide assistance in strengthening its regulatory capacity in nuclear safety, with a focus on the management system of the regulatory body, enhancement of regulatory infrastructure, and the improvement of regulatory effectiveness. BAPETEN is also involved in Safety Standards Committees (SSCs), in particular the Radiation Safety (RASSC) and Transport Safety (TRANSSC) Committees.

Indonesia also actively participates in the Asian Network for Nuclear Safety (ANSN), which provides a forum for cooperation among IAEA member states in Asia on various topics of nuclear safety. Indonesia’s participation in ANSN includes the topics of: governmental and regulatory infrastructure, education and training, siting, safety analysis, operational safety, radioactive waste management, emergency preparedness and response, safety management of research reactors, communication, and leadership and management for safety.

Cooperation with EU has been established in order to enhance the capacity and effectiveness of the regulatory infrastructure for safety and to develop a national waste management strategy. In particular, BAPETEN dispatches several employees to undertake training courses and tutorials in several training centers of the EU for a period of 2 to 6 months. BAPETEN will also participate in the “Regional Cooperation on Emergency Preparedness and Response in South East Asia - Feasibility Study” between EU and the Association of Southeast Asia Nations (ASEAN).

Indonesia also participates in the newly founded ASEAN Network of Regulatory Bodies, which is called ASEANTOM. This co-operation is aimed at significantly enhancing the safety infrastructure in the region.

Bilateral cooperation

BAPETEN has formal bilateral agreements with the United States Nuclear Regulatory Commission (US-NRC), the Canadian Nuclear Safety Commission (CNSC), the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), Korea Institute of Nuclear Safety (KINS), Korea Institute of Nuclear Nonproliferation and Control (KINAC), the Nuclear Regulatory Authority (UJD) of the Slovak Republic, the Australian Safeguards and Non-Proliferation Office (ASNO), and the Atomic Energy Licensing Board (AELB) of Malaysia; to enhance and improve its regulatory control activities. In particular, BAPETEN dispatches several employees to undertake on-the-job training in the USNRC and CNSC for a period of 2 to 6 months. This program is expected to significantly enhance the competence of license application reviewers and nuclear safety inspectors in anticipation of the first nuclear power plant in Indonesia. Furthermore, BAPETEN collaborates closely with ARPANSA to improve the competence of BAPETEN staff on radiation safety of mining activities.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: In order to strengthen the nuclear safety infrastructure in Indonesia, the Government establishes and maintains extensive multilateral and bilateral international cooperation.	
(1)	BASIS: GSR Part 1 Requirement 14 states that <i>“The government shall fulfil its respective international obligations, participate in the relevant international arrangements, including international peer reviews, and promote international cooperation to enhance safety globally.”</i>
GPI	Good Practice: The Government and BAPETEN make extensive use of bilateral and multilateral international cooperation for training and competence building.

2.2. SHARING OF OPERATING EXPERIENCE AND REGULATORY EXPERIENCE

BAPETEN requires that all incidents at nuclear facilities and activities are analyzed and reported to BAPETEN. Methods used by BAPETEN include collecting all information of incidents, investigating unusual events and safety assessment, observing causes and corrective actions, and gaining lesson learned.

BAPETEN has participated in the IAEA systems for receiving, collecting, analyzing, maintaining and disseminating information from other states and relevant authorized parties through IRSRR and FINAS. BAPETEN uses the feedback from both operational and regulatory experience for improving review, assessment, and inspection activities and for developing the regulatory guides.

2.3. SUMMARY

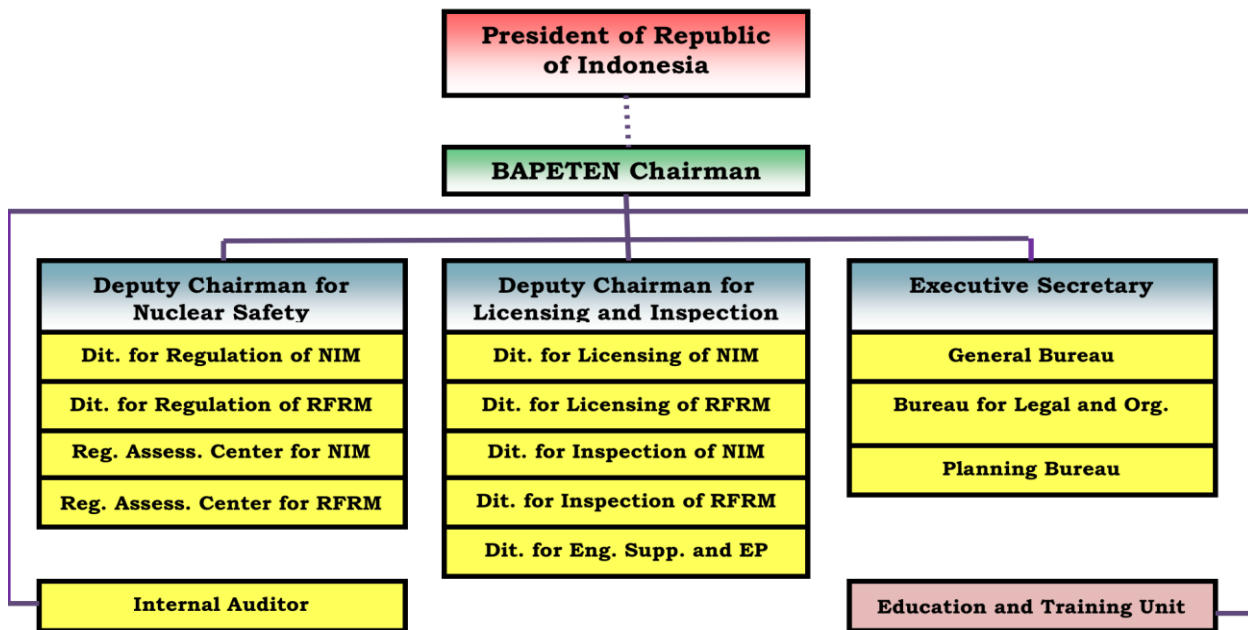
Indonesia puts emphasis on fulfilling its international obligations and participates in the relevant international arrangements, including international peer reviews.

The Government and individual organizations with responsibility for safety (including BAPETEN) make extensive use of bilateral and multilateral international cooperation for training and competence building in the area of nuclear energy uses.

3. RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY

3.1. ORGANIZATIONAL STRUCTURE OF THE REGULATORY BODY AND ALLOCATION OF RESOURCES

The organizational structure of BAPETEN is outlined below. BAPETEN is led by a Chairman, who is appointed by, and reports to, the President of the Republic of Indonesia. The Chairman meets with the President only infrequently, and most of the interaction with the top levels of the Indonesian Government is with the Minister of the Secretary of State (mainly legal issues) and Minister of Research, Technology and Higher Education (see also section 1.3 of this Report). The operational ‘core’ activities are carried out under the leaderships of the Deputy Chairman for Nuclear Safety and the Deputy Chairman for Licensing and Inspection. The two Deputy Chairmen as well as the Executive Secretary are appointed by the President, following proposals (including alternative candidates) by the BAPETEN Chairman. Other functions are positioned organizationally as shown below.



The IRRS Team concluded that the organizational structure of BAPETEN is logical and allows for the BAPETEN to effectively discharge its responsibilities. BAPETEN may adjust its organizational structure to suit the needs, however, this requires consultation with Government, and its approval or recommendation, after which in normal circumstances the Chairman establishes the new structure through a Chairman Regulation. While the structure thus can be adjusted to the needs, the Team considers that BAPETEN should be solely responsible for optimising its organizational structure, and that the current arrangements are unnecessarily cumbersome and impeding on flexibility. This may be particularly relevant when adapting the structure of the BAPETEN to the gradually increasing and changing regulatory needs of an evolving nuclear power programme.

The IRRS Team was informed that responsibilities are assigned within the organization through Chairman Regulations, and decisions are taken in accordance with these assignments (see also Module 4). Regulatory decisions can be appealed (see text in section 1.4 of this Report). There is a process established under the Management System for handling such appeals. In reality, this has never happened. No application for a licence has been declined on the basis of being sub-standard or unacceptable from the

point of view of protection and safety. In the case an application does not satisfy the decision criteria, it is normally returned to the applicant with a request for improvement within a fixed time.

The Management System emphasises a graded approach in decision making. The graded approach is a cross-cutting issue common to most, if not all, of the modules considered during the mission. This is highlighted in a generic Recommendation under section 1.1 and 4.1 of this Report.

Staffing and competence is elaborated on in Section 3.3, however, for the purpose of discussing the effective discharge of responsibilities, it should be noted that out of the currently 114 inspectors, 62 are working on nuclear facilities whereas 52 are working on radiation facilities and activities. The information provided in the Advance Reference Material indicates 94 technical staff in nuclear installations and materials area; whereas 99 work in the radiation facilities and radioactive materials area (activities).

The distribution of technical workforce, and specifically inspectors, between regulating nuclear and radiation activities appears to be disproportionate. This is clear when looking at the number of source licenses and radiation facility licenses on one hand (thousands), and nuclear facilities on the other hand (a few). Whilst the nuclear facilities are larger and more complex on a relative scale than many radiation facilities/sources, the IRRS Team is of the view that this distribution is not optimal and reflective of a graded, or risk-informed, approach. A common theme of bias towards increased attention to ‘nuclear matters’ has been observed in many of the Modules the IRRS Team has reviewed.

It appears to the IRRS Team that the current system where most sources need an individual licence, rather than having several sources covered by a single license, introduces unnecessary administrative burden.

BAPETEN is a centralized Agency with its Headquarters and all offices in Jakarta. The island of Java has the largest number of facilities and sources and all nuclear fuel cycle facilities including research reactors, which are within reasonably convenient and rapid reach from Jakarta. However, the number of sources and licensees is large also on the other main islands. It is possible that establishment of a regional offices may be justified. The IRRS Team considers this being worthy of consideration, while also acknowledging the risk of fragmentation through physical separation of a workforce that is already stretched from the tasks it is handling.

The IRRS Team is generally satisfied that the organizational structure is appropriate and allows for optimization of the allocation of resources, noting that resources may be constrained. The latter aspect is further discussed in Section 3.3.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: BAPETEN does not appear to be authorized to independently take decisions on their organizational structure. BAPETEN’s total funding is under government control; however, the distribution of resources within the BAPETEN is under its own control.	
Observation: The distribution of manpower, e.g. inspectors, between nuclear facilities, and radiation sources and facilities, appears to be disproportional which may be detrimental to regulation of radiation sources and facilities.	
Observation: BAPETEN issues a licence for each single source which inflicts heavy administrative burden on its staff.	
(1)	BASIS: GSR Part 1 Requirement 18, para. 4.5 states that <i>“The regulatory body has the responsibility for structuring its organization and managing its available resources so as to</i>

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

	<i>fulfil its statutory obligations effectively. The regulatory body shall allocate resources commensurate with the radiation risks associated with facilities and activities, in accordance with a graded approach. Thus, for the lowest associated radiation risks, it may be appropriate for the regulatory body to exempt a particular activity from some or all aspects of regulatory control; for the highest associated radiation risks, it may be appropriate for the regulatory body to carry out a detailed scrutiny in relation to any proposed facility or activity before it is authorized, and also subsequent to its authorization.”</i>
R9	Recommendation: The Government should authorise BAPETEN to develop and implement the organizational structure that would be best suited to allow it to carry out its obligatory functions effectively.
S3	Suggestion: BAPETEN should consider adjusting the allocation of resources, within the existing or revised organizational structure, to ensure proper regulation of nuclear facilities and radiation activities, using a risk-informed graded approach.
S4	Suggestion: BAPETEN should consider establishing regional offices to allow it to discharge its regulatory responsibilities, in particular inspections, more effectively and in a timely manner.
S5	Suggestion: BAPETEN should consider revising its licensing structure to allow for a more reasonable and manageable number of licenses, thereby reducing the administrative burden for the organization as well as licence holders.

3.2. EFFECTIVE INDEPENDENCE IN THE PERFORMANCE OF REGULATORY FUNCTIONS

BAPETEN is an independent statutory agency. This is outlined in Presidential Decree Number 103 Year 2001 on Non Departmental Government Institutions, as amended by Presidential Decree Number 9 Year 2004; it establishes BAPETEN as a non-governmental agency which is responsible directly to the President. The IRRS Team was informed that, to guide the discharge of its responsibilities, the Chairman of BAPETEN has issued BCR 11 of 2012 on Ethical Code and Discipline of Civil Servants of BAPETEN.

While the IRRS Team considered the arrangements for independence to be adequate from the point of view of independence *de jure*, the IRRS Team also looked into how ‘effective independence’ is demonstrated *de facto* in BAPETEN’s discharge of its responsibilities.

Interviews with staff indicated awareness of the need to avoid any conflicts of interest in their dealings with license holders, and when contracting consultants and appointing advisers; and on the need to avoid undue influence from individuals or organizations that promote the introduction and use of radiation and nuclear technologies. The IRRS Team could not verify that conflict of interest was covered to any greater extent in the Management System.

BAPETEN itself is a license holder for radiation sources; the IRRS Team was informed that these sources are managed and operated by Directorates, such as the Directorate for Engineering Support and Emergency Preparedness that are separate from the Directorate(s) involved in the regulatory oversight of those licenses.

Nuclear inspectors are involved in assessment and licensing, in order to use resources and competence more effectively and for multiple purposes. This can be perceived as if inspectors are being involved in inspection against licenses they have issued themselves, which may introduce a ‘positive bias’ in relation to their monitoring of the licensee’s performance. However, the IRRS Team considered this being a lower order risk and in many cases an efficient use of resources, or even a practical necessity.

The IRRS Team is of the view that provisions are in place that would allow BAPETEN to act as a *de facto* independent regulatory body; however, the IRRS Team had little opportunity to verify this through *in situ* observation of performance or through analysis of documentation. As already indicated in Section 3.1, the IRRS Team is of the view that BAPETEN should be authorised to put in place the optimal organizational structure without Governmental approval. Also, as a general observation, the IRRS Team notes that pro-actively making regulatory decisions publically available, including a statement of reasons, may improve visibility, increase the recognition of BAPETEN’s competence, increase trust and - importantly - indirectly promote and support a culture of independence and integrity among staff. For more information and conclusions see relevant sections of this Report.

BATEPEN inspectors have the right to terminate any activity which potentially leads to radiological hazard to the workers, the public and the environment in emergency situation; however, this can only be done after consulting the BAPETEN Chairman. For details and conclusion on this subject see section 7.1.3 of this Report.

3.3. STAFFING AND COMPETENCE OF THE REGULATORY BODY

The issue of BAPETEN’s staffing level was discussed in Chapter 1 in relation to the general resourcing of the regulatory body. BAPETEN employs just over 400 staff. The IRRS Team was also informed that BAPETEN also outsources work to approximately 150 additional staff. Of the ‘core’ workforce, about half is ‘technical’ and the other half is ‘administrative’. The number of licenses administered by this workforce is more than 12 000. While the number of facilities is smaller than this (each source has a license but many may be held by individual licensees), the task for staff involved in licensing, inspection and enforcement activities appears daunting for a workforce of 200 technical staff. Discussion with senior management reinforced this observation, although the same view was not expressed in BAPETEN’s Self-assessment.

As already pointed out in Section 3.1, Indonesia is a large and populous country. While nuclear facilities are exclusively located on Java, licensed sources and facilities are spread right across all major islands. The map below illustrates the geographical distribution of radiation facilities and radioactive material (RFRM) across the Indonesian territory.



Location of radiation facilities and radioactive materials in Indonesia

The IRRS Team was informed that workforce planning takes place through analysis of ‘gaps’ and through ‘work load analysis, and mechanisms are in place for job rotation. In order to adjust for shortages, e.g. in inspector workforce, inspectors may be recruited internally from other areas, however, this obviously leads to consequences in those areas from which the inspectors are recruited, which are difficult to mitigate with a static staffing number.

During the interviews, it was indicated that requests for increase in the workforce are not unlikely to be positively received by the relevant Ministries and Parliament, despite a current moratorium on recruitment in the Public Service, from which BAPETEN is already seeking an exemption. The IRRS Team was informed that, in view of BATAN’s decision to apply for siting of a 10 MWt high-temperature gas cooled reactor, the resourcing of BAPETEN is likely to increase significantly next year. This is welcome as the application fee, which for a facility of such nature would be in the order of a few tens of thousands of dollars, would not suffice to cover BAPETEN’s costs associated with review and assessment.

However, the IRRS Team also felt that adjustment of the workforce cannot only be reactive; in particular if Indonesia intends to pursue a nuclear power programme (the plans for a 10 MWt reactor can, however, not in isolation be considered an element of such intention or plan), BAPETEN needs to implement a long-term strategy and plan to increase its staffing level and broaden the competence basis. This, in turn, places a demand on the educational system in the longer term. Despite the possibility that Indonesia may embark on a nuclear power programme, the IRRS Team did not see evidence of such long-term planning. The IRRS Team is of the view that, if the intention is to pursue a nuclear power programme, the Government should proactively resource BAPETEN to allow it to position itself as a strong and competent regulator for such a nuclear power programme. While governmental resourcing was already covered in Chapter 1, BAPETEN also needs to proactively prepare itself for advising the Government on its resource-needs in case a power programme would eventuate or in case other major facilities that require licensing are introduced.

BAPETEN considers that generally it has the competence required to fulfil its functions, including staff with higher technical and scientific education. Nevertheless, there are specific areas where the IRRS Team concluded, that further competence building efforts are needed. Detailed discussion of these cases and individual conclusions are given in the relevant sections of this Report. Training programmes are basically available, but during the self-assessment BAPETEN identified specific areas for improvement in

this area. In this respect, detailed discussion of these cases and conclusions are given in the appropriate sections of this Report as well. As mentioned in section 2, extensive collaboration takes place with IAEA and the EU for competence development; in addition, BAPETEN has entered into many collaborative arrangements with counterparts in other countries. A Human Resources Planning Document is under development for integration in the Management System (see section 4 of this report).

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: BAPETEN does not appear to have developed a staffing plan, based on a thorough competence analysis that addresses its staffing needs to meet the potential expansion of the nuclear programme.

(1)	BASIS: GSR Part 1 Requirement 18, para. 4.11 states that <i>“The regulatory body has to have appropriately qualified and competent staff. A human resources plan shall be developed that states the number of staff necessary and the essential knowledge, skills and abilities for them to perform all the necessary regulatory functions.”</i>
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S6	Suggestion: BAPETEN should consider, as part of the human resource plan, making preliminary and generic analyses of future staffing needs that may be elicited by the introduction of large-scale technologies such as a nuclear power programme.
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3.4. LIAISON WITH ADVISORY BODIES AND SUPPORT ORGANIZATIONS

BAPETEN does not have access to an advisory body established for the specific purpose of providing advice to the regulatory body. However, BAPETEN has established two internal ‘technical support organizations’ (TSOs; see organizational chart in Section 3.1) and is when necessary seeking support from external organizations nationally (such as universities) as well as overseas. The IRRS Team was informed that one example of earlier extensive overseas involvement is the siting, construction and commissioning of the multi-purpose 30 MW research reactor located in Serpong – although it has to be borne in mind that operations of this reactor commenced in 1987, well before the establishment of BAPETEN as an independent regulatory body.

Discussions between the IRRS Team and BAPETEN counterparts revealed that the BAPETEN’s view is that for the current programme for nuclear and radiation facilities and activities, BAPETEN is sufficiently equipped with indigenous competence, although insufficient capacity, to satisfactorily address all issues associated with the programme. The IRRS Team is aware that BAPETEN will likely receive an application for a license for a non-commercial high-temperature gas cooled 10 MWt reactor shortly, and that BAPETEN’s budget will increase significantly in anticipation of this application. While BATAN’s plans appear well advanced, BAPETEN is not yet positioned to deal with the specific aspects of licensing a reactor design of such kind. The IRRS Team also notes that while both the thermal and electrical effect of this reactor is low, the review of the design is challenging.

Despite the increased resourcing, the remaining challenges associated with a new facility of this kind is the demand on staff (capacity and capability) to carry out the review and assessment, to be an ‘intelligent customer’ of consultant services, and to draw on the opportunities offered through arrangements with overseas regulators and international organizations such as IAEA. The current example of the 10 MWt reactor aside, lead times in receiving significant license applications can sometimes be short and stretch the organization considerably. However, BAPETEN can, under such circumstances, approach the Ministry of Finance directly and receive extra-budgetary funding to be able to satisfactorily deal with the situation, e.g. through the use of expert consultants. BAPETEN staff indicated that this has worked to

BAPETEN's satisfaction in the past. The IRRS Team was informed that BAPETEN has a contingency in its budget equalling about a quarter of a million dollars that could be used for urgent needs.

The IRRS Team was generally satisfied with the ability of BAPETEN to draw on the expertise of internal or external expert organizations, whether national or international. The establishment of a network with organizations that can provide expert support, and the general engagement with the global nuclear safety community, was considered by the IRRS Team to be a Good Practice, see Section 2.1 of this Report.

3.5. LIAISON BETWEEN THE REGULATORY BODY AND AUTHORIZED PARTIES

BAPETEN engages with authorised parties, i.e. its licence holders, in various ways. The largest organization operating under BAPETEN license is BATAN, with multiple nuclear fuel cycle facilities including research and multipurpose reactors in several locations, and which is a proponent of nuclear energy in Indonesia. The IRRS Team was informed that interaction between BAPETEN and BATAN takes place frequently (monthly) at the highest level (Chairmen).

The IRRS Team was also informed that executive meetings are being held with a selection of other license holders twice yearly, which is planned to change to yearly but larger meetings. Such meetings would typically involve 30-50 license holders plus other interested parties (stakeholders) as relevant; all invited by BAPETEN.

BAPETEN makes some effort to communicate the reasons for its regulatory decisions, in particular if these have adverse consequences for the license holder, although such cases are rare. The IRRS Team was informed that BAPETEN has handed some cases of non-compliance to the Police Authorities which subsequently have decided to take a few of these to court. BAPETEN does not publicise trend analyses of licensee performance in relation to performance indicators, but provide some positive incentive for good performance, such as the recently instituted award for 'good safety performance', with the inaugural award ceremony taking place just as the IRRS Team performed its review at the BAPETEN Headquarters in Jakarta.

Although some stakeholders, in particular those operating complex facilities, may have some misgivings over aspects of BAPETEN's work, such as perceived long handling times for licence applications, there was no evidence that the relationship between BAPETEN and its licensees is anything but generally positive and non-adversarial.

BAPETEN has established agreements with some regional authorities in areas of specific interest, such as the management of TNORM emanating from present and past activities. BAPETEN also expects to increase its engagement in management of public exposures to radon and its progeny in specific geographic areas.

A trustful and transparent interaction with licensees, while being mindful of the need to preserve the regulatory independence and maintaining a clear demarcation of responsibilities between the regulator and implementer, is important for both regulatory effectiveness and for the credibility and the reputation of the regulator. While it appears that BAPETEN could use its website more for communication on regulatory issues of interest to all licensees, the IRRS Team is mindful of the financial constraints.

3.6. STABILITY AND CONSISTENCY OF REGULATORY CONTROL

A number of controls are in place to ascertain consistency in the regulatory system, from the development of regulations through to the application in authorizations, inspections and enforcement activities. The controls include consultation with the Ministry for Legal and Human Rights, as well as public consultation, when drafting regulations. The drafting also takes place in a planned fashion, using five years as the planning horizon. For more specific information and conclusions of the IRRS Team on this

subject, see modules 5-9. Generally, BAPETEN uses the IAEA Safety Standards as a benchmark for its regulatory system.

While the system as such needs to be internally consistent, there is also a need for consistency in its application. The Management System introduces a scheme of co-ordination meetings at different levels with the aim of securing consistency. Subjectivity in the decision making is mitigated by the right to appeal regulatory decisions, as outlined in Section 1.4, noting that such appeals have so far not been made. It is possible that the consistency in its application could be enhanced by more frequent publication, e.g. on the website, of the rationale and underpinning analysis supporting decisions of major significance (such as publication of a statement of reasons; see Section 3.5).

3.7. SAFETY RELATED RECORDS

BAPETEN's self-assessment lists a range of regulatory records that are maintained by BAPETEN. The internal rules, captured in the Management System set out the procedures including time-frames of data preservation for different kinds of records.

The inspection procedures (verified in the case of the Inspection Checklist for Radiotherapy) provide evidence that the inspections consider records as such.

The self-assessment indicated that the Chairman's Regulations stipulate that the licensee should make arrangements for recording all safety-related information for all facilities and activities. However, analysis of a sample of the BCRs indicates that this requirement may not be particularly clearly expressed. E.g. BCR 4 Radiation and Safety Protection in the Utilization of Nuclear Energy have the following definition of records in Chapter I, Article 1:

“Record is defined as document that declares the received result or provides evidence of the implementation of activities on nuclear energy utilization.”

More specifically, Article 4 (1) h of the same regulation mentions an obligation to: *“Develop and maintain related record to radiation safety.”*

The comprehensive GR number 2 of 2014 specifies the documentation requested by BAPETEN when applying for licences relevant to different phases in the life-cycle of a facility, but does not set requirements on record keeping and preservation of safety-related documents in the long term.

3.8. COMMUNICATION AND CONSULTATION WITH INTERESTED PARTIES

The process of communication with the public and other interested parties is guided by a BAPETEN internal policy statement on public information services.

In accordance with Act 14/2008 on public information disclosure, BAPETEN introduced (through its management system) a process of handling public inquires. This formal process includes specific procedures for different forms of public inquiries (written, e-mail, phone call). Among others, these specific procedures define deadlines for responding to different types of inquires (4 to 5 working days), criteria for refusal, forms, system of data collection, etc. Information on security, nuclear materials, detail on nuclear design, personal data, etc., will not be released. In accordance with the Act on public information disclosure the refusal for information can be appealed to the Public Information Commission, a government agency at the level of BAPETEN, which will make a final decision on disclosure or refusal of the information. For example, in February 2015 BAPETEN processed 34 inquiries and in March the number was 41.

For communication and consultation with government/state institutions, regional and local governments and municipalities, the Act No 30 of 2014 on government administration applies. Implementation of this new Act brought public outreach as a new item to the BAPETEN communication activities. For the next

year BAPETEN plans to conduct 24 outreach campaigns, such as one directed to local authorities in area affected by uranium mining activities.

BAPETEN publishes its annual report, annual safety report, accountability and performance report, and country report for IAEA on a periodic basis.

The BAPETEN web site is used for all sorts of communications and consultations with interested parties. For example, through the web site it is possible to apply electronically for certain licences/approvals/permits. Information on different events is published there as well. Public consultation in process of drafting regulations is also processed through web site. These efforts are helping to increase BATEPEN visibility among the people of Indonesia. Continuous increase of communication and consultation through website will also foster a culture of transparency, accountability and integrity, which will promote the perception a competent and independent regulatory

3.9. SUMMARY

With regard to the functions of the regulatory body, the IRRS Team was able to verify many of the observations made in BAPETEN's self-assessment, and was also able to detect some strengths as well as some shortfalls. The IRRS Team concludes that:

- Indonesia has established a regulatory body with many of the requisites outlined in the Safety Standards that characterise an independent, efficient and effective regulator of radiation sources and facilities, and of nuclear facilities.
- While BAPETEN is in possession of significant resources, it appears to be under-resourced in relation to the number of licences and licensees it is handling. This can be addressed in different ways, e.g. through adjusting the resourcing (this requires Governmental intervention as dealt with in section 1), improved internal allocation of resources and through efficiency gains in the organization, including reducing the number of source licenses to reduce the administrative burden. Potential efficiency gains by establishing regional offices should be assessed.
- BAPETEN is generally capable of accessing advice from external parties and to be an 'intelligent customer', and is well connected to organizations that are able to provide such advice. This observation reinforces the perception of BAPETEN as a significant partner in the development and utilisation of the international framework for radiation and nuclear safety.
- BAPETEN should continue in its efforts to enhance the use of its website to ensure regulatory consistency, promote its core business, and increase its visibility among the people of Indonesia. This will also foster a culture of accountability and integrity, which will promote the perception a competent and independent regulatory authority.

4. MANAGEMENT SYSTEM OF THE REGULATORY BODY

4.1. IMPLEMENTATION AND DOCUMENTATION OF THE MANAGEMENT SYSTEM

BAPETEN has established the BAPETEN Management System, or BMS (BCR10 of 2011). The BMS incorporates ISO 9001:2008 and ISO 9004: 2009 standards but BAPETEN is not formally certified against the standards. The top level document is the paper-based manual, which includes the policy statement of the organization, a description of the management system and the structure of the organization. The manual also includes the mission and vision statements of BAPETEN. The IRRS Team considers that the vision and mission do not reflect all regulatory activities and responsibilities of the regulatory body. Safety and security is included in the vision but not further specified in the BMS, e.g. through establishment of safety goals.

The IRRS Team was informed that the BMS manual has been revised but the new version is not yet implemented. An IAEA expert mission on leadership and management system for safety for the regulatory body was conducted in July 2012. The review generated recommendations which have been taken into consideration when revising the manual. As the new manual is not yet implemented, the IRRS Team reviewed the existing BMS for the purpose of this report and made references to the new manual in areas where information on the new BMS has been provided to, and in some cases verified by, the IRRS Team.

The document hierarchy is (from the top): a) the manual; b) three types of procedures (quality, administrative, general); c) work instructions; d) forms; and, e) records and reports. Procedures can be found on the BAPETEN's intranet. BAPETEN Chairman Regulations (BCRs) are not included in the BMS but can be found on the intranet.

The manual indicates that the Chairman of BAPETEN promotes continuous improvement (Article 3). It is emphasised in the manual that the Executive Secretary has the responsibility to plan, implement, monitor, assess, analyse, review and improve the BMS as necessary to ensure: a) conformity to the tasks of BAPETEN; b) consistency of the BMS; and, c) continually improve the effectiveness of the BMS.

The IRRS Team was not able to locate all necessary documents (policies, procedures, etc). During interviews, the IRRS Team was informed that requirements not stated in internal procedures are stated in relevant laws. It is not clear if BAPETEN has identified and integrated all necessary requirements in a systematic way in the operations of the organization. It is of importance that the documentation included in the BMS is comprehensive and understandable to those who use it, and that it is readily identifiable, available and fit for purpose at the point of use.

Safety culture

The BMS is currently not used to promote and support a strong safety culture. The IRRS Team was informed that a three days' workshop led by the IAEA on Safety Culture Self-Assessment was held with senior managers. Based on the information discussed during the workshop, BAPETEN will implement a self-assessment program which includes a baseline study and methodology for monitoring safety culture indicators. They will also conduct workshops and training with all staff.

Application of graded approach and risk management

The application of a graded approach is not described in the BMS. Section 1.1 of this report discusses the obligation placed on BAPETEN by Government to promote a graded approach, and mechanisms for applying a graded approach thus should be included in the regulatory body's management system. The

IRRS Team has been informed that a graded approach is used in some areas, for example in some inspections. However, BAPETEN has not adopted a graded approach in all regulatory activities.

GR No 29 of 2008 states that BAPETEN shall identify risks relative to radiation facilities and radioactive sources. GR No 60 of 2012 requires regulatory bodies to implement a risk management framework. Accordingly, BAPETEN's Executive Secretariat has implemented risk management methodologies and there are plans to develop a procedure for the entire organization. The Directorate for Engineering Support and Emergency Preparedness is planning to establish guidelines for risk management for the licensees (nuclear installations and radiation facilities).

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: The BAPETEN Management System (BMS) partially captures the components that are essential to carrying out its safety-related functions. Procedures for promotion of a strong safety culture and a graded approach are not included in the BMS.

(1)	<p>BASIS: GSR Part 1 Requirement 19, para. 4.14 states that <i>“The regulatory body shall establish and implement a management system whose processes are open and transparent [9]. The management system of the regulatory body shall be continuously assessed and improved.”</i></p>
(2)	<p>BASIS: GSR Part 1 Requirement 19, para. 4.15 states that <i>“The management system of the regulatory body has three purposes:</i></p> <p><i>(1) The first purpose is to ensure that the responsibilities assigned to the regulatory body are properly discharged.</i></p> <p><i>(2) The second purpose is to maintain and improve the performance of the regulatory body by means of the planning, control and supervision of its safety related activities.</i></p> <p><i>(3) The third purpose is to foster and support a safety culture in the regulatory body through the development and reinforcement of leadership, as well as good attitudes and behaviour in relation to safety on the part of individuals and teams.</i></p>
(3)	<p>BASIS: GSR GS-R-3 Requirement 2.1 states that <i>“A management system shall be established, implemented, assessed and continually improved. It shall be aligned with the goals of the organization and shall contribute to their achievement. The main aim of the management system shall be to achieve and enhance safety by:</i></p> <p><i>—Bringing together in a coherent manner all the requirements for managing the organization;</i></p> <p><i>—Describing the planned and systematic actions necessary to provide adequate confidence that all these requirements are satisfied;</i></p> <p><i>—Ensuring that health, environmental, security, quality and economic requirements are not considered separately from safety requirements,</i></p> <p><i>To help preclude their possible negative impact on safety.”</i></p>
(4)	<p>BASIS: GSR GS-R-3 Requirement 2.5 states that <i>“The management system shall be used</i></p>

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

	<p><i>to promote and support a strong safety culture by:</i></p> <ul style="list-style-type: none"> —<i>Ensuring a common understanding of the key aspects of safety culture within the organization;</i> — ...”
(5)	<p>BASIS: GSR GS-R-3 Requirement 2.6 states that “2.6. <i>The application of management system requirements shall be graded so as to deploy appropriate resources, on the basis of the consideration of:</i></p> <ul style="list-style-type: none"> —<i>The significance and complexity of each product or activity;</i> —<i>The hazards and the magnitude of the potential impact (risks) associated with the safety, health, environmental, security, quality and economic elements of each product or activity;</i> —<i>The possible consequences if a product fails or an activity is carried out incorrectly.”</i>
R10	<p>Recommendation: BAPETEN should review its management system to ensure that the vision, mission, safety culture and the application of a graded approach reflect the Governmental assignment of tasks and that those are communicated to and understood by all layers of the organization.</p>

4.2. MANAGEMENT RESPONSIBILITY

Management responsibilities are stated in the BMS manual by communicating the meeting requirements, defining BAPETEN’s strategy and policy, ensuring that targets are established in all functions carrying out management reviews, and the allocation of resources.

The responsibilities and authority of the Chairman, Deputy Chairmen and Executive Secretary are stated in the Presidential Decree No 76 of 1998. Responsibilities for managers are stated in BCR No 1 rev 2/K-OTK/V of 2004 and after the restructuring of the organization the BCR has been amended with BCR No 11 of 2008 for line managers and BCR No.12 of 2008 for the Education and Training Centre. Responsibilities for staff are documented in work information documents.

The chairman of BAPETEN defines the vision, mission, values, objectives, strategies and targets. The vision, mission and policy are stated in the manual, whereas objectives, strategies and targets are stated in the five year plan, but values are not stated in the manual. Values are stated in the forthcoming manual but not yet implemented.

It is stated in the BMS that BAPETEN’s management shall establish, implement and document relevant documents to ensure efficient use of resources and continually improve its effectiveness. The manual has only one overarching policy, but currently there are no other policies in the BMS. The IRRS Team was informed that work is going on to develop procedures and processes at all levels in the organization.

In order to avoid ambiguity, it is important that decisions are made in a clear way. The IRRS Team was informed that there is no decision-making procedure that states how and when decisions are to be made. The governmental requirements on decision making can be found in Act No 30 of 2014 on Governmental Administration. The IRRS Team was informed that BAPETEN is now drafting a procedure for decision making. In the coordination meetings which are held weekly on directorate, bureau and centre levels, decisions are discussed and made.

BAPETEN has a five year strategic plan which includes goals, targets and key performance indicators. The government requires a strategic plan from all regulatory bodies. One of the strategic objectives is licensees’ non-compliance with regulations. BAPETEN has a performance indicator measuring licensee non-compliance including a target. It is the view of the IRRS Team that it is an important objective but has to be handled in a proper way not conflicting with identifying non-compliances during inspections. There is also a five year strategic plan at the top management level. On directorate, bureau and centre levels the planning takes place annually. BAPETEN reports on performance and accountability annually to government, as well as on targets and fulfilment of key performance indicators and use of budget, and provides the government with monthly reports.

Responsibility and authority for the Management System

The Chairman has assigned the Executive Secretary to be the management representative (article 5). The duties, responsibility and authority for the management representative as stated in the manual are not clear.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: Not all responsibilities of management are reflected in the BAPETEN Management System.	
(1)	BASIS: GS-R-3 para. 3.2 States that <i>“The senior management shall develop individual values, intuitional values and behavioural expectations for the organization to support the implementation of the management system and shall act as role models in the promulgation of these values and expectations.</i>
(2)	BASIS: GS-R-3, para. 3.5 states that <i>“Senior management shall ensure that it is clear when, how and by whom decisions are to be made within the management system”.</i>
(3)	BASIS: GS-R-3, para. 3.7 States that <i>“Senior management shall develop the policies of the management system. The policies shall be appropriate to the activities of the organization”.</i>
R11	Recommendation: BAPETEN should include appropriate values, policies and decision-making procedure in its management system and ensure they are communicated to all staff.
Observation: The role of the individual charged with the responsibility for reporting on the performance of the BAPETEN Management System is not properly captured in the management system.	
(1)	BASIS: GS-R-3, para. 3.13 states that <i>“An individual reporting directly to senior management shall have specific responsibility and authority for: Reporting on the performance of the management system, including its influence on safety and safety culture, and any need for improvement;.</i>
S7	Suggestion: BAPETEN should consider clarifying the responsibility of the individual reporting on the performance of the management system to senior management.

4.3. RESOURCE MANAGEMENT

Competence and training

BAPETEN has started a project aiming at assessing competence needs for all work. To do so they are using the IAEA model “Systematic Assessment of Regulatory Competence Needs for Regulatory Bodies of Nuclear Facilities (SARCoN)”. The method includes three steps: 1) development of competence profiles; 2) performing a competence gap analysis; and 3) periodic review. Competence analyses have not yet been done for the whole organization.

BAPETEN has been developing specific training programmes and dispatching several employees to undertake higher education levels at domestic and foreign universities in accordance with their respective field of work. The training programme comprises in-house (covering both internal and coordinated training) and overseas training. BAPETEN has been establishing overseas training programmes in order to improve their skills and knowledge. The overseas training is conducted by dispatching selected staff to participate in training courses, workshops, seminars, and on the job training (OJT) in regulatory bodies or training institutions in advanced countries. However, BAPETEN’s self-assessment identified that the in-house training programme does not meet the competency requirements for its staff.

Development of staffing plan

BAPETEN each year proposes to the Government the number of staff needed, based on identified workload and competence needs. The IRRS Team was informed that staff analyses are done within the organizational unit proposing different staffing alternatives depending on workload. This work has not yet been completed. The issue of allocation of resources including staff was discussed in Sections 3.1 and 3.3 of this report.

BAPETEN has about 8 persons working with the development and improvement of the Management System. They are working within the Bureau for Legal and Organizational Affairs.

Handling of working environment

The manual states that all managers identify and assesses the various risks associated with the infrastructure and take measures to reduce these risks. These actions include emergency preparedness and response plans. It also states that, in order to create and manage an appropriate working environment, the following should be considered, such as:

- a) creative work methods and opportunities for employees to participate actively in realizing their potential in BAPETEN,
- b) the requirements of laws and regulations relating to quality, safety and security,
- c) ergonomics,
- d) psychological factors, including workload and stress.

The IRRS Team noticed that there are no procedures for analysing working environment although audits of the work environment are carried out. Hazard analysis has been performed in the area of electrical safety. The IRRS Team was informed that there is a procedure in draft which will take into account the requirements in the ISO Standard OHSAS 18001, Occupational Health and Safety Management Systems.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: BAPETEN does not appear to have developed a staffing plan, based on a thorough competence analysis that addresses its staffing needs.

(1)	BASIS: GS-R-3 para. 4.1 states that <i>“Senior management shall determine the amount of resources necessary and shall provide the resources to carry out activities of the organization and establish, implement, assess and continually improve the management system”.</i>
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(S)	See Suggestion 6 in Section 3.3.
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Observation: There are no procedures in the BAPETEN Management System for assessing the safety of the working environment, although audits are performed.

(1)	BASIS: GS-R-3, para. 4.5 states that <i>“Senior management shall determine, provide, maintain and re-evaluate the infrastructure and the working environment necessary for work to be carried out in a safe manner and for requirements to be met.”</i>
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S8	Suggestion: BAPETEN should consider establishing procedures for assessing the safety and appropriateness of the working environment.
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4.4. PROCESS IMPLEMENTATION

The overarching process map is presented in Annex 3 of the BMS manual. The process map consists of two types of processes; core processes and management processes. The process map in the manual also includes organizational functions which makes the map difficult to understand for staff. The review team was shown the revised version of the overarching process map. The map is simplified and includes three types of processes; management, core and support. The IRRS Team was informed that most of the processes are developed. The processes are documented in procedures and can be found on the intranet. The Procedure on the Establishment of Processes Interaction Map (PA-BHO-07 May 21, 2015 rev.0) establishes the method for identification and development of processes. In the current BMS manual process owners and their responsibilities are not expressed. The IRRS Team was informed that the updated manual includes designated process owners and their authority and responsibility.

Control of documents and records

The BMS includes a procedure for document control (PM-01 Procedure on document control, 17 Nov. 2006 rev. 0) and control of records (PM-02 Procedure on Records Control Nov 2006 rev. 0). In addition to the procedure on control of record there is a Chairman Decree 1364/K/X/2014 on retention periods of archives. The procedure for control of records also refers to a guideline which includes storage and disposal. According to the BMS, the Executive Secretary has the responsibility for establishing these procedures. The IRRS Team was informed that BAPETEN is in the process of updating these procedures.

Management of organizational change

Currently the BMS does not include a procedure for organizational changes. This may be due to the fact that BAPETEN is not authorized to change its own organizational structure. This issue was dealt with in Section 3.1.

Internal communication

Internal communication is conducted vertically and horizontally through working meetings, coordination meetings between work units, and inspectors' coordination meetings. The IRRS Team was informed that meetings are documented and stored in the documentation system. All staff can retrieve meeting minutes from the system. Up to now, the chairman of BAPETEN does not have meetings with all staff but the IRRS Team was informed that this is the future intention. The IRRS Team was also informed that management issues are discussed when relevant.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: The BAPETEN Management System currently does not include a procedure for organizational changes.

(1)	BASIS: GS-R-3, para. 5.28 states that <i>“Organizational changes shall be evaluated and classified according to their importance to safety and each change shall be justified.”</i>
(2)	BASIS: GS-R-3, para. 5.29 states that <i>” The implementation of such changes shall be planned, controlled, communicated, monitored, tracked and recorded to ensure that safety is not compromised.</i>
R12	Recommendation: BAPETEN should develop and include procedures for analysing the need for organizational changes taking into consideration safety aspects, and ensure that the procedures are implemented and communicated to all concerned.

4.5. MEASUREMENT, ASSESSMENT AND IMPROVEMENT

The BMS manual states that the BAPETEN Executive Secretary shall monitor, measure, analyse and periodically review the performance of the management system with the objective to:

- a) declare conformity to requirement,
- b) ensure consistency and
- c) continually improve the effectiveness of the BMS

Furthermore, the Executive Secretary is required to determine analysis methods that can be applied, including statistical methods and the scope of their use. This activity aims to determine the effectiveness of the implementation of the BMS.

Self-assessment

The BMS requires that all managers carry out a self-assessment, which includes evaluation of work performance mainly, but also includes benchmarking. The IRRS Team was informed that the self-assessments do not include safety culture aspects.

Management System review

The BMS manual states that a management review is to be conducted at least once a year. The review aims to ensure continual suitability, adequacy and effectiveness of the BMS. Records of management reviews are to be documented and the manual includes a method for management system review. The IRRS Team was informed that management system reviews have not been implemented.

Independent assessment

Independent assessments (Internal Quality Conformity Assessments) are conducted. The Executive Secretary has appointed a team consisting of members from different parts of the organization to carry out

this function. The manual states that they cannot review their own working area. Independent assessments are conducted at least once per year according to a programme. The IRRS Team was informed that the programme is based on the status and importance of the area assessed taking into account results from previous assessments. Planning of independent assessments is done as part of the annual planning. Independent assessments are done according to procedure PM-03 Procedure on internal quality audits May 12 2015 rev.2. The IRRS team was informed that quality audits are organised within the Bureau for Legal and Organizational Affairs. The internal auditor is responsible for the follow-up of budget, performance indicators and the five year strategic plan.

Management of non-conformances and corrective actions

The manual states that managers at all levels are to establish and implement measures to eliminate the causes of nonconformities. This is done in order to prevent any recurrence of nonconformities. The BMS includes procedures on Non-conformances PM-04 Nov. 17, 2006 rev 0, Corrective actions PM-05 Nov. 17, 2006 rev 0 and Preventive actions PM-06 Nov. 17, 2006 rev 0.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: While procedures for self-assessments in order to evaluate performance are included in the BMS, they have not been fully implemented and safety culture aspects are not included.	
(1)	BASIS: GS-R-3 para. 6.2 states that <i>“The Senior management and management at all other levels in the organization shall carry out self-assessment to evaluate the performance of work and the improvement of the safety culture.</i>
S9	Suggestion: BAPETEN should consider enhancing the implementation of self-assessments and to include safety culture aspects.
Observation: While requirements on management system reviews are included in the BMS, such reviews have not been performed.	
(1)	BASIS: GS-R-3 para. 6.7 states that <i>“A management system review shall be conducted at planned intervals to ensure the continuing suitability and effectiveness of the management system and its ability to enable the objectives set for the organization to be accomplished.</i>
R13	Recommendation: BAPETEN should implement the management system review stated in the BMS manual.

4.6. SUMMARY

BAPETEN has established the BAPETEN Management System (BMS) but the system only partially captures the components that are essential to carrying out its safety-related functions. Safety and security is included in the vision but not further specified in the BMS, e.g. through establishment of safety goals. Promotion for a strong safety culture and a graded approach are not included in the BMS.

The IRRS Team provides BAPETEN conclusions to review its management system to ensure that the vision, mission, safety culture and the application of a graded approach reflect the Governmental assignment of tasks and that those are communicated to and understood by all layers of the organization.

Although responsibilities of management are stated in the BMS, not all responsibilities are reflected in the management system. There is no formally decision-making procedure that states when and how decisions are to be made and relevant policies for the organization is not yet identified and implemented. Values are not stated in the BMS manual neither are they identified nor communicated to all staff. The IRRS Team provided BAPETEN with appropriate conclusions to include values, policies and decision-making procedure in its management system and ensure they are communicated to all staff.

The BMS does not properly capture the responsibility for reporting on the performance of the BMS. Although audits are performed, there are no procedures in the BMS for assessing the safety of the working environment. These issues were addressed in the section and BAPETEN was provided with conclusions to consider clarifying the responsibility of the individual reporting on the performance of the management system to senior management and establishing procedures for assessing the safety and appropriateness of the working environment.

BAPETEN does not have a procedure for organizational change. BAPETEN was provided with conclusions on developing and including procedures for analysing the need for organizational changes taking into consideration safety aspects, and ensure that the procedures are implemented and communicated.

Yearly internal reviews are conducted according to a programme. Management self-assessments are required in the BMS manual but do not take in to account safety culture aspects. Management systems reviews are also required in the manual but have not yet been implemented. BAPETEN was provided with conclusion to consider enhancing the implementation of self-assessments and to include safety culture aspects and should implement the management system review stated in the manual.

5. AUTHORIZATION

BAPETEN has sufficient delegations and powers to issue authorizations on utilization of nuclear energy, including radiation facilities and activities. Procedures to obtain a license are set out in regulations. Licensing for nuclear installations is conducted in a multi-step licensing processes, from siting, design, construction, commissioning, operation, and decommissioning. For radiation facilities the authorization steps are construction, operation and closure.

Authorizations are categorized into three groups having different timelines. Authorization processes for all nuclear facilities and radiation facilities and activities follow a similar kind of approach.

BAPETEN is the competent authority for authorization of the transport of radioactive material. However, the Ministry of Transport approves the transport of dangerous goods and provides the licensing for individuals working with the dangerous goods workforce.

5.1. GENERIC ISSUES

GR No 29 of 2008 introduces classification of ionizing radiation sources into groups A, B and C. Group A includes medical sources, industrial irradiators, and export and import of radioactive substances. Group B includes storage of radioactive substances. Use of radiation sources for calibration purposes is in group C. The categorization is not fully based on risk and facilities and activities are only partly subject to a graded approach for regulatory control.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: A graded approach is not always fully implemented in the authorization process.

(1)	<p>BASIS: GSR Part 1 Requirement 1, para. 2.5 states that <i>“The government shall promulgate laws and statutes to make provision for an effective governmental, legal and regulatory framework for safety. This framework for safety shall set out the following:</i></p> <p><i>1) The safety principles for protecting people — individually and collectively — society and the environment from radiation risks, both at present and in the future;</i></p> <p><i>(8) Provision for the review and assessment of facilities and activities, in accordance with a graded approach;</i></p> <p><i>(10) Provision for the inspection of facilities and activities, and for the enforcement of regulations, in accordance with a graded approach;</i></p>
(R)	<p>See R 2 and S1 in section 1.1.</p>

Procedures for application and licensing are issued in regulation GR No 29 of 2008. Timeframes are established for groups A, B and C so that the time period is shortest in group C. Procedures are rigid and do not adequately take into consideration the complexity of the facility or activity covered by the license application. Moreover, the IRRS Team was informed that BAPETEN has constant difficulties with issuing licences within the prescribed timeframe.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: The timeframes for authorizations are not flexible and do not take into account the complexity of the facilities and activities by applying a graded approach.

(1)	<p>BASIS: GSR Part 1, Para 2.5 (3) states that <i>“The government shall promulgate laws and statutes to make provision for an effective governmental, legal and regulatory framework for safety. This framework for safety shall set out the following:</i></p> <p><i>(3) The type of authorization⁵ that is required for the operation of facilities and for the conduct of activities, in accordance with a graded approach;”</i></p>
(R)	<p>Recommendation: See R 2 and S1 in Section 1.1.</p>

BAPETEN issues a separate license for each radiation source. That creates a significant administrative burden requiring more resources than having all sources of the facility or activity covered by one licence. However, inspections are carried out simultaneously at the same facility to cover a group of licenses. See Suggestion 5 in Section 3.1.

Act no. 30 of 2014, states that a government official has obligations to provide an opportunity for public hearing before taking a decision or action. It also states that the agencies or government official should disseminate to all stakeholder’s the legal base for the requirements, documents, and facts related to a decision or action taken by a government official prior to issuance of a licence.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: There is insufficient public consultation before taking regulatory decisions or actions.

(1)	<p>BASIS: GSR Part 1 Requirement 36 states that <i>“The regulatory body shall promote the establishment of appropriate means of informing and consulting interested parties and the public about the possible radiation risks associated with facilities and activities, and about the processes and decisions of the regulatory body.”</i></p>
(2)	<p>BASIS: GSR Part 1 Para (4.66) states that <i>“The regulatory body shall establish, either directly or through authorized parties, provision for effective mechanisms of communication, and it shall hold meetings to inform interested parties and the public and for informing the decision making process. This communication shall include constructive liaison such as:</i></p> <p><i>(a) Communication with interested parties and the public on regulatory judgements and decisions;</i></p> <p><i>(d) Communication on the requirements, judgements and decisions of the regulatory body, and on the bases for them, to the public;.</i></p>
(3)	<p>BASIS: GSR Part 3 Requirement 2, para. 2.30 (f) states that <i>“The regulatory body shall establish a regulatory system for protection and safety that includes [8]:</i></p> <p><i>(f) Provision of information to, and consultation with, parties affected by its decisions and, as</i></p>

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

appropriate, the public and other interested parties.”

R14

Recommendation: BAPETEN should strengthen its communication and consultation system regarding its authorization activities with interested parties.

The IRRS Team considers that the resourcing (competence and staffing) of BAPETEN is not adequate to effectively carry out authorizations on some areas, such as transport and use of radiation in industry and medicine. There is insufficient experience in issuing licenses, understanding of regulations and technical knowledge on modern technology.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: It appears that the number and competence of BAPETEN staff are insufficient to carry out authorizations in some areas such as transport and use of radiation in industry and medicine.

(1)

BASIS: GSR Part 1 Requirement 11 states that *“The government shall make provision for building and maintaining the competence of all parties having responsibilities in relation to the safety of facilities and activities.”*

BASIS: GSR Part 3 Requirement 2, para. 2.22 states that *“The government shall ensure that arrangements are in place for the provision of the education and training services required for building and maintaining the competence of persons and organizations that have responsibilities relating to protection and safety.”*

S

Suggestion: See S3, section 3.1.

5.2. AUTHORIZATION OF RESEARCH REACTORS

The stages of the authorizing nuclear reactors include site evaluation approval, site permit, design approval, construction, commissioning, and operation license including renewal license, research reactor modifications and utilization approval, as well as decommissioning license. BAPETEN does not issue an authorization if a research reactor were to enter an extended shutdown. Documents required to be submitted to BAPETEN for each stage are identified in GR No.2 of 2014. BAPETEN performs a document completeness review to ensure the submitted information is adequate for review. Once the submitted information is deemed acceptable, BAPETEN reviews the technical information to support the issuance of an authorization for the corresponding licensing phase.

BAPETEN requires three types of information needed for authorizations which are administrative, technical, and financial information. Financial requirements apply only to state-owned enterprises, cooperatives, and/or private entity of commercial power or non-power reactors. The technical requirements submitted to BAPETEN to obtain an operation permit include a safety analysis report, limitation and operating conditions, protection and radiation safety programmes; maintenance programmes, safeguards system, physical protection plan, management system, decommissioning programme, nuclear [emergency] preparedness programme, report on the implementation of environmental permit in accordance with regulations in the field of environmental protection and management. Additionally, for certain licensing phases, the regulations require the licensee to establish an ageing management programme.

GRs and BCRs require that the operating organization is to establish an appropriate management structure for the research reactor and provide for all necessary infrastructures for the conduct of reactor operations. BCR No. 2 of 2011 requires that the minimum staffing at a research reactor consists of a reactor manager, reactor supervisor, reactor operator, reactor maintenance supervisor, reactor maintenance technicians, nuclear material supervisor, and radiation protection officer. BCR No. 2 of 2011 also contain communications and responsibilities of staffing. BAPETEN issues individual operator licenses for both reactor supervisors and reactor operators. Maintenance technicians also are required to be licensed. BAPETEN verifies competency by conducting a combination of written examinations consisting of essay and multiple choice, oral interviews, and observance of the individual performing reactor control evaluation. The operator license is valid for three years from issuance and can be renewed on a three-year frequency.

BCR No.2 Year 2014 requires the licensee to form an independent safety assessment committee once the construction phase is commenced. Membership of the safety assessment committee consists of technical experts of which some members must come from outside the reactor operating organization. The function, authority, organization, and administration of the safety assessment committee must be stated in writing and submitted to the BAPETEN Chairman. The safety assessment committee is obligated to provide recommendations on safety matters that include routine operation of the installation, maintenance, surveillance and inspection, modifications to structures, systems and components, design changes, operating limits and conditions changes, new or special procedures, and testing of new or special experimental equipment. BATAN informed the IRRS Team that all members of the RSG-GA Siwabessy safety committee members are from outside of the reactor operating organization. In discussions with BAPETEN and BATAN, the safety committee is responsible to the Head of BATAN and provides advice to the reactor manager of the RSG-GA Siwabessy facility.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: BAPETPEN does not require the licensee to obtain an authorization for a research reactor entering into an extended shutdown.

- (1) **BASIS: GSR Part 1 Requirement 24, para. 4.29 states that** *“Different types of authorizations shall be obtained for the different stages in the lifetime of a facility or the duration of an activity.”*
- BASIS: Code of Conduct on the Safety of Research Reactors, Section IV, para. 20.(b) states that** *“...Require the operating organization to prepare and maintain a safety analysis report and to obtain an authorization for siting, construction, commissioning, operation, modifications important to safety, extended shutdown, and decommissioning;”*
- BASIS: Code of Conduct on the Safety of Research Reactors, Section VII.C, para. 33 states that** *“If unusual and compelling circumstances make it necessary for a research reactor to enter into or to continue in a state of extended shutdown, the operating organization should, as appropriate, prepare and implement a technical preservation programme to maintain the safety of the reactor and the reactor fuel, to be approved by the regulatory body.”*

R15 Recommendation: BAPETEN should develop a regulatory requirement so that operating organizations obtain an authorization for a research reactor for all stages of operation including entering into an extended shutdown condition.

5.3. AUTHORIZATION OF FUEL CYCLE FACILITIES

Indonesia has four fuel cycle facilities at present: the Fuel Element Production Installation (FEPI); the Experimental Fuel Element Installation (EFEI); Radio-metallurgy Installation (RMI) and Interim Storage Facility for Spent Fuel (ISFSF). All these facilities are operational.

One of the most prominent regulations in the context of fuel cycle facilities (FCF) is GR No 2 of 2014. The stages of the authorization process include site evaluation approval, site permit, design approval, construction license, commissioning license, operation license, modification or utilisation approval if any, and decommissioning license. The required documents for each licensing stage are stipulated in this GR, which also clearly outlines the schedule for the submission of documents at the appropriate times in the authorization process, including amendment, renewal and revocation of licenses. When all the documents are complete, BAPETEN proceeds with technical review and assessment. Otherwise, the application is not accepted and is returned to the applicant. When the technical review and assessment shows that the application documents have fulfilled all acceptance criteria, BAPETEN issues a license. The operating licence is granted for a period of time that depends on the facility in question and varies from 2 – 10 years.

The periodic re-licensing has allowed for comprehensive, periodic safety reviews. BAPETEN has the authority to cancel a licence wholly or partly, if implementation of the government and regulatory requirements provided in the GRs and BCRs is unsatisfactory. When cancelling a licence, the same procedure is followed, as appropriate, as when the licence was granted. Also in applying for an amendment to the construction licence or operating licence of a nuclear facility, the same provisions are followed as in the case of a new licence. The authorization process including review and assessment and inspection, is recorded in accordance with the documentation requirements in BCR No. 10 of 2011.

5.4. AUTHORIZATION OF RADIOACTIVE WASTE MANAGEMENT FACILITIES

Radioactive waste is managed by radioactive waste producers and BATAN. In performing radioactive waste management, BATAN need to have a license to carry out the functions necessary for radioactive waste management. The requirements and procedures for applying for a license to conduct radioactive waste management are in accordance with the laws and regulations regarding the licensing of the use of ionizing radiation sources.

Radioactive waste classification in Indonesia is based on the activity, activity concentration, half-life, and/or types of radiation. The Act and GR No 61 of 2013 both require that the radioactive waste is classified into low level radioactive waste, intermediate level radioactive waste, and high level radioactive waste. This classification is not in-line with IAEA Safety Standards.

Now there are no regulatory activities for disposal facilities because no disposal facilities have been sited, design or constructed. Siting and site evaluation for disposal facilities are in progress.

The IRRS Team observed that there are no regulatory requirements for the operator to prepare a safety case and a supporting safety assessment.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: there are no regulatory requirements for the operator to prepare a safety case and a supporting safety assessment for radioactive waste management.

(1)

BASIS: GSR Part 5 Requirement 4, states that *“The operator shall carry out safety assessments and shall develop a safety case, and shall ensure that the necessary activities for*

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siting, design, construction, commissioning, operation, shutdown and decommissioning are carried out in compliance with legal and regulatory requirements.”

(2)

BASIS: GSR Part 5 Requirement 13, states that *“The operator shall prepare a safety case and a supporting safety assessment. In the case of a step by step development, or in the event of modification of the facility or activity, the safety case and its supporting safety assessment shall be reviewed and updated as necessary.”*

(3)

BASIS: GSR Part 5 Requirement 13, para. 5.3 states that *“The safety case has to be prepared by the operator early in the development of a facility as a basis for the process of regulatory decision making and approval.”*

Observation: BAPETEN does not require that waste packages and unpackaged waste that are accepted for processing, storage and/or disposal conform to criteria that are consistent with the safety case.

(1)

BASIS: GSR Part 5 Requirement 12 states that *“Waste packages and unpackaged waste that are accepted for processing, storage and/or disposal shall conform to criteria that are consistent with the safety case.”*

BASIS: SSR-5 Requirement 12 para. 4.25 states that *“Adherence to the waste acceptance criteria is essential for the safe handling and storage of waste packages and unpackaged waste during normal operation, for safety during possible accident conditions and for the long term safety of the subsequent disposal of the waste.”*

Observation: The safety case for a predisposal radioactive waste management facility does not include a description of how all the safety aspects of the site, the design, operation, shutdown and decommissioning of the facility and the managerial controls satisfy the regulatory requirements.

(1)

BASIS: GSR Part 5 Requirement 14 states that *“The safety case for a predisposal radioactive waste management facility shall include a description of how all the safety aspects of the site, the design, operation, shutdown and decommissioning of the facility, and the managerial controls satisfy the regulatory requirements. The safety case and its supporting safety assessment shall demonstrate the level of protection provided and shall provide assurance to the regulatory body that safety requirements will be met.”*

Observation: Regulations do not require that the waste packages are designed and produced so that the radioactive material is appropriately contained during both normal operation and in accident conditions that could occur in the handling, storage, transport and disposal of waste.

(1)

BASIS: GSR Part 5 Requirement 10 states that *“Waste packages shall be designed and produced so that the radioactive material is appropriately contained both during normal operation and in accident conditions that could occur in the handling, storage, transport and disposal of waste.”*

Observation: The regulation does not require in the case of a step by step development, or in the event of the modification of the facility or activity, that the safety case and its supporting safety assessment shall be reviewed and updated as necessary.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

(1)	BASIS: GSR Part 5 Requirement 13 states that <i>“The operator shall prepare a safety case and a supporting safety assessment. In the case of a step by step development, or in the event of modification of the facility or activity, the safety case and its supporting safety assessment shall be reviewed and updated as necessary.”</i>
R	Recommendation: See R 3 section 1.2

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: Classification of the radioactive waste is not in line with the IAEA standards.

(1)	Basis: GSR 5 Para. 4.12 states that <i>“Radioactive waste may be classified for different purposes, and different classification schemes may be used in the successive steps in waste management. The most common classification is that made from the perspective of its future disposal.”</i>
(2)	Basis: GSR 5 Para. 4.10 states that <i>“Radioactive waste has to be characterized in terms of its physical, mechanical, chemical, radiological and biological properties.”</i>
(3)	Basis: GSG 1 Para. 2.2 states that <i>“Six classes of waste are derived and used as the basis for the classification scheme: Exempt waste (EW), Very short lived waste (VSLW), Very low level waste (VLLW), Low level waste (LLW), Intermediate level waste (ILW), High level waste (HLW).”</i>
R	Recommendation: See R3 in Section 1.2.

5.5. AUTHORIZATION OF RADIATION SOURCES, FACILITIES AND ACTIVITIES

GR No 29 of 2008 specifies the different stages of licensing as construction, operation and closure for radiation facilities. However, there is no consideration in the Act for the review and assessment of the development of such facilities with the evaluation of the facilities through different stages.

The Ministry of Health is licensing the medical services. The Act No 44 of 2009, states that ionizing radiation equipment are to comply with the requirements of the authorizing institution [BAPETEN] and to have authorization from it. This Act further states that the following aspects of radiation protection are to be included in the license application.

- organizational structure
- employees
- structural shielding,
- technical specifications of equipment
- report of testing (MoH regulation: 363 of 1998, Chairman decree on testing and calibration of equipment for health service)
- license from BATEPEN

BAPETEN has cooperated with Directorate General of Customs and Excise through INSW (Indonesia National Single Window). Directorate General of Customs and Excise is responsible to verify that importers and exporters of radiation source are authorized prior to releasing the radiation source from customs clearance process.

BAPETEN has issued more than 12000 licenses for radiation facilities and radioactive material (RFRM) consisting of approximately 5800 licenses issued to about 1000 licensees for industrial purpose, 6200 licenses issued to about 2200 licensees for medical purpose and 5 licenses issued to 4 licensees for research purposes as of 26th May 2015. BAPETEN's approach in licensing is issuing a license for each individual radiation source, but in the case that one piece of equipment contains more than one radioactive source (e.g. gamma knife), one license will be issued which includes all those sources. The validity of each license as stated in GR No 29 of 2008 varies between different activities; e.g for an importer of radioactive sources the validity is one year, which also affects the planning of inspections and requires inspections on a yearly basis. The process for obtaining a license is same as the process mentioned above.

BAPETEN issued guidelines and booklets for some activities. These guidelines and booklets are available online to guide the applicants/licensees in applying for a licence and to inform about licensing process. Also guidelines on Radiation Protection for some practices are issued. The IRRS Team was informed that BAPETEN is working on finalizing the set of guidelines and booklets for all activities.

The administrative and technical requirements and/ or specific requirements which should be attached to applications are detailed in GR No 29 of 2008, including the technical requirements, operating procedures, radiation protection and safety programme, and personnel qualification. In this regulation, the number of working days for submission of the documentation and for response to BAPETEN in cases of issuance, amendment and renewal the license, are specified. The time frame for assessing the submitted applications and issuing the licenses by BAPETEN is also specified. When the application has met the requirements BAPETEN Chairman is expected issue the licence within a specified period.

Examination of information in the electronic system, B@LIS, which is used for tracking licensing and inspections, demonstrated that BAPETEN did not comply with the prescribed time frame in 25% of all licence applications. The IRRS Team was informed that there were no formal complaints from any applicant so far in the case delay.

Standard conditions are attached to each license. Applications for renewal of a licence should be submitted 30 days prior to licence expiration date. In the case of medical licences, an additional condition is added which is related to compliance testing for medical equipment.

For medical use of radiation, BAPETEN issues authorizations for radiation sources, but facilities and activities are licensed by MoH. However, BAPETEN issues the license to operate a linear accelerator in the case of radiation therapy. The licence is given only for the highest photon and electron energies, or for a range of energies, without specifying the energies exactly.

The licensing procedures and instructions are established and followed by the licensing team. The licence renewal process is straightforward, and the licensee could apply for amendment if there are changes in relation to:

1. Licensee identity;
2. Personnel working at the facility;
3. Location changes and/or
4. Radiation protection equipment.

5.6. AUTHORIZATION OF DECOMMISSIONING ACTIVITIES

The Act requires a permit for decommissioning activities and states that the requirements and licensing procedures for the utilization of nuclear energy, construction and operation of nuclear reactors and other nuclear installations, as well as decommissioning of nuclear reactors are further provided by GRs. The licensing of nuclear installations follows a sequential multistep processes described above. BAPETEN has not issued any authorization for decommissioning as Indonesia has no nuclear facilities under decommissioning.

5.7. AUTHORIZATION OF TRANSPORT

BAPETEN issues approval certificates. The issuance of approval certificates is contingent upon the adequacy of the quality assurance programme (GR No 26 of 2002 on the Safety of Radioactive Material Transportation). However, the MoT is in charge of approval of transport means dedicated to transport of dangerous goods and providing licenses to transport of dangerous goods workers. The regulation under MoT is based on the international Transport of Dangerous Goods Regulations.

In Indonesia, the movement of a radioactive material consignment from origin to destination by public transportation is made by road, rail, air, sea or inland waterways. And among transported material there are nuclear material and radioactive materials used extensively in medicine, agriculture, research and non-destructive testing.

Within the country there are: type A package manufacturer and a package testing facility “PTKMR” under BATAN accredited by BAPETEN.

The IRRS Team was informed that there is no elaborated procedure for the assessment of applications and the associated technical documentation for issuing of approval certificates for packages type B(U), B(M) fissile material. BAPETEN approval is mainly based on the assessment and validation of the provided approval certificates for different package types (Type IP-1,IP-2, IP-3,Type B(M), Type C, and fissile material).

The IRRS Team was informed that BAPETEN has in place an MoU with Bakamla (Maritime Security Agency) which is about sharing information about the security of radioactive material at border, training for Bakamla staff by BAPETEN and illicit trafficking. But they have no other formal agreement with relevant authorities involved in the transport of dangerous goods class 7 for the safe transport of radioactive material.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: There is no formal and active coordination with relevant authorities involved in the regulation on the transport of radioactive material.

(1)

BASIS: GSR Part 1 Requirement 7 states that “Where several authorities have responsibilities for safety within the regulatory framework for safety, the government shall make provision for the effective coordination of their regulatory functions, to avoid any omissions or undue duplication and to avoid conflicting requirements being placed on authorized parties.”

“This coordination and liaison can be achieved by means of memoranda of understanding, appropriate communication and regular meetings. Such coordination assists in achieving consistency and in enabling authorities to benefit from each other’s experience.

2.19. If responsibilities and functions do overlap, this could create conflicts between

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different authorities and lead to conflicting requirements being placed on authorized parties or on applicants. This, in turn, could undermine the authority of the regulatory body and cause confusion on the part of the authorized party or the applicant.”

R **Recommendation:** See R6 in Section 1.5

It appears that there are no regulatory requirements related to the approval of the design of a low dispersible radioactive material, packages containing 0.1 kg or more of uranium hexafluoride, packages containing fissile material not classified by the regulations as fissile excepted, and Type C packages. There are regulations for Type B(U) packages but they are not in-line with SSR6. The approval of the design needs to be accompanied by a description of the design, engineering drawings, description of materials of construction, standards for manufacture, thermal safety evaluation and criticality safety evaluation (if applicable) and inspection and testing.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: There is no provision in the regulation that requires competent authority to provide an approval for the design of low dispersible radioactive material, fissile material not classified by the regulations as fissile excepted, packages containing 0.1 kg or more of uranium hexafluoride, and type C packages.

(1) **BASIS:** SSR 6 Requirement 802 states that “Competent authority approval shall be required for the following:
 (a) *Designs for:*
 (i) *Special form radioactive material;*
 (ii) *Low dispersible radioactive material;*
 (iii) *Fissile material excepted under para. 417(f);*
 (iv) *Packages containing 0.1 kg or more of uranium hexafluoride;*
 (v) *Packages containing fissile material, unless excepted by para. 417, 674 or 675;*
 (vi) *Type B(U) packages and Type B(M) packages;*
 (vii) *Type C packages.”*

R **Recommendation:** See R3 in Section 1.2.

For radioactive material that need to be transported under special arrangement, BCR No 4 of 1999 states that a consignment which does not fully meet the requirements of this provision should only be transported with a special arrangement. The arrangement should be sufficient guarantee that the level of overall safety in transport and storage during transit at least equal as if all the applicable requirements are already met. For this kind of international shipment, multilateral approval is required. But this provision is not implemented as confirmed by the BAPETEN staff.

BCR No 5P of 2000) requires that the radioactive material should be segregated from other hazardous materials during transport and during storage. This provision is not fully implemented since BAPETEN requires that the transport of the nuclear material or radioactive material should be made without explosive substance but don't take into account other hazardous substance that also could increase the risk.

5.8. SUMMARY

The IRRS team conclude that:

- Graded approach should be further implemented in regulating facilities and activities.
- Regulations on authorizations should be in line with IAEA safety standards.
- Consultancy with the public should be considered to be sufficient before taking regulatory decisions or actions.
- The number and competency of BAPETEN staff should be adequate to carry out authorizations on some areas such as transport and use of radiation in industry and medicine.
- BAPETEN should develop a regulatory requirement that the operating organization obtain an authorization to maintain safety for a research reactor entering an extended shutdown condition.
- BAPETEN should require the operator to prepare a safety case and a supporting safety assessment in compliance with legal and regulatory requirements.
- The existing regulation needs to be updated to cover all area of the transport of radioactive and nuclear material and approval conditions based on the IAEA safety documents.
- BAPETEN needs to elaborate and disseminate guidance and procedure for the carrier, consignor, consignee, and transport workers.
- The staff in charge of licensing of the transport of radioactive material, and use of radiation in industry and medicine needs to have adequate training and to be aware about the existing regulation.

6. REVIEW AND ASSESSMENT

6.1. GENERIC ISSUES

Review and assessment is a prerequisite for any kind of authorizations issued by BAPETEN in connection with the use of nuclear energy and radiation. Submissions requiring review and assessment are mainly associated with individual licensing steps. There are more than 12000 licenses for radiation facilities and activities, three research reactors and four fuel cycle facilities.

6.1.1. MANAGEMENT OF REVIEW AND ASSESSMENT

BAPETEN is responsible to carry out the review and assessment based on the Act. BAPETEN has developed some procedures for review and assessment for areas such as radiation facilities and activities, and nuclear facilities, which are discussed in detail in following sections. Graded approach for review and assessment is only partially taken into account. There is a review and assessment documentation system for radiation sources.

6.1.2. ORGANIZATION AND TECHNICAL RESOURCES FOR REVIEW AND ASSESSMENT

BAPETEN has different departments involved in review and assessment of utilization of nuclear energy under Deputy Chairman for Licensing and Inspection. The two directorates involved in review and assessment are the Licensing of Radiation Facilities and Radioactive Materials Directorate and Licensing of Nuclear Installations and Material Directorate. These Directorates consult with two other Directorates under the Deputy Chairman for Nuclear Safety Assessment which are the Regulatory Assessment Centre for Nuclear Installations and Regulatory Assessment Centre for Radiation Facilities and Radioactive Materials. These centres consult Universities and external professionals on issues related to safety of new technologies. There is no systematic training in place for some areas for review and assessment. The IRRS Team was informed that only on the job training is available for review and assessment; there is no database available for review and assessment process of nuclear installations.

6.1.3. BASES FOR REVIEW AND ASSESSMENT

BAPETEN has the essential regulations and a full review processes in some areas for effectively conducting the review of applications received. BAPETEN is in the process of developing and updating their internal procedures and regulations based on IAEA standards. Further information on regulations are described in section 9.

6.1.4. PERFORMANCE OF REVIEW AND ASSESSMENT

The review and assessment of facilities and activities is carried out through different stages, which are siting, construction, commissioning, operation, and decommissioning for nuclear facilities. For high risk radiation facilities and activities the stages include construction, operation, and closure. There is only one stage for low risk facilities and activities that is operation.

BAPETEN, through Directorate for Licensing of Nuclear Installations and Materials, checks the submitted application to ensure that all requirements are fulfilled. BAPETEN verifies the quality of the safety analysis and other technical documents related to the BCRs.

The scope of review and assessment performed by BAPETEN depend on characteristic of each facility which is divided into three stages (i.e., administrative, financial, and technical issues).

BAPETEN is obligated, through their regulation, to follow a timeframe to review and assess any submitted application and they take the complexity of an activity, to an extent, into the consideration. This may lead to a delay in issuing the license putting them into non-compliance with their own regulations.

6.2. REVIEW AND ASSESSMENT FOR RESEARCH REACTORS

Based on GR No 54 of 2012 and GR No 2 of 2014, BAPETEN performs reviews and assessments for different lifecycle phases for research reactors. GR No 54 of 2012, GR No 2 of 2014, BCR No 2 of 2011, and BCR No. 1 of 2011, require the licensee to submit a set of documents with the application that depends on the lifecycle phase.

BAPETEN requires the information specifically for the siting, construction, commissioning, operation and decommissioning of research reactors. The types of documents include administrative, technical, and financial. Financial documents are only required for state-owned enterprises, cooperatives, and/or private entities for commercial power reactor or non-power reactor. Technical documents to be submitted to BAPETEN to obtain an operation permit includes safety analysis report, limitation and operating conditions document, radiation protection programme, maintenance programmes, safeguards system documents, physical protection plan documents, management system document, decommissioning programmes, nuclear emergency preparedness programme, and a report on the implementation of the environmental permit.

The general safety principles and criteria are defined in GR No. 54 of 2012. Contents of the Safety Analysis Report (SAR) as defined in BCR No 1 of 2011 and BCR No 8 of 2012 must contain the information related to characterization, postulated initiating events, analysis of the sequence of events and evaluation of the consequences of postulated initiating events, comparison of the results of the analysis with the acceptance criteria and design limits, proof that the action of the automatic safety system combined with specific actions the operator is able to cope with the consequences, limiting conditions for operation determination operation, analysis of safety systems and technical safety features, and analysis of confinement. The SAR is required to be updated for license renewal and when modifications are approved by BAPETEN. BAPETEN can issue a renewed license up to but not greater than ten years for each renewal. Depending on which phase is under review, BCR has a set timeframe to complete the review. For example, the review period for an operating permit is two years after the submittal is accepted. For modifications, the timeframe for approval is usually six months, but is dependent on the specific phase. BAPETEN uses BCR No 5 of 2012 to review modifications, but does not have specific requirements for review and acceptance of the submitted documents. The IRRS Team was informed that the review and assessment is more of a confirmatory analysis of the submitted documents.

The provision for a periodic safety review is outlined in BCR No 2 of 2011 and it requires the licensee to submit a report to BAPETEN every five years. However, based on BCR No 2 of 2015 the period of five years is updated into every ten years. The contents of the periodic safety report include organization and administration, procedures, current plant safety documents, operating experience feedback and lessons learned from incidents or occurrences, the condition of structures, systems and / or components, qualification of equipment, safety performance, nuclear emergency preparedness program, aging management program, radiation protection program, management system, data and information related to supervisor reactor, reactor operators, maintenance supervisors, and maintenance technicians, covering training, refreshment training and mutations, releases of radioactive effluents into the environment and the handling of radioactive waste.

BAPETEN has performed review and assessment of operation and equipment modification of the research reactors but never performed a review and assessment for the construction, commissioning, or decommissioning.

6.3. REVIEW AND ASSESSMENT FOR FUEL CYCLE FACILITIES

The scope of review and assessment performed by BAPETEN depends on the characteristics of each facility. The regulatory review and assessment is performed taking into account the potential magnitude and nature of the hazards associated with the fuel cycle facility on case by case basis. The safety principles and criteria are defined in GR No 54 of 2012 and its implementation is stated in various BCRs.

According to GR No 2 of 2014, a utility has to submit various documents during various licensing stages. In article 23, BCR No 11 of 2007, requires the licensee to use design hierarchy according to the hazard potential of non-reactor nuclear installations. In order to verify the adequacy of the design bases for a fuel cycle facility, BCR No 11 of 2007 is used which is stipulated as general requirements such as safety objective, safety principle, safety policies, quality assurance programme, safety culture and emergency preparedness. There are no specific applicable requirements as a reference in deciding on the acceptability of a licence application, which would increase the consistency and reduce the risk of subjectivity of the reviews.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: BAPETEN does not have specific regulatory requirements, regulations and guides providing the basis for its regulatory decisions during various stages of authorization.

(1)	BASIS: GS-G 1.2, Para. 3.32 states that <i>“The regulatory body should establish which requirements, regulations, guides and industrial standards are applicable to the facility in question and should determine the requirements to be placed on the operator. Where no such requirements, regulations, guides and industrial standards exist, the regulatory body should consider developing them. In carrying out its review and assessment, the regulatory body should use the applicable requirements as a reference in deciding on the acceptability of an operator’s submissions”.</i>
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S9	Suggestion: BAPETEN should consider developing regulatory requirements, regulations, and guides as applicable to the facility.
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BAPETEN verifies that the licensee has sufficient qualified staff by conducting the review of the licensees’ safety analysis report, management system manual and examination of the operating personnel. BAPETEN has sufficient qualified staff and analysis software to conduct the assessment of the licensing documents. According to BCR No 4 of 2010, a licensee has to apply a quality assurance document and BAPETEN reviews that all items and services important to safety under procurement meet established requirements. GR No 54 of 2012 and BCR No 11 of 2007, require information on any design changes or change in the process conditions to be submitted to BAPETEN. Their inspectors and assessment staff exhibit good cooperation and coordination while conducting assessment and inspection activities. These specific groups meet on a regular basis to coordinate and align both assessment and inspection activities to the regulation. This approach results in a well-focused and coordinated assessment. During the review and assessment process, many documents are submitted by the applicant and invariably involve the production of reports by experts in the regulatory body and by any consultants. BAPETEN maintains records in accordance with the documentation requirements in BCR No 10 of 2011. However, the present record keeping system for authorization, review and assessment and inspection does not track how the review and how the decision has been prepared, including the requirements and conditions for the decision. BAPETEN does not have systematic record keeping system for the review and assessment of

fuel cycle facilities to allow for easy retrieval and maintaining consistency during the decision making process.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
<p>Observation: BAPETEN does not have systematic record keeping system for the review and assessment of fuel cycle facilities to allow for easy retrieval and maintaining consistency during the decision making process.</p>	
(1)	<p>BASIS: GS-G 1.2, para. 3.65 states that <i>“The review and assessment process will invariably involve the production of reports by various experts in the regulatory body and by any consultants employed. A document control system should be set up for keeping records of the process so as to allow such documents and records to be readily retrieved. It should be possible to access the bases for previous decisions so as to achieve consistency and to facilitate any reassessment made necessary by new information.”</i></p>
S10	<p>Suggestion: BAPETEN should consider developing appropriate record keeping system for effective follow up.</p>

BAPETEN has not established criteria to review and assess the design of the plant regarding incorporation of appropriate features to facilitate the lifting, movement and handling of spent fuel; and prevention of significant damage to items important to safety during the transfer of fuel or casks, or in the event of fuel or casks being dropped.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
<p>Observation: BAPETEN has not established the criteria to review and assess the design of spent fuel storage facility.</p>	
(1)	<p>BASIS: GSR Part 5 Requirement 3 states that <i>“The regulatory body shall review and assess the safety case and the environmental impact assessment for radioactive waste management facilities and activities, as prepared by the operator both prior to authorization and periodically during operation.”</i></p>
(2)	<p>BASIS: GSR Part 4 Requirement 5 states that <i>“The first stage of carrying out the safety assessment shall be to ensure that the necessary resources, information, data, analytical tools as well as safety criteria are identified and are available.”</i></p>
(3)	<p>BASIS: GSR Part 4 Requirement 5 para.(4.18) (d) states that <i>“The safety criteria defined in national regulations or approved by the regulatory body to be used for judging whether the safety of the facility or activity is adequate have been identified.”</i></p>
R16	<p>Recommendation: BAPETEN should promote establishing criteria to review and assess the design of spent fuel storage facility .</p>

6.4. REVIEW AND ASSESSMENT FOR WASTE MANAGEMENT FACILITIES

Regulations and internal procedures require to treat unused and opened radioactive substances, and unused contaminated and/or activated materials and equipment as radioactive waste. BATAN is responsible for the management of the radioactive waste received from radioactive waste producers.

The design aspects reviewed by BAPETEN in regard to the management of radioactive waste from fuel cycle facilities are:

- Documentation of radioactive waste management
- Design of radioactive waste facilities according to general requirement in GR No 61 of 2013 and BCR No 3 of 1999
- Efforts to minimize waste quantity

Technical guidance is issued by BAPETEN on the implementation of radioactive waste management to include: training, consultation, and/or technical assistance to facilitate the process of review and assessment for the radioactive waste management activities. Radioactive waste management facilities categorized in group A, as defined in Section 5.5, are required to submit to BAPETEN special requirements commensurate with the risk.

6.5. REVIEW AND ASSESSMENT FOR RADIATION SOURCES FACILITIES AND ACTIVITIES

The classification of Radiation Facilities and Radioactive Materials was described Section 5.5 and does not follow a graded approach.

BAPETEN has developed comprehensive work instructions for evaluation and assessment of the application for each activity which covers evaluation of radiation protection programme and safety assessment, for example:

1. Working Instruction for Evaluation and Assessment of Nuclear Medicine Installation Construction License Application
2. Working Instruction for Evaluation and Assessment of Nuclear Medicine Operation License Application
3. Working Instruction for Evaluation and Assessment of Radiotherapy Installation Construction License Application
4. Working Instruction for Evaluation and Assessment of Radiotherapy Operation License Application Using Radioactive Source
5. Working Instruction for Processing Determination of Termination Application Data for Radiotherapy Practices
6. Working Instruction for Sub directorate of Licensing for Radiation Facilities Personnel

The examples of the above work instructions are developed and reflect the stages of review and assessment which is stated in GR No. 29 of 2008. Radiotherapy, brachytherapy, nuclear medicine, irradiators, and waste management facilities are required to undergo different stages of licensing commensurate with the radiation risks of the activity.

As described in section 5 in this report, the three listed stages are reviewed and assessed as follows:

- Construction, including: facility in accordance with the design standards of radiation safety and technical description of the construction documents.

- Operations, including: quality assurance program operations; and/or documents regarding technical description of radiation facilities and activities.
- Closure, including statements regarding the final condition of facilities.

For new technologies, the licensing team is supported by the internal Regulatory Assessment Centre for Radiation Facilities and Radioactive Materials to provide technical information for review and assessment. The competence of reviewers is insufficient and there is no specific training for BAPETEN’s reviewers. Specific review and assessment for medical applications is discussed in Section 11.1 of this report.

BAPETEN tracks the status of review and assessment for all submitted applications through BAPETEN Licensing and Inspection System – B@LIS. The applicant can access the system to check the status of their submitted application and be aware of the decision.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: BAPETEN has developed a Database (BAPETEN Licensing and Inspection System – B@LIS) for tracking and monitoring the reviewing and assessment process and information related to Radiation Sources Facilities and Activities (RFRM).

(1)	<p>BASIS: GS-G 1.2, para. 3.65 states that 4.1 <i>“The regulatory body should ensure that the findings and decisions of the review and assessment process are subjected to a suitable process of peer review conforming to the national practices of the State and the overall quality assurance system of the regulatory body. The regulatory body should document the findings of its review and assessment and should make them available to the operator and others in accordance with national practice. Further information is provided in Ref. [4]”</i></p>
(2)	<p>BASIS: GS-G 1.2, para. 3.65 states that 4.2. <i>“The regulatory body should have a system to audit, review and monitor all aspects of its review and assessment process so as to ensure that it is being carried out in a suitable and efficient manner and that any changes to the process necessitated by advances in knowledge or improvements in methods or for similar reasons are implemented. This system should cover, among other things:</i></p> <ul style="list-style-type: none"> (a) Regulations and guides; (b) Procedures for assessment within the regulatory body; (c) Procedures for contact with the operator; (d) Availability of suitable staff for review and assessment; (e) Procedures for using consultants and advisory committees in the process; (f) Procedures for commissioning and evaluating research initiated by the regulatory body; (g) Records of documentation; (h) Production, recording and dissemination of the results of reviews and assessments.
GP2	<p>Good practice: BAPETEN has developed a comprehensive database management for authorization, reviewing and assessment, inspection, transport approval and occupational dose register. The system is fully implemented for review and assessment process and the reviewers can easily monitor the progress on the reviewing process and reach to the licensee’s records.</p>

6.6. REVIEW AND ASSESSMENT FOR DECOMMISSIONING ACTIVITIES

Decommissioning of nuclear installations is specified in BCR No 4 of 2009 and BCR No 6 of 2011. A licensee has to develop a decommissioning programme that includes radioactive waste handling, radiation protection, and a financial estimation.

An initial decommissioning plan should be prepared by the licensee as a requirement to get a license for siting, construction, commissioning and operation. A final decommissioning plan is expected to be submitted after the licensee decides to shut down or terminate the operation of a facility. The IRRS Team observed the following:

- Interested parties are not provided an opportunity to review the final decommissioning plan and provide comments prior to BAPETEN's approval;

Based on article 5 of BCR No 4 of 2009 on the Decommissioning of Nuclear Reactors and article 6 of BCR No 6 of 2011 on the Decommissioning of Fuel Cycle Facilities, the licensees are obliged to review and update the decommissioning plan every 5 years.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: Interested parties are not provided an opportunity to review the final decommissioning plan and provide comments prior to BAPETEN's approval.	
(1)	BASIS: WS-R-5 (5.13) states that <i>“Interested parties shall be provided with an opportunity to review the final decommissioning plan and to provide comments on the plan to the regulatory body prior to its approval.”</i>
(2)	BASIS: GSR Part 6 para. 7.16 states that <i>“Interested parties shall be provided with an opportunity to examine the final decommissioning plan and, as appropriate and subject to national regulations, supporting documents, and to provide comments prior to its approval.”</i>
R	Recommendation: See R 3 section 1.2.

6.7. REVIEW AND ASSESSMENT FOR TRANSPORT

Transport is reviewed and assessed based on BAPETEN regulations like any other facility and activity. However, BAPETEN has not developed procedures for the review and assessment process.

It is required that in case of a non-compliance with the regulations for the safe transport of radioactive material, the carrier, consignor or consignee, as appropriate have to investigate its causes, circumstances and consequences. The investigation report is also required to be submitted to BAPETEN. However, there is no process to make sure that this provision is well implemented.

In BAPETEN regulation, for the reusable packaging, the consignor is not required to have evidence, in the form of inspection reports, release notes, certificates of conformity, etc., to ensure that all necessary and specified servicing and maintenance work has been performed and that the packaging is suitable for the next complete transport operation or programme of movements. The IRRS Team was informed that the transport approval is mostly based on the evaluation of the validity of the provided package certificate.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: BAPETEN does not have a requirement *to ensure safety of reusable packages.*

(1)	<p>BASIS: SSR 6; 306. States that “<i>Certification that the design specification has been fully implemented shall be available to the competent authority. The manufacturer, consignor or user shall be prepared:</i></p> <p><i>(a) To provide facilities for inspection during manufacture and use;</i></p> <p><i>(b) To demonstrate compliance with these Regulations to the competent authority.”</i></p>
(2)	<p>TS-G-1.5 (2009); Page 52;4.72 (f) states that “<i>The consignor should have procedures in operation to ensure that (For example, In the case of reusable packaging, the consignor should have evidence, in the form of inspection reports, release notes, certificates of conformity, etc., that all necessary and specified servicing and maintenance work has been carried out and that the packaging is suitable for the next complete transport operation or programme of movements. The consignor’s procedures should be such as to prevent the use of a package that does not comply with the approved specifications or that has not been subjected to the required and specified servicing and maintenance.)”</i></p>
S11	<p>Suggestion: BAPETEN should consider establishing requirements for the safe reuse of packages.</p>

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: Modifications to be made to an approved package are not subject to approval by BAPETEN

(1)	<p>BASIS: TS-G-1.5 (2009); Page 65; requirement 4.98 states that “<i>For packages approved by the competent authority, the user should be required to record all safety related deviations from and modifications to the specifications, as well as any significant damage noted during the use of the packages. The competent authority should be informed of these deviations before the packages are returned to service, within a certain time period (e.g. 30 days), in accordance with the requirements of the competent authority. Corrective measures or modification proposals, including any plans for repairs, should be subject to the agreement of the competent authority. Any packages undergoing such repairs, modifications or changes should not be returned to use until the competent authority has agreed to or approved the change.”</i></p>
S12	<p>Suggestion: BAPETEN should consider establishing and implementing requirements related to the approval of modified package.</p>

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: BAPETEN does not have documented procedures for the assessment of the management system arrangements of the suppliers.

(1)

BASIS: SSR6, 2012; Page 16; Requirements 306 states that “*A management system based on international, national or other standards acceptable to the competent authority shall be established and implemented for all activities within the scope of the Regulations, as identified in para. 106, to ensure compliance with the relevant provisions of these Regulations. Certification that the design specification has been fully implemented shall be available to the competent authority. The manufacturer, consignor or user shall be prepared:*

(a) To provide facilities for inspection during manufacture and use;

(b) To demonstrate compliance with these Regulations to the *competent authority*.

Where *competent authority approval* is required, such *approval* shall take into account and be contingent upon the adequacy of the *management system*.”

R17

Recommendation: BAPETEN should plan and carry out, in accordance with a documented procedure, assessment of the management system arrangement of the suppliers.

BCR No. 4 of 1999 states that the licensee must perform environmental assessment and dose monitoring for workers involved in the transport of radioactive material. The IRRS Team was informed that the provision is not being implemented by licensees. BAPETEN does not enforce the requirement of the radiation dose assessment for transport workers, or monitoring of workplace or the assessment of dose to members of the public. The arrangement of dose assessment will allow the licensee to meet the requirement and provide information on options for optimizing protection.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: BAPETEN does not enforce the requirement of the radiation dose assessment for transport workers, or monitoring of workplace or the assessment of dose to members of the public.

(1)

BASIS: SSR6 (2012), Requirement 303 states “*For occupational exposures arising from transport activities, where it is assessed that the effective dose either:*

(a) *Is likely to be between 1 and 6 mSv in a year, a dose assessment programme via workplace monitoring or individual monitoring shall be conducted; or*

(b) *Is likely to exceed 6 mSv in a year, individual monitoring shall be conducted.*”

(2)

BASIS: SSR6 (2012), requirement 308 states that “*The relevant competent authority shall arrange for periodic assessments of the radiation doses to persons due to the transport of radioactive material, to ensure that the system of protection and safety complies with the Basic Safety Standards.*”

S13

Suggestion: BAPETEN should consider implementing its regulation on the assessment of radiation doses to workers, public and workplace monitoring.

6.8. SUMMARY

BAPETEN has developed a process for review and assessment, however improvement is needed in some areas such as updating the current regulations based on IAEA standards, procedures and processes, and the competency required for review and assessment. BAPETEN needs to enforce their existing requirements on dose assessment in transport.

Using B@LIS for monitoring the review and assessment process of radiation facilities and activities consider as a good practice for BAPETEN, however other areas are not yet established in the using such system should be extended to be used in monitoring the review and assessment of other activities as well.

7. INSPECTION

7.1. GENERIC ISSUES

The Act, GR No 2 of 2014, GR No 29 of 2008 and GR No 33 of 2007 provide BAPETEN the authority to conduct inspections. Inspection is conducted through auditing of information, verification of licensee compliance with regulations, license conditions, and the safety objective. They conducted around five hundreds inspections in 2014.

7.1.1. INSPECTION PROGRAMME

BAPETEN is responsible for inspections that cover all areas in the Act to ensure compliance with the regulations and license conditions. The inspection programme is managed in accordance with BAPETEN's management system. Planning of inspections is conducted each year by determining the number of inspections, inspectors, areas to be inspected and the inspection schedule.

In addition to the planned inspections on regular basis, BAPETEN also performs reactive inspections to verify issues during the licensing process or specific issues. BAPETEN does not conduct unannounced inspections at source facilities. However, BAPETEN has conducted unannounced inspections at research reactors, fuel cycle facilities and waste management facilities.

BAPETEN coordinates with other relevant authorities to jointly conduct facility inspections. For example, the implementation of inspections on TENORM, BAPETEN coordinates with other ministries and local governments.

And by authority, inspectors can perform inspections of all nuclear installations owned by the licensee. If the licensee has a partnership agreement with a third-party, BAPETEN inspectors coordinate with licensees to conduct inspections of the third-party.

The results of inspections support BAPETEN's decisions to take an enforcement action or conduct a reactive inspection.

The use of a graded approach is not fully apparent as inspection resources are similar but the radiation risk significance is different. The IRRS Team was informed that inspection procedures are continuously reviewed and updated as necessary.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: The inspection programme and frequency of inspections at different nuclear installations and materials are the same even though the radiation risks are significantly different.

(1)

BASIS: GSR Part 1 Requirement 29, states that *“Inspections of facilities and activities shall be commensurate with the radiation risks associated with the facility or activity, in accordance with a graded approach.”*

R18

Recommendation: BAPETEN should apply a graded approach when planning and conducting inspections across all the facilities and activities.

The IRRS Team was informed that inspection reports, procedures, and findings are not shared with the public.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: BAPETEN does not share inspection reports, procedures, and findings with the public.	
(1)	BASIS: GS-G-1.3, para. 4.37 states that <i>“In order to inform the public of the safety of nuclear installations and of the effectiveness of the regulatory body, findings of inspections and regulatory decisions may be made publicly available. The extent to which such information is made publicly available will depend on the legal provisions in the State concerned.”</i>
S14	Suggestion: BAPETEN should consider a means for the public to access information about inspection reports, procedures, and findings to maintain public confidence in BAPETEN.

BAPETEN has not developed specific criteria to conduct reactive inspections. BCR No 4 of 2010 contains the requirement for the licensees to implement a safety culture programme, however the inspection programme does not require the collection of specific safety culture aspects.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: The inspection programme does not include specific safety culture aspects.	
(1)	BASIS: GSR Part 1, para. 4.53 states that <i>“ In conducting inspections, the regulatory body shall consider a number of aspects, including:</i> —Safety culture;
S15	Suggestion: BAPETEN should consider developing and implementing systematic collection of licensee’s safety culture aspects during inspections.

7.1.2. INSPECTION PROCESS AND PRACTICE

Regulations and guides pertaining to the inspection of nuclear installation and radiation facilities and activities are discussed in Section 9.

The preparation for inspections is similar for different types of inspections. Inspection is conducted through auditing documentation and verification of licensee’s compliance with regulatory requirements and the safety objective. Written guidance, including inspection procedures and checklists, contain details for conducting inspections, however procedures and checklist are not available for all stages for nuclear installations and transport. BAPETEN has not developed inspection procedures for construction, commissioning, and decommissioning stages.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: BAPETEN has not developed inspection procedures and checklists to conduct effective and efficient regulatory inspections during construction, commissioning, and decommissioning for	

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

nuclear facilities.

(1)	BASIS: GSR Part 1, para. 4.52 states that <i>“Regulatory inspections shall cover all areas of responsibility of the regulatory body.”</i>
(2)	<p>BASIS: GS-G 1.3, para. 4.1 states that <i>“To ensure that all nuclear facilities in a State are inspected to a common standard and that their level of safety is consistent, the regulatory body should provide its inspectors with written guidelines in sufficient detail. The guidelines should be followed to ensure a systematic and consistent approach to inspection while allowing sufficient flexibility for inspectors to take the initiative in dealing with new concerns that arise. Appropriate information and guidance should be provided to the inspectors and each inspector should be given adequate training in following this guidance. Consideration should be given to the extent to which this guidance should be made available to the operator or to the public. Appropriate subjects for guidance and instructions for inspectors could include:</i></p> <p><i>(d) implementation of the inspection programme, including:</i></p> <ul style="list-style-type: none"> <i>—areas to be subject to inspection,</i> <i>—method of inspection to be used,</i> <i>—methods for selection of inspection samples,</i> <i>—relevant technical information and questionnaires;</i>
S16	Suggestion: BAPETEN should consider developing detailed guidance on inspections conducted during construction, commissioning and decommissioning stages to ensure they cover all the above mentioned stages.

Inspection results are documented in reports that are shared and discussed with the licensee during the exit meeting. The inspection results are evaluated at the end of each year. The evaluation is used to determine the safety status of inspected areas, to provide information to BAPETEN’s annual nuclear safety report, and to plan the inspection programme for the following year. Inspection findings are not systematically tracked within BAPETEN. However, responses to the findings are reviewed and followed-up during the next inspection.

The IRRS Team was informed that BAPETEN has an informal feedback mechanism to inform the other core regulatory processes (authorization, review and assessment, enforcement and development of regulations and guides) of inspection results.

7.1.3 INSPECTORS

BAPETEN has two groups of inspectors depending on the utilization of nuclear energy. One group of 62 inspectors are in charge of inspecting nuclear facilities while the other group of 52 inspectors are responsible for the inspection of radiation facilities and activities. BAPETEN does not use resident inspectors, but uses site inspectors to inspect nuclear facilities. BAPETEN has established an inspectors’ training programme.

Provisions on qualification, training, and responsibility of inspectors are stipulated in BCR No 18 of 2012. Inspectors are provided with the following authorities through GR No 2 of 2014 and GR No 29 of 2008:

- To enter and examine each facility or installation during construction, commissioning, operation and decommissioning stages;
- To conduct inspections during licensing process, including quality verification to vendors or manufacturers;
- To conduct radiation monitoring inside and outside of installations;
- To conduct incidental inspections in the case of emergency or abnormal condition;
- To terminate any activity, which may lead to radiological hazard to the workers, the public and the environment in emergency situation. This action can only be executed after consultation with the Chairman of BAPETEN.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: BAPETEN inspectors are not empowered to stop potentially unsafe condition in facility or activity without consulting the Chairman first.

(1)

BASIS: GSR-1, para. 4.58 states that *“The regulatory body shall establish criteria for corrective actions, including enforcing the cessation of activities or the shutting down of a facility where necessary. On-site inspectors, if any, shall be authorized to take corrective action if there is an imminent likelihood of safety significant events.”*

R19

Recommendation: The Government should amend its regulation to provide direct authority to site inspectors to immediately stop a potential unsafe condition and direct actions to restore an adequate level of safety at a facility or activity.

7.2. INSPECTION OF RESEARCH REACTORS

The procedure for planning an inspection is documented in PUK/IIBN/00.1. BAPETEN has experience in performing inspections of facilities at the operating stage only.

For research reactors, BAPETEN performs periodic, reactive, and complementary inspections for review. Periodic inspections are performed 3-4 times annually as indicated in their annual inspection plan initiated at the beginning of each calendar year. Inspection frequency is based on equally spacing the inspections over a year timeframe. The main areas inspected are operation, radiation protection, maintenance, emergency preparedness, and licensee’s management system. For periodic inspections, the inspection team consists of a senior inspector who acts as the team leader and three other inspectors. The inspection duration is normally four days. Basic techniques used by the inspectors include verification by confirmatory measurements, auditing, and data review. For preparation for the inspection, the inspection team conducts an internal meeting to discuss inspection scope, review the previous inspection, input from other BAPETEN organizational units, inspection methods, time allocations, division of inspection tasks, and the need of inspection tools. To conduct the inspection, the inspectors use work instructions and checklists. The checklist is unique for the facility being inspected. These checklists contain values from the Safety Analysis Report that the inspector uses to compare and document actual data in the facility. Prior to the actual inspection, inspectors review the findings in the previous inspection to follow-up on corrective actions of previous findings.

Site visit to the RSG-GA Siwabessy facility:

The IRRS Team observed a portion of a periodic inspection conducted by BAPETEN. The inspection areas included operation, maintenance, and radiation protection covering a four-day period. The

inspection leader informed the IRRS Team that an entrance meeting was conducted with the licensee on the first day of the inspection and that the items discussed were the scope of the inspection, previous findings, and informational needs. The IRRS Team observed part of the facility's morning meeting at which previous and present day activities were discussed with management and staff.

Licensee documentation to be inspected was located in the meeting room. Documentation included control room logs, records of maintenance activities, effluent release reports, and radiation survey reports. The inspectors performed a verification of certain parameters in the control room using their inspection checklists. The inspectors informed the IRRS Team that any parameters documented outside of the Safety Analysis Report values listed in their checklist are discussed with the licensee to understand the deviation.

The inspectors then split into two groups of two, where one team remained in the control room while the other went to the reactor floor to verify radiation surveys. The verification of radiation surveys was conducted by both the licensee and inspectors by performing radiation surveys together using different survey instruments at designated places within the facility. This method is used to verify calibration of the survey instruments and radiation levels. Additionally, the IRRS Team observed the inspection team checking calibration date tags on installed radiation detectors to verify calibration.

In general, the inspection was conducted in a professional manner. Discussion between the inspection team and licensee appeared to be conducted in an open, professional, and direct manner.

During the site visit, licensees expressed a general concern regarding the lengthy duration of BAPETEN's review and assessment of submitted documents. Additionally, licensees informed the IRRS Team that they are fully involved in the regulatory process. This statement was also confirmed during some other site visits.

7.3. INSPECTION OF FUEL CYCLE FACILITIES

There were seven inspections of Fuel Cycle Facilities (FCF) executed by the Directorate for Inspection of Nuclear Installations and Materials in 2014-2015. Six were executed as announced inspections, and one was executed as unannounced inspection. BAPETEN has recently conducted reactive inspection at PT. INUKI based on inspection findings about their fuel element product.

The annual frequency of routine inspection for fuel cycle facilities is 2 – 3 times per year and on average, 3-4 inspectors participate in an inspection of four days duration. The scope and items to be inspected in the annual plan is set up at the beginning of every year. The inspected areas during a planned or regular inspection are Radiation Safety, Operational, Maintenance, Management System, Environmental Programmes as well as the Emergency Preparedness System. Inspections are conducted in accordance with an annual inspection plan in accordance with Procedure (PUK/DIIBN/00.1). According to this procedure, the inspector should make an inspection report which includes the inspector activities, findings and corrective actions if any. The report will be sent to the operator within 5 days and consists of actions to be taken by the licensee in order to resolve any non-compliance within a given timeframe. The content and format of the inspection report is listed in Working Instruction on Making of Inspection Report.

The inspection findings are evaluated at the end of each year. The results of evaluation determine the scope and frequency of inspection for the next year. BAPETEN performs verification of safety analysis reports prior to issuing a license. Combining a regular inspection report and a safety operational report, BAPETEN determines which aspect will be taken into account while conducting an unannounced inspection at a fuel cycle facility.

BAPETEN has experience in conducting inspections at the operational stage of fuel cycle facilities, but does not perform inspections at construction or commissioning stages. Even though BAPETEN conducts

inspection at operational stage the IRRS Team is of the view that they do not have sufficient trained and qualified inspectors for this purpose.

Fuel cycle facilities were built before BAPETEN was established and they have not conducted any decommissioning inspection as no fuel cycle facility has reached the decommissioning stage yet.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: BAPETEN does not appear to have the required competence for inspecting all stages of fuel cycle facilities.

(1)

BASIS: GSR part 1 Requirement 18, States that *“The regulatory body shall employ a sufficient number of qualified and competent staff, commensurate with the nature and the number of facilities and activities to be regulated, to perform its functions and to discharge its responsibilities.”*

S17

Suggestion: BAPETEN should consider making available qualified inspectors for all stages of fuel cycle facilities.

Site visit to the Fuel Element Fabrication & Installation Facility:

The Directorate for Inspection of Nuclear Installations and Materials conducted a practical periodic inspection on a Fuel Element Fabrication & Installation (FEPI) facility during the IRRS mission. The inspection was conducted by four inspectors who followed an inspection plan prepared by the lead inspector. The inspection plan was officially provided to operators of the FCF several days in advance. The inspectors held an entrance meeting with the management of FEPI. During the inspection, the inspectors conducted interviews with FEPI personnel on the current status of the operation and reviewed the documents prepared by the facility, and discussed the items to be checked. The lead inspector informed the IRRS Team that they will conduct an exit meeting and explain the inspection results.

7.4 INSPECTION OF WASTE MANAGEMENT FACILITIES

The IRRS Team was informed by BAPETEN that about 40 inspectors out of 62 BAPETEN inspectors are involved in the inspection of waste management facilities. BAPETEN has an inspection plan for waste management facilities. The frequency and scope of inspections are established in accordance with the graded approach. The typical frequency of inspections is between 2 and 3 inspections a year for each waste management facility. Both announced and unannounced inspections are used for waste management facilities. For each inspection, 2 or 3 inspectors are involved. Unannounced inspections (e.g. during the night time) are used for inspection of physical protection. The routine inspections are based on the preliminary reports of the facility. Each inspection should be prepared and discussed during an internal preparatory meeting with BAPETEN. Special attention is given to the periodic safety assessment which includes the waste inventory, segregation, minimization, collection, transport, processing and storage. The radiation protection, the qualification of facility’s staff members, document control and record keeping are also subject for inspection. The results of inspection are documented in a formal report. The format of the report is established in the BAPETEN management system.

Site Visit to BATAN

The IRRS Team visited the Radioactive Waste Technology Centre (CRWT) of BATAN, which a central waste processing and storage facility in Indonesia. The CRWT also performs R&D activities related to the predisposal waste management.

The facility comprises of the evaporation, incineration, compaction, chemical treatment, cementation, decontamination and storage units. The CRWT operates several interim storage facilities: two interim storages with the total capacity of 2940 m², High Radiation Waste Interim Storage, which has 20 wells and 4 dry pools, and the Interim Storage for Spent Fuel. The current waste inventory includes:

- Disused sealed radioactive sources with Co-60, Sr-90 and other radionuclides; in total more than 2000 individual sources;
- Solid waste: 931 drums, 200 L each;
- “Semi-liquid” spent resin: 95 concrete containers, 950 L each;
- Concentrated Waste: 19 concrete containers, 950 L each.

The IRRS Team was informed that the CRWT has already used 50% of the total storage capacity.

The strategic plan of the CRWT anticipates the construction of the Demonstration Disposal Plant and the management of the radioactive waste from the forthcoming Experimental Power Reactor, which should be commissioned in 2019.

7.5. INSPECTION OF RADIATION SOURCES FACILITIES, ACTIVITIES AND TRANSPORT

GR No 29 of 2007 authorizes the inspectors to:

- Conduct inspections during the licensing process;
- Enter and inspect any facility or installation, agency or location of Utilization of Ionizing Radiation Sources and of Nuclear Material;
- Perform radiation monitoring inside and outside of installations;
- Conduct direct inspections or inspections by notification in the short time interval in the case of emergency or abnormal events; and
- Terminate the utilization of ionizing radiation sources and nuclear material in case of hazardous situations that may impact safety of workers, the public or the environment.

GR No 29 of 2007 has the provision for announced and unannounced inspections. However, BAPETEN informed the IRRS Team that unannounced inspections are not conducted for transport, radiation facilities and radioactive materials. There are number of procedures and instructions established for conducting inspections and some procedures are under development.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: The legal basis of announced and unannounced inspections is stipulated in the Act however, BAPETEN’s inspectors never plan or conduct unannounced inspections for Radiation Sources’ applications or transport.	
(1)	BASIS: GSR Part 1 Requirement 27 states that <i>“Inspection of facilities and activities, the regulatory body shall carry out inspections of facilities and activities to verify that the authorized party is in compliance with the regulatory requirements and with the conditions specified in the authorization”.</i>
(2)	BASIS: GSR Part 1 Requirement 28, states that <i>“Type of inspection of facilities and activities Inspections shall include programmed inspections and reactive inspections; both announced and unannounced.”</i>

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

S18

Suggestion: BAPETEN should consider including unannounced inspections and broaden the scope of transport inspections in their inspection programme.

BCR No 18 of 2012 includes the required training and competences for inspectors. The IRRS Team was informed that there are two types of inspection training programmes for junior and senior inspectors. In addition, BAPETEN has an arrangement for refresher inspector training to be conducted twice a year. The IRRS Team was also informed that general meetings for all inspectors for the purpose of exchanging experiences, discussing new technologies and general findings are being held.

According to the inspection procedure, an annual inspection plan is developed based on the risk associated with the activity. For example, radiotherapy and industrial radiography activities are inspected once a year, while well logging activities are inspected every two years and nuclear gauges' activities are inspected every three years.

In 2014, BAPETEN did not complete the inspection plan fully. They were only able to inspect five out of 26 radiotherapy facilities. This indicates a serious resource management issue that BAPETEN needs to take into consideration.

Checklists are used during inspection and these checklists could be extracted from B@LIS which is available for each activity. According to the inspection procedures, there are two checklists. One is called "safety checklist" which is sent to the licensee one month prior to the inspection for the purposes of checking the safety condition at the facility before the inspection. The second checklist is the one that is used by inspectors during inspection.

The inspectors explained that there are joint inspections conducted together with the National Agency of Drug and Food Control (BPOM) for radiopharmaceutical activities. BPOM is responsible for checking good manufacturing practices. However, there is no formal agreement in place to have this joint inspection, it is initiated upon BAPETEN's request.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: The formal provision of liaison with relevant organizations for joint inspections for medical facilities is not in place; however there is limited cooperation with the BPOM to inspect radiopharmaceutical activities.

(1)

BASIS: GSR Part 1 Requirement 29, para. 4.52 states that " In conducting inspections, the regulatory body has to focus on a number of considerations, including inspections of:
- Liaison with the relevant organization for joint inspections, where necessary."

R

Recommendation: See R 6 in section 1.5.

Inspection reports are issued within 30 days after conducting the inspection. There is no provision in the inspection report for appealing or noting the disagreed points regarding the findings listed in the report. B@LIS is used to register all inspection findings and monitor the responses to the findings, but is not fully implemented yet. These findings are internally classified in three classes: Class 1 which refers to the violation of Act; Class 2 which refers to the violation of GRs and Class 3 which refers to missing documentation and records.

BAPETEN has a plan to rate the Licensees based on their performance in compliance with the Act and Regulations and share the results with the public. There will be five ranks starting with “Excellent” as the highest safety and security performance and “Very Bad” as the lowest rank. The rating is given based on certain criteria e.g. License condition (30%), the availability of RPO & the defined competent human resources needed (25%).

Site visit to Dharmais Cancer Hospital

An announced inspection was carried out at the public cancer hospital by BAPETEN inspectors. The inspection team consisted of three inspectors lead by a senior inspector. The team had a pre-inspection meeting on the previous day. All needed documents were collected and previous inspection report was discussed. The facilities to be inspected were two linear accelerators (Electa from 2005 and Varian CX from 2011), CT-simulator (GE 16 slice) and a conventional simulator (Toshiba).

During the inspection, the director of the hospital, head of the radiotherapy department and the radiation protection officer were met at the entrance meeting. The inspectors team leader introduced the scope of the inspection and the head of the department presented the radiation protection report that they had prepared. The director of the hospital informed that they are in the process to get an accreditation from the national accreditation body and for that reason inspections are very important for them.

The inspection started with administrative verification of licenses and certificates. SSDL had also verified the “beam output” in reference conditions according to IAEA TRS 398. The certificate for photon beams was noted by the inspector, but the certificate for electron beams was considered to be duplication for the photon beam certificate. The deviation for photon beams was 2.5 % and the tolerance limit in the QC was 2 %. The maximum deviation for electron beams was 3.5 % for electron beams and the tolerance limit in the QC was 3 %. There was no discussion of the actions that the hospital might have carried out after the SSDL measurements. Hospital’s own measurements showed deviation less than 0.5 %.

Dose rates were measured during patient treatments at all control rooms and behind doors to the treatment rooms. This is carried out on for all inspections even if nothing has been changed since previous inspections.

Exit meeting pointed out inspection findings that included for example a missing license and gaps in performing quality control for the simulator.

The IRRS Team discussed inspections with the director of the hospital, the head of the department and the radiation protection officer. All of them considered inspections useful and convinced that there is no difficulty for them to follow all instructions given by BAPETEN. As representatives of the public radiotherapy hospital, they didn’t see any duplication in the control of Ministry of Health.

The inspection was carried out in a professional manner. The inspection team was well prepared for the inspection and the hospital had also prepared required documents and materials. Discussions were open and cooperative.

Inspections could be more effective if the number of inspectors and inspection methods would be optimized to each inspection. In addition, inspectors need further training on safety culture and patient protection.

Site visit to the Irradiator “Rel-Ion Sterilization” and Industrial Radiography “PT Sucofindo” facilities.

Announced inspections were carried out at the two facilities conducting irradiator and industrial radiography activities. An inspection team consisted of three junior inspectors. The team had a pre-inspection meeting on the previous day. As per BAPETEN said, the licensing team in sometimes joined them in preparation phase of inspection. The IRRS Team noticed that the Irradiator Facility has not been inspected for the last three years.

The inspection team had a meeting with higher management and RPOs at both facilities to discuss the scope and pervious findings. The inspection team verified the documents related to the worker dose, work place monitoring and calibration of radiation survey meters. Measurements around the room of irradiator source (Co-60 –570 KCi) and ongoing site radiography work (Ir-192 – 5 Ci) were conducted as well. The inspection findings were discussed at the Exit Meeting.

The IRRS Team had discussions with the both licensees after the inspections. The irradiator licensee referred to the issue that there is no specific training or guides for irradiator activities. The industrial radiography licensee found the inspection useful and they appreciated that BAPETEN included them in the regulation and guides review process.

7.6. INSPECTION OF DECOMMISSIONING ACTIVITIES

No decommissioning facilities to inspect.

7.7. SUMMARY

BAPETEN has a formal inspection program that carries out its functions to ensure its licensees and radiological facilities comply with legislation, regulations and the terms of their licenses. The IRRS Team concludes that BAPETEN’s inspection program can be improved to align more with the IAEA Safety Standards and Guides. The observations of the IRRS Team are as follows:

- The inspection program and frequency of inspection at different Nuclear Installations and Materials are the same even though the radiation risks are significantly different.
- BAPETEN does not share Inspection reports, procedures, and findings with the public.
- BAPETEN inspection program does not include specific safety culture aspects. Consider to include in their compliance assurance programme the monitoring of handling and stowage of packages by consignors and carriers.
- BAPETEN has not developed inspection procedures and checklists to conduct effective and efficient regulatory inspections during construction, commissioning, and decommissioning for nuclear facilities. Consider developing a record keeping inspection findings to be shared within the organization.
- BAPETEN is insufficiently resourced to inspect fuel cycle facilities.
- The legal basis of announced and unannounced inspection is stipulated in the Act however, BAPETEN’s inspectors never plan or conduct unannounced inspections for Radiation Sources’ applications or transport.
- BAPETEN inspectors are not empowered to stop potentially unsafe condition in facility or activity without consulting the chairman first.

- The provision of liaison with relevant organizations for joint inspections for medical facilities is not in place, however there is limited cooperation with National Agency of Drug and Food Control (BPOM) to inspect radiopharmaceutical activities.

The IRRS Team observed inspections at the different facilities and concluded that the inspections were carried out in a professional manner using procedures. However, the inspector level of competency could be improved.

8. ENFORCEMENT

8.1. ENFORCEMENT POLICY AND PROCESS

The legal basis for enforcement is described in the Act. The act and GRs numbers 26 of 2002, 43 of 2006, 29 of 2008, 33 of 2007, 54 of 2012, 61 of 2013 and 2 of 2014 give well defined powers to BAPETEN to take enforcement actions in the event of deviations from, or non-compliance with, the regulatory requirements.

The Act specifies the offences and the corresponding penalties while GR No 33 of 2007 provides different kinds of administrative enforcement actions commensurate with safety significance. BAPETEN can initiate penal action in coordination with the police department. The Act provides provision for the enforcement of regulations, in accordance with a graded approach.

Administrative sanctions are performed in sequences, starting from warning note, followed by license suspension, and finally to license revocation. However, BAPETEN may directly suspend the license in the case of severe violation, or even directly revoke the license in the case there is potential radiological hazard to the worker or the public.

Criteria for the implementation of enforcement action are provided in enforcement procedures. BAPETEN has established intensive collaboration with other enforcement agencies (e.g. Police, District Attorney Office, Provincial Attorney Office) for the implementation of enforcement action.

The licensee will send feedback regarding follow up action of the non-compliance. BAPETEN will verify and ensure that the corrective action is reasonable and adequate through follow-up inspections. However, BAPETEN enforcement process does not have provision for analysis of non-compliances and enforcements actions as a part of dissemination of the lessons learned from the regulatory experience.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: BAPETEN enforcement process does not have provision for analysis of non-compliances and enforcements actions as a part of dissemination of the lessons learned from the regulatory experience.

(1)

BASIS: GSR Part 1 Requirement 15, states that *“The regulatory body shall make arrangements for analysis to be carried out to identify lessons to be learned from operating experience and regulatory experience, including experience in other States, and for the dissemination of the lessons learned and for their use by authorized parties, the regulatory body and other relevant authorities”.*

(2)

BASIS: GSR Part 1 Para, 4.56. States that *“At each significant step in the enforcement process, the regulatory body shall identify and document the nature of non-compliances and the period of time allowed for correcting them, and shall communicate this information in writing to the authorized party”.*

R20

Recommendation: BAPETEN should collect, analyse and disseminate information on non-compliances and enforcement actions to provide feedback to enhance the performance of regulatory functions.

8.2. ENFORCEMENT IMPLEMENTATIONS

BAPETEN has established a comprehensive sets of internal procedures, PUK/DIFRZR/004 "Procedure of Law Enforcement for Radiation Facilities and Radioactive Materials" and PUK/DIIBN/02 "Procedure on Law Enforcement for Nuclear Installations and Materials", and instructions such as IK/PUK/DIFRZR/008.01 "Pre Law Enforcement" (Pre-Reporting the Violation to Police Department), IK/PUK/DIFRZR/008.02 "Working Instruction of Reporting Violation to Police Department" and IK/PUK/DIFRZR/008.03 "Working Instruction of monitoring inspection finding follow-up level", which describe the implementation of various enforcement actions in nuclear energy utilization. Oral or written notices are the most often used enforcement tools in BAPETEN regulatory practice, for nuclear installations. The more severe enforcement tools are very rarely used. Therefore, BAPETENs staff does not have much experience concerning implementation of all kinds of enforcement measures.

Based on GR No 26 of 2002, BAPETEN is also responsible for the implementation of enforcement actions with respect to transport regulations. As stated in GR No 26 of 2002, the significant incidents, including accidents, or deviations from the transport regulations, are required to be reported. However, in practice there are no tools or processes in place to ensure the implementation of this requirement.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: BAPETEN does not have procedures and guidelines governing the use and implementation of different types of enforcement actions related to transport of radioactive material.

(1)

BASIS: GS-G 1.3 Para 5.14, states that *"The regulatory body should adopt clear administrative procedures and guidelines governing the use and implementation of enforcement actions."*

The procedures and guidelines should cover in detail the decision making approach of the regulatory body in determining the level of actions to be taken and the way in which the actions should be taken, including dealing with failure of the operator to comply with requirement for regulatory enforcement".

S19

Suggestion: BAPETEN should consider developing procedures and guidelines governing the use and implementation of different types of enforcement actions.

In general, non-compliances are identified through inspection and documented in the inspection report. The formal inspection report is sent to the licensee for follow up. Administrative enforcement is taken based on inspection report. When enforcing administrative sanctions, BAPETEN informs the licensee about types of violation, and deadlines for follow up. To monitor and confirm the follow up, BAPETEN maintains communication via letter or phone and conducts follow-up inspections.

For penal sanctions, both directorates for inspection hold a forum to investigate and examine the violations involving safety inspectors and legal advisors. If penal enforcement is required, BAPETEN (inspectors accompanied with legal advisors) submit case files to the enforcement agency (Police, District Attorney Office, Provincial Attorney Office). Inspectors gather facts and evidence, report to enforcement agency, and become technical witnesses in the court.

BAPETEN is empowered to take enforcement actions for non-compliance, and have the power to stop operations on-site if significant non-compliance or imminent hazard is detected or in an emergency. This mandate is conferred by the GR No 43 of 2006.

According to BCR No 3 of 2006, inspectors can stop the construction, operation, or decommissioning of nuclear reactor only after consultation with the Chairman of BAPETEN, in case they witness a serious conditions.

According to GR No 43 of 2006, for situations deemed to be serious and considered to pose an imminent radiological hazard to workers, patients, the public or the environment, BAPETEN requires the operator to curtail activities and to take prompt actions necessary to restore an adequate level of safety. In the event of continual, persistent or extremely serious non-compliance, or a significant release of radioactive material to the environment due to serious malfunctioning at or damage to a facility, BAPETEN directs the operator to curtail activities or revokes the licence.

8.3. SUMMARY

Based on the interviews and the review of the presented documents, the IRRS team states that the Act and Government regulations gives BAPETEN adequate enforcement tools to fulfil their duties. However, BAPETEN enforcement process does not have provision for analysis of non-compliances and enforcements actions as a part of dissemination of the lessons learned from the regulatory experience.

In radiation practices, enforcement actions are being implemented in accordance with the graded approach. BAPETEN does not have procedures and guidelines governing the use and implementation of different types of enforcement actions related to transport of radioactive material. BAPETEN regulation has provision, inspectors to take immediate actions on the spot in case of acute health and safety issue with consultation of BAPETEN chairman.

9. REGULATIONS AND GUIDES

9.1. GENERIC ISSUES

Indonesia has established a legislative and regulatory framework for the use of nuclear energy, the uses of radiation sources and for the protection of people and the environment from the harmful effects of ionizing radiation. Based on provisions in the Act and various GRs, BAPETEN Chairman issues several BCRs to provide details relating to the main principles and requirements stipulated in acts and GRs. The Act together with GRs and BCRs constitute an integral system of regulations for the use of nuclear energy and the use of radiation. The Act specifies an obligation to take into account of the International Atomic Energy Agency (IAEA) Safety Standards when developing regulations that pertain to nuclear and radiation facilities.

BAPETEN has a comprehensive document development process and systematic periodic review and update of BCRs. The process for issuing regulations in BAPETEN is carried out according to BAPETEN general procedure on development, amendment and revocation of regulation. This procedure consist of several steps starting with the initiation of the process for developing the regulation, the approval by the Deputy Chairman on Nuclear Safety Assessment, then the initial presentation in the year prior to the establishment of regulation. The preparation process of the BCRs includes coordination meeting with team members from stakeholders and public hearings. BAPETEN then reviews all the responses received from stakeholders. The public participation is made possible through the website of BAPETEN where the drafts for external hearings and all the regulations are also available.

BAPETEN periodically evaluates its regulatory requirements taking into consideration international safety and technical standards, operational experience, technology development, social and economic aspects. For issuing new regulatory requirements and changing existing ones, experts and interested parties are also involved. In addition, the BCRs will incorporate relevant international guidance (mainly IAEA), and take account of BAPETEN's regulatory experience.

The IRRS Team observed that BCRs are not fully consistent with the IAEA requirements. The IRRS Team believes that BAPETEN would benefit from initiating a comprehensive renewal programme and use the current IAEA General Safety requirements and experience gained with regulating nuclear and radiation facilities and activities.

9.2. REGULATIONS AND GUIDES FOR RESEARCH REACTORS

The Act and Presidential Decree No 76 of 1998 established BAPETEN's and mandated it to regulate any facility and activity which uses nuclear energy. The Act requires BAPETEN to establish regulations for the entire lifecycle of research reactors. GR No 11 of 2012 establishes BAPETEN's process for developing regulations. BAPETEN has issued numerous BCRs to specify the requirements for safety and security for research reactors. Some of these regulations also apply to nuclear power plants.

Chairman Regulations are issued to give more detail and technical requirements on safety and security as compared to Government Regulations. BAPETEN reviews and evaluates approximately ten Chairman Regulations annually. This review and evaluation process is established in procedure Directorate of Regulation Development for Nuclear Installation and Materials -BAPETEN which involves meetings with licensees, public, and various BAPETEN organizational units.

BAPETEN identified that comprehensive requirement for construction and operation of research reactors need to be developed. As a result, BAPETEN has implemented an action to revise the regulations of the construction and operations of research reactors. An established graded approach for the application of regulations and guides to research reactors commensurate with the radiation risk was not identified. Both GRs and BCRs are made available to the public. BAPETEN uses the general guide PUK/IIBN/00.1-Inspection Procedure of Nuclear Installations and Materials to establish steps to be performed by the inspectors to ensure consistency across the different types of inspections. Additionally, the regulations require human factors to be incorporated in modifications and design of the facility.

9.3. REGULATIONS AND GUIDES FOR FUEL CYCLE FACILITIES

As a part of the pre-licensing process for a proposed fuel cycle facility, BAPETEN has developed a number BCRs that were intended to assist the applicant with the development of the required safety case in support of the license application during various identified licensing stages. They use GRs and BCRs to form the basis for the review and assessment and subsequently for issuing the authorization.

GRs and BCRs have established primary requirements so as to meet the safety objectives for handling of fresh fuel and its storage thereof including spent fuel storage. The objectives include the implementation of defence in depth concept, safety policies and principles, site evaluation criteria, safety and associated criteria, prevention of criticality and damage to the fuel, ensuring adequate cooling and ensuring that handling operations may not lead to load drops that may jeopardize the safety-related systems, components and structures of the facility including radiological protection targets and limits for the nuclear fuel cycle facilities. Regulatory criteria regarding the external events, natural and human induced have to be considered in the design basis of FCF.

9.4. REGULATIONS AND GUIDES FOR WASTE MANAGEMENT FACILITIES

BAPETEN imposes regulations and conditions on predisposal radioactive waste management facilities, but does not require, in particular, for long term storage to take measures to prevent the degradation of the waste containment. The regulations do not require that due account is taken of the expected period of storage, and to the extent possible passive safety features that need to be applied.

The IRRS Team was informed that while BAPETEN has established general requirements for disposal facilities, the requirements do not cover all types of disposals, neither have they developed procedures to meet the requirements.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: BAPETEN does not require measures to be taken to prevent the degradation of the waste containment particularly in long term storage, nor that account is taken of the expected period of storage and passive safety features.

(1)	BASIS: GSR Part 5 Requirement 11 states that <i>“Waste shall be stored in such a manner that it can be inspected, monitored, retrieved and preserved in a condition suitable for its subsequent management. Due account shall be taken of the expected period of storage, and, to the extent possible, passive safety features shall be applied. For long term storage in particular, measures shall be taken to prevent degradation of the waste containment.”</i>
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R	Recommendation: See R3 in section 1.2.
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RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: BAPETEN has established general requirements for disposal facilities but not for all types of disposals. However, procedures to meet the requirements have not been developed yet.

(1)	BASIS:GSR Part 5 Requirement 3 states that <i>“The regulatory body shall establish the requirements for the development of radioactive waste management facilities and activities and shall set out procedures for meeting the requirements for the various stages of the licensing process.”</i>
(2)	BASIS:SSR-5 Requirement 2 states that <i>“The regulatory body shall establish regulatory requirements for the development of different types of disposal facility for radioactive waste and shall set out the procedures for meeting the requirements for the various stages of the licensing process. It shall also set conditions for the development, operation and closure of each individual disposal facility and shall carry out such activities as are necessary to ensure that the conditions are met”.</i>
S20	Suggestion: BAPETEN should consider establishing regulations for all types of disposal facilities for radioactive waste and develop the procedures for meeting the requirements.

9.5. REGULATIONS AND GUIDES FOR RADIATION SOURCES FACILITIES AND ACTIVITIES

BAPETEN has established regulations and guides related to the regulatory supervision for radiation sources applications. Some of these regulations and guides were discussed in details in the medical and the occupational exposure sections in Modules 11.

GR No 33 of 2007 and GR No 29 of 2008 are under review in order to keep abreast with relevant international standards and relevant experience gained.

9.6. REGULATIONS AND GUIDES FOR DECOMMISSIONING ACTIVITIES

Decommissioning has been specified in BCR No 4 of 2009 and BCR No 6 of 2011. The Act states that the commercial construction, operation, and decommissioning of nuclear reactors to be performed by state company, co-operative, and/or private company. The construction and operation of nuclear reactors and other nuclear installations as well as the decommissioning of nuclear reactor is to be licenced. The operating organization is to establish and implement a quality assurance program starting from siting to decommissioning.

BCR No 7-P of 2002 states that during development of decommissioning plan the following should be taken into consideration:

1. Requirement related to decommissioning and general safety
2. Result of radiological and non-radiological safety assessment
3. Physical condition of installation and structure, system and component integrity
4. Capacity to manage and store radioactive waste
5. Financial resources

6. Human resources
7. Operator experience on similar decommissioning process
8. Social, economic and cultural aspects
9. Master plan of ex-site and surrounding area
10. Preparedness for physical protection or security programme

BCR No 4 of 2009 lists other points to be taken into consideration during decommissioning of nuclear power plants.

9.7. REGULATIONS AND GUIDES FOR TRANSPORT

Indonesia has in place a legal and regulatory framework for regulating the transport of radioactive material to ensure the protection of workers, people and the environment.

The three BCRs (BCR No 3P of 2003, BCR No 4 of 1999 and BCR No 5P of 2000) were provided to the IRRS Team, without translation, only during the mission. Some provisions were translated during the interview and based on this the IRRS Team arrived at new conclusions.

BAPETEN has not developed guides related to transport of radioactive material that need to be provided to carriers, consignors and consignees in order to assist them in complying with the requirements.

The existing regulations on transport of radioactive material would benefit from amending them to adopt and harmonize them with the IAEA safety requirement SSR-6 and the associated IAEA Safety Guides.

9.8. SUMMARY

The system of regulations is enabled by the Act. BAPETEN has established a number of regulations and guides aimed to ensure the radiation safety of facilities and activities including nuclear installations and materials existing in Indonesia. The IRRS Team recognized that BAPETEN have well established process to develop and update regulations and guides.

10. EMERGENCY PREPAREDNESS AND RESPONSE – REGULATORY ASPECTS

10.1. GENERAL EPR REGULATORY REQUIREMENTS

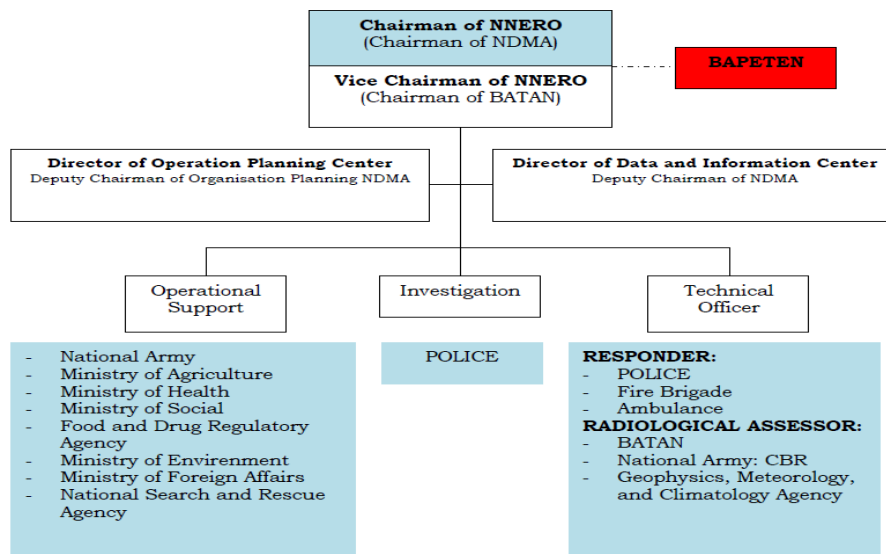
Emergency Management System

Provisions on nuclear emergency preparedness and response are outlined in GR No 54 of 2012. Based on these regulations, nuclear emergency preparedness and response is classified into three levels, those being the installation level: the provincial level; and the national level.

For the installation level, the nuclear emergency preparedness programme is established and implemented by each licensee, who also has the responsibility to declare the status of a nuclear emergency, should this be necessary. The licensee is requested to submit a daily report of the implementation of nuclear emergency response actions to BAPETEN, until the status of nuclear emergency is ended.

For the provincial level, the nuclear emergency preparedness programme is established by the Chairman of the Local Disaster Management Agency, LDMA, in coordination with relevant institutions and licensees. In the case of a nuclear emergency at the provincial level, the status of nuclear emergency will be declared by the Governor, based on recommendations from the Chairman of BAPETEN. Nuclear emergency response at the provincial level is initiated and activated by the Chairman of the LDMA. The Governor declares the end of the status of nuclear emergency, based on recommendations from the Chairman of BAPETEN.

For the national level, the nuclear emergency preparedness programme is established by the Chairman of the National Disaster Management Agency, NDMA, in coordination with relevant ministries and/or non-ministerial institutions, and relevant licensees. In the case of nuclear emergency at the national level, the status of nuclear emergency will be declared by the President of the Republic of Indonesia, based on recommendations from the Chairman of BAPETEN.



A nuclear emergency response at the national level is initiated and activated by the Chairman of NDMA. The National Nuclear Emergency Response Organization, NNERO, the organizational structure of which is shown above, has been in place since 2006 to respond to a nuclear emergency. The President of the Republic of Indonesia declares the end of the status of nuclear emergency, based on recommendations from the Chairman of BAPETEN.

The IRRS Team was informed that while the working-level cooperation between the different government is excellent, the mechanisms for coordination at the highest executive level could be improved. There are no MoUs in place between the relevant ministries and authorities, with the exception of the MoU between BAPETEN and NDMA, and the limited number of national exercises may not be sufficient for developing a well-coordinated national nuclear emergency response system.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: There appears to be a good working-level cooperation between the different organizations involved in emergency preparedness and response, whereas the coordination at the highest executive level could be improved.	
(1)	BASIS: GSR Part 7, para. 4.10 states that <i>“The government shall establish a national coordinating mechanism to be functional at the preparedness stage, consistent with its emergency management system...”</i>
R21	Recommendation: The government should improve the coordination mechanism between the relevant organizations within the national nuclear emergency preparedness and response system.

Roles and Responsibilities

Regarding nuclear and radiological facilities and activities, BAPETEN is the sole regulatory body in Indonesia. Its mandate includes emergency preparedness and response, and is specified in the regulations as follows:

- BCR No 1 of 2010 requires that “the licensee should establish a nuclear preparedness program based on assessment of potential radiological hazards in accordance with radiological hazard category”. This nuclear emergency preparedness and response programme (which encompasses both nuclear and radiological preparedness and response in the conventional sense) defines requirements for the necessary infrastructure and for the response functions.
- BCR No 1 of 2010 obliges the licensee to establish a nuclear emergency response organization.
- BCR No 1 of 2010 requires that “the licensee shall coordinate with other agencies in the implementation of nuclear emergency preparedness and response if the impact of emergency extends beyond installation”
- GR No 54 of 2012 stipulates that a nuclear emergency preparedness programme at the installation level must be developed by the licensees.

BAPETEN provides advice for the development of EPR programmes to other organizations involved in such activities.

Hazard Assessment

BAPETEN obligates the licensee to perform a hazard assessment to be used as the basis for its EPR planning. GR No 54 of 2012 and BCR No 1 of 2010 require that all licensees consider the hazard assessment when developing their EPR plans.

The hazard categorization (‘threat categories’) used in BCR No 1 of 2010 is basically consistent with the emergency preparedness categories of IAEA GSR Part 7, with some deviations. Although category IV is

defined in BCR No 1 of 2010, no actual sources are currently listed under this category. The IRRS Team considers that mobile sources may qualify in this category, and that it might be applied to orphan sources.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
<p>Observation: The hazard categorization is not fully consistent with the emergency preparedness categories defined in GSR Part 7. While the relevant regulatory document BCR No 1 of 2010 defines category IV, the actual listing of the radiation sources in the country does not take category IV sources into consideration.</p>	
(1)	<p>BASIS: GSR Part 7 para. 4.19 states that <i>“For the purposes of these requirements, assessed hazards are grouped in accordance with the emergency preparedness categories shown in Table I. The five emergency preparedness categories (hereinafter referred to as ‘categories’) in Table I establish the basis for a graded approach to be applied in application of these safety requirements and for developing generically justified and optimized arrangements for preparedness and response for a nuclear or radiological emergency.”</i></p>
S21	<p>Suggestion: BAPETEN should consider revising the relevant regulatory documents to adjust its hazard categorization to be fully consistent with the current IAEA categorization.</p>

Protection Strategy for an Emergency

This is a new requirement originating from IAEA GSR Part 7, and has not been covered in BAPETEN’s self-assessment. Based on discussions with the counterpart, the IRRS Team concluded that this new requirement remains to be complied with.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
<p>Observation: There is no protection strategy considered in the national regulatory documents.</p>	
(1)	<p>BASIS: GSR Part 7, Requirement 5 state that <i>“The government shall ensure that protection strategies are developed, justified and optimized at the preparedness stage for taking protective actions and other response actions effectively in a nuclear or radiological emergency.”</i></p>
R	<p>Recommendation: See R3 in section 1.2.</p>

10.2. FUNCTIONAL REGULATORY REQUIREMENTS

Managing Emergency Response Operations

BCR No 1 of 2010 requires that all licensees establish an organization for emergency management. This has to cover all details related to the on-site management of any emergency in the licensed facility.

The roles, responsibilities and operations of the off-site response organizations (including BAPETEN’s role and functions) are described in the National Nuclear Emergency Response Plan (NNERP).

The effectiveness of the licensees’ and response organizations’ emergency management is verified by observing exercises, which are organized regularly.

Identifying, Notifying and Activating

The licensees are required to identify a nuclear emergency immediately and determine the level of appropriate response in accordance with the classification of the nuclear emergency.

For installations or facilities in category I, II or III, the classification of a nuclear emergency uses the following categorization:

- ‘Alert’ in the case of radiological hazard category I, II or III, and which may have an impact within the buildings of the facility or installation;
- ‘Site Emergency’ in the case of radiological hazard category I or II, and which has on-site impact; and,
- ‘General Emergency’ in the case of radiological hazard category I or II, and which may have off-site impact.

In case of a nuclear emergency, the licensee is obliged to report to the Chairman of BAPETEN within one hour by telephone, facsimile or electronic mail, and in writing no later than two days after the event.

The emergency classification is closely aligned with the one outlined in the relevant IAEA Safety Standards. The concept ‘facility emergency’ is not used in Indonesia. Instead, ‘site emergency’ is used in cases when no off-site consequences are expected.

There are arrangements in place aimed at the discovery/detection and characterization of potential “orphan” sources.

Taking Mitigatory Actions

BCR No 1 of 2010 describes what mitigatory actions need to be taken by the licensee during an emergency. To perform these actions, the licensee can request assistance and certain specific emergency services from off-site responders. The licensees are expected to coordinate its activities with the relevant agencies on emergency preparedness and response, such as local government, local disaster management agency, police, fire brigade, hospitals, etc.

Taking Urgent Protective Action and Other Response Actions

BAPETEN has defined operational intervention levels (OILs) to guide protective actions taken during an emergency situation, based on the IAEA Safety Standards, but these are not implemented in the regulations yet. BAPETEN intends to include the emergency action levels (EALs) and OILs into the revised BCR 1 of 2010, planned to be completed by 2018. This will form part of the compliance with the new requirement for a protection strategy (see section 10.1).

According to BCR No 1 of 2010, the licensee determines the emergency planning zones, and the areas thus defined must comply with the values defined in ANNEX II of the same regulations. These emergency zone sizes are in compliance with the IAEA Safety Standards. The local off-site emergency plans are prepared based on these emergency zones and distances, in coordination with the local government.

Providing Instructions, Warning and Relevant Information to the Public

BCR No 1 of 2010 establishes requirements on the responsibilities of the licensees regarding instructing the public during a nuclear or radiological emergency. This BCR also defines the obligations of the licensees of category I and II facilities to provide information, and instructions if necessary, to the public during an emergency, in compliance with the requirements of the IAEA Safety Standards.

Protecting Emergency Workers and Helpers in an Emergency

The required regulatory system is for protecting emergency workers and helpers in an emergency in place. BCR No 1 of 2010 describes the requirements for protection of emergency workers and in Annex V it provides guidance on restricting exposure of emergency workers. The requirements are consistent with the IAEA Safety Standards.

Managing the Medical Response in a Nuclear or Radiological Emergency

BCR No 1 of 2010 requires the licensee to manage the medical response of contaminated or highly exposed workers or members of the public. The requirements are consistent with the IAEA Safety Standards.

Other Activities in Emergency Preparedness

While most of the early phase emergency response functions are satisfactorily complied with, there are a few functional requirements that are not properly addressed. Many of these requirements have either been revised from its original form in IAEA GS-R-2, or they were not part of the now obsolete requirements. The IRRS Team considered that addressing these issues during the upcoming revision of the regulatory system is important, and will, once completed, provide for full compliance with the current IAEA Safety Standards.

Regarding the requirement for taking early protective actions, including defining criteria for agricultural countermeasures and countermeasures against ingestion, as well as longer-term protective actions, no regulations and criteria have as yet been developed.

Regulations for the management of radioactive waste generated in an emergency, compliant with Requirement 15 of GSR Part 7, have not yet been established.

There is no relevant regulatory document that would help the licensees and other stakeholders involved in a nuclear or radiological emergency in mitigating the non-radiological consequences of the emergency and response, as required in GSR Part 7, Requirement 16. This issue requires a coordinated effort of several relevant organizations, and the government is expected to coordinate such an effort.

Regarding Requirement 17 of GSR Part 7 on ‘requesting international assistance for preparedness and response’ it is important to note that Indonesia is a signatory to the Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency. BAPETEN is the National Competent Authority (NCA) under these Conventions and regularly participates in the ConvEx exercises and in many national and regional projects of the IAEA.

Regarding Requirement 18 of GSR Part 7, termination of an emergency, no criteria have been established and implemented in the regulations yet, and BAPETEN is not yet compliant with the new requirement for analysing the emergency and the emergency response, outlined in Requirement 19 of GSR Part 7.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: Regulations and criteria for agricultural countermeasures and countermeasures against ingestion of radionuclides have not yet been developed.

(1)

BASIS: GSR Part 7 para. 5.74 states that “*Within the ingestion and commodities planning distance (see para. 5.36), arrangements shall be made for prompt protection in relation to, and for restriction of, non-essential local produce, forest products (e.g. wild berries, wild mushrooms), milk from grazing animals, drinking water supplies, animal feed and commodities with or possibly with contamination following a significant radioactive release*”

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

in accordance with the protection strategy.”

Observation: Management of radioactive waste in an emergency is not considered yet in the national regulatory documents.

(1) **BASIS: GSR Part 7 para. 5.81 states that** *“The national policy and strategy for radioactive waste management shall apply for radioactive waste generated in a nuclear or radiological emergency taking into account these requirements”*

Observation: The termination of an emergency is not considered yet in the national regulatory documents.

(1) **BASIS: GSR Part 7 requirement 18 states that** *“The government shall ensure that arrangements are in place and are implemented for the termination of a nuclear or radiological emergency, with account taken of the need for the resumption of accustomed social and economic activities”*

Observation: The analysis of the emergency and the emergency response is not considered yet in the national regulatory documents.

(1) **BASIS: GSR Part 7 para. 5.99 states that** *“The government shall ensure that the nuclear or radiological emergency and the emergency response are analyzed in order to identify actions to be taken to prevent other emergencies and to improve emergency arrangements”*

Recommendation: BAPETEN should revise its regulatory system in order to comply with the current relevant IAEA Safety Standards, namely:

R22

- **develop regulations and criteria regarding countermeasures for early protective actions and restriction of food, drink and commodities, to ensure the safety to people;**
- **ensure that the waste generated in an emergency situation will be managed safely;**
- **develop regulations addressing the roles and responsibilities of the licensees and stakeholders, as well as the criteria for the termination of the radiological and nuclear emergency situation; and,**
- **ensure that the nuclear or radiological emergency and the emergency response are analysed in order to identify actions to be taken to prevent other emergencies and to improve emergency arrangements.**

10.3. REGULATORY REQUIREMENTS FOR INFRASTRUCTURE

Authorities for Emergency Preparedness and Response

BAPETEN has full authority in regulating the licensees’ EPR arrangements. Submission of the emergency plan by the applicant is a requirement in the licensing process.

Organization and Staffing for Emergency Preparedness and Response

The EPR programme of the licensees is expected to explain the details of the EPR organization, including tasks and responsibilities of all staff. Verification of compliance with such requirements is done through inspections and evaluation of emergency response exercises.

Coordination of Emergency Preparedness and Response

For facilities which have potential off-site impact in case of an emergency (such as category I and II), BAPETEN requires the licensee to specify the coordination of on-site and off-site emergency services with the local off-site responders. Verification of this coordination is done through observing and evaluating exercises.

Plans and Procedures for Emergency Response

The licensees are obliged to submit their emergency plans as a requirement in the licensing process and subsequently BAPETEN evaluates the documentation. Plans and procedures are part of the emergency programme described in BCR No 1 of 2010, ANNEX III.

The proper implementation of the plans and procedures are also assessed through the evaluation of emergency exercises.

Logistical Support and Facilities for Emergency Response

BCR No 1 of 2010 requires all licensees to provide the appropriate logistical support, equipment and facilities, for the purpose of the licensee's emergency response.

Effectiveness and adequacy of the logistical support and of equipment and facilities is verified during inspections, where the inspector checks the stated data with the facts on the ground.

Training, Drills and Exercises for Emergency Preparedness and Response

GR No 54 of 2012 and BCR No 1 of 2010 require the licensees to perform training and drills regularly. Based on these regulations, drills and exercises are organized: a) once per year at the facility level; b) once per two years at local level; and c) once per four years at the national level.

BAPETEN uses a standardized methodology for the evaluation of these exercises.

Quality Management Programme for Emergency Preparedness and Response

Although BCR No 1 of 2010 requires the licensee to have "procedures", which implicitly means an obligation to follow certain quality assurance programmes, there are no explicit regulatory requirements on quality management and on continuous improvement of the EPR functions.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: A regulatory requirement requesting the licensees to place their emergency preparedness and response arrangements under appropriate quality management has not yet been developed.

(1)

BASIS: GSR Part 7, para. 6.34 states that *"The operating organization, as part of its management system ..., and response organizations, as part of their emergency management system, shall establish a programme to ensure the availability and reliability of all supplies, equipment, communication systems and facilities, plans, procedures and other arrangements necessary to perform functions in a nuclear or radiological emergency as specified in Section 5 The programme shall include arrangements for inventories, resupply, tests and calibrations, to ensure that these are continuously available and functional for use in a*

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

nuclear or radiological emergency.”

R23

Recommendation: BAPETEN should develop regulations that oblige the licensees to place their EPR system under consistent and comprehensive quality management.

10.4. ROLE OF REGULATORY BODY DURING RESPONSE

BAPETEN supervises how licensees respond during an emergency at their installation, and coordinates such activities with response teams from relevant ministries/authorities, within the framework of NNERO. BAPETEN Chairman is an advisor to the NNERO. BAPETEN is responsible for liaison with the IAEA, in accordance with relevant Conventions, as the National Competent Authority.

BAPETEN's role is defined in detail in the National Nuclear Emergency Response Plan. Additionally, there is a document providing operational guidelines for the members of NNERO. These documents also describe the tasks and functions assigned to BAPETEN. BAPETEN has its own emergency response plan (BCR No 1 of 2015).

Details of coordination are outlined in the NNERP. EPR procedures are not yet included in the management system of BAPETEN.

BAPETEN has an in-house training programme which includes EPR. Twice per year, BAPETEN EPR staff conducts its own exercises (one for safety related events and one for security related events). BAPETEN staff also participates in national exercises annually. Experiences from these exercises are analysed on a five-yearly basis in an executive meeting, and the necessary corrective actions are decided based upon the lessons learned.

BAPETEN has an emergency coordination room and a real-time data monitoring system for monitoring releases from the reactors. BAPETEN has allocated a budget every year for continuous improvement of its EPR programme.

10.5. SUMMARY

The emergency management system and the definition of roles and responsibilities regarding preparedness for and response to nuclear and radiological emergencies are well described in the reviewed documentation. The prime responsibility of the licensee to handle on-site emergency situations is clearly spelled out in BAPETEN's relevant regulations and its implementation seems to be thoroughly verified by BAPETEN.

While most of the general requirements, functional and infrastructural requirements of the now obsolete IAEA Safety Standards GS-R-2 are met by the current regulatory practice, some of the requirements of the new IAEA Safety Standards GSR Part 7 have so far not been addressed (e.g. management of waste generated in an emergency, early protective actions, termination of an emergency, analysing the emergency and the response). Particularly important is the new concept of developing a protection strategy for an emergency. One of the main findings of the IRRS Team is that this issue (together with the other missing components) should be considered and the corresponding regulatory documents developed as part of the planned updating of the regulations.

11. ADDITIONAL AREAS

Section 11 consists of subsections on control of medical exposures, occupational radiation protection, protection of the public and the environment, and transport. It should be noted that Section 11 is mostly concerned with specific regulatory aspects of the above mentioned topics. Authorization, review and assessment, inspection, enforcement and regulations and guides are generally discussed in sections 5-9.

11.1. CONTROL OF MEDICAL EXPOSURES

There are 26 radiotherapy centres, 21 nuclear medicine departments and 2086 departments for diagnostic and interventional radiology in Indonesia. There are 149 medical physicists in the country. BATAN operates a Secondary Standards Dosimetry Laboratory (SSDL) that verifies radiotherapy beam calibrations. Compliance testing of equipment is performed by persons as testers that have passed compulsory training and have permits for the purpose of such activities issued by BAPETEN.

BAPETEN's review and assessment of medical uses of radiation is carried out using procedures. However, the IRRS Team was informed that the resources (staffing and competence) are insufficient for effective review and assessment with regard to the most recent developments in the use of radiation in medical applications. Procedures for review and assessment, as well as the inspection forms, closely follow the regulations but are not aligned with the requirements in IAEA GSR Part 3, as described in detail later in this section.

Hospitals that were not licenced for use of radiation in medicine have been enforced to obtain an authorization; the IRRS Team was informed that four cases of failure to comply with the requirement for authorization had been reported to the police.

Responsibilities of the Government

Medical exposures to radiation are not clearly defined in the Act, but they are defined in GR No 33 of 2007. The use of radiation in biomedical research is not included, which was identified by BAPETEN in its self-assessment. Specific aspects of medical use of radiation, such as roles and responsibilities of different organizations; dose constraints; diagnostic reference levels (DRLs); and criteria governing the release of patients after radiation therapy, are only partially outlined in several BCRs which are subject to revision.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: The government has not fully ensured that relevant parties are authorized to assume their roles and responsibilities and that diagnostic reference levels, dose constraints, and criteria and guidelines for the release of patients are established.

(1)

BASIS: GSR Part 3 Requirement 34 states that *“The government shall ensure that relevant parties are authorized to assume their roles and responsibilities and that diagnostic reference levels, dose constraints, and criteria and guidelines for the release of patients are established.”*

R

Recommendation: See R3 in Section 1.2.

There is a clear overlap of responsibilities between BAPETEN and MoH in regulation of medical uses of radiation. The demarcation between the two regulatory bodies is at best unclear, for example both regulatory bodies have their own regulation and guide on radiology diagnostic x-ray QA/QC. This leads

to ineffective use of resources and as MoH is also a promotor of medical use of radiation, it may also lead to a conflict of interest.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: Some roles and responsibilities of BAPETEN and MoH in regulation of medical uses of radiation are overlapping.

(1)	BASIS: see the basis for R6
R	Recommendation: See R6 Section 1.5

The IRRS Team was informed that medical physicist is a recognized profession in Indonesia. However, the IRRS Team was also informed that the required minimum education for medical physicists corresponds only to Bachelor level, which means that the training is insufficient for gaining the competence required to carry out all responsibilities of medical physicists defined in GSR Part 3. To ensure that the medical physicists can fully assume their roles and responsibilities, the Government is encouraged to develop the education and training of medical physicists.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: The level of education and training of medical physicist appears not to be sufficient in all relevant areas of medical use of radiation to allow them to assume all the responsibilities of medical physicists defined in GSR Part 3.

(1)	<p>BASIS: GSR Part 1 Requirement 11 states that <i>“The government shall make provision for building and maintaining the competence of all parties having responsibilities in relation to the safety of facilities and activities.</i></p> <p>2.36. The government;</p> <p>(c) Shall make provision for adequate arrangements for increasing, maintaining and regularly verifying the technical competence of persons working for authorized parties.”</p>
R	Recommendation: See R3 in Section 1.2.

Responsibilities of the Regulatory Body

All medical exposures are authorized except for some beam energies of linear accelerators, as outlined in section 5, and are also inspected (see section 7).

The BAPETEN inspectors are acting as qualified experts in providing verification of compliance testing to the hospitals. This appears to conflict with the fundamental safety principle that the primary responsibility for safety lies with the licensee.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: Several BAPETEN inspectors also act as qualified experts to provide verification of compliance testing to the hospitals that may give rise to a conflict of interest.

(1)	BASIS: SF-1 Principle 1 states that <i>“The prime responsibility for safety must rest with the</i>
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RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

	<p><i>person or organization responsible for facilities and activities that give rise to radiation risks”</i></p> <p>BASIS: GSR Part 1 Requirement 17 states that <i>“The regulatory body shall perform its functions in a manner that does not compromise its effective independence.”</i></p>
R24	<p>Recommendation: BAPETEN should refrain from providing verification of compliance testing to the hospitals, if they may lead to a real or perceived conflict of interest.</p>

Justification of Medical Exposure

Justification of medical exposure for self-referred patients and asymptomatic individuals are not covered in the regulations.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: Referrals for asymptomatic exposure and self-referred patients are not explicitly covered by the regulations.

	<p>BASIS: GSR Part 3 Requirement 36, para 3.150 states that <i>“Registrants and licensees shall ensure that no patient, whether symptomatic or asymptomatic, undergoes a medical exposure unless:</i></p> <p><i>(a) the radiological procedure has been requested by a referring medical practitioner and information on the clinical context has been provided, or it is part of an approved health screening programme;</i></p> <p><i>(b) The medical exposure has been justified through consultation between the radiological medical practitioner and the referring medical practitioner, as appropriate, or it is part of an approved health screening programme;</i></p> <p><i>(c) A radiological medical practitioner has assumed responsibility for protection and safety in the planning and delivery of the medical exposure as specified in para. 3.153(a);</i></p> <p><i>(d) The patient or the patient’s legal authorized representative has been informed, as appropriate, of the expected diagnostic or therapeutic benefits of the radiological procedure as well as the radiation risks.”</i></p>
(1)	
R	<p>Recommendation: See R3 in Section 1.2.</p>

Optimization of Medical Exposure

Design considerations

All medical equipment are required to pass an acceptance test and the test results are sent to be verified by the BAPETEN before taking the equipment into use. The equipment has to comply with international standards. BAPETEN has developed guidelines for shielding calculations to be applied in radiotherapy facilities.

Operational considerations

The regulations for diagnostic radiology allow that instead of a medical physicist, if no one with such qualifications is available, another Bachelor level physicist or other “capable person” can be consulted during the optimization process. This is not in line with GSR Part 3.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: The requirements for the responsibilities of medical physicists are not fully in line with the requirements in the current IAEA Safety Standards.	
(1)	<p>BASIS: GSR Part 3 Requirement 38 states that “<i>Registrants and licensees and radiological medical practitioners shall ensure that protection and safety is optimized for each medical exposure.</i>”</p> <p>BASIS: GSR Part 3 Para 3.166 states that “<i>In accordance with para. 3.153(d) and (e), the medical physicist shall ensure that:</i></p> <p><i>(a) All sources giving rise to medical exposure are calibrated in terms of appropriate quantities using internationally accepted or nationally accepted protocols;</i></p> <p><i>(b) Calibrations are carried out at the time of commissioning a unit prior to clinical use, after any maintenance procedure that could affect the dosimetry and at intervals approved by the regulatory body;</i></p> <p><i>(c) Calibrations of radiotherapy units are subject to independent verification prior to clinical use;</i></p> <p><i>(d) Calibration of all dosimeters used for dosimetry of patients and for the calibration of sources is traceable to a standards dosimetry laboratory.</i></p> <p>BASIS: GSR Part 3 Para 3.167 states that “<i>Registrants and licensees shall ensure that dosimetry of patients is performed and documented by or under the supervision of a medical physicist, using calibrated dosimeters and following internationally accepted or nationally accepted protocols, including dosimetry to determine the following:</i></p> <p><i>(a) For diagnostic medical exposures, typical doses to patients for common radiological procedures;</i></p> <p><i>(b) For image guided interventional procedures, typical doses to patients;”</i></p>
R	Recommendation: See R3 in Section 1.2.

Calibration

The requirements for dosimetry and calibration of equipment are defined in BCR No 1 of 2006 including the traceability to secondary standards.

Dosimetry of Patients

Medical physicists are required to be involved, when appropriate, in the consultations on optimisation, including patient dosimetry which is not fully in line with GSR Part 3 that requires patient dosimetry to be carried out under the supervision of a medical physicist. See above recommendation in “Operational conditions”.

Diagnostic Reference Levels

GR No 33 of 2007 adopts guidance levels from the ‘old’ BSS; such guidance levels are now replaced by Diagnostic Reference Levels (DRLs) in current IAEA Safety Standards. There is a need to develop national DRLs that are based on dose surveys in Indonesia. BAPETEN’s Assessment Centre for Radiation Facilities and Radioactive Materials has started to make surveys on patient doses for computed tomography and fluoroscopy procedures. It is a commendable practice to use such a scientific body to support other control activities.

Quality Assurance for Medical Exposures

Requirements on QC programmes are embedded in BCRs; however, MoH has similar guidelines that have to be implemented as conditions for a licence from MoH.

Dose Constraints

Dose constraints are required in BAPETEN regulations for optimization purposes for careers and comforters.

Pregnant Women and Breast Feeding Women

There are BAPETEN regulations on protection of pregnant and breast feeding women.

Release of Patients

The criteria and guidance for releasing patients after radionuclide therapy or permanent implantation of sealed sources has been established, however the release criteria 1100 MBq has been adopted from the BSS 115 that is not relevant anymore. BCR No 17 of 2012 requires that measurements are carried out before releasing a patient. This is not based on an individual assessment by the practitioner taking into account public exposure.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: The release of patients after I-131 therapy is not based on individual assessment.

(1) **BASIS:** **GSR Part 3 Requirement 40 states that** *“Registrants and licensees shall ensure that there are arrangements in place to ensure appropriate radiation protection for members of the public and for family members before a patient is released following radionuclide therapy.”*
“(a) The activity of radionuclides in the patient is such that doses that could be received by members of the public and family members would be in compliance with the requirements set by the relevant authorities (para. 3.149(b));”

R **Recommendation:** See R3 in Section 1.2.

Unintended and Accidental Medical Exposures

There are no requirements that radiological medical practitioners informed patients or their legal representatives of any unintended or accidental medical exposure.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: There are no requirements that radiological medical practitioners informed patients or their legal representatives of any unintended or accidental medical exposure.

(1)	<p>BASIS: <i>GSR Part 3 Requirement 41 states that “Registrants and licensees shall ensure that no person incurs a medical exposure unless there has been an appropriate referral, responsibility has been assumed for ensuring protection and safety, and the person subject to exposure has been informed as appropriate of the expected benefits and risks.”</i></p> <p>BASIS: <i>GSR Part 3 Requirement 41, para. 3.180 (c) states “Registrants and licensees shall, with regard to any unintended or accidental medical exposures investigated as required in para. 3.179: Ensure that the appropriate radiological medical practitioner informs the referring medical practitioner and the patient or the patient’s legal authorized representative of the unintended or accidental medical exposure.</i></p>
R	<p>Recommendation: See R3 in Section 1.2.</p>

Reviews and records

It was concluded in the self-assessment that there is no requirement that reviews should include an investigation and critical reviews of the current practical application of radiation protection principles of justification and optimisation. Neither period for retention of records of patient dosimetry are specified. Independent audits are not required and as a consequence no third party verifications are carried out.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: There are no requirements that reviews should include an investigation and critical review on justification and optimisation. Periods for retention of records of patient dosimetry are not specified. No requirement for independent audits is in place and, as a consequence, no third party verifications are carried out.

(1)	<p>BASIS GSR Part 3 Requirement 41, para. 3.181 states “Registrants and licensees shall ensure that radiological reviews are performed periodically by the radiological medical practitioners at the medical radiation facility, in cooperation with the medical radiation technologists and the medical physicists. The radiological review shall include an investigation and critical review of the current practical application of the radiation protection principles of justification and optimization for the radiological procedures that are performed in the medical radiation facility. of the unintended or accidental medical exposure.”</p>
R	<p>Recommendation: See R3 in Section 1.2.</p>

11.2 OCCUPATIONAL RADIATION PROTECTION

Legal and Regulatory Framework

Indonesia has established a legal and regulatory framework for occupational exposure in accordance with Requirement 2 of GSR Part 1. The implementation of this framework has been developed through the publication of the Act and the establishment of BAPETEN.

This legal and regulatory framework consists of GR No 33 of 2007, GR No 2 of 2014, GR No 29 of 2008 and several BCRs.

Although it is acknowledged that the regulations cover most of the requirements as established in GSR Part 3, there are several requirements that are not covered or are not in full compliance with the IAEA Standards.

The regulatory framework requires BAPETEN to establish and enforce requirements for the monitoring and recording of occupational exposures in planned exposure situations.

General Responsibilities of Registrants, Licensees and Employers

GR No 33 of 2007 and BCR No 4 of 2013 assign responsibilities to registrant and licensees for the protection of the workers and for compliance with the requirements of the regulations. These regulations require employers and licensees to ensure that optimization and dose limitations are applied.

Some GSR Part 3 requirements have not been covered in the current regulatory framework, and it is considered to be relevant to include them in the next revision of the relevant regulation. Some inconsistencies were also observed in the occupational radiation protection regulatory framework. These gaps or inconsistencies include:

- The dose limit for the lens for apprentices of the eye is 50 mSv/y.
- No specific requirements state that:
 - the conditions of service of workers shall be independent of whether they are or could be subject to occupational exposure.
 - Special compensatory arrangements, or preferential consideration with respect to salary, special insurance coverage, working hours, length of vacation, additional holidays or retirement benefits, shall neither be granted nor be used as substitutes for measures for protection and safety in accordance with the requirements of the regulation.
- Regulations do not fully require employers, registrants and licensees to facilitate compliance by workers with the requirements of the regulation.
- With respect to personal protective equipment, the regulations does not require that employers, registrants and licensees, where appropriate, ensure that:
 - workers receive adequate instruction in the proper use of respiratory protective equipment including testing for good fit.
 - that tasks requiring the use of certain personal protective equipment are assigned only to workers who on the basis of medical advice are capable of safely sustaining the extra effort necessary.
 - all personal protective equipment, including equipment for use in an emergency, is maintained in proper condition and, if appropriate, is tested at regular intervals.
 - if the use of personal protective equipment is considered for any given task, account is taken of any additional exposure that could result owing to the additional time taken or the inconvenience, and of any non-radiological risks that might be associated with using personal protective equipment while performing the task.
- The regulation does not require employers to make all reasonable efforts to provide workers with suitable alternative employment in circumstances for which it has been determined, either by the regulatory body or in the framework of the programme for workers' health surveillance in

accordance with the requirements of the regulations, that workers, for health reasons, may no longer continue in employment in which they are or could be subject to occupational exposure.

- There is no requirement on employers, registrants and licensees to consult with workers in establishing in writing local rules and procedures.

General Responsibilities of Workers

GR No 33 of 2007 and BCR No 4 of 2013 set the responsibilities for workers. Most responsibilities are covered in these regulations, however, there are some gaps including:

- The regulations do not require workers to abstain from any wilful action that could put themselves or others in situations that contravene the requirements of the regulations.
- No clear requirements to require workers to follow any applicable rules and procedures for protection and safety specified by the employer, registrant or licensee;
- No specific requirement to require workers to cooperate with the employer, registrant or licensee with respect to protection and safety and the operation of radiological health surveillance and dose assessment programmes.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: The current equivalent dose limit for the lens of the eye is 50 mSv in a year for apprentices.

- | | |
|------------|--|
| (1) | BASIS: GSR Part 3 Schedule III III.2 states that <i>“For occupational exposure of apprentices of 16 to 18 years of age who are being trained for employment involving radiation and for exposure of students of age 16 to 18 who use sources in the course of their studies, the dose limits are: (b) An equivalent dose to the lens of the eye of 20 mSv in a year;”</i> |
|------------|--|

Observation: No specific requirements state that the conditions of service of workers should be independent of whether they are or could be subject to occupational exposure. Any special compensatory arrangements should neither be granted nor be used as substitutes for measures for protection and safety.

- | | |
|------------|--|
| (1) | BASIS: GSR Part 3 para. 3.111 states that <i>“The conditions of service of workers shall be independent of whether they are or could be subject to occupational exposure. Special compensatory arrangements, or preferential consideration with respect to salary, special insurance coverage, working hours, length of vacation, additional holidays or retirement benefits, shall neither be granted nor be used as substitutes for measures for protection and safety in accordance with the requirements of these Standards.”</i> |
|------------|--|

Observation: The regulation does not require employers to make all reasonable efforts to provide workers with suitable alternative employment in circumstances that workers, for health reasons, may no longer continue in employment in which they are or could be subject to occupational exposure

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|------------|---|
| (2) | BASIS: GSR Part 3 para. 3.112 states that <i>“Employers shall make all reasonable efforts to provide workers with suitable alternative employment in circumstances for which it has been determined, either by the regulatory body or in the framework of the programme for workers’ health surveillance in accordance with the requirements of these Standards, that workers, for health reasons, may no longer continue in employment in which they are or</i> |
|------------|---|

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could be subject to occupational exposure.”

Observation: Regulations do not fully require employers, registrants and licensees to facilitate compliance by workers with the requirements of the regulation.

(3)

BASIS: GSR Part 3 para. 3.82 states that *“Employers, registrants and licensees shall facilitate compliance by workers with the requirements of these Standards.”*

Observation: With respect to personal protective equipment (PPE), the regulations does not require that employers and licensees to ensure that: 1) workers receive adequate instruction including testing for good fit. 2) tasks requiring the use of certain PPE are assigned only to workers who on the basis of medical advice are capable of safely sustaining the extra effort necessary. 3) all PPEs are maintained in proper condition and tested at regular intervals. 4) if the use of PPE is considered for any given task, account is taken of any additional exposure and of any non-radiological risks.

(4)

BASIS: GSR Part 3 para. 3.95 states that *“Employers, registrants and licensees shall ensure that: (b) Where appropriate, workers receive adequate instruction in the proper use of respiratory protective equipment, including testing for good fit. (c) Tasks requiring the use of certain personal protective equipment are assigned only to workers who on the basis of medical advice are capable of safely sustaining the extra effort necessary. (d) All personal protective equipment, including equipment for use in an emergency, is maintained in proper condition and, if appropriate, is tested at regular intervals. (e) If the use of personal protective equipment is considered for any given task, account is taken of any additional exposure that could result owing to the additional time taken or the inconvenience, and of any non-radiological risks that might be associated with using personal protective equipment while performing the task.”*

Observation: There is no requirement on employers, registrants and licensees, to consult with workers in establishing in writing local rules and procedures.

(5)

BASIS: GSR Part 3 para. 3.94 states that *“Employers, registrants and licensees, in consultation with workers, or through their representatives where appropriate: (a) Shall establish in writing local rules and procedures that are necessary for protection and safety for workers and other persons.”*

Observation: The regulations do not fully require workers to 1) to follow any applicable rules and procedures for protection and safety; 2) to cooperate with the employer or licensee with respect to protection and safety and the operation of radiological health surveillance and dose assessment programmes; 3) abstain from any wilful action that could put themselves or others in situations that contravene the requirements of the regulations;

(6)

BASIS: GSR Part 3 para. 3.83 states that *“Workers: (a) Shall follow any applicable rules and procedures for protection and safety as specified by the employer, registrant or licensee; (c) Shall cooperate with the employer, registrant or licensee with regard to protection and safety, and programmes for workers’ health surveillance and programmes for dose assessment;*

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	<i>(e) Shall abstain from any wilful action that could put themselves or others in situations that would not be in accordance with the requirements of these Standards.”</i>
R	Recommendation: See R3 section 1.2.
S22	Suggestion: BAPETEN should consider inviting an IAEA Occupational Radiation Protection Appraisal Service (ORPAS) mission in order to develop an action plan for further improving the infrastructure for occupational radiation protection.

Requirements for Radiation Protection Programmes

Several BAPETEN regulations require registrants and licensees to designate as a controlled area any area in which specific measures for protection are or could be required for: a) controlling exposures or preventing the spread of contamination, or b) preventing or limiting the likelihood and magnitude of exposures in anticipated operational occurrences and accident conditions. They also require licensees to designate as a supervised area any area not already designated as a controlled area but where occupational exposure conditions need to be kept under review.

Monitoring Programmes and Technical Services

BRC No 1 of 2006 states that all dosimetry services or calibration laboratories should have accreditation and, in the absence of accreditation, laboratories should apply to BAPETEN for approval.

Training Services and Staff Training and Re-Training

There are three level of Radiation Protection Officers (RPO). A Candidate of RPO shall attend a RPO training delivered by training center such as BATAN Training Centre and some of MoH Education and Training Centre. Duration of RPO training depending on level of RPO is one or two weeks. The RPO will undergo certification examination at BAPETEN. The certification is valid for 3, 4 or 5 year for RPO levels 1, 2 and 3 respectively. The renewal of the licences is conditional on attendance of a minimum of one radiation protection training event.

There are also training for operators in BATAN or MOH and certification by BAPETEN. The training of radiation workers is carried out locally under the supervision of the RPO.

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Observation: The training courses available for radiation protection officers depending on the level of RPO are one or two week standard courses and there is no practice specific training for RPO.

(1)	BASIS: GSR Part 3 para. 2.22 states that <i>“The government shall ensure that arrangements are in place for the provision of the education and training services required for building and maintaining the competence of persons and organizations that have responsibilities relating to protection and safety.”</i>
S23	Suggestion: Government and BAPETEN should consider to modifying the requirement for RPOs training and retraining to include practice specific part for

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each type of practices.

S24

Suggestion: BAPETEN should consider inviting an IAEA Education and Training Appraisal Service (EduTA) mission to define an action plan for the development of the education and training infrastructure in Indonesia.

11.3. CONTROL OF RADIOACTIVE DISCHARGES, MATERIALS FOR CLEARANCE, AND EXISTING EXPOSURES SITUATIONS; ENVIRONMENTAL MONITORING FOR PUBLIC RADIATION PROTECTION

Introduction

Radioactivity is a natural phenomenon and natural sources of radiation are features of the environment. Radiation and radioactive material may also be of artificial origin and they have many beneficial applications, including uses in medicine, industry, agriculture and research. Some facilities that use radioactive material generate a variety of radioactive residues, which need to be managed in a safe manner. Many of such residues can be collected and managed as radioactive waste. In some cases, it may be appropriate to authorize the release of gaseous and liquid residues to the atmospheric and aquatic environments. Members of the public may be exposed to radiation as a result of such discharges and the environment itself may be affected by the radioactive contamination. The exposure of members of the public can also occur due to direct radiation from facilities and due to management of their waste.

Ten safety principles have been formulated (SF-1), on the basis of which safety requirements have been developed to achieve the fundamental safety objective. Requirements GSR Parts 3, 4, 5 and 6 are particularly relevant to protection of members of the public and the environment from harmful effects of ionising radiation in planned and existing exposure situations, control of radioactive discharges and waste management, environmental monitoring and protection in planned exposure situations.

Findings

The legal and regulatory framework cover the protection of the public and the environment (including exemption and clearance, optimization, constraints, control of radioactive discharges to the environment, monitoring, safety of the waste management and consumer products) in a number of documents. These documents have established the basic principles and requirements on protection of members of the public. They have been developed based on the IAEA International Basic Safety Standards, 1996.

In 2014 the BSS of 1996 was superseded by the new GSR Part 3, which, together with other safety standards adopted by the IAEA during the last decade¹, have substantially expanded the scope and the level of details in requirements related to the protection of the public and the environment. As a result, the current legal and regulatory framework lacks important elements of the new set of the IAEA Safety Standards.

Safety Objective and Safety Principles

The safety objective is stated in the Act and GR No 33 of 2014. The important element of the SF-1 safety objective “*without unduly limiting the operation of facilities or the conduct of activities that give rise to*

¹Such as Safety Fundamentals SF-1, Safety Requirements “Safety Assessment for Facilities and Activities” GSR Part 4 (2009), and Safety Requirements “Predisposal Management of Radioactive Waste” GSR Part 5 (2009).

radiation risks” is missing in the national safety objectives. Safety principles of SF-1 are not introduced yet into the legal and regulatory framework.

Delineation of Exposure Situations and Associated Responsibilities

The legal and regulatory framework are focused on practices and lack the delineation of exposure situations and responsibilities of the government, regulatory body and other involved parties with regard to the protection of the public and the environment in planned and existing exposure situations. The scope of planned exposure situations is not defined neither are the quantitative and qualitative criteria. These gaps can lead to the deficiency of appropriate resources and competence required by the IAEA Safety Standards.

Exemption and Clearance

The concept of exemption and clearance is included into the current regulation and it is widely implemented. The exemption levels are based on BSS-115 of 1996 and adopted in GR No 29 of 2008. The clearance levels are based on RS-G-1.7 and adopted in BCR No 16 of 2012. The basic dose and risk criteria for exemption and clearance have been taken into account but not explicitly included into the regulation. The Act restricts the application of exemption as it limits exemption to exemption from the obligation to have a license.

Exemption from other safety requirements is not included. Sealed radioactive sources are not included in the clearance procedure and the concept of exemption and clearance is not restricted to planned exposure situations.

Responsibilities of the Government and the Regulatory Body Related to the Protection of the Public and the Environment

In general, the existing set of requirements on responsibilities of the government and the regulatory body provide a basis for the protection of the public and the environment. The following requirements of GSR Part 3 are not included yet into the national documents:

- detailed requirements on dose and risk constraints, optimization process, authorization of a new or modified practice, involvement of interested parties, provisions for independent monitoring and assessment (see GSR Part 3, Requirements 11, 29 and Definitions);
- review of the licensee’s monitoring programmes, provisions for independent monitoring programmes and assessments of total public exposure due to authorized sources and practices in Indonesia, and the verification of compliance (para. 3.135);
- provision for maintaining records of discharges, results of monitoring programmes and results of assessments of public exposure (paras 2.35 and 3.135 e);
- involvement of interested parties and public information (paras 2.30 f and 3.136);
- provision of technical services relating to protection and safety (para. 2.23), such as services for environmental monitoring and the calibration of monitoring and measuring equipment.

Optimization of Protection and Safety and Dose Constraints, Operational Limits and Conditions Relating to Public Exposures (Including Authorized Limits for Discharges) and Regulatory Control of Discharges

Optimization process is formally required in the national regulation, but important elements of the process are lacking. The scope of optimization process is limited to the dose quantity (or to the level of discharge rate), however, the number of exposed persons and the likelihood of exposure are out of its scope. The IRRS Team was informed that the optimization processes for public and occupation exposures are

interpreted as two independent processes. Documental evidence of an integrated approach is not required in the regulation.

BCR No 7 of 2013 states that the dose constraint for public exposure should not exceed 0.3 mSv/a. The role of the dose constraint in the optimization process is not clear from the regulation. The IRRS Team was informed that if a proposed limit for discharges leads to the annual dose lower than the generic dose constraint of 0.3 mSv/a, or any lower dose constraint proposed by the operator, the limit for discharges satisfies the requirements of the national regulation and can be approved. The submission and review of safety assessments and other design related documents that address the optimization of protection and safety, the design criteria and the design features relating to the assessment of exposure and potential exposure of members of the public are not explicitly required for the authorization of a practice and radioactive discharges. Based on the indicated above value of 0.3 mSv/a the country-wide limits for discharge were established by BAPETEN. The discharge limit is interpreted as a simple equivalent of the dose constraint, rather than a result of the optimisation process, as stipulated by GSR Part 3 and WS-G-2.3 and DS422. A number of other new requirements of GSR Part 3 related to:

- establishing of dose and risk constraints (para. 3.120);
- identification of representative person (para 3.126 a);
- consideration of good practice (para 3.126 b);
- consideration of uncertainties in the assessment of doses (para 3.126 d);
- operational limits and conditions relating to public exposures (including authorized limits for discharges) (para. 3.123);
- protection of the environment, radiological environmental impact assessments and safety assessments (paras 3.9 e, 3.15 d, 3.33, 3.123 e, 3.126 c, Req. 31, 3.132 d, 3.135); and
- consideration of transboundary exposure (para. 3.124);
- responsibilities of registrants and licensees with regard to radioactive discharges (para. 3.132); are lacking in the current regulations.

BCR No 7 of 2013 establishes limits for concentrations of radionuclides in environmental media based on the dose criterion of 1 mSv/a.

Monitoring, Assessments and Demonstration of Compliance

The new requirements on source and environmental monitoring, assessments, reporting and demonstration of compliance, provisions for independent monitoring and assessments and on public information are not included in the current regulations. The requirements and guides on objectives of source and environmental monitoring programmes, representativeness and averaging of monitoring data, reporting procedures and intervals are not specified in the national documents.

Responsibilities of registrants, licensees, suppliers (e.g. Vendors of nuclear technologies) and providers of consumer products

The new set of detailed requirements, outlined in GSR Part 3, on responsibilities of registrants, licensees, suppliers (e.g. vendors of nuclear technologies) and providers of consumer products related to the protection of the public and the environment, are not introduced into the regulations yet. The lack of requirements on consumer products was identified by BAPETEN during self-assessment and is included in draft Action Plan;

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Observation: The legal and regulatory frameworks do not include the expanded set of safety requirements for planned exposure situations yet.

(1)

BASIS: *SF-1, GSR Part 3, Paras 3.1-3.4, Req. 3.9 e, 3.15 d, 3.33 a, 3.118- 3.144, Schedule I and Definitions, and GSR Part 4.*

R

Recommendation: See R3 in Section 1.2

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: The BAPETEN’s annual reports on radiation safety cover various aspects of BAPETEN activities related to the protection of the public and the environment. The scope of reports is much broader than it is formally required by the IAEA Safety Standards.

(1)

BASIS: **GSR Part 3 Para 3.136 states that** *“The regulatory body shall publish or shall make available on request, as appropriate, results from source monitoring and environmental monitoring programmes and assessments of doses from public exposure.”*

GP3

Good Practice: The public information on environmental monitoring data enhances the trust to the BAPETEN and supports the collaboration with interested parties.

11.4. CONTROL OF CHRONIC EXPOSURES AND REMEDIATION

Introduction

Existing exposure situations include situations of exposure to natural radiation and radionuclides, such as radon. They also include situations of exposure due to residual radioactive material that derives from past practices that were not subject to regulatory control or that remains after an emergency exposure situation.

Findings

The legal and regulatory framework lack the requirements related to the protection and safety in existing exposure situations. The gap has partially been identified by BAPETEN and the draft Action Plan includes:

- the development of the national strategy for remediation activities (to be implemented by 2019).
- the revision of GR No 33 of 2007 to include provision on occupational radiation exposure due to cosmic and radon radiation ((to be implemented by 2017).

The following important issues are not covered yet:

- Scope of the requirements for existing exposure situations;
- Identification and assessment of existing exposure situations;
- Delineation of responsibilities;
- Responsibilities of the government specific to existing exposure situations;
- Justification for protective actions and optimization of protection and safety;
- Responsibilities for remediation of areas with residual radioactive material;
- Exposure due to radionuclides in commodities;

- Occupation exposure in existing exposure situations;
- Reference levels;
- Implementation of protective actions (remediation), coordination between involved agencies.

BAPETEN is aware of the elevated levels of natural radiation in some areas of the country. Specifically, the IRRS Team was informed about the recent survey of natural background dose rates and indoor radon concentrations conducted by BAPETEN with the assistance of the IAEA and other organizations. The IRRS Team acknowledges the proactive approach of BAPETEN to the protection and safety in existing exposure situations. Such an approach permits the timely identification and characterization of major sources of public exposure in Indonesia. The tentative results of on-going monitoring programmes clearly indicate needs of new legal and regulatory requirements on existing exposure situations, which would permit the allocation of appropriate resources for the characterization of existing exposure situations in the country, and would provide a regulatory basis for decisions about appropriate protective actions (such as the implementation of a radon action plan). Taking into account the synergies of the risk associated with radon exposure and smoking, the radon action plan may involve Health Authorities.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: The national legislation and regulation do not include yet the expanded set of safety requirements for existing exposure situations, as stipulated in GSR Part 3.

(1)	BASIS: <i>GSR Part 3 Chapter 5 Existing Exposure Situation</i>
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R	Recommendation: See R3 in Section 1.2.
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11.5. Transport

IRRS Team observed that BAPETEN has not established a compliance assurance programme for transport related activities. As the competent national authority, BAPETEN has the responsibility to establish and also execute a programme to ensure that the provisions of the transport regulations are being adequately implemented by all users of those regulations, such as consignors and carriers.

The compliance assurance programme has to include two major elements in order to provide adequate assurance that all transport requirements are being met in practice by the users of the transport regulations. First, BAPETEN needs to review certain activities for approval before these activities are conducted. Second, BAPETEN needs to ensure, through a programme of inspection and enforcement, that all the regulatory requirements are correctly fulfilled in practice. Consequently, BAPETEN will need to be provided with adequate resources to perform these activities for review, inspection and enforcement. Compliance assurance is also expected to cover activities relating to emergency response.

11.6. ASSESSMENT AGAINST THE PROVISIONS OF THE CODE OF CONDUCT ON THE SAFETY OF RADIOACTIVE SOURCES

Basic Principles: General

The Government of Indonesia is committed to implement the provisions of Code of Conduct for Safety and Security of Radioactive Sources, however, the Government has not yet made a commitment to the IAEA with regard to the Supplementary Guidance on the Import and Export of Radioactive Sources. BAPETEN is implementing the guidance on import and export through their regulations and procedures. The measures taken by BAPETEN to manage the safety and security of sources during their useable lives are:

- Cooperation with the Directorate General of Customs and Excise for controlling import and export of radioactive sources.
- Establishment of a licensing system
- Establishment of a systematic inspection programme for radiation facilities, commensurate with the risk associated with the facility and activity.
- Establishment of an approval process for transport of radioactive sources

In association with the Directorate General of Customs and Excise (Customs) and as part of its international cooperation, BAPETEN ensures that radioactive sources enter the country for use only by licensed users, and that appropriate conditions are attached to the licence regarding the source and its intended application. Through the licensing process and inspections carried out by BAPETEN, a safety culture is fostered, although it needs further enhancement among both licensees and BAPETEN's own staff.

The national legislative and regulatory system for control of sources was described in detail in BAPETEN's responses to a number of modules in the self-assessment included in the ARM. The legislation and regulatory system for control imposes firm requirements over the management and protection of radioactive sources, in accordance with the provisions of paragraphs 7 and 8 of the Code of Conduct (CoC).

Training and Technical Aspects of BAPETEN

BAPETEN has provided their staff with training on radiation measuring instruments suitable for the purpose of managing radioactive sources, and for searching for and securing missing sources. This training is part of the inspectors' training program and is mandatory for all inspectors at BAPETEN. Opportunities for training abroad are available to BAPETEN through its close cooperation with organizations in Australia and with IAEA.

Radiation protection services for personal dosimetry are available in the country, provided by MoH and BATAN. Calibration services are provided by BATAN. This is in line with CoC. The arrangements for training of law enforcement and emergency services organizations are being addressed in Indonesia in accordance with CoC. BAPETEN has organized many training courses to improve knowledge of its staff and interested parties' staff. Below are some training courses organized by BAPETEN for interested parties:

- Radiation Protection and Radiation Safety
- Fundamentals of Nuclear Safety and Security
- Radioactive Source Security Officer Training
- Front Line Officer Training are involved in those training courses are BATAN, MoH (particularly for Hospitals), Maritime Security Agency, National Police (Bomb Squad), Indonesian National Army, National Intelligence Agency and Customs. In 2013 and in cooperation with IAEA, BAPETEN organized Regional Training Courses on The Security in the Transport of Radioactive Sources that were attended by officers from BATAN, National Police Department and Maritime Security Agency.

Systems of Control

BAPETEN has established the national source register of radioactive sources, B@LIS database is build based on the regulatory authority information system (RAIS) database format and cover all categories of radiation sources. The B@LIS database aids consistency with the goal of international harmonization as mentioned in CoC paragraph 11.

Indonesia is party to the Convention on the Early Notification of a Nuclear Accident; and contributes to the IAEA Incident and Trafficking Database (ITDB), for which BAPETEN has been designated the Indonesian point of contact, satisfying the provisions of CoC Paragraph 12.

BAPETEN aims to promote awareness among industry, health professionals, the public and government bodies about the safety and security hazards associated with orphan sources. BAPETEN only covered the part of unregulated sources in GR No 33 of 2007. BAPETEN has already carried out number of search and recovery activities for orphan sources and conducted awareness training among a limited number scrap metal recyclers. It has established appropriate cooperation with customs as regards detection of radiation at the ports.

BAPETEN has been called to investigate several cases of alert from ports and found that the source would normally be naturally occurring radioactive material (NORM) associated with the container. BAPETEN's regulations address suppliers, users and those managing disused sources and enforce responsibilities for safety.

There is one source manufacturer in the Indonesia. The regulations state that sealed sources should be returned to the country of origin at the end of their lives, based on prepayment agreements. Source manufacturers could accept returned sources exported abroad for reuse or recycling as stated in GR No 61 of 2013. This is in line with CoC paragraphs 13, 14 and 15.

Emergency planning, preparedness and response capabilities

The government has not been identified the threat and assessed its vulnerability for radioactive sources as its indicated in summary report, further information about emergency preparedness and response is in section 10 paragraph 16 of CoC.

Legislation and Regulations

The Government of Indonesia has established, through the Act, GR No 33 of 2007 and GR No 29 of 2008, the measures necessary to ensure that radioactive sources are safely managed and securely protected during their useable lives and after the end of their useable lives. Other supporting regulations on radioactive waste management and transport are issued as well.

In particular, the legislative and regulatory system addressing matters covered by CoC paragraphs 18 and 19 are discussed and described extensively in sections 1 and 3 of this IRRS report.

The application of the regulatory infrastructure to work with sealed sources in medicine is covered in section 11.1.

Regulatory Body

BAPETEN has regulatory responsibility for both safety and security of radioactive sources. The safety requirements are dealt with in GR No 29 of 2008. BAPETEN's overall response to the detailed matters covered in the CoC paragraphs 21-22 are discussed in further detail in the relevant parts in sections 3-10 of this IRRS report.

Import and Export of Radioactive Sources

Radioactive sources may be neither imported nor exported unless the radiation user proposing to import/export is in possession of an appropriate license. Working closely with the relevant Customs authority and having an online system for approval between both authorities is considered as good control for radioactive sources. Furthermore, no radioactive sources will be released from the customs without BAPETEN's approval. GR No 26 of 2002 and GR No 29 of 2008 explain the requirements for import and export approval in detail, and it is stated in regulations that no import or export permits can be issued

without a licence issued by BAPETEN. These requirements implement the requirements of CoC paragraphs 23 and 24

Each licensee must obtain written approval from BAPETEN before transferring any Category 1, 2, 3, or 4 sources, satisfying CoC paragraph 25. It is also stated that Indonesia allows for re-entry into its territory of disused radioactive sources manufactured in Indonesia. Indonesia complies with CoC paragraph 27.

Indonesia has partially adopted IAEA SSR6 as the applicable transport regulations, see details in Section 9. BAPETEN works with customs to ensure continuity of control during transit and transshipment. The requirements for Category 1, 2 and 3 sources, adds further reassurance that the transport requirements will be met and that CoC paragraph 29

11.7 SUMMARY

In general, the existing set of requirements related to the control of medical exposures, protection and safety of workers and members of the public, as well as protection of the environment in planned exposure situations provides an initial basis for regulations, however there is a lack of important elements of the new IAEA Safety Standards. Competence of BAPETEN staff needs to be improved. Moreover, the compliance assurance programme on transport also needs improvements.

The current Indonesian legislation and regulation lack the requirements related to the protection and safety in existing exposure situations. The IRRS Team recommends to incorporate the new expanded set of GSR Par 3 requirements related to the existing exposure situations into the national legislative and regulatory documents. It is advisable that the amended national legislation would specify and delineate the responsibilities of relevant national agencies, local authorities and other parties with regard to the protection and safety in existing exposure situations. It also would be important to anticipate the provision of adequate resources for the management of existing exposure situations

12. TAILORED MODULE FOR COUNTRIES EMBARKING ON NUCLEAR POWER (SSG-16)

12.1. INTRODUCTION TO TAILORED MODULE FOR COUNTRIES EMBARKING ON NUCLEAR POWER

Scope of the Review of the Tailored Module

During the IRRS preparatory meeting, Indonesia requested the inclusion of the tailored module for countries embarking on nuclear power in the scope of IRRS mission for countries in Phase 2: Safety infrastructure preparatory work for construction of a nuclear power plant (NPP). The decision was based on considerations of the level of regulatory infrastructure already existing in the country, although no policy decision has been taken yet to opt for nuclear power. As stated in the IRRS Guidelines, this tailored module comprises a review against actions set out in IAEA Safety Guide SSG-16, “Establishing the Safety Infrastructure for a Nuclear Power Programme”, and the IAEA requirements on which the actions are based.

SSG-16 addresses the roles of government, regulatory body, and operating organization. For the implementation of the tailored module of the IRRS mission as related to a State’s regulatory infrastructure for nuclear power, SSG-16 actions considered would be those to be implemented by the government and the regulatory body. Regarding actions directed to the operating organization, the IRRS Team limited its review to consideration of the appropriateness of the regulatory framework, either in place or planned, as regards actions that would have to be taken by the operating organization.

Indonesia has an existing regulatory framework for the oversight of facilities and activities. There is overlap between the scope of SSG-16 and the scope of the other modules of the IRRS. In areas of overlap, the IRRS Team documented its review within the proper IRRS modules, provided the appropriate cross references in the SSG-16 elements, and limited the discussion in the tailored module to the supplementary information provided in support of the nuclear power programme.

Summary of the Indonesian Nuclear Power Policy

The Government of Indonesia has been considering utilizing nuclear power plants as a component of its energy supply policy. It had been included in the National Energy Policy (White Book) which was adopted in 2006, and then repeated in the Long-Term National Development Planning (Act No 17 of 2007) and in the Long-Term Plan of National Energy Policy of National Energy Board, which was established in 2008.

In a newly developed white paper, the portion of “new and renewable energy” in the total electricity generation is targeted to 25% by year 2025, including a contribution of 5 GW from nuclear power. The white paper was developed after discussions and consultations with the relevant national organizations, and was recently signed by the Minister of Energy and Mineral Resources. The document will be submitted to the President when the Ministry has completed the necessary administrative steps. This is planned to take place by the end of the year. However, based on available information, the IRRS Team has conducted its review on the basis that there was no clear and knowledgeable decision yet to embark on nuclear power as of the date of the mission. This was also concluded in Section 1 of this Report.

Nevertheless, since nuclear power may be an option for Indonesia, the legal and regulatory infrastructure for nuclear and radiation safety has been expanded to cope with the requirements of a nuclear power programme. BAPETEN, the regulatory body for nuclear and radiation activities and safety in Indonesia, has been implementing the actions outlined in SSG-16 in this respect. Considering that the existing

regulatory framework and infrastructure are more mature than in a ‘typical’ Phase 1 country from the SSG 16 point of view, inclusion of Phase 2 actions into the scope of the IRRS was been decided at the Preparatory Meeting in 2013, in order to make the peer-review results more useful and providing clear guidance for BAPETEN as regards the safety infrastructure for nuclear power. Therefore, the review based on SSG 16 is conducted for relevant and applicable actions of the applicable SSG 16 Elements.

12.2. CONSIDERATION OF ELEMENTS OF SSG-16

Each of the SSG-16 elements is considered in the following sections. “Element 18 – Preparation for Commissioning” does not contain any actions in Phase 1 and 2 and is therefore out of scope. “Element 20 – Interface with Nuclear Security” was not evaluated since Module 12, Interface with Nuclear Security was excluded from the scope of the mission at the preparatory meeting in 2013.

The review below is based on the information provided in the advance reference material (ARM) and on the results of interviews conducted with the counterparts from BAPETEN. Where there is a discrepancy in the information provided, the interview results were used for the purpose of the Report.

12.2.1. SSG-16 Element 01 National policy and strategy for safety

The IRRS Team’s views on the Indonesian national policy and strategy for nuclear safety are set out in details in Section 1.1 of this report. Additional observations with regard to the development of a safety infrastructure for a nuclear power programme are recorded below.

The activities regarding the utilization of nuclear energy are governed by Act No 10 of 1997. The Act contains the provisions for establishment of the nuclear regulatory body. BAPETEN was established by Presidential Decree (PD) No 76 of 1998 as a nuclear regulatory body tasked with performing the relevant regulatory activities.

There is no established national policy and strategy for nuclear safety in place. However, this is being developed by BAPETEN together with relevant governmental organizations, to cover the areas of safety, health, environment, management system, human resources, transportation, food and agriculture, and emergency management, as well as functions of different organizations and establishing coordination among them. The IRRS Team emphasized the importance of knowledge transfer as a component of the policy document.

There is no governmental organization established or assigned to coordinate activities regarding the establishment of the nuclear safety infrastructure for nuclear power. Different organizations perform coordination roles based on the subject which is dealt with. For example, activities supporting the development of a national policy and strategy for nuclear safety are being coordinated mainly by BAPETEN. This effort involves about 20 different national organizations. Due to the non-existence of a national coordination body, of some of the actions assigned to the Government in SSG-16 have not been effectively implemented.

Although the National Nuclear Energy Agency (BATAN), the main national research and development organization in the nuclear energy field in Indonesia, had conducted site surveys and site selection activities in the past, those siting studies were considered to be obsolete in view of the scope and date of the studies. Moreover, the Government has not identified the future operating organization for nuclear power plants yet.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: A national policy and strategy for safety has not yet been established by Government.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

(1)	<p>BASIS: GSR Part 1 R1 states that <i>“The government shall establish a national policy and strategy for safety, the implementation of which shall be subject to a graded approach in accordance with national circumstances and with the radiation risks associated with facilities and activities, to achieve the fundamental safety objective and to apply the fundamental safety principles established in the Safety Fundamentals.”</i></p> <p>BASIS: SSG-16 Action 5 <i>“The government should establish a clear national policy and strategy for meeting safety requirements in order to achieve the fundamental safety objective and to apply the fundamental safety principles established in the IAEA Safety Fundamentals.”</i></p> <p>BASIS: SSG-16 Action 6 <i>“The government should establish a policy for knowledge transfer for ensuring safety by means of contracts and agreements with organizations in other States that may be involved in the nuclear power programme.”</i></p> <p>BASIS: SSG-16 Action 7 <i>“The government should ensure identification of responsibilities and their progressive allocation to the relevant organizations involved in the development of the safety infrastructure.”</i></p>
R	Recommendation: See R1 in Section 1.1.
<p>Observation: Effective coordination between the organizations involved in the establishment of a nuclear safety infrastructure for a nuclear power programme has not been implemented.</p>	
(1)	<p>BASIS: GSR Part 1 R7 states that <i>“Where several authorities have responsibilities for safety within the regulatory framework for safety, the government shall make provision for the effective coordination of their regulatory functions, to avoid any omissions or undue duplication and to avoid conflicting requirements being placed on authorized parties.”</i></p> <p>BASIS: SSG-16 Action 2 <i>“The government should provide for the coordination of all activities to establish the safety infrastructure.”</i></p> <p>BASIS: SSG-16 Action 8 <i>“The government should ensure that all the necessary organizations and other elements of the safety infrastructure are developed efficiently and that their development is adequately coordinated.”</i></p>
S25	Suggestion: The government should consider assigning the role of coordinating all activities regarding the establishment of a nuclear safety infrastructure to an existing organization, or establish a new organization to carry out this task.

12.2.2. SSG-16 Element 02 Global Nuclear Safety Regime

The IRRS Team’s views on the participation of Indonesia in the global nuclear safety regime are set out in Section 2 of this report.

The IRRS Team found that the participation of Indonesia in the global nuclear safety regime is satisfactory. It is a party to the essential nuclear safety conventions. Indonesia has participated in all review meetings of the Convention on Nuclear Safety, after its ratification. BAPETEN participates in the Radiation Safety Standards Committee (RASSC), of IAEA, but is not a member of the Nuclear, Transport and Waste Safety Committees (NUSSC, TRANSSC and WASSC). The IRRS Team emphasized the benefit of becoming a member of those Committees. BAPETEN has been participating in national and

regional activities of the IAEA’s Technical Cooperation programme. As a member of the Asian Nuclear Safety Network (ANSN), BAPETEN is participating actively in several working groups and workshops organized by ANSN. BAPETEN is also a member of the Regulatory Cooperation Forum, RCF.

Indonesia has signed cooperation agreements with several countries including countries with nuclear power programmes, such as USA, the Republic of Korea, Japan, Canada and the Republic of Slovakia. BAPETEN has also signed several bilateral cooperation agreements or MoUs with regulatory bodies and other organizations from different countries in order to support its activities. These include the US NRC, KINS from the Republic of Korea, JNES from Japan, CNSC from Canada and the regulatory body of Slovakia. The cooperation with those organizations focuses mainly on the training of BAPETEN staff and strengthening of the regulatory framework in Indonesia. The IRRS Team emphasized the benefit of expanding BAPETEN’s cooperation to the regulatory body of the vendor country, when the vendor is selected for potential future nuclear power reactor projects.

BAPETEN has been the recipient of a number of international peer review missions, where various aspects of the national infrastructure for safety and the operations of BAPETEN have been reviewed.

Indonesia has been communicating information about its nuclear power programme to its neighbouring states through some international and bilateral platforms, such as the Association of Southeast Asian Nations (ASEAN) and ANSN.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: Indonesia is party to relevant conventions in the area of nuclear safety and is a member or participant in the activities of many international organizations. BAPETEN has cooperation agreements with different regulatory bodies.

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| (1) | <p>BASIS: GSR Part 1 R14 states that <i>“The government shall fulfil its respective international obligations, participate in the relevant international arrangements, including international peer reviews, and promote international cooperation to enhance safety globally.”</i></p> <p>BASIS: SSG-16 Action 11 <i>“The government should prepare for participation in the global nuclear safety regime.”</i></p> <p>BASIS: SSG-16 Action 14 <i>“All the relevant organizations should participate in the global nuclear safety regime.”</i></p> <p>BASIS: SSG-16 Action 15 <i>“The State should become a party to the relevant international conventions, as identified in Phase 1.”</i></p> |
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GP	Good Practice: See GP 1 in Section 2.1.
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12.2.3. SSG-16 Element 03 Legal Framework

Essential elements of a national legal framework for the nuclear safety infrastructure, including regulation of NPPs, are addressed in the Act as well as several government regulations. Details are given in Section 1.2 of this report.

The Act provides high level requirements for authorizations and other regulatory control activities. It also provides provisions for the establishment of the regulatory body, establishment of an executing body for certain nuclear activities and radioactive waste management, and for a national nuclear liability regime. However, the Act is not a comprehensive nuclear law containing all the essential elements of a legal

framework for nuclear safety. Particularly, it does not include provisions for the fundamental safety principles, i.e. assigning the prime responsibility for safety to the operating organization, nor does it include complete provisions for involvement of interested parties in the decision making process.

BAPETEN was established by Presidential Decree No 76 of 1998 as the nuclear regulatory body. A number of Government Regulations (GR) and BAPETEN Chairman Regulations (BCR) have been developed, including GR No 54 of 2012 “Safety and Security of Nuclear Installations” and GR No 2 of 2014 “Licensing of Nuclear Installation and Nuclear Material Utilization”. Both regulations provide the basis for the licensing process for nuclear power plants.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: All essential elements of nuclear safety are not covered by the legal and regulatory framework.	
(1)	<p>BASIS: GSR Part 1 R2 states that <i>“The government shall establish and maintain an appropriate governmental, legal and regulatory framework for safety within which responsibilities are clearly allocated.”</i></p> <p>BASIS: SSG-16 Action 22 <i>“The government should enact and implement the essential elements of the legal framework for the safety infrastructure.”</i></p>
R	Recommendation: See R3 in Section 1.2.

12.2.4. SSG-16 Element 04 Regulatory Framework

The subjects of the independence of the regulatory body and the appointment of senior managers are covered in Sections 1.3 and 3.2, respectively. Additional observations with regard to the regulatory framework, specific to the regulation of a nuclear power programme, are considered below.

BAPETEN informally studied different regulatory approaches, including a performance based regulatory approach and a prescriptive regulatory approach. However, this study did not result in a written report or a formal decision on which regulatory approach that best suits the country’s needs. The IRRS Team is of the view that the decision on the regulatory approach is important, considering its impact on the organization of the regulatory body, necessary competency and human resources, and the regulatory documents to be developed.

The nuclear legal and regulatory framework includes the Act, Presidential Decrees, Government Regulations and BAPETEN Chairman Regulations. There is an internal procedure in place to develop regulations in BAPETEN. The procedure includes provisions for receiving comments from interested parties, including receiving public comment through its website. The regulations are developed according to the work plan of BAPETEN, which is prepared on 5-year basis. The regulations need to be published in the Official Gazette in order to be enacted. After the enactment of the regulation, BAPETEN informs main licensees through official letters about the new regulation and publishes the new regulation on its website.

GR No 54 of 2012 provides the general provisions governing the safety and security of nuclear power plants and responsibilities of licensees. It also provides provisions for a national nuclear emergency preparedness and response system. GR No 2 of 2014 defines the licensing stages for nuclear power plants. It contains the provisions for applications for different licensing stages; documents to be provided along with these applications; review and assessment; and decision making mechanisms, for the different licenses issued by BAPETEN. GR No 33 of 2007 provides requirements on radiation protection and dose

limits for facilities and activities. A number of BCRs have been developed to further develop the regulatory framework and to accommodate for the possible introduction of nuclear power plants. Further BCR's are planned to be developed with the intention to complete the regulatory framework for NPPs. There is no official guide on the format and content of the documents to be submitted by applicants for nuclear power plant licenses.

GR No 2 of 2014 includes the maximum timelines that BAPETEN should apply when completing its review and assessment of different license applications. The IRRS Team believes that this could put unnecessary pressure and complicate BAPETEN's decision making. Experience from other countries' licensing of new NPPs has shown that the licensing schedule is often influenced by factors outside the control of the regulator, such as lack of or delayed information to the regulator by the applicant. An alternative practice may be to provide tentative timelines in an overall strategy document, with accompanying and clearly outlined assumptions on the quality and timeliness for input from all stakeholders involved.

BCR 3 of 2011 provides design requirements for safety of nuclear power plants. Together with the regulations mentioned above, this provides some information on the regulatory requirements that are essential for the bidding process for nuclear power plants. However, some requirements necessary for the bidding process, such as requirements for construction and manufacturing, have not been developed yet.

BAPETEN's relations with the regulatory bodies of other countries and other international organizations are discussed in Section 12.2.2 of this report.

Indonesia has not formally identified an operating organization for potential future nuclear power plants. Therefore, evaluation of communications and working relations between BAPETEN and the operating organization is not applicable. However, the IRRS Team was informed that there is no formal procedure for communicating with the existing licensees of nuclear installations. The IRRS Team was, however, informed that BATAN, which is the national research organization in the nuclear field and operator of research reactors and fuel cycle facilities, and BAPETEN maintain open and frequent communication, which contributes to the fostering of mutual understanding.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: BAPETEN has not yet conducted systematic assessment of different regulatory approaches and decided which approach to be used in its regulatory framework for nuclear power plants.

(1)	BASIS: SSG-16 Action 29 <i>“The regulatory body should consider the various regulatory approaches that are applied for nuclear power programmes of the same size, and should tentatively plan its approach, taking into account the State's legal and industrial practices and the guidance provided in the IAEA safety standards.”</i>
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S26	Suggestion: BAPETEN should consider performing a systematic assessment of different regulatory approaches and carrying out tentative planning of its approach to licensing and effective regulatory supervision of nuclear power plants.
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Observation: All the requirements to be known for the bidding process for NPPs have not yet been specified by BAPETEN.

(1)	BASIS: GSR Part 1 R32 states that <i>“The regulatory body shall establish or adopt regulations and guides to specify the principles, requirements and associated criteria for</i>
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RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

	<p><i>safety upon which its regulatory judgements, decisions and actions are based.”</i></p> <p>BASIS: SSG-16 Action 31 <i>“The regulatory body should specify the safety requirements that should be known for the bidding process.”</i></p>
S27	<p>Suggestion: BAPETEN should consider completing the set of regulations and guides that define the safety requirements that are essential for the bidding process for nuclear power plants, taking into consideration the scheduling of the nuclear power programme.</p>

12.2.5. SSG-16 Element 05 Transparency and Openness

The IRRS Team’s considerations of the Indonesian approach to communicating and consulting with interested parties and the general public are set out in Section 3.8. With regard to the nuclear power programme, the following observations are made.

The Act does not include provisions to inform the public and other interested parties about the benefits and risks of using nuclear power. However, the IRRS Team was informed that the responsibility to inform the public is given to relevant organizations in the regulations establishing those organizations. PD No 76 of 1998, which establishes BAPETEN, gives the task to conduct outreach activities related to the safety and health of workers and the public, and to environmental protection, to BAPETEN. The website of BAPETEN is used to inform the public about its roles, responsibilities and activities. The IRRS Team was informed that BAPETEN prepares an annual report of its activities and publishes it through its website. The IRRS Team concluded that the BAPETEN website provides only general and limited information about the activities of BAPETEN related to safety.

BAPETEN regulations do not place requirements on nuclear power plant operators to inform the public about risks and safety matters related to operations of nuclear power plants. However, BATAN has been informing the public through its website and other mechanisms, such as tours of its facilities for public visitors.

The BAPETEN licensing process does not include provisions for receiving and considering comments from interested parties including the public. However, the Environmental Impact Assessment process, which is implemented by the Ministry of Environment, requires public hearings and public consultation during the process, which is also applicable to nuclear power plants. In addition, Act no. 30 of 2014, states that a government official has obligations to provide an opportunity for public hearing before taking a decision or action. It also states that the agencies or government official should disseminate to all stakeholder’s the legal base for the requirements, documents, and facts related to a decision or action taken by a government official prior to issuance of a licence.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: A mechanism for consultation with interested parties and the public is not included in BAPETEN’s licensing process for nuclear power plants.

(1)	<p>BASIS: GSR Part 1 R36 states that <i>“The regulatory body shall promote the establishment of appropriate means of informing and consulting interested parties and the public about the possible radiation risks associated with facilities and activities, and about the processes and</i></p>
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RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

	<p><i>decisions of the regulatory body.”</i></p> <p>BASIS: SSG-16 Action 42 <i>“All relevant organizations should continue to inform the public and interested parties on safety issues, including the expected health and environmental impacts of a nuclear power programme.”</i></p> <p>BASIS: SSG-16 Para 2.90 <i>“The involvement of the public and interested parties, including public hearings, and resolution of the issues expressed in those hearings, should be made part of the licensing process.”</i></p>
S28	<p>Suggestion: BAPETEN should consider establishing and implementing a mechanism for consultation with interested parties and the public in its licensing process for nuclear power plants.</p>
<p>Observation: BAPETEN has not used its website to inform the public of nuclear safety issues concerning nuclear power plants.</p>	
(1)	<p>BASIS: GSR Part 1 R36 states that <i>“The regulatory body shall promote the establishment of appropriate means of informing and consulting interested parties and the public about the possible radiation risks associated with facilities and activities, and about the processes and decisions of the regulatory body.”</i></p> <p>BASIS: SSG-16 Action 42 <i>“All relevant organizations should continue to inform the public and interested parties on safety issues, including the expected health and environmental impacts of a nuclear power programme.”</i></p>
S29	<p>Suggestion: BAPETEN should consider improving its website to inform the public of nuclear safety issues concerning nuclear power plants.</p>

12.2.6. SSG-16 Element 06 Funding and Financing

The IRRS Team observed that BAPETEN and other governmental organizations and institutions are funded via the Government budget, following the approval of the budget by the Indonesian Parliament. There is no provision in the Act for funding of BAPETEN. However, PD No 76 of 1998 has provisions in place for funding of BAPETEN to allow for implementation of its regulatory activities.

BAPETEN charges its licensees for its licensing services, and the licensing fees go to mainly to the Indonesian Treasury. The licensing fees collected annually represent only a few percent of the annual budget of BAPETEN.

The IRRS Team noted that research and development institutions and higher education institutions are also funded by government.

Since the operating organization is not identified yet, the IRRS Team has not evaluated the provisions for the funding of the operating organization for safe operation of nuclear power plants. Once the operating organization is identified, adequate funding should be provided to it to build and operate nuclear power plants in a safe manner. A specific requirement for having proper financial capability for the construction of a nuclear power plant, is given in GR No 2 of 2014 (licensing regulation), but there is no requirement for having proper financial capability for the safe operation of nuclear power plants in any of the regulations.

GR No 2 of 2014 requires applicants to provide proof of financial resources for decommissioning; however, there is no mechanism defined by the government that guarantees the financing of the decommissioning of nuclear power plants, considering the possibility of decommissioning before the end of the design life of the NPP. The Act assigns the national radioactive waste management activities to the Executing Body, which is BATAN, and requires that the producers of radioactive wastes and spent fuels shall make payments to BATAN when they transfer their radioactive wastes and spent fuel to BATAN for storage or disposal purposes. The amounts to be paid are determined by BATAN in GR No 29 of 2011, and published on the BATAN website. However, the IRRS Team was informed that these payments are one time payments when the radioactive waste and spent fuel is transferred to BATAN. There is no mechanism for ensuring the financing of long term needs for radioactive waste management and spent fuel management.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: There are requirements, in GR No 2 of 2014, on the operating organization to have adequate financial resources for the construction stage but not for the operation stage for nuclear power plants.	
(1)	BASIS: SSG-16 Action 54 <i>“The operating organization should establish a policy for ensuring adequate funding so as not to compromise safety at any stage of the nuclear power programme.”</i>
S30	Suggestion: BAPETEN should consider including in its regulations requirements for sustainable financing for the safety of nuclear power plants at all stages of the nuclear power programme
Observation: The financial provisions provided in the Act and GRs do not adequately cover the long term nature of radioactive waste management, spent fuel management and decommissioning, including the possibility of decommissioning before the end of design life.	
(1)	BASIS: GSR Part 1 R10 states that <i>“The government shall make provision for the safe decommissioning of facilities, the safe management and disposal of radioactive waste arising from facilities and activities, and the safe management of spent fuel.”</i> BASIS: SSG-16 Action 55 <i>“The government should enact legislation that requires financial provision for the funding of long term radioactive waste management, spent fuel management and decommissioning.”</i>
R	Recommendation: See R 8 in Section 1.7.

12.2.7. SSG-16 Element 07 External Support Organizations and Contractors

The use of external organizations for technical and other support services is a fundamental issue in the design and staffing of a regulatory body. SSG-16 Element 12 of this report also considers the use of technical support organizations (TSO) in the wider context of the BAPETEN resource strategy for a potential future nuclear power programme.

Indonesia plans to utilize external technical support organizations and contractors to support its nuclear power programme. Although BAPETEN has experience in regulating research reactors, it does not have any experience in licensing and inspecting nuclear power plants. Though there are no formal plans established yet, BAPETEN is planning to use external support organizations to assist in any licensing and inspection activities associated with a potential future NPP project. The IRRS Team noted that in the past, BAPETEN had utilized some technical support services, mostly from Indonesian universities. The IRRS Team was informed that there were cases where the licensees of BAPETEN used the same institutes as BAPETEN for technical support. While the past example did not pose an actual conflict of interest, it is important to take measures to address conflicts of interest, whether they are real or perceived. Although BAPETEN observes the need for provisions against conflict of interest in their contracts with technical support organizations, the procurement procedure in the BAPETEN management system does not have any clear requirements to avoid such conflicts.

BAPETEN has an internal specific centre to support licensing activities when an independent analysis is needed. In the case of an application for a license to build a nuclear power plant, the Directorate of Licensing of NIM processes the application and conducts the review and assessment. If and when the Directorate of Licensing of NIM needs independent analysis of the safety aspects of the NPP, the support is requested from the Regulation Assessment Centre for NIM. BAPETEN’s long term vision is to establish comprehensive in-house capability to be able to conduct almost all essential review and assessment work and independent analysis. Until the capability is established, external organizations will continue to be utilized for support.

A systematic assessment of the technical expertise needed during the licensing process, and the organizations that could potentially provide such expertise have not yet been conducted. BAPETEN would need to conduct such assessments so that it covers its short and long term needs for licensing activities as well as capacity building activities.

BAPETEN’s oversight of contractors that provide services to it is not clearly defined in the BAPETEN management system. BAPETEN has been applying the government’s general oversight procedure for all procurement services, which might not be sufficient for overseeing the services in the nuclear safety field.

With regard to the operating organization, there are general regulatory requirements in BCR No 4 of 2010 “Management Systems for Facilities and Activities of Using Nuclear Energy” to request licensees to oversee the performance of the supplier and the quality of the service or product when they purchase a service or a product from any supplier.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: BAPETEN has not yet systematically assessed its needs for external support for its licensing of nuclear power plants.

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| (1) | <p>BASIS: GSR Part 1 R20 states that <i>“The regulatory body shall obtain technical or other expert professional advice or services as necessary in support of its regulatory functions, but this shall not relieve the regulatory body of its assigned responsibilities.”</i></p> <p>BASIS: SSG-16 Action 61 <i>“The government should consider the availability of expertise, industrial capability and technical services that could support the safety infrastructure in the long term.”</i></p> |
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S31	<p>Suggestion: BAPETEN should consider conducting a systematic assessment of external technical expertise needed during the licensing process of an NPP Project, and</p>
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RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

identifying the organizations that could potentially provide such expertise.

Observation: BAPETEN does not have a formal system for overseeing contractors providing it with external technical services.

- (1) **BASIS: GSR Part 1 R20 states that** *“The regulatory body shall obtain technical or other expert professional advice or services as necessary in support of its regulatory functions, but this shall not relieve the regulatory body of its assigned responsibilities.”*
- BASIS: SSG-16 Action 66** *“The regulatory body and the operating organization should plan arrangements for overseeing the activities performed by their respective external support organizations and contractors.”*

S32 **Suggestion:** BAPETEN should consider establishing arrangements for overseeing external support services provided to it, taking into account the quality requirements for activities related to nuclear safety.

12.2.8. SSG-16 Element 08 Leadership and Management for Safety

With respect to BAPETEN, this element is addressed in detail in Section 4 of this report. With respect to the operating organization, GR No 54 of 2012 requires that the operating organization must have a management system in place and implement it and evaluate its performance. BCR No 4 of 2010 provides detailed requirements for the licensees’ management system.

The IRRS Team emphasized the importance and significance of effective leadership and management for the safe, successful and sustainable development of nuclear power programme. The BAPETEN management system, BCR No 11 of 2011, includes provisions for assessment and continuous improvement and competence management. However, some of the safety related issues have not been fully addressed or elaborated in the management system documents, such as safety culture and graded approach. The IRRS Team was informed that the Management System of BAPETEN is under revision in order to improve it and make it compliant with GS-R-3. The IRRS Team emphasized that the needs to meet the requirements of the nuclear power programme should be considered in the revision of the management system.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: The existing management system of BAPETEN does not fully cover or elaborate on some of the important elements, such as safety culture and graded approach.

- (1) **BASIS: GSR Part 1 R19 states that** *“The regulatory body shall establish, implement, and assess and improve a management system that is aligned with its safety goals and contributes to their achievement.”*
- BASIS: GSR Part 2 (GS-R-3) As a whole**
- BASIS: SSG-16 Action 75** *“The regulatory body and the operating organization should start developing and implementing effective management systems in their respective organizations and should promote a strong safety culture.”*

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

R	Recommendation: See R&S given in Section 4.
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12.2.9. SSG-16 Element 09 Human Resources Development

BAPETEN currently has about 200 staff allocated to technical units associated with regulatory functions (Section 3.3), 94 are assigned to regulatory tasks concerning nuclear installations and nuclear materials area and 19 staff work in areas related to engineering support, management system and emergency preparedness.

BAPETEN recruits technical staff based on workload analysis, forecast of personnel needs for the existing activities as well as the planned/near future ones, including the regulatory supervision of NPPs.

At the request of BAPETEN, an IAEA Education and Training Review Services Mission (ETReS) was conducted from 26-29 June 2012. Officials from the Ministry of Research, Technology and Higher Education, the Ministry of Energy and Mineral Resources, BAPETEN, BATAN and Universities participated in the mission. Based on the mission recommendations, BAPETEN carried out a gap analysis using the IAEA SARCoN tool and Training Need Analysis (TNA) for technical staff, by using their own methodology (CODETIS; Competence Development through Education and Training Information System) for human resources development. These institutions will be playing a major role in the development of activities related to the licensing and operations of NPPs. The IRRS Team was informed that, based on the gap analysis, BAPETEN has drafted a plan for the human resources development to cater for the upcoming NPPs, based on the IAEA (SRS 79) and USNRC document (NRC GO-I-ST).

BAPETEN has established an Education and Training Centre (ETC) which conducts training courses based on the Systematic Approach to Training (SAT) methodology, which covers Training Need Assessment (TNA), design, development, implementation, and evaluation. Experts from various disciplines contribute to this training program. The ETC consists of 16 staff members. For NPP-related training courses, the ETC staff is able to act as teachers of some subjects relevant to the nuclear power programme, but most of the instructors come from other units of BAPETEN and BATAN, as well as from universities and other specialist government institutions for meteorology, volcanology and seismology, etc).

ETC offers various training programmes such as Induction Course on the Functions of the Regulatory Body, Radiation Protection Course, Basic Professional Training Course on Nuclear Safety, professional training programs and specific training courses for inspectors, evaluators, computer codes, fuel cycle technology, safeguards training, reactor system training, etc.

To further enhance the capabilities of staff in various specialized fields, and in addition to getting assistance from the IAEA through the national TC Projects, BAPETEN has entered into bilateral agreements with the US DOE, US NRC, US DOS and the EU in order to build its capacity to effectively regulate potential future NPPs as well as the existing nuclear facilities and activities. The cooperation includes tailored on the job training or tutoring, training courses, workshops, train the trainers, scientific visits, etc. Moreover, BAPETEN has entered into a bilateral agreement with KINS and KAIST in Korea and sends its staff to Korea to study for a master's degree in nuclear safety. In addition, BAPETEN sends several employees to domestic and foreign universities for higher education.

The IRRS Team was also informed that the staff working in the nuclear field falls in the category of civil servants. However, for the attraction and retention of skilled staff, an additional incentive is given owing

to the nature of their job, but it does not seem to be sufficient for effective attraction of new staff and retention of the existing staff.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: A strategy for attracting, training and retaining qualified personnel for all the organizations involved in future nuclear power programme, including BAPETEN, has not yet been established by the Government.	
(1)	<p>BASIS: GSR Part 1 R11 states that <i>“The government shall make provision for building and maintaining the competence of all parties having responsibilities in relation to the safety of facilities and activities.”</i></p> <p>BASIS: SSG-16 Action 85 <i>“The government should consider a strategy for attracting, training and retaining an adequate number of experts to meet the needs of all organizations involved in ensuring safety in a prospective nuclear power programme.”</i></p> <p>BASIS: SSG-16 Action 90 <i>“All relevant organizations should implement a strategy to attract and retain high quality trained personnel.”</i></p>
S33	Suggestion: The Government should consider a strategy to enable all organizations involved in ensuring safety of a potential future nuclear power programme, including BAPETEN, to attract, train and retain an adequate number of highly qualified personnel.
Observation: BAPETEN has not completed and finalized its human resource development plan and its training programme is not based on a human resource development plan.	
(1)	<p>BASIS: GSR Part 1 R18 states that <i>“The regulatory body shall employ a sufficient number of qualified and competent staff, commensurate with the nature and the number of facilities and activities to be regulated, to perform its functions and to discharge its responsibilities.”</i></p> <p>BASIS: SSG-16 paragraph 2.169 <i>“Early in Phase 2, a policy decision should be made regarding the implementation of the plans that were developed in Phase 1 for ensuring the availability of experts. Implementation of the selected plan should begin early enough in Phase 2 so that sufficient numbers of individuals can complete the necessary training and occupy positions in the regulatory body, the operating organization, external support organizations and industrial organizations before the commissioning of the first nuclear power plant.”</i></p>
S	Suggestion: see Suggestion 6 Section 3.3.

12.2.10. SSG-16 Element 10 Research for safety and regulatory purposes

Areas of research where in-depth knowledge is required to assess and analyze the safety aspects of nuclear power plants, to support their safe and long term operation, have not been identified. However, in order to review the licensing documents, BAPETEN conducts research and assessment for the regulation of nuclear installations and material, and evaluates the parameter of safety criteria by using self-method calculation. A research centre in BAPETEN has been established, i.e. the Regulation Assessment Centre for Nuclear Installations and Material, for assessing and analysing the safety aspects of a nuclear power plant project.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: Specific safety areas for research, to support the potential future nuclear power programme, have not been identified by BAPETEN and relevant national organizations.

(1)	<p>BASIS: GSR Part 1 R11 para 2.38 states that <i>“Development of the necessary competence for the operation and regulatory control of facilities and activities shall be facilitated by the establishment of, or participation in, centres where research and development work and practical applications are carried out in key areas for safety.”</i></p> <p>BASIS: SSG 16 Action 101 <i>“The operating organization and the regulatory body should be involved in identifying areas for safety research.”</i></p> <p>BASIS: SSG 16 Action 103 <i>“Research centres should begin conducting research relating to safety in areas in which in-depth knowledge is essential to support safe long term operation of nuclear power plants.”</i></p>
S34	<p>Suggestion: BAPETEN and relevant national organizations should consider performing a systematic analysis in order to identify specific safety areas for research to support the nuclear power programme.</p>

12.2.11. SSG-16 Element 11 Radiation protection

The prime responsibility for review and assessment of the radiological environmental analysis lies with the Ministry of Environment by law. However, BAPETEN takes part in the review of environmental impact assessment process as a team member. The site of the potential future nuclear power plant has not been selected yet. There is a need to conduct comprehensive site surveys and subsequently a detailed environmental impact analysis for the candidate sites. This is a key component in demonstrating adequate protection of the public and the environment from radiation that may arise from the future NPP projects. The IRRS Team considered that existing legislation and regulations to some extent provide a framework for regulation of the future nuclear power plants from the point of view of radiation protection. However, the existing regulations need to be revised and updated elaborated in accordance with the current and relevant IAEA Safety Standards in order to ensure that they cover all areas needed for adequate regulatory supervision of NPPs. Radiation protection is covered in more detail elsewhere in this report.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: An evaluation guiding the updating of the regulations to adequately elaborate on radiation protection of the worker, the public and the environment, taking into account the potential future NPP programme, has not been made.

(1)	<p>BASIS: GSR Part 1 R32 states that <i>“The regulatory body shall establish or adopt regulations and guides to specify the principles, requirements and associated criteria for safety upon which its regulatory judgments, decisions and actions are based.”</i></p> <p>BASIS: SSG 16, Action 108 <i>“The regulatory body and/or the government should amend the legislation and/or regulations as appropriate for the purposes of regulating radiation</i></p>
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RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

protection.”

BASIS: SSG-16 Action 109 *“The regulatory body should establish or approve, as appropriate, the limits and constraints regarding workers and the public both for normal and potential exposure situations in a nuclear power plant.”*

R

Recommendation: See R 3 Section 1.2.

12.2.12. SSG-16 Element 12 Safety Assessment

The regulatory safety assessment should be carried out by suitably qualified and experienced personnel who are knowledgeable in the relevant areas of science and technology as well as in all aspects of safety assessment and analysis that are required for the particular type of nuclear power plant under consideration. The regulatory body and the operating organization, together with other relevant organizations such as external support organizations, research organizations and academic institutions, should start to develop their skills in all technical fields that are relevant to safety. However, particularly for countries embarking on nuclear power, both the operating organization and the regulatory body may need considerable support from external support organizations, or individuals, which have specialist skills in particular areas. Therefore, both the regulatory body and the operating organization are expected to conduct assessments of in-house competence needs for performing safety assessments, and to identify areas that will be contracted to external support organizations or consultants. Subsequently, they need to implement systematic training of their staff to build the necessary competency in-house.

In addition to the factual information provided in Section 12.2.9, BAPETEN together with BATAN, universities and other relevant institutions, is involved in a programme to develop competencies in the field of safety analysis and severe accidents. This effort will certainly help in the process of reviewing certain chapters of the preliminary safety analysis report for NPPs. However these competencies constitute a small part of the overall set of competencies required for the review and assessment activities related to NPP that are required by the regulatory body.

Indonesia is an active member of the ANSN Technical Group on Safety Assessment and is using the activities of this group to enhance the competence of its staff on regulatory review and assessment of NPPs.

Additionally, BAPETEN has sent staff to training courses and tutorials in several training centres in the EU. The duration of the courses ranged between two and six months.

BAPETEN needs to continue development of in-house competency on regulatory review and assessment, particularly with regard to core areas for the licensing of the potential future NPPs.

Since the operating organization is not identified yet, the IRRS Team has not evaluated the provisions concerning the operating organization for safe operation of nuclear power plants.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: BAPETEN has not completed developing its staff skills for safety assessment in all all technical fields that are relevant for safety as regards the licensing process for nuclear power plants.

(1)

BASIS: GSR Part 1 R18 states that *“The regulatory body shall employ a sufficient number of qualified and competent staff, commensurate with the nature and the number of facilities*

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

	<i>and activities to be regulated, to perform its functions and to discharge its responsibilities.”</i> BASIS: SSG 16 Action 118 <i>“The operating organization, the regulatory body and external support organizations, as appropriate, should develop the expertise to prepare for the conduct or review of safety assessments.”</i>
S35	Suggestion: BAPETEN should consider further developing staff skills for safety assessment in all technical fields that are relevant for safety as regards the licensing process for nuclear power plants.

12.2.13. SSG-16 Element 13 Safety of radioactive waste, spent fuel management and decommissioning

The overall approach to the management of radioactive waste, spent fuel management and decommissioning is considered in Sections 1, and 5 through 9, of this Report.

12.2.14. SSG-16 Element 14 Emergency preparedness and response

The overall approach to emergency preparedness and response is considered in Section 10 of this Report.

12.2.15 SSG-16 Element 15 Operating Organization

Since there is no clear and definite government decision to embark on a nuclear power programme, an operating organization for NPPs has not been established yet. However, BAPETEN has already developed several requirements, although they are not yet covering all relevant areas, for the operating organization to comply with. For example, BCR No 4 of 2010 requires the operating organization of future NPPs to establish and implement a management system.

Although safety is mentioned in some of the regulatory documents as one of the responsibilities of the operating organization, there is no clear and explicit assignment of prime responsibility for safety to the operating organization in the Act.

Further considerations of the operating organization are not within the scope of this review.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Observation: The Government has not yet identified or established an operating organization for potential future nuclear power plants.

(1)	BASIS: SSG 16 Action 149 <i>“The operating organization should be formed, if it has not already been formed, and it should be expressly assigned its prime responsibility for safety.”</i> BASIS: SSG 16 Action 147 <i>“The government should consider the financial resources and the necessary competences and staffing that are expected from an organization operating a nuclear power plant so as to ensure long term safety.”</i>
S36	Suggestion: The Government should consider identifying or establishing an Operating Organization with the required financial resources and necessary competencies, in a timely manner considering the scheduling of the future nuclear power plants.

12.2.16. SSG-16 Element 16 Site survey, site selection and evaluation

GR No 2 of 2014 provides the administrative and technical requirements applicable to the siting stages for a nuclear power plant. The steps include site evaluation approval and site license. In addition, BAPETEN has issued BCR No 5 of 2007 and a number of supplementary regulations to regulate site related activities. The IRRS Team was informed that all these documents are based on the relevant IAEA Safety Standards.

The IRRS Team was also informed that in the past, limited siting studies were performed in support of the site selection process for nuclear power plants, which did not result in any decision on siting. Since there is no clear decision on embarking on a nuclear power programme, no siting studies for nuclear power plants are being conducted currently.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
<p>Observation: The Government has not identified potential sites, based on a set of defined criteria, and candidate sites for potential future nuclear power plants.</p>	
(1)	<p>BASIS: SSG 16 Action 160 <i>“The government should ensure that potential sites are identified and candidate sites are selected on the basis of a set of defined criteria, at a regional scale and with the use of available data.”</i></p> <p>BASIS: SSG 16 Action 164 <i>“The regulatory body should review and assess the site evaluation report, and should make a decision regarding the acceptability of the site selected and the site related design bases.”</i></p>
S37	<p>Suggestion: The Government should consider identifying potential sites and select candidate sites for future nuclear power plants on the basis of a set of site selection criteria, and prepare and submit a site evaluation report for the selected site to BAPETEN for review and assessment.</p>

12.2.17. SSG-16 Element 17 Design safety

GR No 54 of 2012 and GR No 2 of 2014 provide general requirements on the safety of nuclear power plants. Moreover, BCR No 3 of 2011 on Safety Requirements for the Design of Nuclear Power Reactors, which is based on IAEA NS-R-1, provides general and specific safety objectives, and the design requirements for NPPs. The IRRS Team was informed that BAPETEN is planning to revise BCR No 3 of 2011 to comply with the new IAEA safety requirements.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
<p>Observation: BAPETEN has regulations for defining design requirements of NPPs; however, they have not been updated to conform to the current IAEA Safety Standards.</p>	
(1)	<p>BASIS: GSR Part 1 R32 states that <i>“The regulatory body shall establish or adopt regulations and guides to specify the principles, requirements and associated criteria for safety upon which its regulatory judgments, decisions and actions are based.”</i></p> <p>BASIS: SSG 16 Action 174 <i>“The regulatory body should prepare and enact national safety regulations on design that are necessary for bid specification.”</i></p>

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

R

Recommendation: See R 3 Section 1.2.

12.2.18. SSG-16 Element 19 Transport Safety

The overall approach to transport safety is considered in Section 1, Sections 5 to 9, and Section 11.

12.3. SUMMARY

The Government has, for some time, been considering embarking on a nuclear power programme as one of the options in its energy supply policy. Therefore, BAPETEN has requested IAEA to include the tailored module for countries embarking on nuclear power in the scope of this IRRS mission. The tailored module comprises a review against actions set out in IAEA Safety Guide SSG-16, “Establishing the Safety Infrastructure for a Nuclear Power Programme”, and against the IAEA requirements on which the actions are based. SSG-16 addresses the roles of the government, regulatory body, and operating organization.

The Government has established BAPETEN as the regulatory body for the regulatory oversight of nuclear and radiation facilities and activities. BAPETEN has developed and issued several regulations and guides for strengthening the regulatory infrastructure. The legal and regulatory infrastructure for nuclear and radiation safety has been expanded to encompass the requirements of a potential future nuclear power programme. There is a need to further develop the regulations and to update existing regulations timely in order to support future activities associated with the licensing of nuclear power plants.

BAPETEN is implementing various programmes for human resources development to enhance the capabilities of its staff, so that it can meet the challenges related to licensing of prospective NPPs. However, a complete Human Resource Development Plan is yet to be finalized. BAPETEN has entered into agreements with various national and international organizations that support its efforts to strengthen the regulatory infrastructure. However, there are certain initiatives that still need to be taken by the Government and BAPETEN to effectively manage the safety of potential future NPPs.

Considering the current absence of a firm decision to embark on a nuclear power programme, and the implementation of a infrastructure for safety carried out so far, the IRRS Team recognizes that Indonesia has taken steps in establishing a safety infrastructure for nuclear power plants, based on international best practice and making good use of its interaction with the international organizations and forums. However, there are certain actions still to be taken by the Government and BAPETEN to establish all the necessary elements of the safety infrastructure for a potential future nuclear power programme.

After reviewing the regulatory infrastructure against the actions defined for Phase 1 and Phase 2 of SSG 16, the IRRS Team has made certain suggestions to be considered by the Government and BAPETEN. Many of these suggestions are not only applicable to the future nuclear power plants but to the overall legal and regulatory framework governing current facilities and activities as well.

The IRRS Team emphasizes the benefit of recurrent self-assessments based on the IAEA guidance in SSG-16 as the nuclear power programme progresses, in order to monitor the progress in establishing an appropriate safety infrastructure for the different stages of the establishment of a nuclear power programme.

APPENDIX I - LIST OF PARTICIPANTS

INTERNATIONAL EXPERTS			
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12.	SAIYUT Kittiphong	Office of Atoms for Peace (OAP)	kittiphong@oaep.go.th
13.	CEYHAN Mehmet	Turkish Atomic Energy Authority (TAEK)	mehmet.ceyhan@taek.gov.tr
14.	ZAFAR M. Saleem	Pakistan Nuclear Regulatory Authority (PNRA)	s.zafar@pnra.org

IAEA STAFF MEMBERS

1.	AL KHATIBEH Ahmad	Division of Radiation, Transport and Waste Safety	A.Al-Khatibeh@iaea.org
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4.	ALEXANDER Tom	Division of Radiation, Transport and Waste Safety	T.Alexander@iaea.org

LIAISON OFFICER

1.	SINAGA Dahlia C	BAPETEN	d.sinaga@bapeten.go.id
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APPENDIX II LIST OF COUNTERPARTS

Module	Title	IAEA Reviewers	BAPETEN Counterparts	
1	Responsibilities and Functions of the Government	Petr KRS	Farid Arif Binaruno	
2	Global Nuclear Safety Regime		Yudi Pramono	
3	Responsibilities of the Regulatory Body		Taruniyati Handayani	
4	Management system of the Regulatory Body	Anna Franzén	Taruniyati Handayani	
5	Authorization Nuclear Installations and Material		Dahlia C. Sinaga	
		<i>Research Reactors</i>		Michael Balazik
		<i>Fuel Cycle Facilities</i>		Rajnish Kumar
	Radiation Facilities and Radioactive Material		Zainal Arifin	
		<i>Waste Management Facilities</i>		Volodymyr Berkovsky Mohamed Abdel Geleel
		<i>Radiation Sources Applications</i>		Ritva Bly Hassan Kharita Aayda Al Shehhi
		<i>Decommissioning Activities</i>		Mohamed Abdel Geleel
	<i>Transport Activities</i>	Soumia Zeroual		
6	Review and Assessment Nuclear Installations and Material		Dahlia C. Sinaga	
		<i>Research Reactors</i>	Djoko Hari Nugroho	
		<i>Fuel Cycle Facilities</i>	Rajnish Kumar	
	Radiation Facilities and Radioactive Material		Zainal Arifin	
		<i>Waste Management Facilities</i>		Volodymyr Berkovsky Mohamed Abdel Geleel
		<i>Radiation Sources Applications</i>		Ritva Bly Hassan Kharita Aayda Al Shehhi
		<i>Decommissioning Activities</i>		Mohamed Abdel Geleel
	<i>Transport Activities</i>	Soumia Zeroual		
7	Inspection Nuclear Installations and Material		Budi Rohman	
		<i>Research Reactors</i>		Michael Balazik
		<i>Fuel Cycle Facilities</i>	Rajnish Kumar	
	Radiation Facilities and Radioactive Material		Sugeng Sumbarjo	
		<i>Waste Management Facilities</i>		Volodymyr Berkovsky Mohamed Abdel Geleel
	<i>Radiation Sources Applications</i>	Ritva Bly Hassan Kharita Aayda Al Shehhi		
	<i>Decommissioning Activities</i>	Mohamed Abdel Geleel		

Module	Title	IAEA Reviewers	BAPETEN Counterparts
	<i>Transport Activities</i>	Soumia Zeroual	
8	Enforcement		
	Nuclear Installations and Material		Budi Rohman
	<i>Research Reactors</i>	Michael Balazik	
	<i>Fuel Cycle Facilities</i>	Rajnish Kumar	
	Radiation Facilities and Radioactive Material		Sugeng Sumbarjo
	<i>Waste Management Facilities</i>	Volodymyr Berkovsky Mohamed Abdel Geleel	
	<i>Radiation Sources Applications</i>	Ritva Bly Hassan Kharita Aayda Al Shehhi	
<i>Decommissioning Activities</i>	Mohamed Abdel Geleel		
<i>Transport Activities</i>	Soumia Zeroual		
9	Regulations and Guides		
	Nuclear Installations and Material		Yudi Pramono
	<i>Research Reactors</i>	Michael Balazik	
	<i>Fuel Cycle Facilities</i>	Rajnish Kumar	
	Radiation Facilities and Radioactive Material		Ishak
	<i>Waste Management Facilities</i>	Volodymyr Berkovsky Mohamed Abdel Geleel	
	<i>Radiation Sources Applications</i>	Ritva Bly Hassan Kharita Aayda Al Shehhi	
<i>Decommissioning Activities</i>	Mohamed Abdel Geleel		
<i>Transport Activities</i>	Soumia Zeroual		
10	Emergency Preparedness and Response	Peter Zombori Kittipong Saiyut	Dedik Eko Sumargo
11	Thematic Areas		
	Transport	Soumia Zeroual	Indra Gunawan Ishak
	Control of Medical Exposure	Ritva Bly	Rini Suryanti Ferdinan Siahaan
	Occupational Radiation Protection	Hassan Kharita	Ishak Aris Sanyoto Kristio Rumboko
	Control of Radioactive Discharges and Materials for Clearance	Volodymyr Berkovsky	Agus Yudi Indra Gunawan Diella Ayudha Susanti
	Environmental Monitoring Associated with Authorized Practices for Public Radiation Protection Purposes		Lilin Indayani Asep Saefulloh Ferdinan Siahaan
	Control of Chronic Exposures (radon, NORM and Past Practices) and Remediation		Nur Syamsi Syam Moekhamad Alfiyan

Module	Title	IAEA Reviewers	BAPETEN Counterparts
12	Tailored module for embarking countries (phase II of SSG 16)	Saleem Zafar Mehmet Ceyhan	Dahlia C. Sinaga Yudi Pramono Budi Rohman
Liaison Officer			Dahlia C. Sinaga
Responsible Person from Nuclear Installations and Material (NIM)			Yudi Pramono
Responsible Person from Radiation Facilities and Radioactive Material (RFRM)			Ishak
Person in Charge during Mission			Yanuar W. Wibowo

APPENDIX III MISSION PROGRAMME

INDONESIA IRRS MISSION PROGRAMME, 2 August -14 August. 2015

IRRS MISSION PROGRAMME		
Sunday, 2 August 2015		
IRRS Initial IRRS Review Team Meeting		
<i>Venue:</i> Grand Mercure Hotel		
<i>Participants:</i> The IRRS Team + the LO + Responsible person from NIM and RFRM.		
13:30-17:30	Opening remarks by the IRRS Team Leader Introduction by IAEA Self-introduction of all attendees IRRS Process (IAEA) Report writing (IAEA) Schedule (TL, IAEA) First impression from experts arising from the Advanced Reference Material (ARM) (All Experts) Administrative arrangements (BAPETEN) and IRRS Liaison Officer, IAEA): Detailed Mission Programme	(Module Leaders to prepare slides for the TL presentation for the Entrance Meeting).
Monday, 3 August 2015		
IRRS Entrance Meeting		
<i>Venue:</i> BAPETEN Auditorium 8 th floor		
<i>Participants:</i> High Level Government Official, BAPETEN Management and staff, Official from relevant organizations, the IRRS Team + the LO		
09:00–09.30	Arrival and registration	
09.30–09.40	Safety Induction	
09.40–09.55	Welcoming Address	BAPETEN Chairman
09.55–10.00	Photo Session	BAPETEN
10.00–10.15	Coffee break	
10.15–10.30	Opening Remarks	IRRS Coordinator
10.30–11.00	Expectations for the Mission and introduction of the IRRS Team	IRRS Team Leader
11.00–11.45	Regulatory Overview, SARIS results (strength, challenges, action plan)	BAPETEN
11.45–12.00	Questions?	
12:00–13:00	Lunch	
13:00–17:00	Interviews and Discussions with Counterparts (parallel discussions)	<i>Venue:</i> BAPETEN Meeting room (3 rd , 4 th , and 5 th floor) <i>Participants:</i> Couterpart and IAEA Reviewer

IRRS MISSION PROGRAMME		
17:00- 18:00	Daily IRRS Review Team meeting	<i>Venue:</i> BAPETEN Auditorium 8 th floor <i>Participants:</i> the IRRS team + LO.
Tuesday, 4 August 2015		
Daily Discussions / Interviews		
09:00–17:00	Interviews and discussions with counterparts (parallel discussions)	<i>Venue:</i> BAPETEN Meeting room (3 rd , 4 th , and 5 th floor) <i>Participants:</i> Couterpart and IAEA Reviewer
12:00–13:00	Lunch	
TBD	Visit Ministry* (TBD)	<i>Participants:</i> TL, DTL, TC, Reviewer Modules 1,2 and 3+ BAPETEN Chairman
17:00–18:00	Daily IRRS Review Team meeting	<i>Venue:</i> BAPETEN Auditorium 8 th floor <i>Participants:</i> the IRRS team + LO.
18.30 –	Dinner	<i>Venue:</i> Sate Khas Senayan <i>Participant:</i> IRRS Team+BAPETEN Chairman+Deputy Chairman+LO
Wednesday, 5 August 2015		
Daily Discussions / Interviews		
09:00–16:00	Interviews and discussions with counterparts for all modules	<i>Venue:</i> BAPETEN Meeting room (3 rd , 4 th , and 5 th floor) <i>Participants:</i> Couterpart and IAEA Reviewer
12:00–13:00	Lunch	
16:00–17:00	Writing first draft of preliminary findings (Rs, Ss and GPs)	
17:00–18:00	Daily IRRS Review Team meeting	<i>Venue:</i> BAPETEN Auditorium 8 th floor <i>Participants:</i> the IRRS team + LO.
Thursday, 6 August 2015		
Daily Discussions / Interviews		
08:00-13:30	Site visit to Multi Purpose Reactor 30 MW, Serpong + Fuel Fabrication facility	Participants, BAPETEN

IRRS MISSION PROGRAMME		
		inspectors
08:00–13:30	Site visit to Hospital (RS. Darmais)	Participants, BAPETEN inspectors
09:00–15:00	Interviews and discussions with counterparts (parallel discussions)	<i>Venue:</i> BAPETEN Meeting room (3 rd , 4 th , and 5 th floor) <i>Participants:</i> Couterpart and IAEA Reviewer
08:00–13:30	Site visit to Industrial irradiator: Rel-ion Company	Participants, BAPETEN inspectors
08:00–13:30	Site visit to Industrial radiography company (SUCOFINDO)	Participants, BAPETEN inspectors
12:00–13:00	Lunch	
15:00-17:00	Policy issue discussion: 1. New radiation technology in medical applications; 2. Regulatory control of TENORM.	<i>Participants:</i> TL, TC and Reviewers <i>Venue :</i> BAPETEN Meeting room (4 th , and 5 th floor)
17:00–18:00	Daily IRRS Review Team Meeting: recommendation, suggestions and good practices	<i>Venue:</i> BAPETEN Auditorium 8 th floor <i>Participants:</i> the IRRS team + LO.
Friday, 7 August 2015		
09:00–17:00	Follow-up Interviews and discussions with counterparts (parallel discussions)	Counterparts and Offices: TBD
12:00–13:00	Lunch	
14:00–16:00	Policy discussions: 3. Long term operation and ageing nuclear facilities; 4. New build reactors (NPP and RR);	<i>Participants:</i> TL, TC and Reviewers <i>Venue :</i> BAPETEN Meeting room (4 th , and 5 th floor)
16:00–18:00	Daily IRRS Review Team Meeting	<i>Venue:</i> BAPETEN Auditorium 8 th floor <i>Participants:</i> the IRRS team + LO.
Saturday, 8 August 2015		
Daily Discussions		
09:00–20:00	Team members write draft report. Finalize Observations, Recommendations, Suggestions and Good Practices	<i>Venue:</i> BAPETEN Auditorium 8 th floor <i>Participants:</i> Module Leaders

IRRS MISSION PROGRAMME		
		with Module reviewers
Sunday, 9 August 2015		
Team rest day + cultural event		
09.00-15.00	Team rest day + cultural event	<i>Venue:</i> TMII <i>Participants:</i> IRRS team + BAPETEN staff
Monday, 10 August 2015		
Daily Discussions		
09:00–16:00	Report writing	<i>Venue:</i> BAPETEN Auditorium 8 th floor <i>Participants:</i> The IRRS team + LO.
12:00–13:00	Lunch	
18:00 –	Cross reading	
Tuesday, 11 August 2015		
09:00–14:00	Finalize report text	<i>Venue:</i> BAPETEN Auditorium 8 th floor <i>Participants:</i> The IRRS team + LO
12:00–13:00	Lunch	
14:00 –	Draft to be sent to BAPETEN for review	
Wednesday, 12 August 2015		
08:30–18:00	BAPETEN review the draft report. Discussion with the counterparts on findings if required.	<i>Venue:</i> TBD BAPETEN
All day	Team's free day.	IRRS Team
18.00–22.00	Dinner	TBD
Thursday, 13 August 2015		
08:30–12:00	Discussion with the counterparts on findings if required BAPETEN submit comments	<i>Participants:</i> IRRS Team + Modules counterparts.
12:00–13:00	Lunch	
13:00–17:00	Report finalization by the team and handover the report to BAPETEN	<i>Venue:</i> BAPETEN Auditorium 8 th floor <i>Participants:</i> the IRRS
Friday, 14 August 2015		
<i>Venue:</i> BAPETEN Auditorium 8 th floor <i>Participants:</i> High Level Government Official, BAPETEN Management and		

IRRS MISSION PROGRAMME		
staff, Official from relevant organizations, the IRRS Team + the LO		
09:00–09:15	Closing remarks	IAEA Official
09.15–10.00	Main findings of the IRRS mission	Team Leader
10.00–10.15	Closing remarks and response to the mission findings	BAPETEN Chairman
10:30–11:30	Press Conference	<i>Venue:</i> BAPETEN Building A <i>Participants:</i> IAEA Officials, TL, Government Official, BAPETEN Management, BAPETEN Chairman, Journalist

APPENDIX IV SITE VISITS

List of Site Visit

No	Name of Site	Personnel	
1.	<p>Tuesday, 6 August 2015</p> <p>Radioactive Waste Treatment Facility (IPLR) Evaporation Unit (Evaporator Capacity 0.75m³/h) Compaction Unit (Power Compactor 600kN) Cementation and Incineration Unit Transport Unit Ion Exchange Unit Laundry Unit Hot Cell Sandblasting/Vaqua D Abrasive Blast System (Decontamination System / Metal Surface Scraper) Glove Box</p> <p>Interim Storage Facility (Module 1 and Module 2)</p>	<p>IPLR:</p> <ol style="list-style-type: none"> 1. Suryantoro 2. Raden Sumarbagiono 3. Imam Sasmito 4. Arie Budianti <p>IAEA:</p> <ol style="list-style-type: none"> 1. Volodymyr Berkovskyy 2. M. Abdel Geleel <p>BAPETEN staff:</p> <ol style="list-style-type: none"> 1. Manda Fermilia 	
2.	<p>Tuesday, 6 August 2015</p> <p>Installation for Fuel Elements Production of Research Reactor (PT. INUKI) Fuel Element Fabrication and Production Unit</p>	<p>PT. INUKI:</p> <ol style="list-style-type: none"> 1. Kusnanto 2. Ira Iriati 3. Abdurrahman Dzikri 4. Sumardi 5. Fitri Novita 6. Hardita W. P. 7. Juli Supriyatno 8. Dony H. Y 9. Bilal Samsuri 10. Syah Hermawanto 11. Syahruli Alam 12. Nurkholis 13. Tetra Mareta 14. Azizah 15. Hesti Sektiani 	<p>IAEA:</p> <ol style="list-style-type: none"> 1. Rajnish Kumar 2. Michael Balazik <p>BAPETEN Inspectors:</p> <ol style="list-style-type: none"> 1. Mutiara Solichah 2. Agus Yudi Pristianto 3. Bambang Tri 4. Agus Dwi
3.	<p>Tuesday, 6 August 2015</p> <p>GA Siwabessy Multi Purpose Reactor Facility :</p> <ol style="list-style-type: none"> 1. Operation Hall 2. Control Room 3. Experiment Hall 	<p>GA Siwabessy:</p> <ol style="list-style-type: none"> 1. Bambang heru Utomo 2. Yusi Eko Yulianto 3. Edison S 4. Subiharto 5. A. Mariatmo 	<p>IAEA</p> <ol style="list-style-type: none"> 1. Rajnish Kumar 2. Michael Balazik <p>BAPETEN Inspectors:</p>

No	Name of Site	Personnel	
		6. Purwadi 7. M. Yahya 8. M. Imron 9. Anthony S 10. Nugroho L 11. Slamet Suprianto 12. Sujarwono 13. Edison 14. Syafrul 15. Suwoto 16. Cahyana	1. Bintoro Adji 2. Lukman Hakim 3. Joko 4. Miftahul Ummah
4.	Tuesday, 6 August 2015 PT. Rel Ion Sterilization : Irradiator	PT. Rel Ion Sterilization: 1. Dora Inda Khaelia (PPR/ QA Spv.) 2. Rully Apriono (PPR/ Maintenance) 3. Syahrul Nurtama (GA Manager) 4. Tubagus Ichsan Nurjaman (PPR/ Manager Produksi) IAEA: 1. Hassan Kharita 2. Aayda Al Shehhi BAPETEN Inspectors: 1. Aris Sanyoto 2. Ilham Hidayat 3. Wahyu Ramdhan	
5.	Tuesday, 6 August 2015 PT. Sucofindo (Persero): Industrial Radiography	PT. Sucofindo (Persero): 1. Adri Yusandi (Sekper/ SCI KP) 2. Arianta Sembiring (Inspector SCI - JKT) 3. Dani Pramantyo (QHSE Mgr KP) 4. Eko Handoko (QHSE) 5. Fajria Putra (PKSR) 6. Fikri Haykal (Sekper/ SCI KP) 7. Ibrohim Budiman (Kepala Cabang SCI Tanjung Priok) 8. Tohirin (PPR) 9. M. Gunawan N. (QHSE) IAEA: 1. Hassan Kharita 2. Aayda Al Shehhi BAPETEN Inspectors: 1. Aris Sanyoto	

No	Name of Site	Personnel
		2. Ilham Hidayat 3. Wahyu Ramdhan
6.	Tuesday, 6 August 2015 Hospital (RS. Darmais) * Linac Varian (treatment & operator room) * Linac Elekta (treatment & operator room) * Toshiba Simulator (treatment & operator room) * Treatment Planning System Room * Brachytherapi Ir-192 (treatment & operator room) * C Arm Mobile (treatment & operator room)	Hospital (RS. Darmais): 1. Keliek Soedarto 2. Dewi S. Soeis 3. Fidelia Luthfi 4. M. Hari S. IAEA: 1. Ritva Bly BAPETEN Inspectors: 1. Leily Savitri 2. Asep Saefulloh Hermawan 3. W. P. Daeng Beta

APPENDIX V RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES

Area		R:Recommendations S: Suggestions G:Good Practices	Recommendations, Suggestions or Good Practices
1.	RESPONSIBILITIES AND FUNCTIONS OF THE GOVERNMENT	R1	The Government should develop and document a national policy and strategy for safety, supported by a national co-ordinated plan, to ensure the appropriate national infrastructure is implemented.
		R2	The Government should ensure that the fundamental safety principles of the IAEA SF-1 are fully incorporated into the legal and regulatory framework for safety.
		S1	The Government and BAPETEN should consider ensuring that all regulatory functions are implemented in a graded approach.
		R3	The Government and BAPETEN should ensure that the legal and regulatory framework is kept up to date and corresponds to the current IAEA standards.
		R4	The Government should provide BAPETEN with human and financial resources to ensure adequate discharge of its statutory regulatory obligations.
		R5	The Government, through the legal framework, should ensure that prime responsibility of safety is assigned to the person or organization responsible for a facility or an activity.
		R6	The Government should ensure there is appropriate coordination and liaison between BAPETEN and other relevant authorities in the areas of medical

Area		R:Recommendations S: Suggestions G:Good Practices	Recommendations, Suggestions or Good Practices
			application of radiation and transport of radioactive material.
		R7	The Government should establish and promulgate a national policy and strategy for radioactive waste management and decommissioning.
		R8	The Government should establish provisions, in the legal framework, governing long-term radioactive waste management, spent fuel management and decommissioning, including funding of such activities.
		S2	BAPETEN should consider requiring the appropriate individual monitoring periods commensurate with the exposure condition.
2.	GLOBAL SAFETY REGIME	GP1	The Government and BAPETEN make extensive use of bilateral and multilateral international cooperation for training and competence building.
3.	RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY	R9	The Government should authorise BAPETEN to develop and implement the organizational structure that would be best suited to allow it to carry out its obligatory functions effectively
		S3	BAPETEN should consider adjusting the allocation of resources, within the existing or revised organizational structure, to ensure proper regulation of nuclear facilities and radiation activities, using a risk-informed graded approach.
		S4	BAPETEN should consider establishing regional

Area		R:Recommendations S: Suggestions G:Good Practices	Recommendations, Suggestions or Good Practices
			offices to allow it to discharge its regulatory responsibilities, in particular inspections, more effectively and in a timely manner.
		S5	BAPETEN should consider revising its licensing structure to allow for a more reasonable and manageable number of licenses, thereby reducing the administrative burden for the organization as well as licence holders.
		S6	BAPETEN should consider, as part of the human resource plan, making preliminary and generic analyses of future staffing needs that may be elicited by the introduction of large-scale technologies such as a nuclear power programme.
4.	MANAGEMENT SYSTEM OF THE REGULATORY BODY	R10	BAPETEN should review its management system to ensure that the vision, mission, safety culture and the application of a graded approach reflect the Governmental assignment of tasks and that those are communicated to and understood by all layers of the organization.
		R11	BAPETEN should include appropriate values, policies and decision-making procedure in its management system and ensure they are communicated to all staff.
		S7	BAPETEN should consider clarifying the responsibility of the individual reporting on the performance of the management system to senior management.

Area		R:Recommendations S: Suggestions G:Good Practices	Recommendations, Suggestions or Good Practices
		S8	BAPETEN should consider establishing procedures for assessing the safety and appropriateness of the working environment.
		R12	BAPETEN should develop and include procedures for analysing the need for organizational changes taking into consideration safety aspects, and ensure that the procedures are implemented and communicated to all concerned.
		S9	BAPETEN should consider enhancing the implementation of self-assessments and to include safety culture aspects.
		R13	BAPETEN should implement the management system review stated in the BMS manual.
5.	AUTHORIZATION	R14	BAPETEN should strengthen its communication and consultation system regarding its authorization activities with interested parties.
		R15	BAPETEN should develop a regulatory requirement so that operating organizations obtain an authorization for a research reactor for all stages of operation including entering into an extended shutdown condition.
6.	REVIEW AND ASSESSMENT	S9	BAPETEN should consider developing regulatory requirements, regulations, and guides as applicable to the facility.
		S10	BAPETEN should consider developing appropriate

Area		R:Recommendations S: Suggestions G:Good Practices	Recommendations, Suggestions or Good Practices
			record keeping system for effective follow up.
		R16	BAPETEN should promote establishing criteria to review and assess the design of spent fuel storage facility.
		GP2	BAPETEN has developed a comprehensive database management for authorization, reviewing and assessment, inspection, transport approval and occupational dose register. The system is fully implemented for review and assessment process and the reviewers can easily monitor the progress on the reviewing process and reach to the licensee's records.
		S11	BAPETEN should consider establishing requirements for the safe reuse of packages.
		S12	BAPETEN should consider establishing and implementing requirements related to the approval of modified package.
		R17	BAPETEN should plan and carry out, in accordance with a documented procedure, assessment of the management system arrangement of the suppliers.
		S13	BAPETEN should consider implementing its regulation on the assessment of radiation doses to workers, public and workplace monitoring.
7.	INSPECTION	R18	BAPETEN should apply a graded approach when planning and conducting inspections across all the

Area		R:Recommendations S: Suggestions G:Good Practices	Recommendations, Suggestions or Good Practices
			facilities and activities.
		S14	BAPETEN should consider a means for the public to access information about inspection reports, procedures, and findings to maintain public confidence in BAPETEN.
		S15	BAPETEN should consider developing and implementing systematic collection of licensee's safety culture aspects during inspections
		S16	BAPETEN should consider developing detailed guidance on inspections conducted during construction, commissioning and decommissioning stages to ensure they cover all the above mentioned stages.
		R19	The Government should amend its regulation to provide direct authority to site inspectors to immediately stop a potential unsafe condition and direct actions to restore an adequate level of safety at a facility or activity.
		S17	BAPETEN should consider making available qualified inspectors for all stages of fuel cycle facilities.
		S18	BAPETEN should consider including unannounced inspections and broaden the scope of transport inspections in their inspection programme.
8.	ENFORCEMENT	R20	BAPETEN should collect, analyse and disseminate information on non-compliances and enforcement

Area		R:Recommendations S: Suggestions G:Good Practices	Recommendations, Suggestions or Good Practices
			actions to provide feedback to enhance the performance of regulatory functions.
		S19	BAPETEN should consider developing procedures and guidelines governing the use and implementation of different types of enforcement actions.
9.	REGULATION AND GUIDES	S20	BAPETEN should consider establishing regulations for all types of disposal facilities for radioactive waste and develop the procedures for meeting the requirements.
10.	EMERGENCY PREPAREDNESS AND RESPONSE	R21	The government should improve the coordination mechanism between the relevant organizations within the national nuclear emergency preparedness and response system.
		S21	BAPETEN should consider revising the relevant regulatory documents to adjust its hazard categorization to be fully consistent with the current IAEA categorization.
		R22	BAPETEN should revise its regulatory system in order to comply with the current relevant IAEA Safety Standards, namely: <ul style="list-style-type: none"> • develop regulations and criteria regarding countermeasures for early protective actions and restriction of food, drink and commodities, to ensure the
			<ul style="list-style-type: none"> • safety to people; • ensure that the waste generated in an

Area		R:Recommendations S: Suggestions G:Good Practices	Recommendations, Suggestions or Good Practices
			<p>emergency situation will be managed safely;</p> <ul style="list-style-type: none"> • develop regulations addressing the roles and responsibilities of the licensees and stakeholders, as well as the criteria for the termination of the radiological and nuclear emergency situation; and, • ensure that the nuclear or radiological emergency and the emergency response are analysed in order to identify actions to be taken to prevent other emergencies and to improve emergency arrangements.
		R23	BAPETEN should develop regulations that oblige the licensees to place their EPR system under consistent and comprehensive quality management.
11.1	CONTROL OF MEDICAL EXPOSURES	R24	BAPETEN should refrain from providing verification of compliance testing to the hospitals, if they may lead to a real or perceived conflict of interest.
11.2	OCCUPTIONAL RADIATION PROTECTION	S22	BAPETEN should consider inviting an IAEA Occupational Radiation Protection Appraisal Service (ORPAS) mission in order to develop an action plan for further improving the infrastructure for occupational radiation protection.
		S23	Government and BAPETEN should consider to modifying the requirement for RPOs training and retraining to include practice specific part for each type of practices

Area		R:Recommendations S: Suggestions G:Good Practices	Recommendations, Suggestions or Good Practices
		S24	BAPETEN should consider inviting an IAEA Education and Training Appraisal Service (EduTA) mission to define an action plan for the development of the education and training infrastructure in Indonesia.
11.3	CONTROL OF.RADIOACTIVE DISCHARGES AND MATERIAL FOR.CLEARANCE ENVIRONMENTAL MONITORING ASSOCIATED WITH AUTHORIZED PRACTICES FOR PUBLIC RADIATION PROTECTION PURPOSES CONTROL OF CHRONIC EXPOSURES	GP3	The public information on environmental monitoring data enhances the trust to the BAPETEN and supports the collaboration with interested parties.
12.	TAILORED MODULE FOR COUNTRIES EMBARKING ON NUCLEAR POWER (SSG-16)	S25	The government should consider assigning the role of coordinating all activities regarding the establishment of a nuclear safety infrastructure to an existing organization, or establish a new organization to carry out this task.
		S26	BAPETEN should consider performing a systematic assessment of different regulatory approaches and carrying out tentative planning of its approach to licensing and effective regulatory supervision of nuclear power plants.
		S27	BAPETEN should consider completing the set of regulations and guides that define the safety requirements that are essential for the bidding process for nuclear power plants, taking into consideration the scheduling of the nuclear power programme.

Area	R:Recommendations S: Suggestions G:Good Practices	Recommendations, Suggestions or Good Practices
	S28	BAPETEN should consider establishing and implementing a mechanism for consultation with interested parties and the public in its licensing process for nuclear power plants.
	S29	BAPETEN should consider improving its website to inform the public of nuclear safety issues concerning nuclear power plants.
	S30	BAPETEN should consider including in its regulations requirements for sustainable financing for the safety of nuclear power plants at all stages of the nuclear power programme
	S31	BAPETEN should consider conducting a systematic assessment of external technical expertise needed during the licensing process of an NPP Project, and identifying the organizations that could potentially provide such expertise.
	S32	BAPETEN should consider establishing arrangements for overseeing external support services provided to it, taking into account the quality requirements for activities related to nuclear safety.
	S33	The Government should consider a strategy to enable all organizations involved in ensuring safety of a potential future nuclear power programme, including BAPETEN, to attract, train and retain an adequate number of highly qualified personnel.
	S34	BAPETEN and relevant national organizations

Area	R:Recommendations S: Suggestions G:Good Practices	Recommendations, Suggestions or Good Practices
		should consider performing a systematic analysis in order to identify specific safety areas for research to support the nuclear power programme.
	S35	BAPETEN should consider further developing staff skills for safety assessment in all technical fields that are relevant for safety as regards the licensing process for nuclear power plants.
	S36	The Government should consider identifying or establishing an Operating Organization with the required financial resources and necessary competencies, in a timely manner considering the scheduling of the future nuclear power plants.
	S37	The Government should consider identifying potential sites and select candidate sites for future nuclear power plants on the basis of a set of site selection criteria, and prepare and submit a site evaluation report for the selected site to BAPETEN for review and assessment.

APPENDIX VI REFERENCE MATERIAL USED FOR THE REVIEW

6 Year 2015	08-04-2015	BAPETEN Chairman's Regulation Number 6 Year 2015 on Security of Radioactive Source
5 Year 2015	08-04-2015	BAPETEN Chairman's Regulation Number 2 Year 2015 on Site Evaluation of Nuclear Installation for Vulcanic Aspect
2 Year 2015	23-02-2015	BAPETEN Chairman's Regulation Number 2 Year 2015 on Safety Verification and Assessment of Non Power Reactor
1 Year 2015	15-12-2015	BAPETEN Chairman's Regulation Number 1 Year 2015 on Management of Emergency Respons of BAPETEN
16 Year 2014	15-12-2014	BAPETEN Chairman's Regulation Number 16 Year 2014 on Working License for Certain Personel Working in Ionizing Radiation Sources Facilities
15 Year 2014	15-12-2014	BAPETEN Chairman's Regulation Number 15 Year 2014 on Radiation Safety on the Production of Diagnostic and Interventional X-Ray Machine
10 Year 2014	13-10-2014	BAPETEN Chairman's Regulation Number 10 Year 2014 on Management of Non Tax Revenue of BAPETEN
8 Year 2014	17-06-2014	BAPETEN Chairman's Regulation Number 8 Year 2014 on Revision of BAPETEN Chairman's Regulation Number 7 Year 2009 on Radiation Safety on the Use of Industrial Radiography
6 Year 2014	30-01-2014	BAPETEN Chairman's Regulation Number 6 Year 2014 on Site Evaluation of Nuclear Installation for Meteorology and Hydrology Aspects.
4 Year 2014	30-01-2014	BAPETEN Chairman's Regulation Number 4 Year 2014 on Operation Limit and Condition of Nuclear Installation Non Reactor
3 Year 2014	10-01-2014	BAPETEN Chairman's Regulation Number 3 Year 2014 on Composing Document of Analysis for Enviromental Impact of Nuclear Energy Field
2 Year 2014	10-01-2014	BAPETEN Chairman's Regulation Number 2 Year 2014 on Core Reactor Management and Handling and Storage for Nuclear Fuel of Non Power Reactor
17 Year 2013	13-12-2013	BAPETEN Chairman's Regulation Number 17 Year 2013 on Radiation Safety for Import, Export, and Transfer Activities of Consumer's Product
16 Year 2013	13-12-2013	BAPETEN Chairman's Regulation Number 16 Year 2013 on Radiation Safety for Strorage of Technologically Enhanced Naturally Occurring Radioactive Material
9 Year 2013	17-06-2013	BAPETEN Chairman's Regulation Number 9 Year 2013 on Operation Limit and Condition of Non Power Reactor
8 Year 2013	17-06-2013	BAPETEN Chairman's Regulation Number 8 Year 2013 on Site Evaluation of Nuclear Installation for Vulcanic Aspects.
7 Year 2013	17-06-2013	BAPETEN Chairman's Regulation Number 7 Year 2013 on Dose Limit for Environmental Radioactivity
6 Year 2013	17-06-2013	BAPETEN Chairman's Regulation Number 6 Year 2013 on Working License for Operator of Installation and Nuclear Material
4 Year 2013	13-03-2013	BAPETEN Chairman's Regulation Number 4 Year 2013 on Radiation Protection and Safety in Nuclear Energy Utilization
3 Year 2013	13-03-2013	BAPETEN Chairman's Regulation Number 3 Year 2013 on Radiation Safety in the Use of Radiotherapy
1 Year 2013	31-01-2013	BAPETEN Chairman's Regulation Number 1 Year 2013 on Amendment to BAPETEN Chairman's Regulation Number 3 Year 2012 on Administration of State Revenue
17 Year 2012	27-11-2012	BAPETEN Chairman's Regulatory Number 17 Year 2012 on Radiation Safety in Nuclear Medicine
16 Year 2022	27-11-2012	BAPETEN Chairman's Regulation Number 16 Year 2012 on Klirens Level
12 Year 2012	24-09-2012	BAPETEN's Chairman Regulation Number 12 Year 2012 on the Implementation of Electronic System in Respect to the Framework of Indonesia National Single Window in the Nuclear Energy Regulatory Agency
8 Year 2012	05-07-2012	BAPETEN's Chairman Regulation Number 8 Year 2012 on the Reporting of the Analysis to the Safety of Non-Power Reactor
7 Year 2012	20-06-2012	BAPETEN's Chairman Regulation Number 7 Year 2012 on Aging Management of Non-Nuclear Reactor Installations
6 Year 2012	20-06-2012	BAPETEN's Chairman Regulation Number 6 year 2012 on the Essential System Design for Computer Based Safety In Power Reactor
5 Year 2012	20-06-2012	BAPETEN's Chairman Regulation Number 5 Year 2012 on Safety in Utilization and Modified Non Power Reactor
3 Year 2012	30-03-2012	BAPETEN's Chairman Regulation Number 3 Year 2012 on the Management of Non-Tax Revenues in the Nuclear Energy Regulatory Agency
2 Year 2012	01-03-2012	BAPETEN's Chairman Regulation Number 2 Year 2012 on the Protection Against Internal Hazard other than Fires and Explosions in the Design of Nuclear Power Plants

<u>1 Year 2012</u>	13-01-2012	<u>BAPETEN's Chairman Regulation Number 1 Year 2012 on the Provision Against Internal Fires and Explosions in the Design of Nuclear Power Plants</u>
<u>10 Year 2011</u>	25-10-2011	<u>BAPETEN Chairman's Regulation Number 10 Year 2011 on the Management System for Nuclear Energy Regulatory Agency</u>
<u>9 Year 2011</u>	10-10-2011	<u>BAPETEN Chairman's Regulation Number 9 Year 2011 on the Compliance Test for the X-Ray Radiology Diagnostic</u>
<u>8 Year 2011</u>	10-10-2011	<u>BAPETEN Chairman's Regulation Number 8 Year 2011 on the Radiation Safety in the Uses of X-Ray Radiology Diagnostic and Intervention</u>
<u>7 Year 2011</u>	04-08-2011	<u>BAPETEN Chairman's Regulation Number 7 Year 2011 on the Design of Emergency Power Supply System for Power Reactor</u>
<u>6 Year 2011</u>	01-06-2011	<u>BAPETEN Chairman's Regulation Number 6 Year 2011 on the Decommissioning of Non-Reactor Nuclear Installation</u>
<u>4 Year 2011</u>	11-04-2011	<u>BAPETEN Chairman's Regulation Number 4 Year 2011 on the Safeguard System</u>
<u>5 Year 2011</u>	05-02-2011	<u>BAPETEN Chairman's Regulation Number 5 Year 2011 on the Maintenance Requirements for Non-Power Reactor</u>
<u>3 Year 2011</u>	14-01-2011	<u>BAPETEN Chairman's Regulation Number 3 Year 2011 on the Safety Design of Power Reactor</u>
<u>2 Year 2011</u>	14-01-2011	<u>BAPETEN Chairman's Regulation Number 2 Year 2011 on the Safety Requirements for the Operation of Non-Power Reactor</u>
<u>1 Year 2011</u>	14-01-2011	<u>BAPETEN Chairman's Regulation Number 1 Year 2011 on the Safety Requirements for the Design of Non-Power Reactor</u>
<u>6 Year 2010</u>	15-11-2010	<u>BAPETEN Chairman's Regulation Number 6 Year 2010 on the Health Monitoring for Radiological Workers</u>
<u>4 Year 2010</u>	30-09-2010	<u>BAPETEN Chairman's Regulation Number 4 Year 2010 on the Nuclear Energy Facility and Utilization Activity Management System</u>
<u>3 Year 2010</u>	21-07-2010	<u>BAPETEN Chairman's Regulation Number 3 Year 2010 on the Design of Handling and Storage System of Nuclear Fuel For Power Reactors</u>
<u>1 Year 2010</u>	18-04-2010	<u>BAPETEN Chairman's Regulation Number 1 Year 2010 on Nuclear Emergency Responses and Preparedness</u>
<u>9 Year 2009</u>	12-10-2009	<u>BAPETEN Chairman's Regulation Number 9 Year 2009 on Intervention Exposure From Technologically Enhanced Naturally Occurring Radioactive Material</u>
<u>7 Year 2009</u>	12-03-2009	<u>BAPETEN Chairman's Regulation Number 7 Year 2009 on Radiation Safety in The Use of Radiography Industry Equipments</u>
<u>6 Year 2009</u>	12-03-2009	<u>BAPETEN Chairman's Regulation Number 6 Year 2009 on Radiation Safety in The Utilization of Radioactive Materials and X-Ray for Gauging Equipment</u>
<u>5 Year 2009</u>	12-03-2009	<u>BAPETEN Chairman's Regulation Number 5 Year 2009 on Radiation Safety in The Use of Radioactive Materials for Well Logging</u>
<u>4 Year 2009</u>	26-02-2009	<u>BAPETEN Chairman's Regulation Number 4 Year 2009 on the Decommissioning of Nuclear Reactor</u>
<u>3 Year 2009</u>	26-02-2009	<u>BAPETEN Chairman's Regulation Number 3 Year 2009 on the Operating Limitation and Condition and the Operating Procedure of Power Reactor</u>
<u>2 Year 2009</u>	26-02-2009	<u>BAPETEN Chairman's Regulation Number 2 Year 2009 on the Making of Design Information List</u>
<u>1 Year 2009</u>	26-02-2009	<u>BAPETEN Chairman's Regulation Number 1 Year 2009 on the Physical Protection System Requirements for Nuclear Installations and Materials</u>
<u>15 Year 2008</u>	27-10-2008	<u>BAPETEN's Chairman Regulation Number 15 Year 2008 on Requirements for Working Permit For Certain Officers at Installation Using Ionizing Radiation Sources</u>
<u>14 Year 2008</u>	20-10-2008	<u>BAPETEN's Chairman Regulation Number 14 Year 2008 on Revocation BAPETEN's Chairman Regulation Number 18/Ka-Bapeten/II-00 on Certification and Accreditation of Certification Bodies, Institutions and/or Laboratory Courses in the Utilization of Nuclear Energy</u>
<u>12 Year 2008</u>	08-05-2008	<u>BAPETEN Chairman's Regulation Number 12 Year 2008 on Organization and Working Procedure for Education and Training Center</u>
<u>11 Year 2008</u>	08-05-2008	<u>BAPETEN Chairman's Regulation Number 11 Year 2008 on Amandement to BAPETEN Chairman's Decree Number 01. rev.2/K-OTK/V-04 on BAPETEN's Organization and Working Procedures</u>
<u>10 Year 2008</u>	24-04-2008	<u>BAPETEN Chairman's Regulation Number 10 Year 2008 on Working License for Installation and Nuclear Materials Officer</u>
<u>9 Year 2008</u>	14-04-2008	<u>BAPETEN Chairman's Regulation Number 9 Year 2008 on Formulation and Implementation of The Declaration Format of Additional Protocol Accountability and Control Systems in Nuclear Materials</u>
<u>8 Year 2008</u>	17-03-2008	<u>BAPETEN Chairman's Regulation Number 8 Year 2008 on Determinated of Safety Management of Non Power Reactor Aging</u>
<u>6 Year 2008</u>	14-03-2008	<u>BAPETEN Chairman's Regulation Number 6 Year 2008 on The Power Reactor Site Evaluation for External Aspects of Human Induced</u>
<u>5 Year 2008</u>	01-02-2008	<u>BAPETEN Chairman's Regulation Number 5 Year 2008 on The Power Reactor Evaluation for Meteorology's Aspects</u>
<u>4 Year 2008</u>	01-02-2008	<u>BAPETEN Chairman's Regulation Number 4 Year 2008 on Power Reactor Site Evaluation for Geotechnical and Foundation Aspects of Reactor Power</u>

<u>3 Year 2008</u>	01-02-2008	<u>BAPETEN Chairman's Regulation Number 3 Year 2008 on Power Reactor Site Evaluation for Determining Dispersion Aspects of Radioactive Substances in Air and Water and Consideration of Population Distribution Around Tread Power Reactor</u>
<u>2 Year 2008</u>	28-01-2008	<u>BAPETEN's Chairman Regulation Number 2 Year 2008 on Evaluation Power Reactor Site's of Volcanology Aspects</u>
<u>1 Year 2008</u>	28-01-2008	<u>BAPETEN Chairman's Regulation Number 1 Year 2008 on Power Reactor Evaluation's Site For Aspects of Seismic</u>
<u>14 Year 2007</u>	22-10-2007	<u>BAPETEN's Chairman Regulation Number 14 Year 2007 on Response Unit Emergency</u>
<u>11 Year 2007</u>	24-09-2007	<u>BAPETEN's Chairman Regulation Number 11 Year 2007 on Requirements for Non Reactor Nuclear Installation Safety</u>
<u>7 Year 2007</u>	24-08-2007	<u>BAPETEN's Chairman Regulation Number 7 Year 2007 on Security of Radioactive Sources</u>
<u>5 Year 2007</u>	21-08-2007	<u>BAPETEN's Chairman Regulation Number 5 Year 2007 on Safety Requirements for Nuclear Reactor Site Evaluation</u>
<u>9 Year 2006</u>	01-11-2006	<u>BAPETEN's Chairman Regulation Number 9 Year 2006 on Additional Protocol to The System of Accountability and Control of Nuclear Material</u>
<u>10 Year 2006</u>	01-11-2006	<u>BAPETEN's Chairman Regulation Number 10 Year 2006 on Guidelines for Preparation of Nuclear Installation Safety Analysis Reports Non Reactor</u>
<u>3 Year 2006</u>	22-05-2006	<u>BAPETEN's Chairman Regulation Number 3 Year 2006 on Non-Reactor Nuclear Installation Licensing</u>
<u>1 Year 2006</u>	05-04-2006	<u>BAPETEN's Chairman Regulation Number 1 Year 2006 on Dosimetry Laboratory, Calibration Measurement of Radiation Therapy Radiation Sources and Exodus, and Standardization of Radionuclide</u>
<u>01 Rev.2/K-OTK/V â€“ 04</u>	17-05-2004	<u>BAPETEN's Chairman Decree Number 01 Rev.2/K-OTK/V &acirc;&euro;&ldquo; 04 on Nuclear Energy Regulatory Agency's Organization and Procedures</u>
<u>05-P/Ka-BAPETEN/I-03</u>	20-01-2003	<u>BAPETEN's Chairman Decree Number 05-P/Ka-BAPETEN/I-03 on Emergency Response Planning Guide</u>
<u>04-P/Ka-BAPETEN/I-03</u>	20-01-2003	<u>BAPETEN's Chairman Decree Number 04-P/Ka-BAPETEN/I-03 on Operator and Supervisor Training Nuclear Reactor</u>
<u>03-P/Ka-BAPETEN/ I-03</u>	14-01-2003	<u>BAPETEN's Chairman decree Number 03-P/Ka-BAPETEN/ I-03 on Laboratory Requirements Test for Radioactive Type A and Type B Packages</u>
<u>02-P/Ka-BAPETEN/I-03</u>	14-01-2003	<u>BAPETEN's Chairman Decree Number 02-P/Ka-BAPETEN/I-03 on Service System Individual External Dose Monitoring</u>
<u>01-P /Ka-BAPETEN/ I-03</u>	14-01-2003	<u>BAPETEN's Chairman Decree Number 01-P /Ka-BAPETEN/ I-03 on Guidelines For Patient Dose Radiodiagnostic</u>
<u>21/Ka-BAPETEN/XI I-02</u>	24-12-2002	<u>BAPETEN's Chairman Decree Number 21/Ka-BAPETEN/XII-02 on Quality Assurance Program Installation Radiotherapy</u>
<u>07-P/Ka-BAPETEN/I-02</u>	14-01-2002	<u>BAPETEN's Chairman Decree Number 07-P/Ka-BAPETEN/I-02 on Medical Facilities Decommissioning Guidance, Industry and Research and Non-Reacto Nuclear Installations</u>
<u>06-P /Ka-BAPETEN/XI -00</u>	22-11-2000	<u>BAPETEN's Chairman Decree Number 06-P /Ka-BAPETEN/XI-00 on Guidelines for Preparation of Safety Analysis Reports</u>
<u>05-P/Ka-BAPETEN/VI I-00</u>	21-07-2000	<u>BAPETEN's Chairman Decree Number 05-P/Ka-BAPETEN/VII-00 on Guidelines Requirements For Safety Transportation of Radioactive Substances</u>
<u>14/Ka-BAPETEN/VI -99</u>	15-06-1999	<u>BAPETEN's Chairman Decree Number 14/Ka-BAPETEN/VI-99 on the Safety of the Radioactive Lantern Factories</u>
<u>12/Ka-BAPETEN/VI -99</u>	15-06-1999	<u>BAPETEN's Chairman Decree Number 12/Ka-BAPETEN/VI-99 on Requirements for Occupational Safety in Mining and Processing of Radioactive Material</u>
<u>11/Ka-BAPETEN/VI -99</u>	15-06-1999	<u>BAPETEN's Chairman Decree Number 11/Ka-BAPETEN/VI-99 on Licensing for Construction and Operating of Irradiators</u>
<u>04-P/Ka-BAPETEN/VI</u>	15-06-1999	<u>BAPETEN's Chairman Decree Number 04-P/Ka-BAPETEN/VI-99 on Technical Guidelines for Development Environmental Impact Assessment for Plan Development and Operation of Nuclear</u>

-99		<u>Installations and Other Installations</u>
<u>03-P/Ka-BAPETEN/VI-99</u>	15-06-1999	<u>BAPETEN's Chairman Decree Number 03-P/Ka-BAPETEN/VI-99 on Technical Guidelines for Preparation of an Environmental Impact Assessment For Development Plan and Operation of Nuclear Reactor</u>
<u>01-P/Ka-BAPETEN/VI-99</u>	15-06-1999	<u>BAPETEN's Chairman Decree Number 01-P/Ka-BAPETEN/VI-99 on Guidelines For The Determination of Nuclear Reactor Site</u>
<u>07/Ka-BAPETEN/V-99</u>	05-05-1999	<u>BAPETEN's Chairman Decree Number 07/Ka-BAPETEN/V-99 on Quality Assurance of Nuclear Installations</u>
<u>03/Ka-BAPETEN/V-99</u>	05-05-1999	<u>BAPETEN's Chairman Decree Number 03/Ka-BAPETEN/V-99 on Requirements Safety for Radioactive Waste Management</u>
<u>02/Ka-BAPETEN/V-99</u>	05-05-1999	<u>BAPETEN's Chairman Decree Number 02/Ka-BAPETEN/V-99 on Environmental Radioactivity Level</u>
<u>01/Ka-BAPETEN/V-99</u>	05-05-1999	<u>BAPETEN's Chairman Decree Number 01/Ka-BAPETEN/V-99 on Requirements for Radiation Safety</u>
<u>04/Ka-BAPETEN/V-99</u>	00-00-0000	<u>BAPETEN's Chairman Decree Number 04/Ka-BAPETEN/V-99 on Requirements Safety for Transport of Radioactive Substances</u>
<u>15 Year 2012</u>	30-10-2012	<u>BAPETEN Chairman's Regulation Number 15 Year 2012 on Procurement Services Unit in Nuclear Energy Regulatory Agency</u>
<u>11 Year 2012</u>	01-08-2012	<u>BAPETEN Chairman's Regulation Number 11 Year 2012 on Enforcement Code of Ethics and Disciplinary for Civil Nuclear Energy Regulatory Agency</u>
<u>9 Year 2012</u>	05-07-2012	<u>BAPETEN's Chairman Regulation Number 9 Year 2012 on the Standard Service Management Public Information in Nuclear Energy Regulatory Agency</u>

LIST OF GOVERNMENT REGULATIONS (GR)

54 Year 2012	23-04-2012	The Government Regulation Number 54 Year 2012 on the Safety and Security of Nuclear Installations
46 Year 2009	30-06-2009	The Government Regulation Number 46 Year 2009 on Limit of Liability for Nuclear Damages
29 Year 2009	24-03-2009	The Government Regulation Number 29 Year 2009 on the Procedures for Determining the Amount, Payment, and Remittance of Payable Non-Tax State Revenues
27 Year 2009	19-02-2009	The Government Regulation Number 27 Year 2009 on the Classification and Tariff of Non-Tax State Revenues for the Nuclear Energy Regulatory Agency
29 Year 2008	08-05-2008	The Government Regulation Number 29 Year 2008 on the Licensing of the Utilization of Ionizing Radioactive Sources and Nuclear Materials
33 Year 2007	08-06-2007	The Government Regulation Number 33 Year 2007 on the Safety Ionizing Radiation and the Security of Radioactive Sources
43 Year 2006	15-12-2006	The Government Regulation Number 43 Year 2006 on the Licensing of Nuclear Reactors
27 Year 2002	13-05-2002	The Government Regulation Number 27 Year 2002 On the Radioactive Waste Management
26 Year 2002	13-05-2002	The Government Regulation Number 26 Year 2002 on the Safety Transport of Radioactive Sources

LIST OF PRESIDENTIAL DECREES/REGULATIONS

74 Year 2012	16-08-2012	Presidential Regulation Number 74 Year 2012 on Nuclear Damage Liability
84 Year 2010	28-12-2010	The Presidential Regulation Number 84 Year 2010 on the Ratification to the Joint Convention on the Safety of Spent Fuel Management and on The Safety of Radioactive Waste Management
46 Year 2009	29-10-2009	The Presidential Regulation Number 46 Year 2009 on the Ratification to the Convention on the Physical Protection of Nuclear Material

106 Year 2001	04-10-2001	The Presidential Decree Number 106 Year 2001 on the Ratification to the Convention on Nuclear Safety
80 Year 1993	01-09-1993	The Presidential Decree Number 80 Year 1993 on the Ratification to the Amendment of Article VI of the Statute of the International Atomic Energy Agency
82 Year 1993	01-09-1993	The Presidential Decree Number 82 Year 1993 on the Ratification to the Convention on Assistance in Case of a Nuclear Accident or Radiological Emergency
81 Year 1993	01-09-1993	The Presidential Decree Number 81 Year 1993 on the Ratification to the Convention on Early Notification of a Nuclear Accident
49 Year 1986	24-09-1986	The Presidential Decree Number 49 Year 1986 on the Ratification to the Convention of the Physical Protection of Nuclear Material

LIST OF ACTS

12 Year 2011	12-08-2011	The Act Number 12 Year 2011 on the Establishment of Legislations
10 Year 1997	10-04-1997	The Act Number 10 Year 1997 on Nuclear Energy (unofficial translation)
9 Year 1997	02-04-1997	The Act Of the Republic Of Indonesia Number 9 Year 1997 on the Ratification to the Treaty on the Southeast Asia Nuclear Weapons Free Zone
8 Year 1978	18-12-1978	The Act Of Republic Of Indonesia Number 8 Year 1978 on Ratification of the Treaty on the Non-Proliferation of Nuclear Weapons

ADDITIONAL LIST OF REGULATION RELATING TO IAEA - IRRS MISSION TO INDONESIA

No.	Title
1.	Presidential Decree No. 76 of 1998 on nuclear energy regulatory authority
2.	Act No. 17 of 2007 on Long Term National Development Planning
3.	Act No. 44 of 2009 on Hospitals
4.	Government Regulation No. 29 of 2011 on the Classification and Tariff of Non-Tax State Revenues for the National Nuclear Energy Agency (BATAN)
5.	Presidential Decree No. 103 of 2001 on Non Departmental Government Institutions
6.	Presidential Decree No. 9 of 2004 on Amendment of Presidential Decree No. 103 of 2001
7.	Bapeten Chairman Regulation No. 11 of 2012 on Ethical Code and Discipline of Civil Servants of BAPETEN
8.	Act No. 30 of 2014 on Government Administration
9.	Government Regulation No. 60 of 2012 on Governmental Internal Control System

LIST OF REGULATIONS FOR NUCLEAR INSTALLATION

A. Regulations enacted up to 2011

No.	Title
10.	Nuclear Energy Act No. 10/1997 on Nuclear Energy
11.	GR No. 29/2008 on the Licensing of Ionizing Radiation Sources and Nuclear Material
12.	GR No. 46/2009 on the Limit of Nuclear Damage Liability
13.	GR No. 33/2007 on the Ionizing Radiation Safety and Security of Radioactive Sources
14.	GR No. 43/2006 on the Licensing of Nuclear Reactor
15.	GR No. 26/2002 on the Safety of Radioactive Material Transportation
16.	GR No. 27/2002 on the Radioactive Waste Management
17.	Presidential Regulation No. 46/ 2006 on the Ratification of Amendment to the Convention on the Physical Protection of Nuclear Material
18.	Presidential Decree No. 106/ 2001 on the Ratification of Convention on Nuclear Safety
19.	Presidential Decree No. 82/1993 on the Ratification of Convention on Assistance in the Case of a Nuclear Accident or Radiology Emergency
20.	Presidential Decree No. 81/ 1993 on the Ratification of Convention on Early Notification of a Nuclear Accident
21.	Presidential Decree No. 80/1993 on the Ratification of Amendment of Article VI of the Statute of the International

	Atomic Energy Agency
22.	Presidential Decree No. 49/ 1986 on the Ratification of Convention on the Physical Protection of Nuclear Material
23.	BAPETEN Chairman Regulation (BCR) No. 5/2007 on the Safety Provisions for Site Evaluation of Nuclear Reactors
24.	BAPETEN Chairman Regulation (BCR) No.3/2011 on Safety Design of Nuclear Power Reactor
25.	BAPETEN Chairman Regulation (BCR) No.7/2011 on Safety Design of Emergency Power Supply for Nuclear Power Reactor
26.	BAPETEN Chairman Decree No. 04-P/Ka-BAPETEN/VI-99 on the Technical Guidance of the Format and Content of Environmental Impact Analysis Report Construction and Operation of Nuclear Installation and other Installations.
27.	BAPETEN Chairman Decree No. 03/Ka-BAPETEN/V-99 on the Safety Provisions on Radioactive Waste Management
28.	BAPETEN Chairman Decree No. 03-P/Ka-BAPETEN/VI-99 on the Technical Guidance of the Format and Content of Environmental Impact Analysis Report Construction and Operation of Nuclear Reactor.

B. Regulations enacted after 2011

No.	Title
1.	GR No. 54/2012 on Nuclear Installation Safety and Security
2.	Presidential Regulation No. 74/2012 on the Nuclear Liability
3.	BAPETEN Chairman Regulation (BCR) No.16/ 2012 on Clearance
4.	BAPETEN Chairman Regulation (BCR) No.6/2012 on The Design of Computer Based Important to Safety System for Nuclear Power Reactor
5.	BAPETEN Chairman Regulation (BCR) No.2/2012 on The Design of Protection against Internal Hazards other than Fire and Explosive Hazards for Nuclear Power Reactor
6.	BAPETEN Chairman Regulation (BCR) No.1/2012 on The Design of Protection against–Fire and Explosive Hazards for Nuclear Power Reactor
7.	BAPETEN Chairman Regulation (BCR) No. 7/ 2013 On the Environmental Radioactivity Limit
8.	BAPETEN Chairman Regulation (BCR) No. 9/ 2013 on the Site Evaluation in the Seismic Aspect of Nuclear Installation

C. Draft Regulations

No.	Title
1.	Draft Revision of GR No. 26/2002 on the Safety of Radioactive Material Transportation
2.	Draft Revision of GR No. 27/2002 on the Radioactive Waste Management
3.	Draft GR on Licensing of Nuclear Installation and Utilization of Nuclear Material
4.	Draft BAPETEN Chairman Regulation (BCR) on Format and Content of Environmental Impact Analysis of Nuclear Energy Utilization
5.	Draft BAPETEN Chairman Regulation (BCR) on the Site Evaluation in the Meteorology and Hydrology Aspect of Nuclear Installation

MASTER LIST DOCUMENTS – NUCLEAR INSTALLATION AND MATERIAL LICENSING DIRECTORATE

No	Sub Directorate	Technical Procedure	Done			Lvl	Note
			Yes	No	Draft		
1	SDCV	Procedure for Package Validation and Certification (Prosedur Validasi Sertifikat Bungkusan dan Sertifikasi Bungkusan)	√			2	
2		Procedure for Installation and Nuclear Material Work Permit License Issuance (Prosedur Penerbitan SIB Petugas Instalasi dan Bahan Nuklir)	√			2	
3		Procedure for Nuclear Installation and Material Officer Certification (Prosedur Sertifikasi Petugas Instalasi dan Bahan Nuklir)	√			2	
4	SDNRL	Procedure for Nuclear Reactor Licensing (Prosedur Perizinan Reaktor Nuklir)	√			2	Need to revised based on Gov. Reg. 2/2014
5		Procedure for Nuclear Material Licensing (Prosedur Perizinan Bahan Nuklir)			√	2	Need to revised based on Gov. Reg. 2/2014
6	SDNRNIL	Procedure for Non Reactor Nuclear Installation Licensing (Prosedur Perizinan INNR)	√			2	Need to revised based on Gov. Reg. 2/2014

No	Guide / Work Instruction – SDCV	Done			Level
		Yes	No	Draft	
1	Guidelines for Certificate Evaluation and Empowerment Officer of Nuclear Installations (Pedoman Evaluasi Sertifikat dan Pemberdayaan Petugas Instalasi Nuklir)	√			3
2	Guidelines for Evaluation of Radioactive Material Package Testing (Pedoman Evaluasi Pengujian Bungkusan ZRA)	√			3
3	Guidelines for Syllabus of Qualification Examination of Nuclear Material and Nuclear Installation Officer (Pedoman Materi Pengujian Kualifikasi Petugas Instalasi dan Bahan Nuklir)	√			3
4	Guidelines for NPP Personnel Certification (Pedoman Sertifikasi Personil PLTN)	√			3
6	Work Instructions for Package Evaluation (Instruksi Kerja Evaluasi Bungkusan)	√			3

7	Work Instructions for Examiner Team Establishment (Instruksi Kerja Pembentukan Tim Penguji)	√			3
8	Work Instructions for Examination Document Evaluation (IK Evaluasi Dokumen pengujian)	√			3
9	Work Instructions for Examination Materials Formulating (IK Penyusunan soal ujian)	√			3
10	Work Instructions for Examination Implementation and Preparation (IK persiapan penyelenggaraan ujian)	√			3
11	Work Instructions for Research Reactor Officer Examination Evaluation (IK penilaian pengujian (tulisan, Lisan) RND)			√	3
12	Work Instructions for Non Research Reactor Officer Examination Evaluation (general) (IK evaluasi hasil pengujian (umum di luar RD))			√	3
13	Work Instructions for Work Permit Issuance (IK penerbitan SIB)			√	3
14	Work Instructions for Power Reactor Personnel Examination Evaluation (IK evaluasi hasil pengujian petugas RD)		√		3
15	Work Instructions for Type A Package Certificate Evaluation (Instruksi Kerja Evaluasi sertifikat Bungkusan Zat Radioaktif (Tipe A))		√		3
16	Work Instructions for Type B(U) Package Certificate Evaluation (Instruksi Kerja Evaluasi sertifikat Bungkusan Zat Radioaktif (Tipe B(U))		√		3
17	Work Instructions for Type B(M) Package Certificate Evaluation (Instruksi Kerja Evaluasi sertifikat Bungkusan Zat Radioaktif (Tipe B(M))		√		3
18	Work Instructions for Type A Package Certificate Validation (Instruksi Kerja Evaluasi Validasi Sertifikat Bungkusan Zat Radioaktif (Tipe A))		√		3
19	Work Instructions for Type B(U) Package Certificate Validation (Instruksi Kerja Evaluasi Validasi Sertifikat Bungkusan Zat Radioaktif (Tipe B(U))		√		3
20	Work Instructions for Type B(M) Package Certificate Validation (Instruksi Kerja Evaluasi Validasi Sertifikat Bungkusan Zat Radioaktif (Tipe B(M))		√		3

No	Guide / Work Instruction – SDNRL	Done			Level
		Yes	No	Draft	
1	Technical Guidelines of NPP Site License Application (Petunjuk Teknis Perizinan Tapak PLTN untuk Pemohon)	√			3

2	Work Instructions for Evaluation of Site Evaluation Program (IK Evaluasi Program Evaluasi Tapak)	√			3
3	Work Instructions for Evaluation of Site Evaluation Management System Program (IK Evaluasi Program Jaminan Mutu Evaluasi Tapak)			√	3
4	Work Instructions for Evaluation of Site Evaluation Report Document (IK Evaluasi dokumen laporan evaluasi tapak)	√			3
6	Work Instructions for Evaluation of Main Data Document (IK Evaluasi dokumen data utama reaktor nuklir)			√	3
7	Work Instructions for Evaluation of Preliminary Design Information Questionnaire (IK Evaluasi dokumen daftar informasi desain pendahuluan)		√		3
8	Work Instructions for Evaluation of Site Evaluation Management System Implementation Document (IK Evaluasi dokumen rekaman pelaksanaan PJM evaluasi tapak)		√		3
9	Work Instructions for Evaluation of NPP Construction Management System Program (IK Evaluasi dokumen PJM Konstruksi (untuk RD))		√		3
10	Work Instructions for Evaluation of Preliminary Safety Analysis Report Document (IK Evaluasi dokumen LAK Pendahuluan)		√		3
11	Work Instructions for Evaluation of NPP Detailed Design Document (IK Evaluasi dokumen desain rinci reaktor nuklir (untuk RD))		√		3
12	Work Instructions for Evaluation of Commercial NPP Probabilistic Safety Analysis Report Document (IK Evaluasi dokumen LAK Probabilistik (hanya untuk reaktor daya komersial))		√		3
13	Work Instructions for Evaluation of NPP Construction Program Document (IK Evaluasi dokumen program konstruksi (untuk RD))		√		3
14	Work Instructions for Evaluation of NPP Preliminary Design Information Questionnaire Document (IK Evaluasi dokumen daftar informasi desain (untuk RD))		√		3
15	Work Instructions for Evaluation of Nuclear Security System Document (IK Evaluasi dokumen system keamanan nuklir pendahuluan)		√		3
16	Work Instructions for Evaluation of NPP Construction Final Progress Report Document (IK Evaluasi dokumen laporan kemajuan hasil kegiatan konstruksi terakhir (untuk RD))		√		3
17	Work Instructions for Evaluation of NPP Environment Monitoring and Management Implementation Report Document (IK Evaluasi dokumen Laporan Pelaksanaan Pengelolaan dan Pemantauan Lingkungan (untuk RD))		√		3
18	Work Instructions for Evaluation of NPP Commissioning Program Document		√		3

	(IK Evaluasi dokumen program komisioning (untuk RD))				
19	Work Instructions for Evaluation of Construction Activity Report Document (IK Evaluasi dokumen laporan hasil kegiatan konstruksi)		√		3
20	Work Instructions for Evaluation of As Build Technical Drawing Document (IK Evaluasi dokumen gambar teknis reactor nuklir terbangun)		√		3
21	Work Instructions for Evaluation of NPP Security And Seifgard System Document (IK Evaluasi dokumen system seifgard dan system keamanan nuklir)		√		3
22	Work Instructions for Evaluation of Emergency Preparadness Program Document (IK Evaluasi dokumen program kesiapsiagaan nuklir)		√		3
23	Work Instructions for Evaluation of NPP Commisioning Management System Program Document (IK Evaluasi dokumen PJM komisioning (untuk RD))		√		3
24	Work Instructions for Evaluation of Commisioning Activity Final Report Document (IK Evaluasi dokumen laporan kemajuan hasil kegiatan komisioning terakhir)		√		3
25	Work Instructions for Evaluation of Operation Management System Program Document (IK Evaluasi dokumen PJM operasi)		√		3
26	Work Instructions for Evaluation of Final Safety Analysis Report Document (IK Evaluasi dokumen LAK akhir (2010 – 2014 untuk RD, 2011 untuk RND))	√			3
27	Work Instructions for Evaluation of Nuclear Material Seifgard Appendix Document (IK Evaluasi dokumen lampiran seifgard bahan nuklir)		√		3
28	Work Instructions for Evaluation of Operation Activity Report Document (IK Evaluasi dokumen laporan kegiatan operasi)		√		3
29	Work Instructions for Evaluation of Ageing Management Report Document (IK Evaluasi dokumen laporan kajian penuaan)		√		3
30	Work Instructions for Evaluation of ITAAC Document (IK Evaluasi dokumen ITAAC)		√		3
31	Work Instructions for Evaluation of Decomisioning Program Document (IK Evaluasi dokumen program dekomisioning)		√		3
32	Work Instructions for Evaluation of Decomisioning Management System Program Document (IK Evaluasi dokumen PJM dekomisioning)		√		3
33	Work Instructions for Evaluation of Decomisioning Activity Report Document (IK Evaluasi dokumen hasil pelaksanaan kegiatan dekomisioning)		√		3
34	Work Instructions for Evaluation of Waste Management Report Document		√		3

	(IK Evaluasi dokumen hasil pelaksanaan pengelolaan limbah radioaktif)				
35	Work Instructions for Evaluation of Modification Program Document (IK Evaluasi dokumen program modifikasi)		√		3
36	Work Instructions for Evaluation of Modification Management System Program Document (IK Evaluasi dokumen PJM Modifikasi)		√		3
37	Work Instructions for Evaluation of Utilization Program Document (IK Evaluasi dokumen program Utilisasi)		√		3
38	Work Instructions for Evaluation of Utilization Management System Program Document (IK Evaluasi dokumen PJM utilisasi)		√		3

No	Guide / Work Instruction – Nuclear Material – SDNRL	Done			Level
		Yes	No	Draft	
1	Work Instructions for Completeness Evaluation of Nuclear Material Licensing Documents (IK Pemeriksaan Kelengkapan Dokumen Perizinan Pemanfaatan Bahan Nuklir)		√		
2	Work Instructions for Evaluation of Nuclear Material License Application Documents (IK Evaluasi Permohonan Izin Pemanfaatan Bahan Nuklir)		√		
3	Work Instructions for Evaluation of Nuclear Material Transport Approval Application Document (IK Evaluasi Dokumen Permohonan Persetujuan Pelaksanaan Pengiriman Bahan Nuklir)		√		
4	Work Instructions for Evaluation of Spent Fuel Export Approval application Document (IK Evaluasi Dokumen Permohonan Persetujuan Pengiriman Kembali Bahan Bakar Nuklir Bekas)		√		
6	Work Instructions for Evaluation of Spent Fuel Export Procedure Document (IK Evaluasi Dokumen Prosedur terkait Pengiriman Kembali Bahan Bakar Nuklir Bekas)		√		
7	Work Instructions for Evaluation of Fuel and Control Rod Test Certificate (IK Evaluasi Dokumen Sertifikat Uji Elemen Bakar dan Elemen Kendali untuk Pengoperasian Reaktor)		√		
8	Technical Guidance for Nuclear Material License Application Document (nuclear material mining and fabrication) Penyusunan Petunjuk Teknis Permohonan Izin Pemanfaatan Bahan Nuklir untuk Pengguna (Penambangan bahan galian nuklir, pembuatan, pengalihan)		√		
9	Work Instructions for Evaluation of Nuclear Material License Termination Application Document (IK Evaluasi Dokumen Permohonan Penetapan Penghentian Pemanfaatan Bahan Nuklir)		√		

No	Guide / Work Instruction – SDNRNIL	Done			Level
		Yes	No	Draft	
1	Work Instructions for Evaluation of Non Reactor Nuclear Installation Decommissioning Program and Decommissioning Management System Program (Instruksi Kerja Evaluasi Program Dekomisioning INNR & PJM Dekomisioning)	√			3
2	Work Instructions for Evaluation of Non Reactor Nuclear Installation Safety Analysis Report (Instruksi Kerja Evaluasi LAK INNR)	√			3
3	Work Instructions for Evaluation of IPEBRR Safety Analysis Report (IK Evaluasi LAK IPEBRR)	√			3
4	Work Instructions for Evaluation of IRM Safety Analysis Report (IK Evaluasi LAK IRM)	√			3
6	Work Instructions for Evaluation of IEBE Safety Analysis Report (IK Evaluasi LAK IEBE)			√	3
7	Work Instructions for KH-IPSB3 Safety Analysis Report (IK Evaluasi LAK KHIPSB3)		√		3
8	Work Instructions for Evaluation of Non Reactor Nuclear Installation Periodic Safert Review (IK Evaluasi Laporan Review Berkala INNR)		√		3
9	Guidance for Non Reactor Nuclear Installation Ageing Management (Pedoman terkait manajemen penuaan INNR)		√		3
10	Guidance for IPEBRR Ageing Management (Penyusunan pedoman terkait manajemen penuaan IPEBRR)		√		3
11	Guidance for IRM Ageing Management (Penyusunan pedoman terkait manajemen penuaan IRM)		√		3
12	Guidance for IEBE Ageing Management (Penyusunan pedoman terkait manajemen penuaan IEBE)		√		3
13	Guidance for KH-IPSB3 Ageing Management (Penyusunan pedoman terkait manajemen penuaan KHIPSB3)		√		3

No	Guide / Work Instruction – Internal Quality (Non Technical) - DPIBN	Done			Level	Note
		Yes	No	Draft		
1	Guidance for Developing Information Management System on Reactor and Non Reactor Nuclear Installation Licensing (Penyusunan Pedoman Pembuatan Sistem Informasi Manajemen Perizinan Reaktor dan INNR)	√			3	
2	Guidance for Developing Information Management System Nuclear Material Licensing (Penyusunan Pedoman Pembuatan Sistem Informasi Manajemen Perizinan RBN)		√		3	
3	Guidance for Developing Information Management on Personel Certification (Penyusunan Pedoman Pembuatan Sistem Informasi Manajemen Sertifikasi Personil)	√			3	
4	Guidance for Developing Information Management on Certification and Validation of Packaging (Penyusunan Pedoman Pembuatan Sistem Informasi Manajemen Sertifikasi dan Validasi Bungkusan)		√		3	

Procedure and Work Instruction in DIIBN

No.	Document Title	category	No. Document/Date Revision	Comment
1.	Prosedur Inspeksi Instalasi dan Bahan Nuklir <i>Inspection Procedure of Nuclear Installation and Materials</i>		PUK/IIBN/00.1 3 Desember 2010 Rev 1.0	available
2.	Prosedur Penegakan Hukum Pemanfaatan Tenaga Nuklir Bidang IBN <i>Law Enforcement Procedure for Nuclear Energy Utilization</i>		PUK/DIIBN/02 31 Mei 2012 Rev 0.0	available
4.	Prosedur Kendali Dokumen <i>Document Control Procedure</i>			available
1.	IK Kategorisasi Temuan Inspeksi Instalasi dan Bahan Nuklir <i>Work Instruction for Categorization of Inspection Finding</i>		IK/IIBN/00.1.33 5 April 2012 Rev 0.0	available
2.	IK Inspeksi untuk Evaluasi Tapak Reaktor Nuklir Aspek Penentuan Dispersi Zat Radioaktif di Udara dan Air dan Pertimbangan Distribusi Penduduk di Sekitar Tapak Reaktor Daya <i>Work Instruction for Inspection During Site Evaluation Of Nuclear Reactor On Determining Radioactive Substances Dispersion In Air And</i>	Site Evaluation Stage	IK/IIBN/01 21 Mei 2010 Rev 1.0	available

No.	Document Title	category	No. Document/Date Revision	Comment
	<i>Water, And Consideration Of Population Distribution Around The Reactor Site Aspects</i>			
3.	IK Inspeksi untuk Evaluasi Tapak Reaktor Nuklir Aspek Bahaya Kegempaan <i>Work Instruction For Inspection During Site Evaluation of Nuclear Reactor on Seismic Hazard Aspects</i>		IK/IIBN/02 21 Mei 2010 Rev 1.0	available
4.	IK Inspeksi untuk Evaluasi Tapak Reaktor Nuklir Aspek Bahaya Kegunungapian <i>Work Instruction For Inspection During Site Evaluation of Nuclear Reactor on Volcanic Aspects</i>		IK/IIBN/03 21 Mei 2010 Rev 1.0	Available
5.	IK Inspeksi untuk Evaluasi Tapak Reaktor Nuklir Aspek Geoteknik dan Pondasi <i>Work Instruction For Inspection During Site Evaluation of Nuclear Reactor on Geotechnical and Foundation Aspects</i>		IK/IIBN/04 21 Mei 2010 Rev 1.0	available
6.	IK Inspeksi untuk Evaluasi Tapak Reaktor Nuklir Aspek Meteorologi <i>Work Instruction For Inspection During Site Evaluation of Nuclear Reactor on Meteorological Aspects</i>		IK/IIBN/05 21 Mei 2010 Rev 1.0	available
7.	IK Inspeksi untuk Evaluasi Tapak Reaktor Nuklir Aspek Kejadian Eksternal Akibat Ulah Manusia <i>Work Instruction For Inspection During Site Evaluation of Nuclear Reactor on Human Induce External Hazard Event Aspects</i>		IK/IIBN/06 21 Mei 2010 Rev 1.0	available
8.	IK Inspeksi untuk Evaluasi Tapak Reaktor Nuklir Aspek Bahaya Banjir <i>Work Instruction For Inspection During Site Evaluation of Nuclear Reactor on Flood Hazard Aspects</i>		IK/IIBN/07 21 Mei 2010 Rev 1.0	available
9.	Instruksi Kerja Inspeksi Untuk Evaluasi Tapak Reaktor Nuklir Aspek Jaminan Mutu <i>Work Instruction For Inspection During Site Evaluation of Nuclear Reactor on Quality Assurance Aspects</i>		IK/IIBN/08 21 Mei 2010 Rev 1.0	available
10.	Instruksi Kerja Inspeksi Keselamatan Instalasi Nuklir Tahap Operasi Aspek Keselamatan Operasi <i>Work Instruction For Inspection Of Nuclear Installation Safety During Operation Stage On Operation Safety Aspects</i>		IK/IIBN/09 30 September 2010 Rev 1.0	available

<i>No.</i>	<i>Document Title</i>	<i>category</i>	<i>No. Document/Date Revision</i>	<i>Comment</i>
11.	Instruksi Kerja Inspeksi Keselamatan Instalasi Nuklir Tahap Operasi Aspek Perawatan <i>Work Instruction For Inspection Of Nuclear Installation Safety During Operation Stage On Manitenance Aspects</i>	Operation Satge	IK/IIBN/10 30 September 2010 Rev 1.0	available
12.	Instruksi Kerja Inspeksi Keselamatan Instalasi Nuklir Tahap Operasi Aspek Proteksi Radiasi <i>Work Instruction For Inspection Of Nuclear Installation Safety During Operation Stage On Radiation Protection Aspects</i>		IK/IIBN/11 30 September 2010 Rev 1.0	available
13.	Instruksi Kerja Inspeksi Keselamatan Instalasi Nuklir Tahap Operasi Aspek Jaminan Mutu <i>Work Instruction For Inspection Of Nuclear Installation Safety During Operation Stage On Quality Assurance Aspects</i>		IK/IIBN/12 30 September 2010 Rev 1.0	available
14.	Instruksi Kerja Inspeksi Keselamatan Instalasi Nuklir Tahap Operasi Aspek Kesiapsiagaan Nuklir <i>Work Instruction For Inspection Of Nuclear Installation Safety During Operation Stage On Emergency Preparedness Aspects</i>		IK/IIBN/13 30 September 2010 Rev 1.0	available
15.	Instruksi Kerja Inspeksi Keselamatan Instalasi Nuklir Tahap Operasi Aspek Manajemen Penuaan <i>Work Instruction For Inspection Of Nuclear Installation Safety During Operation Stage On Ageing Management Aspects</i>		IK/IIBN/14 30 September 2010 Rev 1.0	available
16.	Instruksi Kerja Pembuatan Laporan Inspeksi <i>Work Instruction for Preparing Inspection Report</i>		IK/IIBN/00.1.15 8 Agustus 2011 Rev 2.0	available
17.	Instruksi Kerja Inspeksi Kendali Dokumen <i>Work Instruction for Inspection of Document Control</i>		Management System	IK/IIBN/00.1.16 11 November 2011 Rev 0.0
18.	Instruksi Kerja Inspeksi Kendali Produk <i>Work Instruction for Inspection of Product Control</i>	IK/IIBN/00.1.17 11 November 2011 Rev 0.0		available
19.	Instruksi Kerja Inspeksi Kendali Rekaman <i>Work Instruction for Inspection of Record Control</i>	IK/IIBN/00.1.18 11 November 2011 Rev 0.0		available

No.	Document Title	category	No. Document/Date Revision	Comment	
20.	Instruksi Kerja Inspeksi Pengelolaan Perubahan Organisasi <i>Work Instruction for Inspection of organizational change Management</i>	Management System	IK/IIBN/00.1.19 11 November 2011 Rev 0.0	available	
21.	Instruksi Kerja Inspeksi Manajemen Proses <i>Work Instruction for Inspection of Process Management</i>		IK/IIBN/00.1.20 11 November 2011 Rev 0.0	available	
22.	Instruksi Kerja Inspeksi Pemantauan dan Pengukuran <i>Work Instruction for Inspection of Monitoring and Measurement</i>		IK/IIBN/00.1.21 11 November 2011 Rev 0.0	available	
23.	Instruksi Kerja Inspeksi Penilaian Diri <i>Work Instruction for Inspection of Self Assessment</i>		IK/IIBN/00.1.22 11 November 2011 Rev 0.0	available	
24.	Instruksi Kerja Inspeksi Penilaian Mandiri <i>Work Instruction for Inspection of Independent Assessment</i>		IK/IIBN/00.1.23 11 November 2011 Rev 0.0	available	
25.	Instruksi Kerja Inspeksi Tinjauan Sistem Manajemen <i>Work Instruction for Inspection of Management System Review</i>		IK/IIBN/00.1.24 11 November 2011 Rev 0.0	available	
26.	Instruksi Kerja Inspeksi Kendali Ketidaksesuaian <i>Work Instruction for Inspection of Incompatibility Control</i>		Management System	IK/IIBN/00.1.25 11 November 2011 Rev 0.0	available
27.	Instruksi Kerja Inspeksi Kendali Tindakan Korektif dan Pencegahan <i>Work Instruction for Inspection of Corrective and Preventive Measures</i>			IK/IIBN/00.1.26 11 November 2011 Rev 0.0	available
28.	Instruksi Kerja Inspeksi Perbaikan Sistem Manajemen <i>Work Instruction for Inspection of Management System Improvement</i>			IK/IIBN/00.1.27 11 November 2011 Rev 0.0	available
29.	Instruksi Kerja Inspeksi Penyediaan Sumber Daya Manusia (SDM) <i>Work Instruction for Inspection of Human Resource Provision</i>			IK/IIBN/00.1.28 11 November 2011 Rev 0.0	available
30.	Instruksi Kerja Inspeksi Kendali Peralatan Pengujian dan Pengukuran <i>Work Instruction for Inspection of Equipment Testing and Measurement</i>	IK/IIBN/00.1.29 11 November 2011		available	

<i>No.</i>	<i>Document Title</i>	<i>category</i>	<i>No. Document/Date Revision</i>	<i>Comment</i>
	<i>Control</i>		Rev 0.0	
31.	Instruksi Kerja Inspeksi Pembelian <i>Work Instruction for Inspection of Purchasing</i>		IK/IIBN/00.1.30 11 November 2011 Rev 0.0	available
32.	Instruksi Kerja Inspeksi Komunikasi <i>Work Instruction for Inspection of Communication</i>		IK/IIBN/00.1.31 11 November 2011 Rev 0.0	available
33.	Instruksi Kerja Inspeksi Kendali Penerimaan, Penyimpanan, dan Penanganan Barang <i>Work Instruction for Inspection of Controlling of Acceptance, Storage , and Handling of Goods</i>	Management System	IK/IIBN/00.1.32 11 November 2011 Rev 0.0	available

LIST OF PROCEDURE FOR REGULATION DEVELOPMENT OF NUCLEAR INSTALLATION AND MATERIALS

NO.	DOCUMENT	STATUS
1.	Prosedur tentang Pembentukan dan Pembinaan Peraturan Perundang-undangan Bidang Instalasi dan Bahan Nuklir Procedure for Making Regulation of Nuclear Installations and Materials	Telah terbit Tahun 2014 Published in 2014
2.	Intruksi Kerja tentang Konsultasi Publik Peraturan Perundang-undangan Bidang Instalasi dan Bahan Nuklir Work Instruction for Public Consultancy on Regulation of Nuclear Installations and Materials	Dalam penyusunan Tahun 2015 Under process in 2015
3.	Intruksi Kerja tentang Pembinaan Peraturan Perundang-undangan Bidang Instalasi dan Bahan Nuklir Work Instruction for Socialization on Regulation of Nuclear Installations and Materials	Dalam penyusunan Tahun 2015 Under process in 2015

List of Legislation and Regulations related to Radiation Facility and Radioactive Material

No.	Name of Legislation or Regulation
1.	Act No. 10 Year 1997 on Nuclear Energy
2.	GR No. 26 Year 2002 on the Safe Transport of Radioactive Material
3.	GR No. 33 Year 2007 on the Safety of Ionizing Radiation and the Security of Radioactive Material
4.	GR No. 29 Year 2008 on the Licensing for Utilization of Ionizing Radiation Sources and Nuclear Material
5.	GR No. 61 Year 2013 on Radioactive Waste Management
6.	President Regulation No. 84 Year 2010 on Ratification of Joint Convention on The Safety of Spent Fuel Management and on The Safety of Radioactive Waste Management
7.	BCR No. 03/Ka-BAPETEN/V-99 on Safety Requirement for Radioactive Waste Management
8.	BCR No. 04/Ka-BAPETEN/V-99 on Safety Requirement for Transport of Radioactive Material
9.	BCR No. 11/Ka-BAPETEN/VI-99 on Licensing for Construction and Operation of Irradiator
10.	BCR No. 05-P/Ka-BAPETEN/VII-00 on Guidance for Safe Transport of Radioactive Material
11.	BCR No. 07-P/Ka-BAPETEN/I-02 on Decommissioning of Medical, industrial, and Research Facility, and Non-Reactor Nuclear Installation
12.	BCR No. 21/Ka-BAPETEN/XII-02 on Quality Assurance Programme for Radiotherapy
13.	BCR No. 02-P/Ka-BAPETEN/I-03 on Services System of External Dose Monitoring
14.	BCR No. 03-P/Ka-BAPETEN/ I- 03 on Requirement for Testing Laboratory of Type A Packaging and Type B Packaging
15.	BCR No. 1 Year 2006 on Dosimetry Laboratory, Calibration, Radiation Measurement, Output of therapy Radiation Equipment, and Standardization of Radionuclide
16.	BCR No. 5 Year 2009 on Radiation Safety in Use of Well-Logging
17.	BCR No. 6 Year 2009 on Radiation Safety in Use of Gauging Equipment
18.	BCR No. 7 Year 2009 on Radiation Safety in Use of Industrial Radiography Equipment
19.	BCR No. 9 Year 2009 on Intervention for TENORM
20.	BCR No. 6 Year 2010 on Health Surveillance for Radiation Worker
21.	BCR No. 8 Year 2011 on Radiation Safety in Use of X-Ray Machine for Diagnostic and Interventional Radiology
22.	BCR No. 9 Year 2011 on Compliance Testing of X-Ray Machine for Diagnostic and Interventional Radiology
23.	BCR No. 16 Year 2012 on Clearance Level
24.	BCR No. 17 Year 2012 on Radiation Safety in Nuclear Medicine
25.	BCR No. 3 Year 2013 on Radiation Safety in Radiotherapy
26.	BCR No. 4 Year 2013 on Radiation Protection and Safety in Utilization of Nuclear Energy
27.	BCR No. 16 Year 2013 on Radiation Safety in Storage of TENORM

28.	BCR No. 17 Year 2013 on Radiation Safety in import, Eksport, and Transfer of Consumer Product
29.	BCR No. 8 Year 2014 on Revision of BCR No. 7 Year 2009 on Radiation Safety in Use of Industrial Radiography
30.	BCR No. 15 Year 2014 on Radiation Safety in Production of X-Ray machine for Diagnostic and Intervensional Radiology
31.	BCR No. 16 Year 2014 on the Working Permit for Particular Personnel in Radiation Facility
32.	BCR No. 6 Year 2015 on Security of Radioactive Material

Guidelines

1. Guideline and Booklet for Radiology Diagnostic and Interventional Practices
2. Guideline and template for Radiation Protection Programme of Industrial Radiografy Practices
3. Guideline and template for Radiation Protection Programme of Radiology Diagnostic and Interventional Practices
4. Guideline for Radiation Protection Programme of Industrial Gauges
5. Guideline for Radiation Protection Programme of Well Logging Industry
6. Guideline for Standard Operating Procedure in Industrial Gauges
7. Guideline for Standard Operating Procedure in Industrial Radiography
8. Guideline for Verification and Radiation Safety Report of Industrial Gauges Practices
9. Guideline for Verification and Radiation Safety Report of Industrial Radiography Practices

Working Instructions

1. Working Instruction for Evaluation and Assessment of Nuclear Medicine Operation License Applications
2. Working Instruction for Evaluation and Assessment of Radioteraphy Operation License Applications using Radioactive Sources
3. Working Instruction for Evaluation and Assessment of Radioteraphy Operation License Applications using Radiation Generator
4. Working Instruction for Evaluation and Assessment of Radioteraphy Installation Construction License Applications
5. Working Instruction for Evaluation and Assessment of Nuclear Medicine Installation Construction License Applications
6. Working Instruction for Evaluation and Assessment of Radiology Diagnostic and Interventional Operation License Applications
7. Working Instruction for Processing Determination of Termination Application Data for Radioteraphy Practices
8. Working Instruction for Processing License Application Data for Radiology Diagnostic and Interventional Practices
9. Working Instruction for Processing Contruction License Application Data for Radioteraphy Practices
10. Working Instruction for Processing Operation License Application Data for Radioteraphy Practices
11. Working Instruction for Processing Determination of Termination Application Data for Radiology Diagnostic and Interventional Practices
12. Working Instruction for Processing Operation License Application Data for In Vivo Nuclear Medicine Practices
13. Working Instruction for Processing Operation License Application Data for In Vitro Nuclear Medicine Practices

14. Working Instruction for Processing Construction License Application Data for In Vivo Nuclear Medicine Practices
15. Working Instruction for Data Input and Checking Completeness of Application Documents for Research and Industrial Facilities
16. Working Instruction for Sub Directorate of Licensing for Radiation Facilities Personels

Forms

1. Application form of Radiology Diagnostic and Interventional
2. Application form of Baggage Fluoroscopy
3. Application form of Construction License Application for Irradiation Facility
4. Application form of Export Radioactive Material for non-medic
5. Application form of import and transfer of ionizing radiation source and radioactive material for medic
6. Application form of import of ionizing source for non-medic
7. Application form of import of radioactive material for non-medic
8. Application form of industrial gauges
9. Application form of industrial radiography
10. Application form of ionizing radiation source fabrication
11. Application form of ionizing radiation source transfer (distribution) for non-medic
12. Application form of nuclear medicine facility construction
13. Application form of nuclear medicine operation
14. Application form of fotofluorograph
15. Application form of radioactive material transfer (distribution) for non-medic
16. Application form of radioisotop production construction
17. Application form of radioteraphy facility construction
18. Application form of radioteraphy operation
19. Application form of tracer

Application form of well logging

APPENDIX VII IAEA REFERENCE MATERIAL USED FOR THE REVIEW

1. INTERNATIONAL ATOMIC ENERGY AGENCY - No. SF-1 - Fundamental Safety Principles
2. INTERNATIONAL ATOMIC ENERGY AGENCY - Governmental, Legal and Regulatory Framework for Safety General Safety Requirement Part 1 (Vienna2010)
3. INTERNATIONAL ATOMIC ENERGY AGENCY - Preparedness and Response for a Nuclear and Radiological Emergency Safety Requirement Series No. GS-R-2 IAEA Vienna (2002)
4. INTERNATIONAL ATOMIC ENERGY AGENCY The Management System for Facilities and Activities. Safety Requirement Series No. GS-R-3 IAEA, Vienna (2006)
5. INTERNATIONAL ATOMIC ENERGY AGENCY – Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards, General Safety Requirements Part 3, 2014 edition
6. INTERNATIONAL ATOMIC ENERGY AGENCY – Safety assessment for facilities and activities, General Safety Requirements Part 4, No. GSR Part 4, IAEA, Vienna (2009)
7. INTERNATIONAL ATOMIC ENERGY AGENCY – Predisposal Management of Radioactive Waste General Safety Requirement Part 5, No. GSR Part 5, IAEA, Vienna (2009)
8. INTERNATIONAL ATOMIC ENERGY AGENCY – Decommissioning of Facilities Using Radioactive Material Safety, Safety Requirement Series No. WS-R-5, IAEA, Vienna (2006)
9. INTERNATIONAL ATOMIC ENERGY AGENCY - Organization and Staffing of the Regulatory Body for Nuclear Facilities, Safety Guide Series No. GS-G-1.1, IAEA, Vienna (2002)
10. INTERNATIONAL ATOMIC ENERGY AGENCY - Review and Assessment of Nuclear Facilities by the Regulatory Body, Safety Guide Series No. GS-G-1.2, IAEA, Vienna (2002)
11. INTERNATIONAL ATOMIC ENERGY AGENCY - Regulatory Inspection of Nuclear Facilities and Enforcement by the Regulatory Body, Safety Guide Series No. GS-G-1.3, IAEA, Vienna (2002)
12. INTERNATIONAL ATOMIC ENERGY AGENCY - Documentation for Use in Regulatory Nuclear Facilities, Safety Guide Series No. GS-G-1.4, IAEA, Vienna (2002)
13. INTERNATIONAL ATOMIC ENERGY AGENCY- - Arrangements for Preparedness for a Nuclear or Radiological Emergency, Safety Guide Series No. GS-G-2.1, IAEA, Vienna (2007)
14. INTERNATIONAL ATOMIC ENERGY AGENCY – Criteria for use in Preparedness and Response for a Nuclear or Radiological Emergency, General Safety Guide Series No. GSG-2, IAEA, Vienna (2011)
15. INTERNATIONAL ATOMIC ENERGY AGENCY– Assessment of Occupational Exposure Due to Intake of Radionuclides Safety Guide Series No. RS-G-1.2, IAEA, Vienna (1999)
16. INTERNATIONAL ATOMIC ENERGY AGENCY - Assessment of Occupational Exposure Due to External Sources of Radiation Safety Guide Series No. RS-G-1.3, IAEA, Vienna (1999)
17. INTERNATIONAL ATOMIC ENERGY AGENCY - Building Competence in Radiation Protection and the Safe Use of Radiation Sources, Safety Guide Series No. RS-G-1.4, IAEA, Vienna (2001)
18. INTERNATIONAL ATOMIC ENERGY AGENCY – Classification of Radioactive Waste, General Safety Guide No. GSG-1, IAEA, Vienna (2009)

19. INTERNATIONAL ATOMIC ENERGY AGENCY – Regulatory Control of Radioactive Discharge to the Environment, Safety Guide Series No. WS-G-2.3, IAEA, Vienna (2000)
20. INTERNATIONAL ATOMIC ENERGY AGENCY – Safety Assessment for the Decommissioning of Facilities Using Radioactive Material, Safety Guide Series No. WS-G.5.2, IAEA, Vienna (2009)
21. INTERNATIONAL ATOMIC ENERGY AGENCY - Convention on Early Notification of a Nuclear Accident (1986) and Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (1987), Legal Series No. 14, Vienna (1987).

APPENDIX VIII ORGANIZATION CHART

