



The Government of the Republic of Indonesia

**NATIONAL REPORT
ON COMPLIANCE TO
CONVENTION ON NUCLEAR SAFETY**

for the 6th Review Meeting 2014

INDONESIA

2013

**Convention on Nuclear Safety
National Report of Republic of Indonesia for the 6th Review Meeting**



FOREWORDS

The Republic of Indonesia is a contracting party to the Convention on Nuclear Safety since 2004. For the purpose of the Third Review Meeting in 2005, Indonesia has submitted its first national report in 2004. This is the fourth report that was prepared and based on the IAEA guideline No. INFCIRC/572/Rev. 3 (2002) on National Reports under the Convention on Nuclear Safety and through a self assessment on the implementation of the nuclear safety of the nuclear facilities in Indonesia. Several parts of the previous report of 2010 will be included in this report, provided that they remain relevant and necessary to report.

To support the national policy on energy based on President Regulation No. 5 Year 2006 on National Energy Policy, Government of Indonesia continues to develop its nuclear infrastructure, especially in strengthening its regulatory infrastructure by improving its regulations, licensing and inspection system and enhancing its human resources. For the purpose of strengthening its regulatory infrastructure, Indonesia has ratified Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management by President Regulation No. 84 Year 2010 on 28 December, 2010. On the other hand, Indonesia has issued some regulations related on siting and design of Nuclear Power Plant (NPP).

In regard to the development of governmental infrastructure for nuclear power, the Government of Indonesia received IAEA's Integrated Nuclear Infrastructure Review (INIR) mission in 2009. From the INIR mission, it can be concluded that Indonesia has completed the action plan for the phase 1 (Considerations before a decision to launch a nuclear power programme is taken) and has completed for the necessary requirements to the phase 2 (Preparatory work for the construction of an NPP after a policy decision has been taken). It is important to note that, based on this review mission, our regulatory framework is considered adequate to license and control the first NPP in Indonesia.

Indonesia also continues to enhance its human resources by dispatching some personnel to several training, workshop and on the job training in relevant with nuclear power plant to the mature country in the operating of NPP such as US, Canada, and Japan.

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Acronym and Abbreviation Used in this Report

ANSN	<i>Asian Nuclear Safety Network</i>
BCD	<i>BAPETEN Chairman Decree</i>
BCR	<i>BAPETEN Chairman Regulation</i>
BAPETEN	<i>Badan Pengawas Tenaga Nuklir (Nuclear Energy Regulatory Agency)</i>
BATAN	<i>Badan Tenaga Nuklir Nasional (National Nuclear Energy Agency)</i>
CONVEX	<i>Convention Exercise</i>
GR	<i>Government Regulation</i>
GSR	<i>General Safety Requirement</i>
IAEA	<i>International Atomic Energy Agency</i>
ICRP	<i>International Commission on Radiological Protection</i>
INFCIRC	<i>Information Circulation</i>
INIR	<i>Integrated Nuclear Infrastructure Review</i>
IRRS	<i>Integrated Regulatory Review Service</i>
MPR	<i>Multi Purpose Reactor</i>
NCA	<i>National Competent Authority</i>
NDMA	<i>National Disaster Management Agency</i>
NEPIO	<i>Nuclear Energy Programme Implementation Organization</i>
NPP	<i>Nuclear Power Plant</i>
NSR	<i>Nuclear Safety Requirement</i>
NWP	<i>National Warning Point</i>
PR	<i>Presidential Regulation</i>
SDI	<i>Site Data Information</i>
SDR	<i>Site Data Report</i>
SER	<i>Site Evaluation Report</i>
TRIGA	<i>Training, Research, Isotopes, General Atomic.</i>

I. INTRODUCTION

1.1. National Policy on Nuclear Energy Programme

Indonesia is committed to continuously improving national development, which requires a secured and sustained energy supply. As energy sector plays very important roles in materializing sustainable national development, the use and supply of national energy should be managed well considering the following aspects: environment, next generation priority, energy needs, social-politics, geopolitics, and economy. Therefore, long-term national energy planning should be formulized carefully for sustainable development.

The planning and preparation process for a NPP in Indonesia has begun since early 1970s. Various studies have been carried out to determine whether NPP will be economically, technically and environmentally feasible.

Indonesia has also done significant infrastructure preparations including establishing an independent regulatory body, preparing the science and technology base for research and engineering, and necessary legal instruments. IAEA Safety Series NG-G-3.1 identifies that there are three distinct steps or milestones and 19 infrastructure issues that need to be achieved and prepared by a country embarking on a nuclear power programme. In order to assess its readiness, the Indonesian government has invited IAEA's INIR mission. The mission was performed in Indonesia in 2009 after the preceding self-assessment activity. The mission concluded that in principle most of the 19 areas of infrastructure necessary for a nuclear power programme for Phase-1 have been adequately prepared and more activities can follow to complete Phase-1 and continue to Phase-2. The accomplishment of Milestone-1 signifies that Indonesia should be ready to make a knowledgeable commitment to a nuclear power programme.

Law and regulations have been enacted in relation to the nuclear power programme. Presidential Regulation (PR) No. 5 Year 2006 on National Energy Policy has included and increased the share of New and Renewable Energy to 17% by 2025 to reduce dependence on fossil as well as to diversify energy. But the Ministry of Energy and Mineral Resources targeted that in 2025 will be 25%. Nuclear energy is part of the New and Renewable energy, as an alternative in national energy optimum mix.

The introduction of nuclear power plant (NPP) in Indonesia is not only to reach an optimum energy mix considering costs and environment, but also to relieve the pressure arising from increasing domestic demand for oil and gas (so that oil and gas resources can be used for export and feed stocks). Thus, the role of NPP is clearly to stabilize the supply of electricity, conserve strategic oil and gas resources and protect environment from harmful pollutants as

the results of the use of fossil fuels. The national commitment to implementing a nuclear power plant program is stated in Act No. 17 Year 2007 on Long-Term National Development Planning, which stipulates that the first NPP should be available to operate before the year of 2025 with high consideration of safety factor.

National Energy Board established in 2008 has issued in the Long-term Plan of National Energy Policy considering nuclear energy as one of the alternative energy. In this Plan, nuclear energy is going to be utilized by considering the security of national energy supply and safety aspect.

1.2. Nuclear Installation Safety Issue

Fukushima Daiichi accident has significant impact on nuclear installation safety issue for three research reactors which has been operated in Indonesia. Stress test must be carried out for these reactors to ensure that all safety requirements are met and a high safety level is achieved. Site evaluation for the three research reactors have been carried out. Result of the site evaluation showed no significant threat toward the reactor safety from the site safety point of view.

1.3. Summary of Important Changes to the Last Report

Some important changes in this National Report on Nuclear Safety Convention compared to the third one (2010) are as follows:

1. the enactment of Government Regulation (GR) No. 54 Year 2012 on the Safety and Security of Nuclear Installation;
2. the enactment of President Regulation (PR) No. 74 Year 2012 on Nuclear Liability;
3. the enactment of GR No. 84 Year 2010 on Ratification of Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management;
4. the enactment of various BAPETEN Chairman Regulations (BCRs) as listed in the Annex 1; and
5. various preparatory programme for NPP development in Indonesia.

II. ARTICLE BY ARTICLE ASSESSMENT

A. GENERAL PROVISION

Article 6 – Existing Nuclear Installations

Each Contracting Party shall take the appropriate steps to ensure that the safety of nuclear installations existing at the time the Convention enters into force for that Contracting Party is reviewed as soon as possible. When necessary in the context of this Convention, the Contracting Party shall ensure that all reasonably practicable improvements are made as a matter of urgency to upgrade the safety of the nuclear installation. If such upgrading cannot be achieved, plans should be implemented to shut down the nuclear installation as soon as practically possible. The timing of the shut-down may take into account the whole energy context and possible alternatives as well as the social, environmental and economic impact.

6.1. List of Nuclear installation

As it was reported previously, Indonesia at the moment is not operating any NPP yet and just operating three research reactors, i.e.: (1) Multipurpose Reactor (MPR) GA Siwabessy, Serpong; (2) TRIGA 2000 Reactor, Bandung; and Kartini Reactor, Yogyakarta which are operated by the National Nuclear Energy Agency (BATAN).

(1) MPR GA Siwabessy

The MPR GA Siwabessy, with 30 MWt maximum power, is a pool type reactor. The reactor has been operated by the Center for Multipurpose Reactor (MPR) BATAN since 1987 for the purpose of material testing and analysis, radioisotope production, research etc. Operating license of the reactor has been renewed until December 2020.

(2) TRIGA 2000 Reactor

The TRIGA 2000 is a pool (TRIGA MARK II) type reactor using H₂O both as the moderator and coolant. The first criticality of the reactor was achieved in 1965, and currently is operated by the Center for Nuclear Technology of Material and Radiometry BATAN for the purpose of material analysis, radioisotope production, research etc. This reactor is in temporary shutdown condition for major maintenance.

(3) Kartini Reactor

Kartini Reactor is also a pool (TRIGA MARK II) type reactor. The first criticality of the reactor was achieved in 1979, and now is operated by the Center for Accelerator and Material Process Technology BATAN for the purpose of material analysis, research, education, training, etc. This reactor has the operation license which is valid until 5 December, 2019.

6.2. Safety Issues of Research Reactors

There are specific main safety issues for three reactors in Indonesia, i.e.:

(a) MPR GA Siwabessy

There are 8 control elements containing the absorber Ag-In-Cd in the core. This absorber is produced by BATAN Technology Co, 6 control elements has been approved in controlling reactivity of reactor, while the remaining 2 control elements are under evaluation to get approval for usage. Furthermore the periodical safety review of the reactor is planned to be started in September 2013.

(b) TRIGA 2000 Reactor

This reactor is temporary in shutdown condition for major maintenance such as retrofitting of reactor building, and control rod replacement.

Based on the workshop on review of utilization planning and stakeholder through IAEA mission for BATAN in 2012, there are some recommendations given by experts to resolve issues at the TRIGA 2000 Reactor:

- the Center for Nuclear Technology of Material and Radiometry should establish two teams:
 - i. Market Team: for seeking potential customers to utilize the reactor; and
 - ii. Technical Team: for re-analyzing the operation of reactor.
- Options for future operation
 - i. operation with new TRIGA fuel elements;
 - ii. operation with existing TRIGA fuel elements and control rods without fuel follower; or
 - iii. operation with MTR fuel elements.

(c) Kartini Reactor

Following the earthquake occurred in Yogyakarta in 2006, some modifications of Kartini Reactor have been done to improve its safety performance. The main modification is retrofit of the reactor building. Following-up the modification, the safety analysis report has been revised in accordance with the current situation and condition.

B. LEGISLATION AND REGULATION

Article 7 - Legislative and Regulatory Framework

1. *Each Contracting Party shall establish and maintain a legislative and regulatory framework to govern the safety of nuclear installations.*
2. *The legislative and regulatory framework shall provide for:*
 - i. *the establishment of applicable national safety requirements and regulations;*
 - ii. *a system of licensing with regard to nuclear installations and the prohibition of the operation of a nuclear installation without a licence;*
 - iii. *a system of regulatory inspection and assessment of nuclear installations to ascertain compliance with applicable regulations and the terms of licences;*
 - iv. *the enforcement of applicable regulations and of the terms of licences, including suspension, modification or revocation.*

7.1. Nuclear Legislation

One of the acts at the hierarchy of legislation and regulation related to nuclear energy in Indonesia is Act No. 10 Year 1997.

7.2. Nuclear Regulation

As it was reported previously, In order to implement the Act No. 10 Year 1997 on Nuclear Energy, the Government of the Republic of Indonesia has enacted several government regulations and presidential regulations. The Government Regulations (GR) and Presidential Regulation (PR) which have been enacted since 2010 are GR No. 84 Year 2010 on Ratification of Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, GR No. 54 Year 2012 on the Safety and Security of Nuclear Installation, and PR No. 74 Year 2012 on Nuclear Liability. In addition to the above GR and PR, several technical regulations in the level of BAPETEN Chairman Regulations have also been established.

Applicable regulations on the safety of nuclear installations are listed on Annex 1.

7.3 Licensing System of Nuclear Reactors

The licensing system of nuclear reactors follows the provisions and requirements stated by the Government Regulation (GR) No. 43 Year 2006 on Licensing of Nuclear Reactor. The GR states that the future NPP in Indonesia shall be land-based and shall meet the proven technology criteria. Basically, it utilizes multi-step licensing system.

The GR No. 43 Year 2006 is currently revised for improving and accommodating the licensing provisions and requirements of establishment and operation of nuclear installations and nuclear materials. The draft of GR on Licensing of Nuclear Installation and Utilization of

Nuclear Material will supersede the GR No.43 Year 2006 and amend a part of GR No. 29 Year 2008 on the Licensing of Ionizing Radiation Sources and Nuclear Material.

7.4 Regulatory Inspection

Regulatory inspection is conducted to verify license holders' compliance to regulatory requirements and license conditions. It functions to provide a high level of assurance that all activities performed by license holders during all stages of authorization process and the lifetime of nuclear facility are executed to put safety as top priority among the others. These regulatory activities are performed by inspectors having necessary and relevant skills who are appointed by the Chairman of the Nuclear Energy Regulatory Agency (BAPETEN).

To ensure that all nuclear facilities are inspected to a common standard and that their level of safety is consistent, BAPETEN has produced written procedures, work instructions and guidelines in sufficient detail. These documents are created by adopting not only relevant GRs and BCRs, but also international practices. This standardization process continues up to now.

Since 2011, BAPETEN has formulated a categorization system for inspection findings based on their safety significance. This formulation allows relevant units in BAPETEN, such as Licensing Unit, to take necessary regulatory actions. Following inspection will be focused on the safety significance of the findings.

Qualification, training, and responsibility of inspectors are stipulated on BAPETEN Chairman Regulation (BCR) No. 18 Year 2012 on Nuclear Safety Inspector.

The regulation stipulates the inspector competences in conducting inspection for siting, construction, commissioning, operation and decommissioning activities of NPP.

7.5 Enforcement

In principle, the enforcement to any violation of license conditions or regulatory requirements could be performed by means of the following actions:

- a. warning note;
- b. license suspension;
- c. license revocation; and
- d. penal provision for nuclear energy utilization without authorization.

Article 8 – Regulatory Body

- 1. Each Contracting Party shall establish or designate the regulatory body entrusted with the implementation of the legislative and regulatory framework referred to in Article 7, and provided with adequate authority, competence and financial and human resources to fulfill its assigned responsibilities.*
- 2. Each Contracting Party shall take the appropriate steps to ensure an effective separation between the functions of the regulatory body and those of any other body or organization concerned with the promotion or utilization of nuclear energy.*

BAPETEN (Nuclear Energy Regulatory Agency of Indonesia) is an independent regulatory body established in 1998 based on Act No. 10 Year 1997. BAPETEN is the only government institution in controlling the utilization of the nuclear energy in Indonesia covering the aspects of safety, security, and safeguards. In controlling the utilization of the nuclear energy, BAPETEN is supported by adequate human and financial resources. BAPETEN has been developing the competence and capacity of human resources through domestic and overseas training and education. The overseas training and education have been performed through cooperation with regulatory bodies from developed countries such as US-NRC, KINS (Korea), CNSC (Canada). Currently, in anticipating the introduction of NPPs, training and education are emphasized on competence enhancement of BAPETEN's personnel in licensing and inspection of NPP siting.

Financial resources of BAPETEN come from the government funding and licensing fee in accordance with the annual budget plan which is approved by National Development Planning Agency and the Minister of Finance.

Article 9 – Responsibility of the License Holder

Each Contracting Party shall ensure that prime responsibility for the safety of a nuclear installation rests with the holder of the relevant license and shall take the appropriate steps to ensure that each such licensee meets its responsibility.

BAPETEN Nuclear Safety Policy states that the main responsibility of the safety in the nuclear energy utilization lies on the license holder, and this responsibility cannot be delegated. Responsibility of the Licensee is mandated on article 61 of the GR No. 54 Year 2012 on the Safety and Security of Nuclear Installation.

C. GENERAL SAFETY CONSIDERATION

Article 10 - Priority to Safety

Each Contracting Party shall take the appropriate steps to ensure that all organizations engaged in activities directly related to nuclear facilities shall establish policies that give due priority to nuclear safety.

10.1. Nuclear Safety Policy

As the license holder, the operators establish nuclear safety policy in order to maintain the safety level of their nuclear reactors, i.e.:

- a. to operate the facility in compliance with the requirements stated in the license conditions established by BAPETEN;
- b. to operate and maintain the facility according to operation and maintenance procedures;
- c. to implement safety culture;
- d. to implement quality assurance programme in the management of the facility; and
- e. to conduct periodical safety review.

Article 11 - Financial and Human Resources

1. *Each Contracting Party shall take the appropriate steps to ensure that adequate financial resources are available to support the safety of each nuclear facility throughout its life.*
2. *Each Contracting Party shall take the appropriate steps to ensure that sufficient numbers of qualified staff with appropriate education, training and retraining are available for all safety-related activities in or for each nuclear facility, throughout its life.*

11.1. Financial Resources

Most of the nuclear installations in Indonesia are owned and operated by BATAN. Their financial resources in operation and maintenance including decommissioning and radioactive waste management of nuclear installations are provided by the government funding.

11.2. Human Resources

Based on Act No. 10 Year 1997 on Nuclear Energy, Article 3 and 4, the Government established the National Nuclear Energy Agency (BATAN) as a promoting body and Nuclear Energy Regulatory Agency (BAPETEN) as the regulatory body. Those two government organizations have responsible for developing the nuclear capacity building program. Ministry of Energy and Mineral Resources has also responsibility to prepared the program of human resource development for Nuclear Power Plant.

Article 19 of Act No. 10 Year 1997 states that all employees operating a nuclear reactor and certain employees in other nuclear installations shall be subjected to working permit. BCR No. 6 Year 2013 on the Working Permits for Personnel of Nuclear Installation and Materials that supersedes the BCR No 10 Year 2008, regulates the mechanism for obtaining the working permit through qualifying examination and certification based on their competency. The employees subjected to working permit in an NPP are reactor operators and supervisors, radiation protection officers, maintenance personnel and nuclear material inventory personnel. To maintain their competency, those employees shall be trained and retrained regularly by the accredited training center i.e. the Center for Education and Training of BATAN.

Beside those trainings required by the licensing purpose, the nuclear facilities conduct other technical training, workshop or on-the-job training for their employee, domestically as well as abroad, refer to the Training Needs Assessment (TNA). Systematic Approach to Training (SAT) is adopted by the Center for Education and Training of BATAN as a standard procedures in organizing the training that needed by the nuclear facilities.

In 2012 IAEA/ANSN conducted for the first time the review mission on education and training in nuclear safety based on the ETReS Guidelines developed by the IAEA. The main objective of the ETReS mission was to evaluate the development and maintenance of a sustainable and adequate education and training programme in nuclear safety in Indonesia consistent with IAEA safety standards and international good practices. This objective is expected to be met by a self-assessment, followed by an international peer review of the results and implementation of an action plan to fulfill the identified needs with the support of the ANSN and the IAEA as appropriate. The scope of the review mission was including the implementation of education and training in relevant institution in Indonesia as follows:

- regulatory body: BAPETEN;
- operating organization: the Center for Multipurpose Reactor – BATAN;
- Technical Supporting Organization (TSO): the Center for Reactor Technology and Nuclear Safety – BATAN;
- training center: the Center for Education and Training – BATAN; and
- universities: University of Gadjah Mada, Bandung Institute of Technology, University of Indonesia.

The review team concluded that in general Indonesia had developed and maintained an adequate education and training programme in nuclear safety. Nevertheless there were some recommendations produced by the review mission in order to improve the quality of capacity building in the field of nuclear safety in Indonesia.

Article 12 - Human Factors

Each Contracting Party shall take the appropriate steps to ensure that the capabilities and limitations of human performance are taken into account throughout the life of a nuclear installation.

GR No. 54 Year 2012 stipulates the obligation of licensees in conducting analysis of human reliability and training and education program. Qualification, health, and task analysis of personnel, ergonomic factor and human-machine interface in nuclear installations are considered in analyzing human reliability. In addition, to implement training and education program, licensees shall establish qualification and competence of nuclear installation personnel from site monitoring to decommissioning activities.

Article 13 – Quality Assurance

Each Contracting Party shall take the appropriate steps to ensure that quality assurance programmes are established and implemented with a view to providing confidence that specified requirements for all activities important to nuclear safety are satisfied throughout the life of a nuclear installation.

GR No. 54 Year 2012 stipulates the provision on implementation of management system in all stages of the lifetime of nuclear installation from siting to decommissioning stage. Guideline on the implementation of management system, including quality assurance, is further provided in BCR No. 4 Year 2010 on Management System for Nuclear Facilities and Activities.

Currently, all nuclear installations have established and implemented the quality assurance programmes and have carried out periodic internal audit based on BCR No. 4 Year 2010 on Management System for Nuclear Facilities and Activities. BAPETEN conducts quality assurance audit for nuclear installation licensee and supplier having the activities and supplying the safety related system, structures and components.

Article 14 - Assessment and Verification of Safety

Each Contracting Party shall take the appropriate steps to ensure that:

- i. comprehensive and systematic safety assessments are carried out before the construction and commissioning of a nuclear installation and throughout its life. Such assessments shall be well documented, subsequently updated in the light of operating experience and significant new safety information, and reviewed under the authority of the regulatory body;*
- ii. verification by analysis, surveillance, testing and inspection is carried out to ensure that the physical state and the operation of a nuclear installation continue to be in accordance with its design, applicable national safety requirements, and operational limits and conditions.*

GR No. 54 Year 2012 stipulates requirements for safety verification and assessments for all stages in the lifetime of nuclear installations. Safety verification has to be performed through analysis and surveillance which include:

- a. implementation of management system in each stage of activities;
- b. design confirmation by independent team;
- c. review of site related factors;
- d. continuous surveillance during commissioning and operation nuclear installations including environmental monitoring; and
- e. assessment of modification and its control.

GR No. 54 Year 2012 also stipulates the obligation of the licensees to carry out periodical safety review during construction, commissioning, and operation of installation, including:

- a. nuclear installation design;
- b. current condition of structure, system, and component;
- c. equipment qualification;
- d. ageing;
- e. safety performance and operation experience feedback;
- f. safety management and nuclear emergency preparedness program; and
- g. environmental radiological impact.

Article 15 – Radiation Protection

Each Contracting Party shall take the appropriate steps to ensure that in all operational states the radiation exposure to the workers and the public caused by a nuclear installation shall be kept as low as reasonably achievable and that no individual shall be exposed to radiation doses which exceed prescribed national dose limits.

The GR No. 33 Year 2007 has adopted some significant principles from IAEA BSS-115, i.e.: defense in depth, good engineered practices, safety verification, intervention and security of radioactive sources. It also adopts the basic concepts of justification, limitation and optimization, through dose constraint and guidance level in medical exposures.

For nuclear installations, this GR governs that the licensee shall continuously, periodically and/or incidentally monitor the environmental radioactivity. The level of environmental radioactivity shall not exceed the limit of environmental radioactivity established by BAPETEN. Besides that, GR No. 43 Year 2006 on Licensing of Nuclear Reactor requires the licensing applicant to submit the report of environmental management and environmental monitoring programme.

In order to improve assurance on safety for harmful impact to the environment, BAPETEN has amended several implementing regulations such as BCD No. 1 Year 1999 on Provision of Working Safety against Radiation into BCR No. 4 Year 2013 on Radiation Protection and Safety in Nuclear Utilizations, and BCD No. 2 Year 1999 on Environmental Radioactivity Limit into BCR No. 7 Year 2013 on Environmental Radioactivity Limit.

Article 16 – Emergency Preparedness

1. *Each Contracting Party shall take the appropriate steps to ensure that there are on-site and off-site emergency plans that are routinely tested for nuclear installations and cover the activities to be carried out in the event of an emergency. For any new nuclear installation, such plans shall be prepared and tested before it commences operation above a low power level agreed by the regulatory body.*
2. *Each Contracting Party shall take the appropriate steps to ensure that, insofar as they are likely to be affected by a radiological emergency, its own population and the competent authorities of the States in the vicinity of the nuclear installation are provided with appropriate information for emergency planning and response.*
3. *Contracting Parties which do not have a nuclear installation in their territory, insofar as they are likely to be affected in the event of a radiological emergency at a nuclear installation in the vicinity, shall take the appropriate steps for the preparation and testing of emergency plans for their territory that cover the activities to be carried out in the event of such an emergency.*

GR No. 43 Year 2006 stipulates that the applicant shall apply for commissioning license to BAPETEN, inter alia, by submitting the emergency preparedness program. In addition, GR No. 33 Year 2007 governs that the licensees are responsible and shall have their own capability for emergency response based on their emergency preparedness program.

As a contracting party, the Government of Indonesia has taken some actions in regard to Early Notification of a Nuclear Accident and Assistance in the Case of a Nuclear Accidents or Radiological Emergency convention, such as:

- a. providing and operating National Competent Authority-Abroad (NCA-A) that is the Chairman of BAPETEN; National Competent Authority-Domestic (NCA-D) that is the Deputy of Chairman of BAPETEN for Licensing and Inspection; and, National Warning Point (NWP) that is the Director of Nuclear Engineering Support and Emergency Preparedness, BAPETEN; and
- b. participating in International Convention Exercise (CONVEX) and Field Exercise.

Provisions on nuclear emergency preparedness and response are stipulated in GR No. 54 Year 2012. Based on this GR, nuclear emergency preparedness and response consist of 3 (three) levels:

- a. installation nuclear emergency preparedness and response;
- b. provincial nuclear emergency preparedness and response; and
- c. national nuclear emergency preparedness and response.

Each level of nuclear emergency preparedness and response has a program that contains infrastructure and response functions.

For the National level, nuclear emergency preparedness is implemented by the coordination of the Chairman of NDMA, and carried out by the licensee and related ministries and/or non-ministerial institutions according to the nuclear emergency program. National nuclear

emergency status is declared by the President and nuclear emergency response is initiated and activated by the Chairman of NDMA.

For provincial level, nuclear emergency preparedness is implemented by the coordination of the Chairman of Regional Response Disaster Agency. Provincial nuclear emergency status is declared by the Governor and nuclear emergency response is initiated and activated by the Chairman of Regional Response Disaster Agency.

For installation level, nuclear emergency is implemented by licensee according to established nuclear emergency program. Licensee declares nuclear emergency status. Each licensee has established the nuclear emergency plan.

According to GR No. 54 Year 2012, one of nuclear emergency response actions is providing information and instructions to workers, public, and media in appropriately and timely manner.

D. SAFETY OF INSTALLATION

Article 17 – Siting

Each Contracting Party shall take the appropriate steps to ensure that appropriate procedures are established and implemented:

- i. for evaluating all relevant site-related factors likely to affect the safety of a nuclear installation for its projected lifetime;*
- ii. for evaluating the likely safety impact of a proposed nuclear installation on individuals, society and the environment;*
- iii. for re-evaluating as necessary all relevant factors referred to in sub-paragraphs (i) and (ii) so as to ensure the continued safety acceptability of the nuclear installation;*
- iv. for consulting Contracting Parties in the vicinity of a proposed nuclear installation, insofar as they are likely to be affected by that installation and, upon request providing the necessary information to such Contracting Parties, in order to enable them to evaluate and make their own assessment of the likely safety impact on their own territory of the nuclear installation.*

The Government of Indonesia takes necessary efforts to ensure that the future NPP site will comply with established requirements for site safety. The siting license application shall be submitted together with of administrative and technical documents.

A site evaluation activity is one of the pre-requisite for issuing site license. In accordance with GR No. 54 Year 2012, site monitoring of the nuclear installation shall be conducted in the construction, commissioning, operation, and decommissioning stage.

For implementing the above GR, BAPETEN has issued several BCRs in more detail related to siting (see Annex 1). In addition to the BCR No. 05 Year 2007 on the Safety Provisions on Site Evaluation of Nuclear Reactor, there have been established several working instructions in order to conduct inspection, and issue site license.

Several site candidates have been identified and studied in detail. During 2010 – 2013, related site study activities include Kramatwatu Banten and Bangka Belitung site. The site studies in Kramatwatu, Banten has been carried out before implementing Bangka Belitung site study, and site studies in Bangka Belitung has been implemented for 2 (two) sites in 2011 and 2013

Site study activities in Bangka Belitung during the last 3 years include regional and near regional survey in 2011, site vicinity survey and site characterization in 2012, and the preparation of licensing documents such as SDR, SER, SDI, EIA, and Master Plan for nuclear power plants in 2013.

The current status of nuclear power plant candidate site in Bangka Belitung is still in the feasibility study stage. Baseline environmental radioactivity measurement has been carried out in coordination with local government in Bangka Belitung.

Article 18 – Design and Construction

Each Contracting Party shall take the appropriate steps to ensure that:

- i. the design and construction of a nuclear installation provides for several reliable levels and methods of protection (defense in depth) against the release of radioactive materials, with a view to preventing the occurrence of accidents and to mitigating their radiological consequences should they occur;*
- ii. the technologies incorporated in the design and construction of a nuclear installation are proven by experience or qualified by testing or analysis;*
- iii. the design of a nuclear installation allows for reliable, stable and easily manageable operation, with specific consideration of human factors and the man-machine interface.*

In accordance with GR No. 54 Year 2012, construction activities shall be performed based on safety design principles. The requirements of safety design shall be implemented from construction to decommissioning stage. The classification of structures, systems, and components of nuclear installations shall be established based on safety, quality, and/or seismicity aspects.

The applicant shall apply the construction licensing application at least 4 years since the site license has been issued. The licensee shall commence the construction activities at most one year since the construction license has been granted. If the licensee has not completed the construction activities for the determined period, the licensee shall apply for renewal of the construction license at least 6 months before the construction license expired.

In order to implement the draft GR on Licensing of Nuclear Installation and Utilization of Nuclear Material, BAPETEN has finished several drafts BCR on the Safety Provisions of NPPs design and construction, referring to the IAEA documents.

Article 19 – Operation

Each Contracting Party shall take the appropriate steps to ensure that:

- i. the initial authorization to operate a nuclear installation is based upon an appropriate safety analysis and a commissioning programme demonstrating that the installation, as constructed, is consistent with design and safety requirements;*
- ii. operational limits and conditions derived from the safety analysis, tests and operational experience are defined and revised as necessary for identifying safe boundaries for operation;*
- iii. operation, maintenance, inspection and testing of a nuclear installation are conducted in accordance with approved procedures;*
- iv. procedures are established for responding to anticipated operational occurrences and to accidents;*
- v. necessary engineering and technical support in all safety-related fields is available throughout the lifetime of a nuclear installation;*
- vi. incidents significant to safety are reported in a timely manner by the holder of the relevant licence to the regulatory body;*
- vii. programmes to collect and analyse operating experience are established, the results obtained and the conclusions drawn are acted upon and that existing mechanisms are used to share important experience with international bodies and with other operating organizations and regulatory bodies;*
- viii. the generation of radioactive waste resulting from the operation of a nuclear installation is kept to the minimum practicable for the process concerned, both in activity and in volume, and any necessary treatment and storage of spent fuel and waste directly related to the operation and on the same site as that of the nuclear installation take into consideration conditioning and disposal.*

Although nuclear power plant has not been constructed in Indonesia, the requirement of safety operation of nuclear installation has been established in GR No. 54 Year 2012. As well as, the requirement for obtaining and procedures for issuing operation-license of nuclear reactor have been established in GR No. 43 Year 2006. This GR is being revised in accommodating the requirements of license issue for other nuclear installations

Annex 1. LIST OF REGULATIONS FOR NUCLEAR INSTALLATION

A. Regulations enacted up to 2011

No.	Title
1.	Nuclear Energy Act No. 10/1997 on Nuclear Energy
2.	GR No. 29/2008 on the Licensing of Ionizing Radiation Sources and Nuclear Material
3.	GR No. 46/2009 on the Limit of Nuclear Damage Liability
4.	GR No. 33/2007 on the Ionizing Radiation Safety and Security of Radioactive Sources
5.	GR No. 43/2006 on the Licensing of Nuclear Reactor
6.	GR No. 26/2002 on the Safety of Radioactive Material Transportation
7.	GR No. 27/2002 on the Radioactive Waste Management
8.	Presidential Regulation No. 46/ 2006 on the Ratification of Amendment to the Convention on the Physical Protection of Nuclear Material
9.	Presidential Decree No. 106/ 2001 on the Ratification of Convention on Nuclear Safety
10.	Presidential Decree No. 82/1993 on the Ratification of Convention on Assistance in the Case of a Nuclear Accident or Radiology Emergency
11.	Presidential Decree No. 81/ 1993 on the Ratification of Convention on Early Notification of a Nuclear Accident
12.	Presidential Decree No. 80/1993 on the Ratification of Amendment of Article VI of the Statute of the International Atomic Energy Agency
13.	Presidential Decree No. 49/ 1986 on the Ratification of Convention on the Physical Protection of Nuclear Material
14.	BAPETEN Chairman Regulation (BCR) No. 5/2007 on the Safety Provisions for Site Evaluation of Nuclear Reactors
15.	BAPETEN Chairman Regulation (BCR) No.3/2011 on Safety Design of Nuclear Power Reactor
16.	BAPETEN Chairman Regulation (BCR) No.7/2011 on Safety Design of Emergency Power Supply for Nuclear Power Reactor
17.	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.
18.	BAPETEN Chairman Decree No. 03/Ka-BAPETEN/V-99 on the Safety Provisions on Radioactive Waste Management
19.	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

Annex 2: ACTION PLAN ON NUCLEAR SAFETY

1. SAFETY ASSESSMENT IN THE LIGHT OF THE ACCIDENT AT TEPCO'S FUKUSHIMA DAIICHI NUCLEAR POWER STATION

Undertake assessment of the safety vulnerabilities of NPP in the light of lessons learned to date from the accident.

Because NPP has not yet been constructed in Indonesia, it is not necessary for Indonesia to implement the assessment of the safety vulnerability of NPP. However, Fukushima Daiichi accident has been become as a lesson learned for improving the regulatory activities for the next NPP and for the safety of existing nuclear installations. There are some reviews of the status of seismicity in all reactors based on the new Indonesia Earthquake Map of 2010.

Indonesia is committed to improving nuclear safety by building of regulatory infrastructure of utilization of nuclear energy by taking into account lessons learned from Fukushima tragedy, by focusing on:

1. Building and enhancing their capabilities on:
 - a. severe accident management and recovery (on-site);
 - b. national organizations; and
 - c. emergency preparedness and response and post-accident management (off-site), through reviewing of the documents of nuclear preparedness and accident management, establishing a clear roles and functions of BAPETEN and other related organizations, coordinating for nuclear emergency preparedness and response, formulating the national policies related to nuclear/radiological emergency preparedness and response, and enhancing nuclear emergency preparedness and response in nuclear facilities;
2. Building and enhancing regional cooperation and international cooperation within the framework of capacity building, such as:
 - a. institutional capacity building, technical upgrading of nuclear emergency preparedness and response and prevention of nuclear/radiological disaster, control and coordination among agencies; and
 - b. sharing of information.

2. IAEA PEER REVIEWS

Strengthen IAEA peer reviews in order to maximize the benefits to Member States.

In July 2012, IAEA conducted expert mission on review of the BAPETEN Management System to strengthen the regulatory activities in Indonesia. Based on the recommendation from the IAEA mission, BAPETEN has improved its Management System. Furthermore, Indonesia has also requested IAEA to conduct the IRRS mission in 2014.

3. EMERGENCY PREPAREDNESS AND RESPONSE

Strengthen emergency preparedness and response

One of BAPETEN's experts was selected to the IAEA fact-finding team in Japan, May 2011 related to Fukushima Accident. Indonesia has been participated as field assistant team in RANET Workshop in Fukushima, June 2013. Following that activities, Indonesia has been improving the capability of nuclear emergency response for RANET, including improving the equipment and human.

In the end of 2013, National nuclear emergency response exercise are going to be carried out for the scenario of radioactive material transportation accident during the shipment of spent fuel from the one site to the other site. This activity will involve some personnel from other related national government institutions and organizations.

The action plans in 2012 and the next five years include:

- perform monitoring of environmental radioactivity in the three reactors (Serpong, Yogyakarta and Bandung), and installing the radioactivity detector in the border areas of Indonesia, where sensors (detectors) connected to the Real Database Monitoring System in BAPETEN in 2013;
- provide awareness for Regional Disaster Management Agency in the Southern of Tangerang in terms of potential radiological hazards in the region, by implementing and providing:
 - capacity building enhancement for Regional Disaster Management Agency of the South Tangerang (including 75 disaster volunteers in each district) to visit the Serpong reactor and participate in the national and international training, seminars, and workshops.
 - coordination between Regional Disaster Management Agency of the South Tangerang and the Nuclear Facilities at the Serpong areas and other related

organization (police, fire department, health office, transportation agency, etc.) to formulate the Memorandum of Understanding (MoU) for emergency preparedness and response.

- nuclear emergency infrastructure, such as materials, equipment, facilities, transport vehicles, and iodine tablets.
- disseminate Government Regulation on Safety and Security on Nuclear Installation as a legal basis of emergency preparedness and response.

4. NATIONAL REGULATORY BODIES

Strengthen the effectiveness of national regulatory bodies

In line with the Fukushima accident, BAPETEN embarks on the strengthening its international co-operation with the multilateral and regional partners, such as with the International Atomic Energy Agency (IAEA) and Asian Nuclear Safety Network (ANSN). Bilateral cooperation has also been developed with the Nuclear Energy Agency (NEA) of Organization for Economic Co-operation and Development (OECD), European Union, the United States Nuclear Regulatory Commission (NRC) and the Canadian Nuclear Safety Commission (CNSC).

BAPETEN has established a strong collaboration with the IAEA, especially in the area of nuclear safety. Immediately after the Fukushima accident, BAPETEN requested the Agency to provide assistance in strengthening regulatory capacity of nuclear safety, with a focus on management system of regulatory body, enhancement of regulatory infrastructure, and the improvement of regulatory effectiveness.

In addition, BAPETEN has requested the Agency to perform Integrated Regulatory Review Service (IRRS) mission to Indonesia in 2014, which will further strengthen the national regulatory infrastructure in nuclear safety. As anticipation for the upcoming IRRS missions, BAPETEN has hosted a regional workshop on Self Assessment in the Preparation of IRRS Mission, which successfully provided a benchmark for Indonesia and other Asian countries.

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

As a follow up to the Fukushima accident, BAPETEN embarks further collaboration especially in strengthening international collaboration in regulatory infrastructure, siting and emergency preparedness with the IAEA member states. Among them is the participation of BAPETEN in its Committee on Nuclear Regulatory Activities (CNRA) of NEA-OECD. Along with Vietnam, Indonesia will regularly participate in the activities of CNRA as a new-entrant country. The European Union assists Indonesia in terms of strengthening the regulatory effectiveness and improving emergency preparedness.

5. OPERATING ORGANIZATIONS

Strengthen the effectiveness of operating organizations with respect to nuclear safety

Not relevant.

6. IAEA SAFETY STANDARDS

Review and strengthen IAEA Safety Standards and improve their implementation

Improvement of legislation and regulation with respect to external events, particularly the design issues in anticipation of multi-events hazards and to multi-unit events in a single site. In drafting and formulating the legislation and regulation in the safety of nuclear installations, IAEA Safety Standards have been considered as one of the references.

7. INTERNATIONAL LEGAL FRAMEWORK

Improve the effectiveness of the international legal framework

Indonesia has reviewed the effectiveness of the international legal framework after Fukushima Daiichi accident in strengthening the international legal framework through identifying the participation in international legal instruments such as convention and treaty and the possibility in ratifying them.

8. MEMBER STATES PLANNING TO EMBARK ON A NPP

Facilitate the development of the infrastructure necessary for Member States embarking on a nuclear power programme

Following the INIR Mission in 2009, some related government institutions and organizations have followed up some recommendations of the mission, eventhough the NEPIO has not yet been established.

9. CAPACITY BUILDING

Strengthen and maintain capacity building

In order to strengthen, develop, maintain and implement the capacity building programmes, Indonesia particularly has conducted several actions such as:

1. developing infrastructure environmental laboratory;
2. developing monitoring system network and providing the training for the personnel for the system;
3. formulating basic training for nuclear power personnel; and
4. formulating personnel competence standard.

To enhance regulatory infrastructure and capability, BAPETEN intensifies cooperation with various international organizations, such as the Nuclear Energy Agency (NEA) of the Organization for Economic Co-operation and Development (OECD) and the European Union.

In anticipation of the construction and operation of the first nuclear power plant in Indonesia, BAPETEN embarks further collaboration with various IAEA member states, especially the United States Nuclear Regulatory Commission (NRC), the Canadian Nuclear Safety Commission (CNSC), the Nuclear Regulatory Authority (NRA) of Slovak Republic, the Korea Institute of Nuclear Safety (KINS), the Atomic Energy Licensing Board (AELB) of Malaysia, and the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA). Furthermore, BAPETEN also seeks to strengthen its human resources, by dispatching its selected employees to perform on-the-job training programme in the NRC and CNSC for the period of 2 to 9 months.

10. PROTECTION OF PEOPLE AND THE ENVIRONMENT FROM IONIZING RADIATION

Ensure the on-going protection of people and the environment from ionizing radiation following a nuclear emergency

To protect the people and environment from the radiation hazards following the Fukushima accident, there are some activities that have been implemented such as:

- radiation monitoring of imported goods from Japan through coordination among ministries, and other government institutions such as BAPETEN, Ministry of Health, Ministry of Agriculture, Ministry of Foreign Affairs, BATAN (National Nuclear Energy Agency), BPOM (Agency for Food and Drug Control), BMKG (Agency for Meteorology, Climatology, and Geophysics), and Customs.

- radiation contamination monitoring on civil aviation, transport of goods from Japan to Indonesia.
- follow-up radiation and contamination monitoring including the measurements of the passengers, crew, aircraft and goods of the plane that landed at the Sukarno-Hatta airport Jakarta and Bali's Ngurah Rai airport to the possibility of contamination from nuclear power plant accident in Fukushima, Japan.
- environmental radioactivity monitoring (through sampling of air, water, and soil) in Manado, Sangihe-North Sulawesi, Nunukan-East Kalimantan, and Jayapura-Papua, three times for each location.

11. COMMUNICATION AND INFORMATION DISSEMINATION

Enhance transparency and effectiveness of communication and improve dissemination of information

BAPETEN and BATAN, as the authorities in charge, provide information and conduct disseminations on the actions conducted following Fukushima accident to the public through their websites.

12. RESEARCH AND DEVELOPMENT

Effectively utilize research and development

BATAN has been implementing some activities on the research and development related to the safety for design of nuclear power plant considering the design improvement after Fukushima accident.