



Nuclear Regulatory Policy Concept on Safety, Security, Safeguards and Emergency Preparedness (3S+EP)

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1. Introduction

- ❑ The use of nuclear power for commercial purpose has started since 1950s, and as of 2008 there are 439 nuclear power plants operating in 31 countries with 372 GW of total capacity. Currently there are 284 research reactors operating in 56 countries, as well as 220 nuclear-powered ship and submarines.
- ❑ Fifty years after the operation of the first nuclear installation, there has been three major nuclear accidents, namely Three Mile Island accident in Pennsylvania, USA in 1979, Chernobyl accident in Ukraine, in 1986 and Tokaimura in Japan, in 1999. Both Three Mile Island and Tokaimura accidents do not cause environmental damage nor present public health risk, while Chernobyl accident cause 56 fatalities due to radiation, as well as huge damage to the public health and environment.



1. Introduction (cont.)

- ❑ In the applications of nuclear energy, the nuclear installation safety is highly related to the safety, security and safeguards (3S), as well as emergency preparedness which is embedded in the 3S system. Emergency preparedness is one of requirements in the operating licence of nuclear installations, since it involves the protection of workers, the public and the environment in the event of accident. Emergency preparedness subsystem at the vicinity of nuclear facilities is the most important part in ensuring safe evacuation of the general public. Based on lessons learned from the past nuclear accidents, the availability of infrastructure is crucial in assuring proper emergency response.



2. Nuclear Regulatory Philosophy

2.1. Legal Aspect

- The international norms and practices dictate that regulatory body shall be effectively independent from the agency or organisation that bear the responsibility in promoting nuclear energy, operating nuclear facilities or undertaking activities using nuclear energy. Its independence encompass political, legal and financial aspects, as well as the capability in disseminating information for the public, performing international cooperation and developing human resources, as stipulated by the Act No 10 of 1997 on Nuclear Energy.



2. Nuclear Regulatory Philosophy (Cont.)

- The control of nuclear energy in Indonesia is required in Article 14, Act No 10 of 1997 which states that the control of nuclear energy is assigned to a regulatory body via the regulation development, licensing and inspecting by taking safety, security and safeguards aspects into account. In accordance with its statute, the regulatory body reports directly to the President and is assigned to provide assurance to the public and environment, nationally and internationally. The regulatory body has the responsibilities in assuring safety and peace by complying with the obligations set forth in the international nuclear agreements that have been ratified by the Indonesian government as national laws



2. Nuclear Regulatory Philosophy (Cont.)

2.2. Technical Aspects

- **Engineering and Scientific Principles**
 - The discharge of the control of nuclear installation is based on engineering and scientific principles, especially the construction and the operation of nuclear installations that shall abide the applicable international norms and practices. The basis for regulation and engineering judgement is the defence in depth principle. The defence in depth principle is a concept that is utilised during the lifetime of the nuclear installations, from the site evaluation phase to the decommissioning phase. The defence in depth principle is necessary due to limitation of technology and the possibilities of human or organisational error. The defence in depth principle can be categorised into:
 1. failure prevention;
 2. unanticipated transient detection; and
 3. mitigating efforts against fault consequences.



2. Nuclear Regulatory Philosophy (Cont.)

Radiological Protection Principles

- Risk-based regulatory control of nuclear installation is needed, during both normal operation and abnormal conditions, for the safety of workers, public and the environment. Radiation protection principle considers the interconnection between regulation and the assessment of the normal operating conditions, which involves two basic principles:
 - 1. The exposure is kept below the annual limit; and**
 - 2. The exposure is maintained as low as reasonably achievable.**
- The assumptions in regulation development and safety assessment for normal operation are of deterministic type, which is characteristically different with probabilistic nature of regulation development and risk assessment for accident scenario.



3. Nuclear Regulatory Policy

3.1. Nuclear safety

Nuclear regulatory policies that are set forth in government regulations for the licensing of nuclear installations, from the design phase to the decommissioning phase, is that any nuclear installations must be based on proven technology, hence the safety of public, workers and the environment is assured. The owner of nuclear installations bears the responsibility in ensuring safety during all stages of the operation of the installations, namely in the design, the construction, the commissioning, the operation, the decommissioning and the shutdown of the installations, as well as the rehabilitation of contaminated area. The government regulations also stipulate the responsibilities and obligations of the licensee in the management of radioactive waste and the provision of financial guarantee for the construction and the operation of the installations, which commensurate with the current industrial and economic capabilities.



3. Nuclear Regulatory Policy (Cont.)

3.2 Nuclear security and safeguards

- ❑ The government regulations also stipulate that nuclear materials are exclusively for peaceful purposes (i.e. safeguards principle). Hence, to prevent diversion from peaceful use of nuclear energy, an effective regulatory control is necessary. Since safeguards issue is of high importance, nuclear security is one of the strategic challenges for the regulatory body. National and international-level collaborations are absolutely needed to anticipate for potential diversions. Government regulations on nuclear security therefore must cover the security of nuclear materials, nuclear facilities, nuclear area and the cooperative arrangement with local and international entities.



3. Nuclear Regulatory Policy (Cont.)

3.3. Nuclear liability

Regulatory policy set forth in government regulation has the objective to ensure the remediation of the environment and the provision of financial compensation to the affected public in the event of nuclear accident. The licensee is obliged to provide financial compensation as required in the regulations for the construction and operation of nuclear installations. The regulations have to establish adequate financial guarantee for the third party in the event of nuclear accidents that cause property damage and personal injuries or even fatalities.



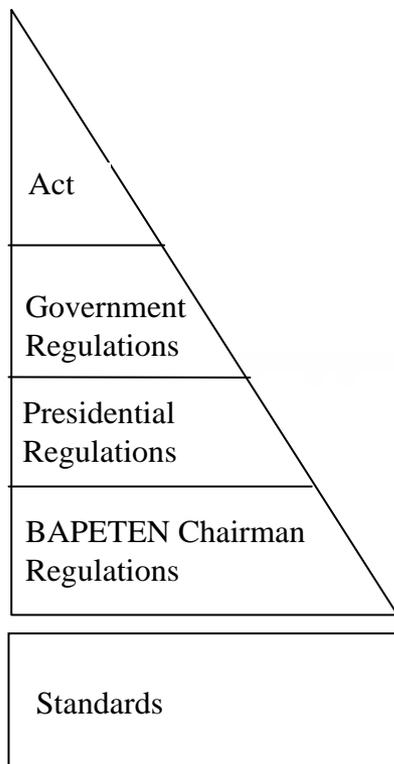
3. Nuclear Regulatory Policy (Cont.)

3.4. Emergency preparedness

Nuclear installations have provided enormous benefits to our society, yet if they are not managed professionally and neither followed by a sufficient oversight, it can produce unintended consequences. To mitigate the consequences of accidents, the central and regional governments must be capable and ready to provide immediate and appropriate response. The government has to establish a rule that regulates the management of the accident as an emergency response system. The government has the capability to provide effective response and proper intervention to the accident. In the event of accident, the government shall be equipped and ready to evacuate and protect the public. Such requirements shall be clearly established in the regulations of emergency preparedness and response.



4. Regulations



The Act is the most fundamental legislation in the use and the control of nuclear energy

Government regulations establish the implementation of the Act

Presidential regulations establish the implementation of the Act and the government regulations

BAPETEN Chairman regulations establish the detailed implementation of the Act and the government regulations

Standards establish the requirements for the component, structures and systems in the design, construction and operation of nuclear installations.



5. Safety, Safeguards & Security (3S) + Emergency Preparedness (EP)

- The 3S+EP is an integrated and comprehensive system. The 3S part is a combined subsystem of regulatory policies in the control of nuclear energy. The EP part is a subsystem embedded in the 3S subsystem and is an important part of the requirements for an operation license in order to anticipate any nuclear incidents and accidents. Regulatory body shall discharge oversight on 3S+EP thoroughly. Cooperation based on EP policy must clearly establish lines of responsibilities at the local and national levels. In the case of nuclear accident, the regulatory body collaborates with the IAEA and foreign countries, as stipulated in the applicable international conventions and bilateral agreements.



5. Safety, Safeguards & Security (3S) + Emergency Preparedness (EP) (Cont.)

- One of the important regulatory issues is the capability of the public in performing self-evacuation, whether they are properly trained and whether the international institutions and governments have made efforts to train the public for emergency situation. It is necessary that the countries with the risks of nuclear accidents to develop proper regulatory infrastructure, which covers regulations, licensing, review and assessment, inspection and enforcement, by considering the issues of 3S.



5. Safety, Safeguards & Security (3S) + Emergency Preparedness (EP) (Cont.)

- Even though 3S issues have been thoroughly established and implemented in the process of operation licensing in the countries with nuclear power, the author deems it necessary to assess the national capability in mass evacuation, especially for the population in the off-site area of the nuclear installations. Emergency preparedness (EP) is often overlooked and, therefore, shall be required in the licensing of nuclear installation. The EP arrangement shall include the provision of adequate infrastructures such that providing safety assurance to the public. The requirements in the licensing of nuclear installations, among others, shall be:
 - 1. The control and enforcement of prescribed zoning at the offsite area of nuclear installations, such that evacuation can be performed effectively in the event of accidents.***
 - 2. Establishment of evacuation points along with the required infrastructures.***
 - 3. Communication between the authorities and the public, as well as the need for early warning system to ensure immediate evacuation***
 - 4. Training and exercise for emergency preparedness.***



6. Conclusion

1. Regulations on the area of safety, security, safeguards, emergency preparedness and nuclear liability have been promulgated, and they are the basic requirements for the issuance of operation license
2. Regulations on the zoning of the vicinity of nuclear installations needs to be developed in order to be a determining requirement for operation license issuance.
3. People at the offsite area of nuclear installations need to be trained for safe evacuation and protection.
4. Emergency shelter needs to be prepared.
5. The responsibilities and control assigned by 3S+EP concepts are essential in the use of nuclear energy.



**THANK YOU
FOR YOUR ATTENTION**

