

CHALLENGES ON SECURITY INFRASTRUCTURE FOR DECOMMISSIONING OF NUCLEAR FACILITIES IN INDONESIA

BAMBANG TRI PURNOMO

Indonesian Nuclear Energy Regulatory Agency (BAPETEN)

Jakarta, Indonesia

Email: b.tripurnomo@bapeten.go.id

LUKMAN HAKIM

Indonesian Nuclear Energy Regulatory Agency (BAPETEN)

Jakarta, Indonesia

An assessment of regulatory infrastructure has been carried out to ensure the security in decommissioning of nuclear facilities in Indonesia. Indonesia have many nuclear facilities, but none of them have implemented decommissioning. Indonesia only have a little experience in the decommissioning of the nuclear-related facility (Phosphoric Acid Purification facility owned by PT. Petrokimia Gresik). However, the nuclear facilities in Indonesia are aged more than 30 years. In fact, the first nuclear reactor in Indonesia that located in Bandung has been operated for more than 50 years. So, the decommissioning activities may take place in the not-too-distant future. Many attentions have been given on the safety of the decommissioning regulations. However, the attention on how to ensure the adequacy of security infrastructure on every steps of decommissioning in Indonesia is still low. Hence it is important to evaluate and improve the decommissioning security infrastructure. The method used in this assessment is to compare the existing regulations in Indonesia with various IAEA standards and guidance. Based on this gap analysis it can be concluded that there are several challenges on the security aspect on the decommissioning of nuclear facility including the need for national policy on the security of decommissioning and regulation that guarantees the funding of security infrastructures on long decommissioning. Some guidelines also need to be developed, such as: the establishment of proper security plan based on every decommissioning steps, the implementation of a graded approach on the security of decommissioning, ensuring information security, cybersecurity, maintaining security culture, and how to prevent insider threat during decommissioning.

1. INTRODUCTION

Decommissioning is the process that should be done by the facility that entering its final life. It is the process when administrative and technical action are conducted to allow the removal of some or all regulatory control from facility. Until now, Indonesia only have a little experience in the decommissioning of nuclear facility, which is conducted on Phosphoric Acid Purification (nuclear related) facility owned by PT. Petrokimia Gresik.

There are several nuclear facilities operating in Indonesia, including three research reactors. All of them are in operation stage. The age of those facilities varies from 35 to 58 year old. The oldest are the TRIGA 2000 reactor located in Bandung, West Java (reached its first criticality in 1964). So, the decommissioning activities may take place in the near future.

In Indonesia, all activities related nuclear energy are regulated by BAPETEN (Indonesian Nuclear Energy Regulatory Agency). BAPETEN already issued regulation related to all stages of nuclear facility, including decommissioning. Radiation safety is become the most considered aspect on those regulations. However, even though the purpose of the decommissioning is to return the site into its original state, by removing nuclear material and other radioactive materials from it, there is probability that the threat on the theft of nuclear material and the sabotage of nuclear installation still exist during this process. Therefore, a security system or physical protection system is still needed during the decommissioning stage. Unfortunately, the attention on how to ensure the adequacy of security infrastructure on every steps of decommissioning in those regulations is still low.

2. IAEA GUIDANCE FOR THE SECURITY OF DECOMMISSIONING

IAEA guidance on the security of decommissioning can be found in the IAEA Nuclear Security Series (NSS) No. 35-G Security during the Lifetime of a Nuclear Facility, since the main publication for decommissioning, General Safety Requirement (GSR) Part 6 Decommissioning of Facilities, mostly discuss about the safety requirement.

NSS No. 35-G stated that the operator should revise the security plan prior to the transition to decommissioning stage, and also revise the security measures using graded approach. The operator should also revise the security measures for protection of the sensitive information asset and implement measures to meet regulatory requirements for nuclear security during the decommissioning stage, including for computer security, sustainability, contingency planning, emergency preparedness, incident reporting, trustworthiness, quality assurance, nuclear security culture and nuclear materials accounting and control, as applicable.

3. REGULATORY FRAMEWORK IN INDONESIA

The requirement related to decommissioning nuclear installation in Indonesia are mentioned in some regulations below:

- Government Regulation (GR) No. 54/2012 on the Safety and Security of Nuclear Installation;
- Government Regulation (GR) No. 2/2014 on the Licensing of Nuclear Installation and Nuclear Material Utilization;
- BAPETEN Regulation (BR) No. 4/2009 on the Decommissioning of Nuclear Reactor;
- BAPETEN Regulation (BR) No. 6/2011 on the Decommissioning of Non Reactor Nuclear Installation.

GR No. 54/2012 stated that at the decommissioning stage, after the nuclear material are transferred outside the nuclear installation site, the licensee should submit special equipment declaration and nuclear related materials to the Chairman of BAPETEN every time a change occurs; and ensure the physical protection of nuclear installations, special equipment, and nuclear related materials.

GR No. 2/2014 stated that technical requirements for obtaining Decommissioning permits includes: a. decommissioning program; b. radiation protection and safety program; c. nuclear preparedness program; and d. document management system.

The Decommissioning Program mentioned in the GR No. 2/2014 above are described in more detail in BR No. 4/2009 and BR No. 6/2011. On these two regulations, the decommissioning program should includes nuclear security and safeguards programs. But unfortunately, there is no further explanation about the security programs on those regulations. It is only stated that the security programs for the decommissioning is an adaptation from the existing physical protection plan during operation stage.

Since there is no further explanation on the security during decommissioning stage, and considering that the security aspect in decommissioning is no less important than the safety aspect, the national policy regarding security in decommissioning need to be emphasized more.

4. CHALLENGES ON THE SECURITY ASPECT ON THE DECOMMISSIONING OF NUCLEAR FACILITY

By comparing the IAEA guidelines and Indonesian regulations related to the decommissioning above, we can see that there are some gaps in those regulations on the security aspect. These gaps can be seen again on Table 1.

TABLE 1. COMPARISON BETWEEN IAEA GUIDELINES AND INDONESIA REGULATIONS ON THE SECURITY OF DECOMMISSIONING

IAEA Guidelines	Indonesia Regulations
<p>1. NSS No. 35-G:</p> <p>a) Operator should revise the security plan prior to the transition to decommissioning stage, using graded approach.</p> <p>b) The operator should also revise the security measures for protection of the sensitive information asset, computer security, sustainability, contingency planning, emergency preparedness, incident reporting, trustworthiness, quality assurance, nuclear security culture and nuclear materials accounting and control, as applicable.</p>	<p>1. GR No. 54/2012: The licensee should ensure the physical protection of nuclear installations, special equipment, and nuclear related materials. ()</p> <p>2. GR No. 2/2014: Technical requirements for obtaining Decommissioning permits includes: a) decommissioning program; b) radiation protection and safety program; c) nuclear preparedness program; and d) document management system.</p> <p>3. BR No. 4/2009 and BR No. 6/2011: e) the decommissioning program should includes nuclear security and safeguards programs. f) the security programs for the decommissioning is an adaptation from the existing physical protection plan during operation stage.</p>

These gaps can pose challenges during the implementation of decommissioning process, so they are need to be solved by adding new provision or guideline on the regulations. Some of those provisions or guidelines that do not yet exist and need to be added to the regulations are as follows.

4.1. Provision or guideline on the establishment of proper security plan based on every decommissioning steps using graded approach

During decommissioning process/steps, there will be some changes in the facility condition, for example the change in facility configuration because of the removal of fuel or other radioactive material from the facility and the reduction of vital equipment/area. This may reduce the risk related to the material or vital area. But other risk also increase during decommissioning process, for example the risk that arise from the many new personnel/workers, and from the transport of nuclear material. Every process or step will have different condition and risk, so it is wise to implement graded approach on the security measures, to avoid wasting resources on unnecessary security. Hence, the operator need to adjust the security plan or security measures applied using graded approach based on those condition and risk during every decommissioning steps.

Right now, there is no clear guideline on those regulation on how to adjust security plan during decommissioning by using graded approach, although it is stated on BR No. 4/2009 and BR No. 6/2011 that the security plan can be adapted from the security plan on the operation stage. However, it is likely that the adjustment for decommissioning process is not just by simple adaptation, it could need recalculation on the security plan itself. There will also a challenge to integrate the security measures into the workflow of the decommissioning process without hindering work. So, in order for operators to be better prepared in making such security plans adjustment using graded approach, it is necessary to include requirement or guideline regarding this matter in regulations.

4.2. Provision or guideline on how to prevent insider threat

The shift from the operation to the decommissioning stage resulted on the cessation of several activities at the facility. There will also some changes during the process, and not every personnel will be involved in the decommissioning process. Some personnel could lost their job. This will have some impact on the working environment. It could create lack of motivation and depression among the personnel, and could create many disgruntled employees. Meanwhile, there will be some addition of new personnel with various background come to the facility to involve in the decommissioning process. These condition can increase the risk of the insider threat.

To reduce the risk of the insider threat, the facility need to establish a program to prevent and counter it. Procedures and arrangements should be established to perform human reliability programs on those who are responsible for storage security. Background checks and trustworthiness determinations should also be implemented.

Considering the importance of the prevention and mitigation program from the insider threat during decommissioning, the requirement of its establishment need to be stated in the regulation.

4.3. Provision or guideline on ensuring information security and cybersecurity

Even though decommissioning will dismantle the facility and return the site environment to its initial condition, there are still a lot of important information that need to be protected during the process. The important information including schematic and diagram of the facility, specific description of the security plan and measures, nuclear material transport routes, access code, etc. So, the facility still need to establish its security. During the decommissioning, there are also possibility that facility will still use computer based system in many aspect, including safety and security. To protect those computer based system, facility will need to establish cybersecurity/computer security.

Considering the importance of this information security and cybersecurity, the requirement of its establishment need to be stated in the regulation.

4.4. Provision on the requirement on maintaining security culture

Decommissioning will create some impact on the working environment. There will be increased pressure to reduce staff number, that could create uncertainty among the personnel. This will reduce the morale and dedication of the personnel, especially the one who not be involved in the decommissioning process. Meanwhile, there will be addition of new workers from contractor who may not understand about security culture. There will also some changing on the structure and physical layout of the facility as it is dismantled, that may reduce the awareness of the personnel. All of those will affect the strength of security culture on the facility.

The reduction on the awareness of the importance security culture can affect security implementation, because security implementation is not just rely on the physical measures and procedures, but also on the attitudes and believes of the personnel on the facility.

Considering the importance of this security culture during decommissioning, the requirement of its establishment need to be stated in the regulation.

4.5. Provision on the requirement of financial guarantee of security infrastructures on long decommissioning.

On the GSR Part 6, IAEA mentioned two strategies for decommissioning; immediate dismantling and deferred dismantling. On the immediate dismantling, the equipment and structures, systems and components of a facility containing radioactive material are removed and/or decontaminated to a level that permits the facility to be released from regulatory control. While on the deferred dismantling, all or part of a facility containing radioactive material is either processed or placed in such a condition that it can be put in safe storage and the facility maintained until it is subsequently decontaminated and/or dismantled. The final removal of control on this deferred dismantling can be postponed for 40 - 60 year.

Those two strategies required funding. GSR Part 6, as well as BR No. 4/2009 and BR No. 6/2011, already explain about the financial assurance requirement for safe decommissioning. However, since those document are mainly focus on safety aspect, the requirement on financial assurance for security measures during the decommissioning is not addressed.

To implement proper security measures, the facility need to provide funding. The decommissioning process could take a long time, especially for those implementing a deferred dismantling that can last decades. During this period security measures should always be taken. Facility need to keep providing guards and other security equipment throughout the process, and all of this requires funding.

Considering the importance of this financial assurance for security, the requirement of it need to be stated in the regulation.

5. CONCLUSION

- (a) Indonesia already has adequate regulations regarding decommissioning, but most of them only focus on the safety aspect.
- (b) Provisions related to security on decommissioning need to be revised in Indonesian regulations.
- (c) Several provisions that need to be added on Indonesian regulations on security of decommissioning including establishment of proper security plan using graded approach, prevention against insider threat, information security and cybersecurity, maintaining security culture, and financial guarantee of security infrastructures.

REFERENCES

- [1] Security during the Lifetime of a Nuclear Facility, IAEA Nuclear Security Series (NSS) No. 35-G, IAEA, Vienna (2019).
- [2] Decommissioning of Facilities, IAEA General Safety Requirement (GSR) Part 6, IAEA, Vienna (2014).
- [3] Safety and Security of Nuclear Installation, Government Regulation (GR) No. 54/2012, Republic of Indonesia, Jakarta (2012).
- [4] Licensing of Nuclear Installation and Nuclear Material Utilization, Government Regulation (GR) No. 2/2014, Republic of Indonesia, Jakarta (2014).
- [5] Decommissioning of Nuclear Reactor, BAPETEN Regulation (BR) No. 4/2009, BAPETEN, Jakarta (2009).
- [6] Decommissioning of Non Reactor Nuclear Installation, BAPETEN Regulation (BR) No. 6/2011, BAPETEN, Jakarta (2011).
- [7] Maintaining Effective Security during the Decommissioning of Nuclear Power Plants, WINS International Best Practice Guide 4.13, WINS, Vienna (2020)