

Efforts for Appropriate Responses to Safeguards Activities

(1) Overview

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Abstract

In order to ensure transparency in the peaceful use of nuclear materials in state, it is important to appropriately respond to safeguards activities conducted by the IAEA/state. Inappropriate response to these activities could have significant impacts in sustainable nuclear utilization activities, such as raising suspicion from the international community about the misuse of nuclear materials by not only operators but also by state. In order to strengthen activities to appropriately respond to safeguards activities, JAEA has started the following one activity of (I) for all staff to promote understanding and raise awareness of safeguards and three activities of (II) for the staff involved in safeguards activities to appropriately respond on-site to the activities since 2020: (I) Basic education of safeguards, (II-1) Lectures, (II-2) Case studies and (II-3) Standardization of procedures related to safeguards response. Questionnaires, exam or evaluations from responsible persons in each site after those activities revealed that those efforts promoted understanding and raised awareness of safeguards for all staff, and raised and maintained to recognize safeguards as importance, understanding risks of inappropriate response to safeguards and unified of safeguards responses throughout JAEA for the staff involved in safeguards activities. These results indicated that the efforts contributed to decrease the risk of inappropriate response to safeguards activities.

1. Introduction

In order to ensure transparency in the peaceful use of nuclear materials in Japan, it is important for operators to appropriately respond to safeguards activities conducted by the IAEA/state, according to safeguards agreements including additional protocol or domestic laws. Inappropriate response to these activities could have significant impacts on sustainable peaceful nuclear utilization activities, such as raising suspicion from the international community about the misuse of nuclear materials by not only operators but also state.

Safeguards activities are included response to routine and random inspections, and complementary access based on additional protocol, management of seals and surveillance installed by IAEA/state, provision of facilities information to IAEA/state in advance regarding operations status, design or access restrictions, and nuclear material accounting and control for. Staff involved in safeguards activities need to respond appropriately to those. For that, it is important to recognize that each person has important role to play in execution of international agreements and to understand the risk and situation of inappropriate response to safeguards activities. On the other hand, general staff, who have few opportunities to be involved in safeguards activities, need to respond such as complementary access or actively provision of facility information as well as the staff in charge of safeguards activities. However, since there are only a limited number of practitioners in charge of safeguards, the awareness of safeguards among general staff is low. Therefore, it is important to promote understanding and raise awareness of

safeguards for general staff as well. Consequently, in order for operators to appropriate responses to those safeguards activities, it is necessary to implement appropriate training activities for both staff in charge of safeguards activities and general staff.

As conventional activities for safeguards in JAEA, actual response to safeguards activities has been engaged by staff in each site and the sharing information and lateral spread has been conducted by staff in headquarters. In order to strengthen activities for appropriate response to safeguards activities, the headquarters took a lead in starting four voluntary activities since 2020 by referring to activates to develop nuclear security culture started in JAEA [1]. In this paper, the specific details and the results until 2022 for those activities are introduced.

2. Efforts for Appropriate Responses to Safeguards Activities in JAEA

In order to strengthen activities for appropriate response to safeguards activities, we set two goals for each target staff; for all staff including general staff and the staff involved in safeguards activities in JAEA to promote understanding and raise awareness of safeguards, and for the staff involved in safeguards activities to appropriately respond on-site to the activities.

Until now, the JAEA has conducted activities only for staff involved in safeguards activities and has not provided education for general staff. Therefore, JAEA provide with basic education of safeguards to raise awareness of the importance and promote understanding for all staff.

In JAEA, there are many sites, and the staff is involved in safeguards activities in each site. In order that the staff appropriately respond to the activities with a certain level of response quality throughout JAEA, it is necessary to maintain and raise to recognize safeguards as importance, understand risks of inappropriate response to safeguards and its prevention and unify safeguards responses whole JAEA. Therefore, three activities for the staff involved in safeguards activities are Lectures, Case studies and Standardization of procedures related to safeguards response.

Table 1 illustrates the list of the efforts for appropriate responses to safeguards activities.

Table 1. List of the efforts for appropriate responses to safeguards activities in JAEA

	Basic education of safeguards	Lectures	Case studies	Standardization of procedures related to safeguards response
Purpose	To promote understanding and raise awareness of safeguards	To appropriately respond on-site to the activities		
		To maintain and raise to recognize safeguards as importance	To understand risks of inappropriate response to safeguards and its prevention	To unify safeguards responses throughout JAEA
Target staff	All staff	Staff involved in safeguards activities		
year	2020	●		●
	2021	●		●
	2022	●	●	●

3. Activity for all staff to promote understanding and raise awareness of safeguards

3.1 Basic education of safeguards

Basic education of safeguards by self-learning started to be conducted from 2021 with purpose of promoting understanding and raise awareness of safeguards for all staff in JAEA. The staff work on self-learning with slides utilizing JAEA owned e-learning systems.

The slides include topic I “Framework of safeguards” for promoting raise awareness, and topic

II “Safeguards activities (material accounting and control, containment/surveillance and inspection)” and topic III “Safeguards enhancement and information provision” for promoting understanding, based on external open information. In topic I, the slides explained the background of the implementation of safeguards such as international agreements and domestic legal frameworks, and made it possible to recognize the importance of safeguards by understanding the obligations of operators. In topic II, the slides introduced basic activities of safeguards in JAEA facilities for understanding basic knowledge for safeguards. In topic III, the slides introduced the method of response for reports of research activities and complementary access and provision of facility information, and shared the note about those activities. In addition, the illustrated slides without technical terms are also useful to make all staff including the non-expertized staffs understood. Some parts of the slides are shown in Figure 1.

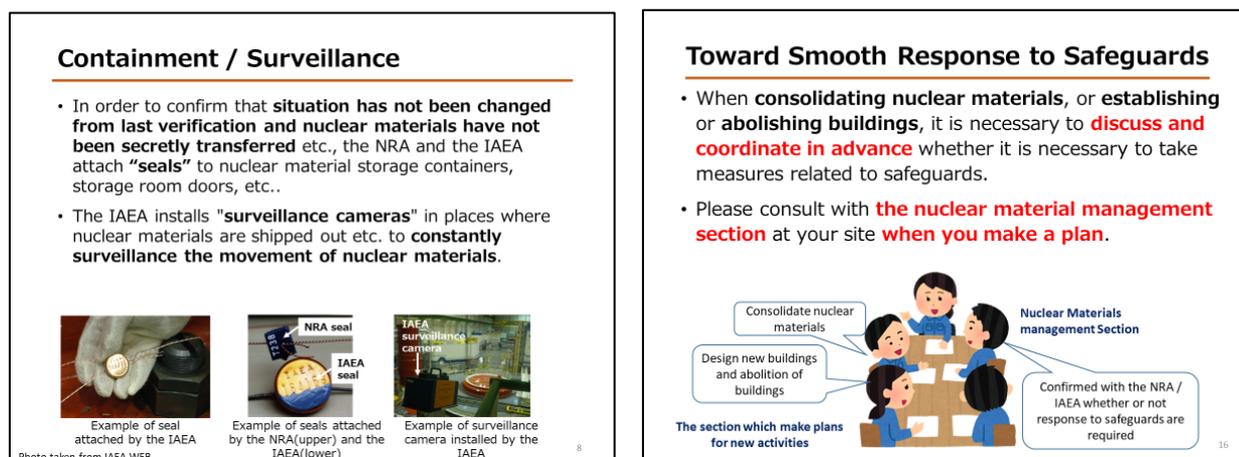


Figure 1. Examples of the education slides

To confirm the effect to promote understanding and raise awareness of safeguards by the education, questionnaire survey was conducted for all participants in 2021. In the questionnaire, there were two questions; Question 1 “Did you understand the educational content?” for confirming the depth of understanding, and Question 2 “Were you aware that you were part of the safeguards measures?” for confirming the effect to raise awareness. The results are shown in Figure 2. The result of Question 1 revealed that almost all participants could understand the educational content since the ratio of the affirmative answer was over 99 %. The result of Question 2 revealed that the education raised awareness of almost all participants about safeguards since the ratio of the affirmative answer was over 97 %. However, some participants had comments that they could not understand that their works were related to safeguards activities. In order to show that safeguards are related to various works, the material was improved to hold aware of the relevance between their own works and safeguards by giving examples related to their works as shown in Figure 3 in 2022.

In 2022, exam to confirm their understanding was conducted after the self-learning instead of the questionnaire. In the exam, passing criteria is set and those who didn’t meet the criteria was retested. Multiple questions are prepared for each of topic I, II and III and questions in the exam are randomly selected from those. Finally, the participants can confirm answers and commentaries after the exam. As a result of the exam, all participants could pass the exam. In addition, correct answer rates of the successful applicants were 97 % in average of topic I, 86 % in average of topic II and 90% in average of topic III. It revealed that all participants got a certain level of understanding in each topic.

According to the result of the questionnaire in 2021 and the exam in 2022, it revealed that the education promoted understanding and raised awareness of safeguards for all staff.

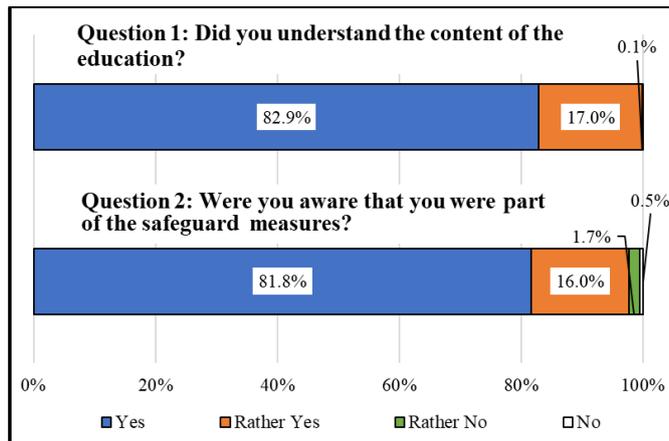


Figure 2. Result of questionnaire in 2021

Safeguards Enhancement (Licensee's Obligation)

Under the Additional Protocol

- You may think that safeguards are not relevant to you, however, **"Your research" can be an R&D activity obligated to report to the IAEA.**
- You may think that safeguards are not relevant to you, however, **the IAEA can be access "Where you work".**
- "Your research" can be confirmed at the CA.**

Only the site is notified 24 hours prior to implement CA, and the building is notified just before the access.
In addition to this, **the IAEA notify CA upon arrival at the site, in which case the licensee must make them enter the building within two hours of notification.**

Figure 3. Example of improved education slides

4. Activities for the staff involved in safeguards activities to appropriately respond

4.1 Lectures

The lectures on the theme of “Current situation and issues related to safeguards” started to be held from 2020 as an opportunity to reaffirm the importance of maintaining transparency in peaceful uses of nuclear material and the impact of inappropriate responses, with purpose of maintaining and raising to recognize safeguards as importance to the staff in JAEA.

There were some topics in lectures by some internal and external experts on safeguards in three years such as Importance of responding challenges in safeguards, Operators’ responses to ensure smooth implementation of safeguards, Safeguards measure associated with decommissioning or Past cases of deficiencies and impact, as Table 2. In 2022, one JAEA expert on safeguards had a lecture about “Importance of responding to IAEA safeguards issues”. In addition to introducing safeguards activities in JAEA from internal experts, we tried to make the lectures broadly understanding of safeguards importance by having external experts give lectures on the current situation and issues of safeguards activities in Japan from 2021. The lectures were held in hybrid style with face-to-face and online in order that the staff who worked other site of the venue could participate since JAEA has some site throughout Japan.



Figure 4. Scene from the lecture in 2022

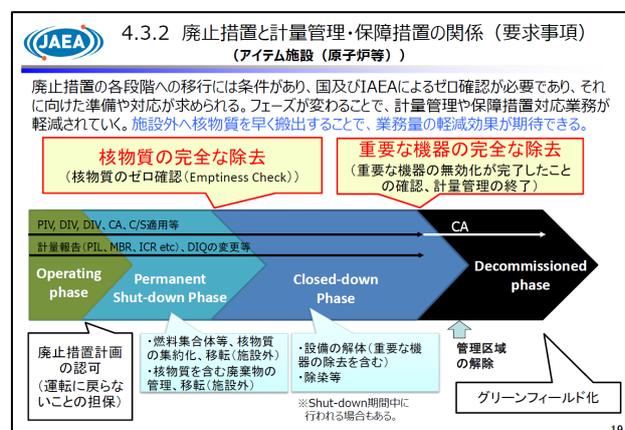


Figure 5. Examples of the lecture slide in 2022

Table 2. Topics list of the lectures in 2022-2022

year	Topics	Presenter	Contents
2020	Importance of responding to IAEA safeguards issues	JAEA expert on safeguards	<ul style="list-style-type: none"> • Case studies of past safeguards issues and their responses • Activities to properly implementation safeguards
2021	Current status and issues of Japan's safeguards activities	External expert on safeguards	<ul style="list-style-type: none"> • Japan's obligations and current status of safeguards activities in Japan • Case studies of safeguards issues
	Safeguards activities in Monju and its experience	JAEA expert on safeguards	<ul style="list-style-type: none"> • Safeguards activities in Monju • Safeguards response to decommissioning
2022	Current status and issues of Japan's safeguards activities	External expert on safeguards	<ul style="list-style-type: none"> • Japan's obligations and current status of safeguards activities in Japan • Case studies of safeguards issues
	Safeguards response to decommissioning	JAEA expert on safeguards	<ul style="list-style-type: none"> • Decommissioning plan in JAEA • Relationship between decommissioning and accountancy/safeguards

Questionnaire survey was conducted for all participants to confirm the learning effect of the lecture in each year. In 2020 and 2021, one question was prepared of “Were you aware that you were playing an important part in safeguards measures and material accounting?”. In 2022, one question was prepared of “Did you have awareness of the importance of safeguards after the lecture?”. The result is shown in Figure 6. Although the participants were different among 2020, 2022 and 2022, the results showed that all participants had awareness of safeguards importance in 3 years. In addition, the results showed that the percentage of participants who were strongly aware increased between 2020 and 2021. The results were considered to aware the importance of safeguards strongly because most participants understood the response to safeguards in a large framework with two lectures by external and internal expert from 2021. In addition, since introduction of some cases in past deficiencies for safeguards was received well by some participants and required to continue the introduction, Case studies have conducted with collection of examples on inappropriate response to safeguards since 2022. Therefore, the lectures promoted maintaining and raising to recognize safeguards as importance for all participants.

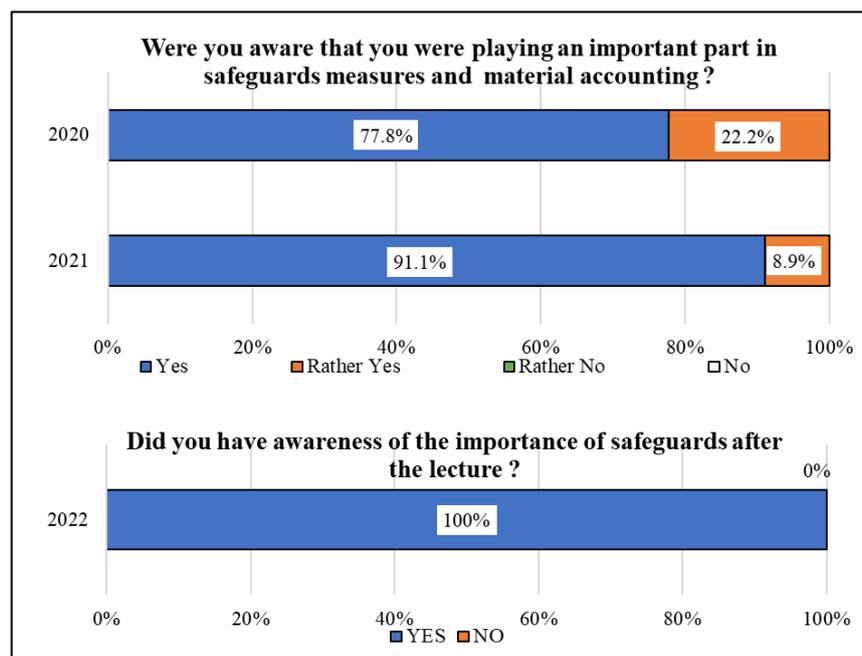


Figure 6. Questionnaire results about the lecture in 2020 - 2022

4.2 Case studies

From 2022, JAEA introduces case studies with collection of examples on inappropriate response to safeguards in order to encourage staff involved in safeguards activities to understand risks of inappropriate response to safeguards and its prevention.

First, JAEA has developed the collection of materials consist of parts of question introducing several cases with concerns on safeguards and explanation for each question. In the question introducing several cases, 10 cases of inadequate response to safeguards were prepared. Common cause of deficiencies in safeguards response is lack of sufficient prior coordination between response to regulatory requirements of nuclear security and safety, and of safeguards. One example of that is inadequate submission of photos to IAEA. When the photos taken in nuclear facility are included the equipment which is important to nuclear security, the photos cannot be provided to outside without masking in ordinary, but the photos can be provided to IAEA without masking after confirmation by person in charge in the facility when IAEA inspection by internal regulation. If any staff don't know that and provide the photos with masking when IAEA inspection, it may result in an inappropriate response. To avoid the case, it is necessary to be aware of nuclear security, safety and safeguards requirements, and to assume in advance what kind of response will be necessary in that case. Based on these, ten cases were selected such as inadequate submission of photos to IAEA and information on restriction in inspection, and undeclared touch of inspection equipment. The material illustrated the situation of case with simple explanation in one sheet. The material for the case is shown in left of Figure 7. The part of explanation clarified requirements in frameworks and rules on safeguards and explained causes, consequences and appropriate response and so on, and summarized points on the response in safeguards as right of Figure 7.

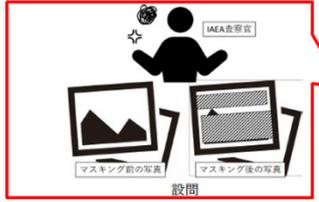
Questions for case studies	Explanation for case studies	Commentary on the problem in the case
<p>事例4：IAEA への写真提供について</p> <ul style="list-style-type: none"> IAEA による査察の際、IAEA からホットセル内の写真撮影・提供を求められた。 核物質防護担当が、撮影された写真をチェックしたところ、核物質防護情報に相当するものが映り込んでいたため、該当箇所の周囲を含めマスクした。 保障措置担当者は、マスクされた写真を IAEA に提供した。  <p>設問</p> <p>設問-1: この状況について、何が問題でしょうか。全て挙げてください。</p> <p>① Issues for grasping the current situation</p> <p>設問-2: 挙げた問題のうち、この事例の本質となる問題を1点選んでください。</p> <p>② Essential issue</p> <p>設問-3: この事例によって、保障措置へどのような影響があるでしょうか。</p> <p>③ Safeguards impact of the response</p> <p>設問-4: 上記を踏まえ、どのように対応すればよいでしょうか。</p> <p>④ Appropriated response</p>	<p>事例4：IAEA への写真提供について</p> <p>国・IAEA から提供を求められた写真は、核物質防護情報（管理情報）の有無にかかわらず、基本マスクなしで提供する必要があります。IAEA 以前回の検認時の写真と比較して評価を行うため、マスクをした写真を提供すると、評価上問題となります。</p> <p>本事例では、繼續から IAEA へ大部分をマスクした写真を提供したことに対し、IAEA より、何も評価できないとして改善を求められることが考えられます。</p> <p>IAEA Safeguards Glossary 2001 ではアノマリーとして、「純用又は不正使用が発生しなかったことの結論を導出する IAEA の能力を損な、又は制限する普通でない疑わしい状態（一部抜粋）」と記載されており、本事例は、アノマリーと判断される可能性があったものです。同様事例の発生を防止するため、写真等の提供は次のように実施してください。</p> <ul style="list-style-type: none"> 国・IAEA への写真等の情報提供は基本マスクなしで提供する。 核物質防護情報（管理情報）にあたると思われる情報は、全要素の「核物質防護に係る情報管理要領」に従い、必要な開示のための手続きを実施し、情報を提供する。 機密情報等やむを得ない場合以外は、マスクをすることはしない。マスクをする場合は、国・IAEA へ十分に説明し、保障措置上支障がないことを確認した上で、マスクをして情報を提供する。マスクの範囲は最小限にとどめる。 ヘッダーまたはフッターに Safeguards Confidential の表記を必ず入れる。 IAEA が要求したものを、核物質防護情報があるから撮影しない等の対応をしない。 <p>回答例</p> <p>設問-1: この状況について、何が問題でしょうか。全て挙げてください。</p> <ul style="list-style-type: none"> 施設担当者は、核物質防護担当に IAEA に提供する写真であることを十分説明していなかった 保障措置担当者は、写真のマスクについて、国・IAEA に十分な説明をしていなかった 保障措置担当者は、マスクした写真を国・IAEA に提供した 保障措置担当者は、核物質防護担当や施設担当者と連携をしていなかった <p>設問-2: 挙げた問題のうち、この事例の本質となる問題を1点選んでください。</p> <ul style="list-style-type: none"> 保障措置担当者は、核物質防護担当や施設担当者と連携をしていなかった <p>設問-3: この事例によって、保障措置へどのような影響があるでしょうか。</p> <ul style="list-style-type: none"> 未申告の核物質や原子力活動が存在するという疑いをもたれる 査察の目的が達成できなくなり、アノマリー通報を受ける可能性がある 検認活動において疑義が生じ、後日、フォローアップが必要が生じる <p>設問-4: 上記を踏まえ、どのように対応すればよいでしょうか。</p> <ul style="list-style-type: none"> 保障措置担当者は、提供する写真に核物質防護情報がある場合、核物質防護担当に依頼して、「核物質防護に係る情報管理要領」に従った手続きを行い、マスクせずに写真を提供する 保障措置担当者は、誤解が生じないように機構内及び国・IAEA と十分にコミュニケーションをとって対応する 	<p>Explanation of rules</p> <p>Commentary on exemplary responses</p> <p>Sample answers to each question</p>

Figure 7. Examples of the questions introducing several cases with concerns on safeguards and explanation for each question in the text

In the case studies, selected cases from the ten cases in the collection material has been discussed in a group of 2 to 6 people. For example, the group discussed (1) issues for grasping the current situation, (2) essential issue, (3) safeguards impact of the response, (4) appropriated response for the selected case. After the discussion, the group confirm the essence derived by the group, compared with the essence of the explanation for understanding the point of appropriate response for safeguards. If the essence is different of the explanation, the group rediscuss why the group didn't have derived the essence of the explanation.

The case studies in 2022 were implemented with the staff involved in safeguards activities at all sites where safeguards activities were conducted. Responsible persons in each site evaluated that the participants could recognize the impact of inappropriate response to safeguards to execution of operation in JAEA and discuss including countermeasures under similar situation in their site, and the case studies was effective to prevent inappropriate response to safeguards. Thus, the activities promoted prevention of the inappropriate response to safeguards via understanding risks of that.

4.3 Standardization of procedures related to safeguards response

In order to improve the quality of safeguards response throughout JAEA, the activity for standardization of procedures related to safeguards response had been conducted for two years from 2020.

In each site of JAEA, there are different types of facility such as research reactor, reprocessing facility or enrichment facility and the response of inspection activities are different. On the other hand, provision of safeguards information, response of complementary access and maintain of design information questionnaire (DIQ) are common response to safeguards activities in all sites. Therefore, the headquarter prepared the three standardizations of procedures; how to provide safeguards information, response of Complementary Access and how to maintenance of DIQ. In order to make it a uniform standard procedure for the entire JAEA, the procedures were included precautions and points for the response, requirement from IAEA/state and the impact of inappropriate response to safeguards activities. Then, each site revised own manual based on the standard procedure. Consequently, the activities made it possible to take a unified response in JAEA and ensured the further appropriately respond to safeguards activities.

5. Conclusion

In order to strengthen activities to appropriately respond to safeguards activities, JAEA has started the basic education of safeguards for all staff and Lectures, Case studies and Standardization of procedures related to safeguards response for the staff involved in safeguards activities to appropriately respond on-site. These activities affect to ensure adequacy of the response to safeguards activities and decrease risk of causing inappropriate response to those. Further improvement will be aimed through the continuous those activities with evaluation.

Reference

[1] Takahiko Kitao, Yoshikatsu Takeuchi, Takashi Kimura, Junji Kojima, Satoshi Shioya, Takashi Tasaki, Hironobu Nakamura, Report on Activities Related to Fostering Nuclear Security Culture in Tokai Reprocessing Facility, INMM Japan, 2018, November