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**Report on the International Forum on Peaceful Use of Nuclear Energy,  
Nuclear Non-proliferation and Nuclear Security,  
“Nuclear Non-proliferation and Nuclear Security in the Post COVID-19 Era”**

**1. Purpose of the Forum**

The ISCN (Integrated Support Center for Nuclear Nonproliferation and Nuclear Security) of JAEA (Japan Atomic Energy Agency) held in 15 December 2021 an annual international forum to promote a better understanding of nuclear non-proliferation and nuclear security which is essential to ensure the peaceful use of nuclear energy.

The COVID-19 pandemic has created unprecedented challenges to both nuclear nonproliferation and nuclear security. In this year's forum, we focused on the challenges and difficulties caused by the COVID-19 pandemic and actions and measures taken by international organization, regulator, facility operator and international society in the area of international safeguards and nuclear security. Discussed and shared lessons learned and good practice, discussed what should we do to be prepared for future pandemics and challenges for building and maintaining a resilient, safe and secure society. We also discussed importance of human resource development and technology development under these circumstances.

The following forum reports are the responsibility of the organizer, JAEA.

**2. Overview of the Forum**

(1) Date & Time

15 December 2021

16:00-18:30 Japan Standard Time

8:00-10:30 European Central Time

(2) Venue

Virtual event in Zoom webinar.

(3) Participants, language

Around 210 participants. English and Japanese simultaneous translation.

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#### (4) Program

[Opening remarks]

- **Mr. Toshio Kodama, President of JAEA**

[Keynote Speech]

- **Mr. Massimo APARO, IAEA Deputy Director-General for Safeguards**

(Read by Mr. Malik DERROUGH (Chief of Program Coordination Division, IAEA Security Measures Bureau))

- **Mr. Scott A ROECKER., Senior Director, Nuclear Threat Initiative (NTI), USA (Recorded)**

[Panel discussion]

[Closing remarks]

- **Mr. Hiroyuki OSHIMA, Executive Director of JAEA**

### 3. Keynote speech

#### (1) Mr. Massimo APARO read by Mr. Malik DERROUGH

- **Title: Implementation of IAEA safeguards under the COVID-19 pandemic.**

The number of inspections and inspections conducted by the IAEA during the year starting July 1, 2020 was about the same as before the pandemic. The biggest reason this has become possible is that the IAEA has invested in remote monitoring systems over the last two decades. However, due to travel restrictions in each country due to the pandemic, some inspections with a short notice have not been conducted. In the inspection activities, although there was a slight delay due to restrictions on access to the Vienna International Center or delays in reporting from the Parties, all the functions of Seibersdorf and the Rokkasho Analytical Laboratory continued. We are also responding to inspector's requests for environmental sample kits. The introductory safeguards training course for newly designated inspectors (ICAS) was provided in the form of remote learning through the use of an online portal. For safeguards-related training courses for member states and trainees, we increased online teaching materials or developed remote learning modules. As for the safeguards trainee program, the trainees listened to the presentation remotely, did their homework, and participated in the virtual workshop.

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On the other hand, there were many problems with the IAEA safeguards activities in COVID-19. First, the cancellation of many flights prevented inspectors from traveling to member states. In some countries, non-residents were restricted from entering the country due to stricter immigration control. In addition, even if they were able to travel, domestic movement was restricted, and services such as lodging at hotels and eating out were restricted. As a result, inspectors and technicians sometimes had to drive long distances at their place of stay. The IAEA also signed a contract for the first charter aircraft since its inception, which incurred out-of-budget costs. Employees at Vienna headquarters, Tokyo and Toronto were ordered to work from home as much as possible and were instructed to follow the instructions of their country of residence, making it difficult to even go to offices and labs. In addition, since the supply of personal protective equipment was initially insufficient all over the world, the health management of inspectors and technicians themselves when traveling abroad became a problem. There were also restrictions such as being inspected immediately after entering and leaving Japan and being quarantined for a certain period of time. In addition, information such as travel restrictions in each country changed frequently, which had a great impact on the planning of field inspection activities.

Cooperation with host states was extremely important in overcoming these difficulties. Close communication with state authorities allowed the IAEA to continue to secure access to its nuclear facilities. In addition, taking measures such as conducting PCR tests for quarantine exemption and obtaining special flight permits in sections where the sky was blocked paved the way for cross-border movement. In addition, most of the member states and regional authorities have submitted reports, etc. to the IAEA based on the agreement even under the pandemic. However, it is advised from here that "the Contracting Parties cannot unilaterally suspend the submission of the report under any conditions" or "cannot refuse the local inspection activities". In some cases, I was urged to submit it. For one year from July 1, 2020, IAEA inspectors were placed in quarantine for a total of 2500 days outside the IAEA headquarters. This is equivalent to seven inspectors being quarantined for one year.

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Almost two years have passed since the beginning of the Corona disaster. During this time, despite various restrictions such as travel restrictions, the IAEA was able to implement safeguards through efforts and at higher cost than planned. For that purpose, the cooperation of the Contracting Parties was indispensable, and without this, effective and efficient implementation of safeguards would not have been possible. We have been flexible in responding to new situations and would like to continue to provide guarantees for the peaceful use of nuclear energy by doing so. In 2020, the IAEA was able to take soundly-founded safeguards for all Parties, and is confident that it could and will do so in 2021.



**(2) Mr. Scott A ROECKER.**

- **Title: Impact on ensuring nuclear security during a pandemic and its response**

COVID-19 is often thought of as a seemingly unrelated theme to nuclear security activities, but it has been found to have a major impact. At present, 263 million people have been infected with the new corona virus, and it is expected to increase further in the future. It is said that 500 million people were infected during the 1918 influenza pandemic. But thankfully, no serious nuclear accident has occurred. There is no nuclear terrorism, no sabotage, no forced shutdown of nuclear reactors, no cancellation of construction projects. At the time of the pandemic, there were concerns about economic uncertainty and supply chain shortages, but nuclear power was relatively unaffected and energy production fell by only 2.5%.

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However, many challenges were presented in COVID-19. Regarding the preparation for nuclear security, we had to take appropriate measures in consideration of both regular training of response force and sustainability of employee health. Regular training and tabletop exercises required social distance and were severely restricted. Licensed operators worked closely with security authorities to develop plans to ensure the safety of the facility in the unlikely event that the operator and employees were infected. Specifically, we responded by changing shift system, formulating a pandemic response plan by a designated corona person in charge, forming a task force for the new corona, and daily verification of the measures implemented. In the field, they often worked in situations where it was difficult to maintain a social distance, so they had a lot of trouble. At the Sellafield facility in the United Kingdom, mass quarantine due to infection of employees was carried out in mid-March 2020. More than 200 infected people occurred during refueling maintenance work at a nuclear power plant in Michigan, USA, the maintenance period was usually one month, but it was forced to stop for as long as five months. In addition, domestic and overseas inspection activities, which are extremely important for maintaining a strong nuclear security system, were also affected, and in many cases the inspection activities were postponed or not implemented. When implemented, it also needed to reduce physical contact, and in some cases, it was implemented as an online and face-to-face hybrid.

In COVID-19, the number of situations that rely on cyber to secure social distance has increased. With the increasing use of this cyber function, the threat situation is also changing. Specifically, new vulnerabilities for attacking nuclear facilities will also arise. On the other hand, it is possible to minimize potential cyber vulnerabilities by referring to the response to corona and pandemics. Just as the corona wreckage that started in one country spread all over the world to a community of small remote islands, digital attackers can initiate an invasion of the entire network by breaking through a single target. In order to avoid these, the communities that have succeeded in responding to pandemics and their methods are very helpful. Understanding the true location of an illness, or problem, and responding proactively is common to digital security. Also, to

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protect yourself from the virus every day, wash your hands, do not touch your face, hold your mouth when you sneeze.

In order to access the network, it is necessary to realize excellent cyber hygiene such as device enhancement, two-step verification, and attention to phishing attacks. Particular attention should be paid to the fact that access to confidential information is more difficult during a pandemic. With the increase in telework, the importance of maintaining good cyber hygiene is increasing.

The problem of transportation disruption was also enormous. In the early stages of the pandemic, the number of flights by private airlines dropped sharply, with international flights down 98% and domestic flights down 87% in April 2020. This had a profound effect on the air transport of radioactive isotopes, which depended on civilian airmail. Some destinations required two weeks of quarantine, forcing charter flights for the most important transportation. Meanwhile, the turmoil in sea shipping occurred in the second half of the pandemic. Problems such as the truck driver in charge of land transportation from the port not wanting to go to the port, which is the hotspot of Corona, have occurred and are still a problem. As for the supply chain, it takes time to import, and the introduction of border inspection requirements has had an impact on rail transportation. Prior to the Corona disaster, border inspections were not required in the EU, which had a particularly significant impact.

There were also problems with employment related to nuclear security. In many industries, measures such as salary freezes, job type changes (from staff to part-time workers), and personnel reductions have been taken. Although the goal of nuclear policy has always been to achieve gender equality, research on pandemics and nuclear security attacks has revealed that minority women are most affected. Women were three times more likely to reduce their working hours than men, 86% of whom were due to childcare or long-term care, while 0% of men reduced their working hours for the same reason. Women, blacks, indigenous peoples and people of color were twice as likely to have salary cuts and twice as likely to lose their jobs. Mental health, loneliness and

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burnout are also frequent effects of the pandemic. See the website ([www.gcnuclearpolicy.org/](http://www.gcnuclearpolicy.org/)) for more information.

It also affected nuclear security issues. In the case of governments, nuclear security was sometimes postponed due to urgent and imminent pandemic-related issues. One example is the impact on the Review Conference on the Amended Convention on the Physical Protection of Nuclear Material. Due to the influence of the pandemic, cooperation between ministries and agencies regarding the revision of laws and regulations has been slow to progress. Due to limited telework in some countries, resources were also limited. In addition, efforts to improve the security of radioactive materials managed by medical facilities such as university hospitals must be postponed in situations where medical professionals continue to respond pandemically day and night. Under these circumstances, public confidence in the government also tended to decline. Pandemic responses vary widely from country to country, and many have lost confidence in the government. In early March 2020, 63% of Americans supported the federal government, but in June it dropped to 48%.

In such a situation, it is very important for the world to cooperate. There were a wide variety of problems, but cooperation was closer than before the pandemic. New creative approaches implemented in some countries can be applied in countries around the world. Therefore, forums like today are very important as a means of exchanging



information to strengthen nuclear security procedures. Through such experiences, we will be able to deal with challenges more strongly, more flexibly, and more positively.



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#### 4. Panel Discussion

Theme : Nuclear Nonproliferation and Nuclear Security in the Post COVID-19 Era

Panelist:

- Masato HORI (moderator), Deputy Director of JAEA / ISCN
- Mr. Malik DERROUGH, Head of Section for Safeguards Programme Coordination in the IAEA Department of Safeguards
- Mr. Tomohiro TERASAKI, Director of Japan Safeguards Office, NRA, Japan
- Ms. Na Young LEE, Director General, Office of Nuclear nonproliferation, KINAC ROK
- Mr. Hiroshi SAGARA, Associate Professor, Institute of Innovative Research, Tokyo Institute of Technology
- Ms. Natsumi MITSUBOSHI, School of Environment and Society, Tokyo Institute of Technology (On Tuesday 14 December (a day before the international forum), we had a student session. Ms. MITSUBOSHI, one of the students who participated in the summer internship program of ISCN took part in the session as representative of the student session.)



(Panel discussion)



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## (1) Overview

In the latter half of this international forum, a panel discussion entitled "Nuclear Nonproliferation and Nuclear Security in the Post-COVID-19 Era" was held by domestic and foreign experts. Masato HORI, Deputy Director of ISCN, is the moderator. The following three topics were discussed with online participants.

## (2) Topic-1:

### **Impact of COVID-19 pandemic in international safeguards and nuclear security, lessons learned and best practices from the pandemic**

#### ➤ **Impact of COVID-19 Pandemic in Implementing Safeguards Activities in Japan Presented by Mr. Tomohiro TERASAKI**

##### ① Outline of safeguards in Japan

The IAEA's safeguards activities in Japan account for about 20% of the IAEA's worldwide safeguards activities, and many of the IAEA's resources are devoted to large-scale activities. The reason for its large scale is that Japan has various facilities such as reprocessing, enrichment, fuel manufacturing, and research facilities as well as light water reactors, and in particular, there are many activities for reprocessing facilities in Rokkasho and Tokai. For this reason, inspectors and analysts are stationed at the reprocessing facility to constantly manage nuclear material. The Nuclear Material Control Center (NMCC) plays an important role on behalf of the State (JSGO) in safeguarding activities. The NMCC supports inspections by the IAEA, conducts domestic safeguards inspections, information processing for measurement control, and summarizes related inspection results.

##### ② Safeguard activities in COVID-19

Basically, two weeks of quarantine was required for foreign immigrants, but for IAEA inspections, quarantine is not required so as not to affect activities, and infection control is prevented for immigrants. After thorough measures, the operator (licensee) has also paid close attention and accepted inspectors. In addition, as a risk avoidance measure on

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the Japanese regulator side, we divided it into two groups, office work and telework, to prevent the spread of infection. JSGO communicates more closely with the IAEA in COVID-19, requesting that the IAEA's inspections be conducted by a minimum of two people, instead of the usual four inspectors. In some cases, four people from NMCC usually participate, but one from NMCC and one from JSGO participate to prevent the spread of infection within NMCC. Even when a close contact came out on the facility side on the eve of the random inspection, we were able to immediately share information with IAEA and respond properly. Although the scale of inspections may be minimized, each operator (licensee) was thoroughly informed that attendance personnel should be flexibly secured, continuity of knowledge should be emphasized, and inspection entry should be given top priority. In addition, JSGO will be able to flexibly complement the inspection response normally carried out by NMCC, and a system will be built in which former inspectors within JSGO can be mobilized if necessary, and NMCC will also reduce the risk of infection associated with business trips. We took measures such as reviewing the business allocation between sites. Furthermore, in order to reduce the risk of infecting operators, NMCC has created more conservative guidelines so that if employee feel any physical discomfort or a sign of fever, it can be easily substitute personnel for inspection.

③ Lessons learned

- **Reaffirmed the importance of the IAEA Tokyo Office (TRO). The impact of changes in the national isolation policy could be minimized, and even if the host company had a sudden emergency, there was no time difference, so it was possible to judge the situation in real time and respond appropriately. In addition, through close communication with the TRO, we were able to timely consider and disseminate measures to prevent the occurrence of anomaly.**
- **I reaffirmed the need to properly use online and face-to-face meetings. I think that there will always be difficult meetings unless they are face-to-face.**
- **It is important to maximize the benefits of having two inspection agencies (JSGO and NMCC) in Japan. In order to prevent the spread of infection, it is important to communicate closely with each other and cooperate so that prompt and effective decisions and responses can be taken. Although it was legally**

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**stipulated that JSGO could complement NMCC's inspection activities, it became a real problem for the first time in the face of the COVID-19. We reaffirmed the need to strengthen the quality and quantity of human resources in preparation for this situation.**

➤ **Safeguards implementation under Pandemic in ROK**

**Presented by Ms. Na Young Lee**

① Background (Korea's response to the COVID-19 pandemic)

KINAC's safeguards activities were also affected by the Korean Disease Control and Prevention Agency (KDCA) issuing Crisis Alert Level 4 (regulating most outdoor activities).

② Impact on regulatory activities in South Korea

The Nuclear Safety and Security Commission and all nuclear operators in South Korea will prepare a manual for the work process in accordance with the rules of KDCA. As for the implementation of domestic safeguards inspections, we were able to flexibly change the schedule, so for example, we did not conduct domestic inspections under crisis alert level 4. In addition, by reducing the number of inspectors and extending the inspection period, the chances of people crowding in one place were reduced. Since the law stipulates that the percentage of online training should not exceed 50% in education and training for nuclear operators, the number of training sessions was increased and the number of participants per training was limited. As a result, we were able to complete all the training without causing any infection, and we were able to provide education and training to 2000 people in one year.

South Korea's support activities for IAEA safeguards inspections can be divided into two categories: immigration support and information provision. For immigration support, A2 visas (public servant visas) will be provided to IAEA inspectors. A2 visa holders are exempt from quarantine if their PCR test is negative, but they are under the supervision of the Korean Ministry of Health by a self-diagnosis app for 14 days after entry. As for information provision, information packages have been provided to IAEA inspectors since February 2020. It provides inspectors with guidelines such as the situation of South Korea's corona disaster and behavior restrictions according to the crisis alert level in a timely manner.

In the 2020 IAEA safeguards activities, KINAC fully supported the response to the COVID-19, 104 IAEA safeguards activities (95 inspections and 9 complementary

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accesses), and 36 KINAC domestic safeguards activities. The inspection was 100% carried out as planned. Activities in 2021 are proceeding in much the same way without any problems.

### ③ Lessons learned

Even in a pandemic, the most important issue is the safety of personnel, and it is necessary to be prepared to take effective measures in it. It is important to secure alternative personnel according to the retention of human resources, urgency and importance of the task. In response to the expansion of telecommuting, IT infrastructure and cyber security will be strengthened, and interpersonal communication will be reduced, so it will be necessary to enhance information sharing within the organization. Regulators also need to provide predictable regulations and communicate transparently with stakeholders when changing rules.

### ➤ Lessons Learned and Best Practices from the Pandemic

#### **Presented by Masato HORI**

The transition of newly infected persons in Japan has experienced the fifth wave to date after repeated expansion and contraction from the first wave in April 2020. JAEA set up a response headquarters on February 28, 2020, when the number of domestically infected persons has increased, and has responded from an early stage based on the action plan in accordance with the 2013 New Influenza Special Measures Law. The action plan stipulates the establishment of a countermeasures headquarters, establishment of a communication system, collection and sharing of information, and preparation of a business continuity plan (BCP) in order to ensure the safety and health of nuclear facilities and staff. The masks and rubbing alcohol stored based on the attached equipment list were effectively used in the initial response. In addition, personnel plans corresponding to the five levels of work (essential work, top priority work, priority work, support work, etc.) are created according to the three outbreak stages (overseas outbreak stage, domestic outbreak early stage, domestic infection stage). However, the business is carried out based on it. Since ISCN is not an organization that directly implements safeguards activities, there is no work equivalent to essential work, but monitoring of CTBT radionuclides that require social and international reliability, facility operation, data center operation, etc. was positioned as the highest priority work in ISCN. While taking basic measures such as wearing masks, washing hands, disinfecting alcohol, and promoting telework, under the state of emergency in Japan, the personnel are divided into two groups and the building (living room) in order to secure more social distance was also divided to prepare for an emergency. In addition, we have developed and implemented online training in order to

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continue the international training that was conducted in a face-to-face manner even in the Corona disaster.

Here are three good practices in COVID-19. The first is preparation, and JAEA (ISCN) was able to respond smoothly from the initial response because the law, action plan, equipment, etc. were in place. It is also important to further improve the action plan, etc. in the future based on the experience of COVID-19. Secondly, by adapting to new work styles, it is necessary to develop a foundation that responds to the change from face-to-face to online. Third, in maintaining nuclear security and safeguards, it is necessary to further consider the possibilities of various technological innovations that arise in opportunities such as the Corona disaster.

#### Questions from online participants and answers:

- **What is the status of the IAEA's response to the development of specific technologies or the creation of procedures to maintain and improve the appropriateness or effectiveness of safeguards activities under various restrictions caused by the Corona Stigma?**
- **Mr. Malik DERROUGH 's answer: We have learned many lessons for maintaining the effectiveness and efficiency of verification activities. We believe that it is important to review and revise the BCP and incorporate lessons such as those discussed in the panel discussion here as one of the means to incorporate these into future activities. The COVID-19 required greater reliance on equipment and greater flexibility in performing the most important verification activities. We also found that it was imperative to rely heavily on the IAEA Regional Office to maintain the same level of verification activity as usual. As with many organizations, the IAEA will ensure that the lessons learned are reflected in the BCP and are prepared to maintain the same level of verification activity in the next crisis.**
  
- **How has the Fukushima accident changed the IAEA's safeguards activities?**
- **Mr. Malik DERROUGH 's answer: The Fukushima accident has caused a significant change in safeguards activities. A complete revision of the design and operation of safeguards activities was needed to provide the IAEA with a guarantee for the peaceful use of nuclear energy, even in situations where access to the site was lost after the accident. We established a completely different approach in cooperation with national authorities, and evolved. This amendment to the safeguards approach maintains the Broader Conclusions for Japan and provides assurance that the peaceful use of nuclear energy is still in place. It is important to respond flexibly not only to the Fukushima accident but also to the Corona disaster. In this regard, the State Level Concept (SLC), in**

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which the IAEA adjusts verification methods according to each country's fuel cycle and infrastructure, is flexible, even if specific activities cannot be carried out. I would like to add that it is possible to supplement with activities and draw positive conclusions.

- You mentioned that you were reporting R & D activities that do not involve nuclear material. Is this part of the IAEA inspection, or is it an activity unique to Japan, and is it related to nuclear non-proliferation and nuclear security? So what does it mean?
- Mr. Tomohiro TERASAKI's answer: This is not an activity unique to Japan, but a national activity that has ratified the IAEA Additional Protocol for Safeguards. As part of the evaluation of all activities such as safeguards and nuclear fuel cycle of each country by the national government and the IAEA, the information provided by the national government and related information will be organized and combined based on the additional protocol for research and development activities without nuclear material. We are evaluating the activity of the country.
  
- Regarding the impact on South Korea's nuclear regulation and promotion, which is more influential, the Bun administration, which is reluctant to nuclear power, or the Corona disaster?
- Ms. Na Young LEE 's answer: Difficult to answer. The South Korean government is not very active in nuclear power, but understands the importance regulation. The Korean government has been generously supporting the safeguards activities of KINAC and IAEA, and the activities are very smooth.
  
- About the impact of the corona disaster at the university
- Mr. Hiroshi SAGARA's answer: Lectures went online, and R & D was greatly affected. The inspection of the LOF (Location Outside Facilities) of Tokyo Institute of Technology had been carried out by the IAEA headquarters so far, but there was also the influence that it was carried out only by the IAEA Tokyo office in COVID-19.

### (3) Topic-2

How to build and maintain a resilient, safe and secure post COVID-19, new technological development, human resource development

- Nuclear nonproliferation and security research and education at Tokyo tech

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**Presented by Mr. Hiroshi SAGARA**

① Introduction of the organization

Tokyo Institute of Technology is a specialized university of science and engineering with a history of 130 years. Regarding nuclear engineering, the Nuclear Reactor Engineering Research Institute was established in 1956, and the Nuclear Engineering Department was established in the graduate school in 1957. In 2017, as a subsidized project from the Nuclear Regulation Authority, "systematization and practice of education related to nuclear safety, security and safeguards" is being implemented, and this year (2021) is the final year. The Leading Nuclear Research Institute, which has been responsible for research and education on nuclear power, was reorganized into the Zero Carbon Energy Research Institute in 2021. The Zero Carbon Energy Research Institute comprehensively researches non-fossil energy such as renewable energy and nuclear power, as well as heat storage and storage, which are important media for actual use, in order to realize carbon neutrality in 2050. The goal is to develop and contribute to the realization of carbon neutrality in 2050.

② Introduction of nuclear non-proliferation and nuclear security research

Tokyo Institute of Technology is conducting research related to nuclear non-proliferation and nuclear security, as represented by the following.

➤ **Nuclear non-proliferation and nuclear security of accident-resistant fuel (ATF):**

The candidate technology, uranium silicate fuel, is already under research and development in various countries around the world, and is in the demonstration stage after irradiation in a nuclear reactor. Since this fuel has high uranium density and thermal conductivity, it has the advantages of good neutron economy and high safety. In addition, since it has high chemical stability, it is difficult to recover plutonium during reprocessing, and from the viewpoint of nuclear non-proliferation and nuclear security, it can be expected to have the effect of reducing the attractiveness of nuclear materials. Therefore, we are conducting research on nuclear non-proliferation and nuclear security when silicide fuel is applied to small and medium-sized reactors.

➤ **Safeguards and nuclear security methods for small modular reactors (SMRs):**

For example, in the floating small reactor, which is a type of SMR, new safeguards measures to overcome offshore counterterrorism and access difficulties are necessary to be considered. In this way, SMR needs to be designed with safeguards and nuclear security in mind in advance, and is researching its methods.

➤ **Gamma-ray and neutron-ray tomography technology:**



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According to the IAEA's medium- to long-term R & D roadmap, the development of partial defect detection technology for spent fuel assemblies is given top priority. We are developing tomography technology for fuel assemblies by incorporating it which has made remarkable progress in the medical industry, into the nuclear industry.

### ③ Introduction of nuclear non-proliferation and nuclear security education

Tokyo Institute of Technology has been conducting nuclear education for many years, but until now it has not been possible to systematically incorporate nuclear non-proliferation and nuclear security education as nuclear education at the university. Therefore, starting with the regulated human resources development project in 2017, we have newly established four lectures, four practical training courses, and internship courses associated with them. One of the characteristics is that it has set up courses that are more practical and practical outside the university. Examples of the courses that have been set up are "Nuclear non-proliferation / nuclear security training" to learn about uranium enrichment detection and neutron measurement methods, "Radioactive material environmental dynamics training" to learn about radioactive material diffusion simulation, and fields. There is a "radiation disaster response training" to learn how to respond to radiation disasters in Japan. Over the past five years, a total of more than 500 people have participated in the newly launched lectures, practical training, and internships on nuclear non-proliferation and nuclear security. In particular, for internships, by collaborating with JAEA's ISCN, Nuclear Material Management Center (NMCC), and IAEA, we can build a system for stable acceptance every year, and a place to actually use the knowledge learned at the university can be obtained.

### ④ Impact of the COVID-19 at the university

Examples of how the COVID-19 affected university activities include:

It is no longer possible to visit external facilities or travel abroad.

It became difficult to carry out the experiment.

In the information sharing of research and development, if it is shared online, it will be regarded as a public material, so it was necessary for us to be careful from the viewpoint of intellectual property rights. The materials were shared offline, and only the lectures were given online.

Opportunities to chat have decreased within students, and the range of communication has narrowed.

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Inspections to the LOF of Tokyo Institute of Technology are usually conducted by the IAEA Headquarters, but in COVID-19, they were conducted by the IAEA Tokyo Office.

⑤ Recommendations for the post-corona era

The importance of sharing the PDI (Person-Day of Inspection) with the IAEA Regional Offices and Regional Regulators, including State Regulators:

not limited for in COVID-19, it is very important for conducting activities such as inspections with limited resources.

Importance of remote monitoring technology:

With the development of various technologies such as SMR expected in the future, we will develop remote monitoring technology for non-attendance monitoring in order to efficiently monitor with limited resources. This is very important.

Importance of open-source ware:

With the progress of online, intellectual property rights and licensing issues have become apparent. In order to promote efficient research and development and education, it is important to develop and release open-source software that is easy for anyone to use. It is also important to develop virtual technology as is done in JAEA.

**Question from online participants and answers:**

- **At JAEA, what are the training materials? You said that you developed and implemented online content, I would like to know the degree of understanding and satisfaction of the participants and the evaluation from the partner country or institution.**
- **Masato HORI's answer: Until last week, we have been conducting regional training courses on the State System and Accounting for and Control of Nuclear Materials (SSAC) online, we have many participants mainly from Asian countries. Prior to that, we also offer a regional training course on Design and Evaluation of Physical Protection System for Nuclear materials and Facilities. The evaluation and satisfaction are very high in a word. The contents and details are included in the prerecorded online presentation by Naoi in this forum webpage Naoi, I would like to answer the content of the training conducted by ISCN and its satisfaction on the ISCN website at a later date.**

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- Although remote technology has developed worldwide due to the COVID-19, I think it would be better to increase remote inspections and hybrid inspections in the future in order to reduce the burden on the IAEA and other countries.
  - Mr. Malik DERROUGH 's answer: The pandemic has made it more device-dependent. Currently, we are conducting remote monitoring activities by sending data from surveillance cameras and sealing equipment to the IAEA headquarters, but we believe that there are other options, such as the introduction of non-destructive measurement equipment. Our problem is that it is difficult to authenticate whether the obtained measurement result is the result obtained by measuring the nuclear material to be measured, but we think that there is a solution. Pandemics may be a factor in increasing remote surveillance activities and may actually reduce the chances of IAEA inspectors going to the facility.
  - Mr. Tomohiro TERASAKI's answer: Japan has a lot of inspection activities, so the idea of reducing PDI by remote monitoring was not born in a pandemic, but it had existed before that. Labor saving by remote monitoring has been actively implemented so far, but I think that further efforts for labor saving are necessary in the wake of the pandemic. On the other hand, it seems that labor saving is progressing in Japan compared to other countries, so I think that sharing the case of Japan with other countries may contribute to the efficiency of inspection activities.
  - Ms. Na Young LEE 's answer: South Korea supports the IAEA's activities because it considers the IAEA's independence to be important in the process of drawing the conclusions of the inspection, but there are some parts that we are not involved in the inspection work.
  - Masato HORI's answer: There is room for further introduction of technology that can be monitored without the presence of inspector for labor saving, but on the other hand, it is also possible to evaluate how much labor saving can be contributed by introducing new technology. I think it's important.

#### (4) Topic-3

##### Recommendations from students' session for the post-corona era

Presented by Ms. Natsumi MITSUBOSHI

**Recommendation 1:** Recommendations for nuclear non-proliferation and nuclear security education at universities

Importance of Nuclear Non-Proliferation / Nuclear Security Education

The issues are that the terms nuclear non-proliferation and nuclear security are not known to the world and that only the negative parts of nuclear power are taken up. As

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an opportunity to learn about nuclear non-proliferation and nuclear security, in compulsory education and high school education, not only the negative parts of nuclear power such as the Fukushima Daiichi Nuclear Power Station accident (Fukushima accident), but also medical care and industry

The positive aspects of nuclear power, such as the use of RI, should also be taught. I think it would be good to use public relations videos and animations for education. In addition, it is important to actively experience not only university lectures but also practical training at nuclear facilities in order to get to know at the site.

There is no nuclear non-proliferation / nuclear security education even in the faculty of nuclear engineering.

There are several universities in Japan that have majors in nuclear engineering, but the number of universities that have lectures and laboratories on nuclear non-proliferation and nuclear security is very limited. It was pointed out in the discussion that even the faculties of nuclear engineering are unfamiliar with the keywords of nuclear security and especially non-proliferation. Nuclear non-proliferation and nuclear security education should be added to the lectures of the faculty of nuclear engineering/science. At that time, I think that ISCN's on-site lectures are very useful, so I hope that more universities will ask ISCN to provide on-site lectures. In addition, regarding nuclear security, it may be possible to incorporate the content in the form of expanding existing classes related to regional disaster prevention response training. Furthermore, it is also effective to plan to make students of other faculties and the general public aware of nuclear non-proliferation and nuclear security at university festivals and school festivals.

Currently, only students majoring in nuclear engineering are exposed to nuclear non-proliferation / nuclear security education, but in reality, the field of nuclear non-proliferation / nuclear security involves not only nuclear technology but also many people such as government and diplomacy. Therefore, I think that people in the humanities are also indispensable from the stage of human resource development. At university, from the perspective of nuclear non-proliferation and nuclear security, with the humanities

It would be good to hold workshops and special lectures as a place for science students to learn together.

**Recommendation 2:** Recommendations for maintaining and strengthening nuclear non-proliferation and nuclear security personnel

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Providing an opportunity to learn about nuclear energy earlier than the university

In order to increase the number of human resources for nuclear non-proliferation and nuclear security, it would be good to hold a class to learn about nuclear energy even in high school with the aim of getting people interested in nuclear energy. In addition, there are many Super Science High Schools (SSH) designated by the Ministry of Education, Culture, Sports, Science and Technology in Japan that are particularly focusing on scientific research activities. Many students enrolled in SSH designated schools have a strong interest in science and technology, so having them experience special lectures on nuclear power and practical training at nuclear facilities. It will lead to increase the number of students who are interested in nuclear energy.

Support for internship participation in international organizations

One of the things that the students who actually went to the IAEA as an intern felt was that there were few Japanese internship students compared to Japan's contribution to international organizations. It was also pointed out that the degree of fulfillment of dispatch programs varies depending on the university. Future government support is expected to create an environment where students who wish to make an intern can participate in the internship.

Japanese problem

If you are studying or researching in Japan, you will be able to obtain the information you are looking for to some extent only in Japanese. Therefore, it was pointed out that Japanese students tend not to greedily try to obtain information from overseas or send it to the outside. In addition, because Japanese literature is written in Japanese, overseas students and researchers can not refer to Japanese materials.

It was said that there was no such thing. Publishing information on the technology cultivated in Japan in English is expected to lead to support for nuclear non-proliferation and nuclear security in countries that are planning to adopt nuclear power in the future.

Make the most of the characteristics of Japan

Japan is the only country in the world that has been bombed but has a nuclear fuel cycle facility. We believe that nuclear non-proliferation and nuclear security personnel who fully understand both the horror of nuclear weapons and the benefits of peaceful use of

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nuclear energy (nuclear power generation) will be extremely valuable personnel not only in Japan but also worldwide.

**Comment from Ms. Na Young LEE:** Although in Japan there is a lot of useful information written only in Japanese. By translating such information into English and strengthening the dissemination of information overseas, we believe that Japan can improve its presence in the world. Also, the fact that Japan is the only country exposed to the atomic bomb and that it is working on the use of nuclear power is very impressive from the perspective of countries around the world, so I would like you to send more information.

**Comment from Mr, Malik DERROUGH:** The influence of the pandemic has led to the development of innovative training methods and tools that can reach more people than ever before. For example, the IAEA has made it possible to tour IAEA facilities using 3D models. In the recommendations, it was proposed to incorporate nuclear security and safeguards into the educational curriculum, I think it is very important. There were also suggestions for internships, internships are a very important opportunity to understand the activities of the organization, so if you are interested in the IAEA, please apply. It is easy to think that there is a language barrier, but many IAEA staff can communicate only in basic English, not in their native language. As a lesson, we learned how resilient humans are from their attitude of creating innovative methods and responding to the Corona disaster. I think we will continue to be exposed to other crises, but it is necessary to maintain this ability.

**Comment from Mr. Tomohiro TERASAKI:** I think the feeling of seeing the adversity of a pandemic as an opportunity will lead to the next. I think that the case where the IAEA and ISCN collaborated to bring the training online gave us different insights from the face to face training. I think that such a situation is an opportunity to create new added value. I think that each person can overcome this situation by having an awareness of where the issues are and how to break through them, and by demonstrating their leadership. I think that adding value will be added by thinking about what you can do from each position. As a result, we believe that new paths will be opened.

**Comment from Mr. Hiroshi SAGARA:** The internship at the IAEA has continued for nearly 20 years at Tokyo Institute of Technology. With the support of the Ministry of Education, Culture, Sports, Science and Technology, activities are being carried out by the University Union so that students from other universities can also participate in

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internships at the IAEA, and two students were dispatched through these activities this year as well. Currently, 18 universities are participating, but I think there are still some areas where promotion is insufficient. Also, I think that the fusion of humanities and sciences is a unique feature of nuclear engineering. At universities in the United States, there are cases where students majoring in nuclear engineering and security at other universities form one organization to make effective use of educational resources, which can be used as a reference. While incorporating such ideas, I would like to make nuclear power a more attractive field.

**Comment from Ms. Natsumi MITSUBOSHI:** After hearing that various teaching materials have been developed, I have had a difficult university life due to the corona, but instead of thinking only about such negative parts, I am proactive with wonderful tools. I felt that it was important to utilize it effectively.

**Comment from Masato HORI:** I think the current students are having a hard time, but I think that the hardship experience will be useful in future crises, such as when a new infectious disease is prevalent.

## **(5) Summary**

**Moderator Masato HORI summarized the panel discussion.**

**As a summary of this panel discussion, the following three good examples for post-corona were given.**

### **① Priority**

Prioritize and devote resources to important projects. Secure alternative personnel as needed and establish a backup system. On the other hand, we will flexibly deal with projects with low priority.

### **② Dispersion**

In order to prevent the spread of the new coronavirus infection, it was effective to shift work from home and work. It was also introduced that the IAEA regional offices in Toronto and Tokyo played a very important role in the IAEA's safeguards. From the above, we consider that "dispersion" is one of the keywords. In order to operate



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smoothly in a decentralized environment, it is necessary to develop an IT infrastructure for centralizing and sharing information. In addition, strengthening cyber security will be important.

### ③ Preparation

If there is a law or action plan, we can respond smoothly. There was also a proposal to develop more innovative technologies for the future and aim for further labor saving, I think that such efforts are also necessary. Furthermore, from the perspective of securing alternative personnel to respond to pandemics, it is considered important to continue to develop human resources, and it is necessary to continue to work on university education.

The theme of this panel discussion was "What should we do to build a resilient, safe and secure society in the post-corona era?" I think the answer has come to light. We hope that everyone who participated today will be able to use it as a reference for future efforts.

## 5. Conclusion

This forum was held online to prevent the spread of COVID-19, and simultaneous interpretation was also distributed. Participants will share their valuable experience of how to deal with the common challenges of humankind called corona, and based on that experience, the important mission of nuclear non-proliferation and nuclear security will continue to be steadily and more resilient. It was a useful opportunity to carry out.