Instructor Training Program

News Letter

Vol.11
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Environmental Radiation Measurement Exercise at JAEA, ITC on Nuclear/Radiological Emergency Preparedness and Environmental Radioactivity Monitoring

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Developing Instructors in Nuclear Field in Asia

Instructor Training Program (ITP)

ITP is conducted by Nuclear Human Resource Development Center (NuHRDeC), the Japan Atomic Energy Agency (JAEA) since 1996 under contract with the Ministry of Education, Culture, Sports, Science and Technology of Japan (MEXT). The aims of ITP are to contribute to human resource development (HRD) in the field of nuclear technology in Asian countries and to make nuclear facility located areas in Japan become a hub for international activities. ITP initially started with two participating countries, and currently the number of the countries has increased up to eleven.

Training in Japan

Instructor Training Course (ITC)

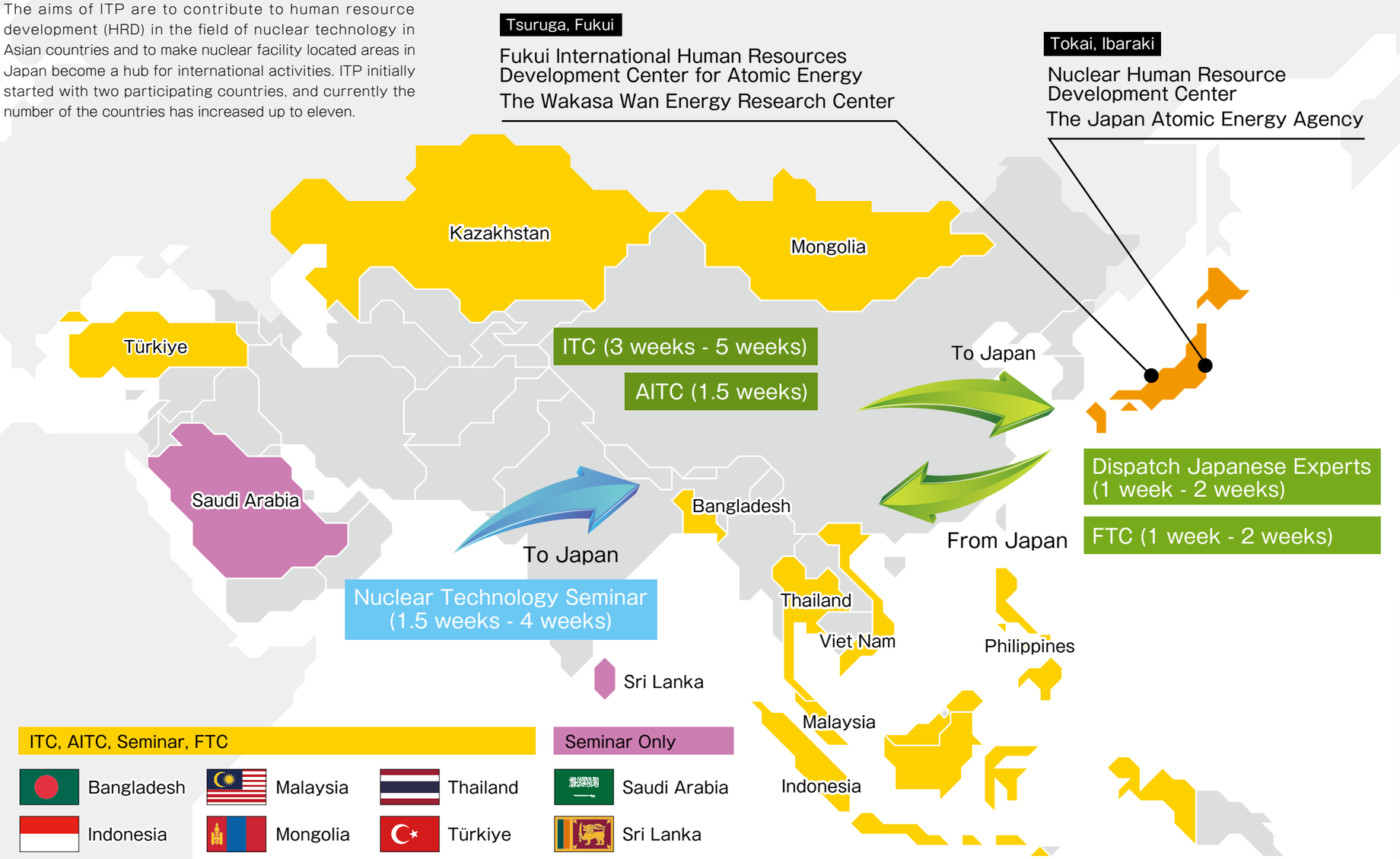
ITC is designed to foster technical instructors concerning three areas: Reactor Engineering, Nuclear/Radiological Emergency Preparedness and Environmental Radioactivity Monitoring. During the three-to-five-week courses in Tokai-mura, Ibaraki Prefecture, Japan, participants from Asian countries aim to acquire necessary basic knowledge as instructors through joining lectures by experts, exercises using a variety of equipment, and visits to nuclear facilities.

Advanced Instructor Training Course (AITC)

AITC is designed for enhancing FTC instructors' quality in three areas: Reactor Engineering, Nuclear/Radiological Emergency Preparedness and Environmental Radioactivity Monitoring. Participants of this course stay in Tokai-mura, Ibaraki prefecture, Japan for about ten days. They are expected to acquire advanced technical knowledge and skills through the course. The lectures and exercises are organized to learn deeply about themes of each area.

Nuclear Technology Seminar (NTS)

NTS is designed to cultivate engineers and specialists in specific areas of nuclear technology. In Tsuruga city, Fukui prefecture, three seminars are held: Nuclear Plant Safety, Nuclear Energy Officials, and Site Preparation and Public Relations. Basic Radiation Knowledge for School Education is held in Tokai-mura, Ibaraki Prefecture. Participants of Seminar are invited to Japan for one to four weeks to improve their specialty through tours to nuclear facilities, discussion and interaction with people at nuclear facilities located areas, as well as lectures and exercises.



Training in Participating Countries

Follow-up Training Course (FTC)

FTC is held in each ITC participating country. The ITC participants give lectures in FTC by making the best use of knowledge and experience gained from ITC. They become excellent instructors by the accumulation of teaching experiences year by year through FTC. Two or three Japanese experts are dispatched to FTC to give lectures and technical advice for the establishment of the self-sustainable training courses.

Developing Instructors in the Nuclear Field in Asian Countries

- Establish a nuclear HRD network in Asia
- Build an international activity base at nuclear facility located areas
- Facilitate cooperation between Japan and Asian countries in the nuclear field

The Accumulated Number of ITP Participants

(JFY 1996～2024)

Instructor Training Course	743
Advanced Instructor Training Course	88
Follow-up Training Course	7455*
Nuclear Technology Seminar	690

*The number is as of 3 February 2025.

Instructor Training Course (ITC)

Reactor Engineering

Period: 4 September – 10 October 2024 (5 weeks)
Venue: Tokai, Ibaraki
Participants: 7
Outline: Participants acquire a wide range of knowledge on nuclear engineering and the skills to disseminate the knowledge as a lecturer. The course is open to engineers, researchers and academic staff in the nuclear field. In JFY2024, the course provided 20 lectures, 6 exercises and 9 facility visits.

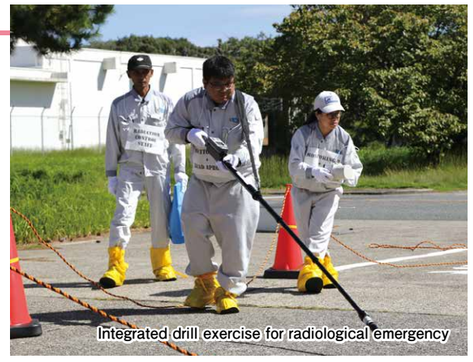

Exercise on boiling heat transfer

Learning Heat Transfer in Reactors

In an operating nuclear reactor, the heat generated by the fission reaction of the fuel is continually cooled by the coolant (water) to keep the fuel in a safe condition. Therefore, it is very important to understand the heat transfer phenomena between the fuel and the coolant. In the boiling heat transfer exercise, participants observed the heat transfer process qualitatively and attempted to quantify the degree of heat transfer. A copper tube simulating a fuel rod is electrically heated while coolant flows from the bottom to the top of the simulated fuel rod. First, the simulated fuel rods are heated, and the transition from a non-boiling to a boiling state of the coolant can be observed. Next, to quantitatively understand the heat transfer, the temperatures of the simulated fuel rods and coolant are measured, and the heat transfer coefficient, which indicates the degree of heat transfer, is calculated. By comparing the heat transfer coefficients in non-boiling and boiling state, participants could understand how the heat transfer changes due to boiling. Furthermore, if the simulated fuel rods are heated excessively, a boiling heat transfer limit called "burnout" occurs. Once burnout occurs, the simulated fuel rod can no longer be cooled, becoming red-hot and potentially damaged if left unattended. For safety reasons, the heating was stopped before any damage occurred during the exercise, but participants gained a valuable opportunity to observe the burnout phenomenon. Finally, participants conducted a quantitative analysis of the burnout point and were able to gain valuable insights of heat transfer between fuel and coolant.

Nuclear/Radiological Emergency Preparedness

Period: 4 September – 26 September 2024 (3 weeks)
Venue: Tokai, Ibaraki
Participants: 6
Outline: Participants acquire knowledge and skills on emergency response in case of a radiation accident inside and outside nuclear or radiation handling facilities. The course is open to engineers, researchers and academic staff in the nuclear field. In JFY2024, the course provided 15 lectures, 11 exercises and 4 facility visits. Some parts of the curriculum were joint classes with ITC on Environmental Radioactivity Monitoring.


Integrated drill exercise for radiological emergency

Integrated Drill for Radiation Emergency Scenarios

In this course, participants gained knowledge covering topics ranging from radiation basics and protection measures to radiation emergency response techniques. The radiation emergency tabletop exercise and integrated emergency response drill were the key exercises that summarized the three-week program.

This year's scenario involved a traffic accident that damaged a transport container carrying a radiation source. Participants created a tabletop response plan, assigned roles, and simulated their actions using a tabletop exercise to discuss and confirm procedures. The integrated emergency response drill took place outdoors and began with a call from the person who discovered the accident. Then it proceeded with first aid for the injured, radiation measurement, and recovery of the radiation source. While some tabletop plans did not work as expected during the practical exercise, participants gained a deeper understanding of the challenges involved in responding to actual accidents and further enhanced their learning from the course.

Environmental Radioactivity Monitoring

Period: 4 September – 26 September 2024 (3 weeks)
Venue: Tokai, Ibaraki
Participants: 6
Outline: Participants acquire knowledge and skills on environmental radioactivity monitoring. The course is open to engineers, researchers and academic staff in the nuclear field. In JFY 2024, the course provided 16 lectures, 9 exercises and 5 facility visits. Some parts of the curriculum were joint classes with ITC on Nuclear/Radiological Emergency Preparedness.


Sample preparation for tritium measurements

Learning to Measure Tritium Levels in Water

When ALPS treated water* is released into the ocean from the Fukushima Daiichi Nuclear Power Station of Tokyo Electric Power Company (TEPCO), it contains tritium, a radioactive nuclide that emits weak beta radiation in the water, which has become a hot topic. Since tritium is a part of a water molecule, it cannot be removed from the water. To ensure the safety, ALPS treated water is diluted with seawater to keep tritium concentrations is sufficiently lower than regulatory limits. Liquid scintillation counter is used to confirm these concentrations.

In this course, participants learned the entire process, from sample pretreatment and preparation to measurement, through lectures and practical exercises. During sample preparation, they focused on differences in sample amounts to understand their impact on measurement results, highlighting the importance of proper preparation. Additionally, participants learned about the measurement principles while observing the components inside a disassembled liquid scintillation counter, which they would not normally have the opportunity to see. This experience will be beneficial when they become instructors in their home countries.

*ALPS treated water: Water that has been purified using the Advanced Liquid Processing System (ALPS), a multi-nuclide removal system.

Voices of ITC Participants

Reactor Engineering

Ms. JAHURA Fatema Tuj
Bangladesh Atomic Energy Commission (BAEC)

My experience in ITC on Reactor Engineering has been highly enriching. The lecture materials were insightful and helped me learn a lot about reactor physics, operation, and safety systems, significantly expanding my knowledge and skills. It was great to meet and learn from experts and other participants from different countries that provided a great opportunity to exchange knowledge. The practical sessions, like reactor simulation exercise, various experiments, and various facility visits helped me understand things better. I also gained knowledge about new technologies, and I am excited to apply these skills in my work.

Nuclear/Radiological Emergency Preparedness

Mr. Fahmi Alfa MUSLIMU
National Research and Innovation Agency (BRIN)

It is an honor to be part of the ITC and I am grateful for the opportunity to meet colleagues from other countries, exchange stories and experiences, and practice the spirit of Kaizen by not only teaching skills but also continuously improving our methods and approaches in mentoring. Just as "Wabi-Sabi" celebrates the beauty in imperfection, "Kaizen" encourages continuous improvement and growth. By integrating these two philosophies, we create an environment that supports deep learning and fosters a desire for ongoing improvement. Our goal as instructors is to bring ever-growing wisdom, inspiration, and dedication.

Environmental Radioactivity Monitoring

Ms. ERDENE Erdenetsetseg
Metropolitan Education Department of Ulaanbaatar City

Thank you very much to NuHRDeC, JAEA for organizing ITC for us. It provided us with a great opportunity to acquire both theoretical and practical knowledge and experiences in this field. It also helped us to enhance various skills related to both professional and personal growth.

The practical exercises and facility visits, especially to the environmental monitoring facility of JAEA, the Great East Japan Earthquake and Nuclear Disaster Memorial Museum and TEPCO' s Fukushima Daiichi Nuclear Power Station were exceptional experiences that left an unforgettable impression, deepening our understanding of nuclear energy and the importance of effective safety measures. So, I would say it was truly an extraordinary experience that I will stay with me forever.

Voices from Guest Lecturers

What is a Guest Lecture?

Past ITC participants who showed excellent performance in ITC and actively contribute to FTC in their own countries are invited as guest lecturers to ITC. This system has started in JFY2010 and 42 guest lecturers have been invited from each country so far. In JFY2024, three past ITC participants were selected as the guest lecturers.

Mr. PHAM Quang Huy

Vietnam Atomic Energy Institute (VinAtom)
Completed ITC 2010 on Reactor Engineering III and ITC 2013 on Nuclear/Radiological Emergency Preparedness

Viet Nam

My Experience of ITC and FTC

I have been working at VinAtom for more than 23 years. My main duty is ensuring the safe operation and efficient utilization of the Dalat Nuclear Research Reactor, which is the only reactor VinAtom currently operates. I was fortunate to have the opportunity to attend two ITCs. The knowledge and experience gained through these ITCs were very useful for me in terms of knowledge, teaching skills, and improving the quality of my lectures for FTC. Since completing the ITC in 2010, I have been a lecturer for FTC on Reactor Engineering. I am responsible for lecturing on topics related to thermal hydraulics, reactor physics experiments and nuclear fuel engineering. I also participated as a lecturer in FTC on Nuclear/Radiological Emergency Preparedness, covering topics related to Nuclear Emergency Preparedness and Response. Recently, I have actively contributed as a coordinator in organizing the FTC on Reactor Engineering, which was successfully held at Dalat in 2023.

My Hope as Lecturer and Coordinator

Our country is currently advancing a project to establish a new research institute for Nuclear Science and Technology, which will include a new research reactor of 10 MWt. Therefore, human resource development (HRD) is one of the key issues that must be prioritized. I hope that continued cooperation with NuHRDeC, JAEA through ITC and FTC will lead to significant contributions to our future HRD.

Ms. Noor Fadilla Binti ISMAIL

Malaysian Nuclear Agency (Nuklear Malaysia)
Completed ITC 2016 on Nuclear/Radiological Emergency Preparedness

Malaysia

My Experience of FTC as Lecturer and Coordinator

Since 2013, I have been working as a research officer in the Radiation Safety and Health Division at Nuklear Malaysia. In 2016, I had the opportunity to attend ITC. Upon returning from the program, my knowledge of nuclear and radiological emergency response increased significantly, enabling me to effectively serve as an instructor and share this expertise with others. My journey as an instructor began with the FTC in JFY2016, where I was given the responsibility of lecturing on topics such as radiation basics, internal dose exposure. I really enjoy sharing my knowledge and experience with FTC participants who are mainly emergency responders from organizations such as Atom Malaysia, the Royal Malaysian Police, Fire and Rescue Department, and Malaysian Armed Forces. In JFY2022 and 2023, I had an opportunity to serve as a coordinator for FTC. Throughout this period, I gained valuable experience, particularly in collaborating with JAEA on the successful implementation of the FTC. This collaboration not only improved my skills in course coordination, but also strengthened international partnership in ensuring preparedness for nuclear and radiological emergencies.

Future Plan as Instructor

In the future, I hope that Malaysia will strengthen its collaboration with JAEA in organizing the FTC. I believe, this course is very important in developing competent radiological responders who can effectively manage and mitigate the severity of emergencies, thereby contributing to global nuclear safety.

Ms. OZGUR Mine

Turkish Energy, Nuclear and Mineral Research Agency (TENMAK)
Completed ITC 2015 and AITC 2022 on Environmental Radioactivity Monitoring

Türkiye

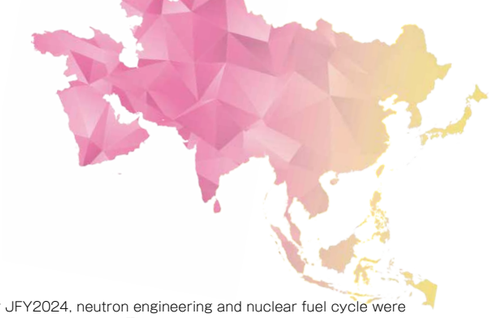
My Experience as FTC Coordinator

I am a physics engineer and have been working as a gamma spectrometry analyst at the Nuclear Energy Research Institute (NUKEN), TENMAK since 2013. I participated in ITC in 2015, and since 2017, I have served as a coordinator, organizing FTC five times with other past ITC participants. Before attending the ITC, I only participated in the measurement phase of environmental radioactivity monitoring. However, thanks to the ITC, I gained a broader perspective and improved my general knowledge in environmental radioactivity monitoring. Additionally, although nuclear reactors have not yet been operated in our country, environmental radioactivity monitoring is mostly carried out routinely. It was also a great experience to have the opportunity to learn JAEA's on-site experiences regarding emergency environmental monitoring.

Future Plan for FTC

Since personnel in NUKEN, TENMAK work in both laboratories and emergency teams, we organize the FTC as a joint course on Nuclear/Radiological Emergency Preparedness and Environmental Radioactivity Monitoring. In JFY2023 and 2024, we invited participants from our stakeholder organizations. We are committed to increasing the number of external institutions and participants and to organize FTCs according to their needs. Although large groups in practical sessions can be challenging, FTC is effective in enhances participants' knowledge and experience.

Advanced Instructor Training Course (AITC)



Reactor Engineering

Period: 27 November – 6 December 2024 (1.5 weeks)
Venue: Tokai, Ibaraki
Participants: 7

In this course, participants acquired advanced expertise on neutron engineering and learned how to apply the radiation transport simulation code PHITS, developed by JAEA, which is important calculations in reactor engineering such as neutron spectrum and radiation shielding. Participants also learned the outline of the nuclear fuel cycle simulator code NMB and how to apply it to various issues. Furthermore, they learned how to develop effective lecture and exercise materials for their lectures in their home countries.

Additionally, participants visited TEPCO Decommissioning Archive Center and the Fukushima Daiichi Nuclear Power Station to study the nuclear accident. They received explanations on the progress of decommissioning and the facilities related to ALPS treated water. The information obtained on-site left a profound and meaningful impression on the participants.

Outline : For JFY2024, neutron engineering and nuclear fuel cycle were selected as the main themes. The objective was to acquire advanced knowledge and skills on the themes and to further improve teaching techniques. The course provided 5 lectures, 5 exercises and 2 facility visits. Some parts of the curriculum were joint classes with other courses of AITC.

Visit to Fukushima Daiichi nuclear power station Source: TEPCO

Nuclear/Radiological Emergency Preparedness

Period: 27 November – 6 December 2024 (1.5 weeks)
Venue: Tokai, Ibaraki
Participants: 5

In this course, under the theme emergency radiation dose assessment using simulation codes, participants learned about simulation tools the Worldwide System for Prediction of Environmental Emergency Dose Information (WSPEEDI-II) and PHITS developed by JAEA. Through lectures and hands-on exercises, they studied the theories behind these tools and how to use them for radiation dose assessment. Participants also discussed radiation accident case studies from different countries, sharing ideas on emergency response and technical challenges.

In the PHITS exercise, participants created virtual spaces, placed objects for evaluation, and set calculation conditions based on what they learned in the lectures. While they faced many errors and had to correct them step by step, they were excited when they finally succeeded in creating spatial radiation distribution maps.

Outline : For JFY2024, the goal was to acquire advanced and specialized knowledge and skills in radiation dosimetry in emergency situations. The course provided 7 lectures, 7 exercises and 1 facility visit. Some parts of the curriculum were joint classes with other courses of AITC.

Exercise on WSPEEDI-II

Environmental Radioactivity Monitoring

Period: 27 November – 6 December 2024 (1.5 weeks)
Venue: Tokai, Ibaraki
Participants: 5

Utilizing simulation technologies is essential for effective environmental radiation monitoring. This year, the participants used WSPEEDI-II to observe how radioactive substances disperse in the atmosphere and how dose distributions vary depending on different scenarios. They also learned from researchers at JAEA about studies that used simulation technologies to determine the dispersion of radioactive substances released into the ocean and rivers following the accident at the Fukushima Daiichi Nuclear Power Station of TEPCO.

Additionally, participants visited Fukushima, where they attended lectures by JAEA researchers on monitoring and data analysis related to the discharge of APLS treated water into the ocean. They also had the opportunity to learn about large-scale environmental radiation monitoring using aircraft while observing actual equipment in use. Through these experiences, the participants gained insights into the cutting-edge technologies utilized in Japan.

Outline : For JFY2024, the aim was to develop human resources capable of analyzing and evaluating environmental radiation monitoring data using radioactive material transfer models. The course provided 10 lectures, 5 exercises and 2 facility visits. Some parts of the curriculum were joint classes with other courses of AITC.

Observation of aircraft used for environmental radiation monitoring

Follow-up Training Course (FTC)

The Follow-up Training Course (FTC) is designed to foster nuclear human resources in the home countries of ITC (Instructor Training Course) graduates. This training is managed primarily by ITC graduates, who also serve as instructors. The course offers training in three areas: Reactor Engineering, Nuclear/Radiological Emergency Preparedness, and Environmental Radioactivity Monitoring.

FTC on Nuclear/Radiological Emergency Preparedness, Kazakhstan

Annual Implementation Record of FTC

Indonesia, Kazakhstan, Malaysia, Mongolia, Philippines, Thailand, Türkiye, Viet Nam

	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
Reactor Engineering	KZ	TH					PH		VN	MN	MY	
Nuclear/Radiological Emergency Preparedness	KZ	TR			TH		MN, VN			PH	MY	
Environmental Radioactivity Monitoring	KZ	MN, TR			PH		VN	ID	TH		MY	

Reactor Engineering

Philippines

Comprehensive Learning of the Basics

The Philippine government is planning to generate 1.2 GW of electricity through nuclear power by 2032, marking a significant milestone in its energy development goals. Human resource development in nuclear science and technology has become a priority as a part of this effort, with initiatives to introduce nuclear education programs in universities and high schools, which are gaining momentum.

Against this backdrop, FTC 2024 on Reactor Engineering was held as a national training course over two weeks at the Philippine Nuclear Research Institute (PNRI). The training brought together 18 participants, including young scientists from PNRI, university and high school educators, and officials from the Department of Education and the Department of Energy.

Until JFY2023, lectures were conducted online due to the COVID-19 pandemic. However, this year, both lectures and practical exercises were held in person. The curriculum covered a broad range of topics, from the fundamental properties of radiation and atomic nuclei to reactor operation principles, nuclear fuel cycle, and nuclear accidents. The participants comprehensively learned about reactor engineering as a multidisciplinary field.

Practical exercises included the neutron experiment, where participants measured data themselves to deepen their understanding of reactor operation principles. Across all lectures and exercises, participants engaged in high-quality discussions and active Q&A sessions, making the training highly valuable and meaningful.

Neutron Experiment

Nuclear/Radiological Emergency Preparedness

Indonesia

Learning Emergency Response Skills

In Indonesia, the National Research and Innovation Agency (BRIN) was established in 2021 by integrating various government research agencies, including the Indonesian National Nuclear Agency (BATAN), as well as policy research divisions from different ministries. Following three previous online FTCs, BRIN organized its first in-person FTC on Nuclear/Radiological Emergency Preparedness this fiscal year.

Twenty-six engineers and researchers working at the maintenance of nuclear facilities at BRIN participated in the FTC. Participants gained a wide range of knowledge, including the fundamentals of radiation, its effects on the human body, BRIN's emergency response framework, and real cases of radiological contamination incidents in Indonesia along with corresponding responses.

As a culmination of the training, the participants conducted a tabletop exercise at a research reactor, simulating a radioactive material leak incident. They were assigned roles such as on-site managers and radiation safety officers, and discussed what they should do as the situation progressed. Through this exercise, they gained a better understanding of how to respond to a nuclear incident.

Tabletop exercise on emergency response

Environmental Radioactivity Monitoring

Kazakhstan

FTC organized by INP in cooperation with KazNU

The Institute of Nuclear Physics (INP) in Almaty has been organizing FTC on Reactor Engineering from JFY2023, following the course conducted by the National Nuclear Energy Center of the Republic of Kazakhstan (NNC RK) in Kurchatov (see Vol. 10), as Kazakhstan is considering the use of nuclear power. Therefore, developing human resource in the field of environmental radioactivity monitoring is becoming increasingly important.

FTC on Environmental Radiation Monitoring had mainly been organized by Al-Farabi Kazakh National University (KazNU); however, from JFY2024, INP has taken the lead, with support from KazNU and JAEA.

Twelve participants attended the 3-day FTC, which provided 12 lectures and two exercises. The lectures covered specialized topics such as building a database to track the distribution of radioactive contamination in soil at former nuclear test sites as well as practical exercise on soil sampling. These activities provided the participants with valuable knowledge and skills. Thanks to the hard work of the coordinator and instructors, the FTC was a great success. It is hoped that the training program will be expanded to become even more informative and beneficial for participants.

Exercise on environmental radiation measurement

Nuclear Technology Seminar (NTS)

Nuclear Plant Safety

Period: 16 September – 11 October 2024 (4 weeks)
Venue: Tsuruga, Fukui
Participants: 10

Outline : The course is open to researchers and engineers engaged in the field of radiation application, fundamental nuclear technology, and operation of nuclear power plants or research reactors in Asian countries. The course provides participants with lectures on safety measures and risk assessment for nuclear facilities, operation and maintenance of nuclear reactors, prevention of nuclear disaster and management of radioactive wastes. Moreover, it provides exercises and nuclear related facility visits as well as information exchange and discussion on each country' s nuclear power generation plan. In JFY2024, the course provided 20 lectures, 3 exercises, 8 facility visits and 3 discussions.

Research reactor operation exercise in Kindai University

Gaining Better Understanding of Safety Through Reactor Operation Experience

Participants conducted practical exercise on reactor operation with the cooperation of the Atomic Energy Research Institute, Kindai University. Its research reactor is highly safe as it does not require a cooling system due to its low output of 1W of rated thermal power. The radiation level around the reactor core is extremely low, allowing people to safely enter the reactor room even while it is operating. These features are utilized in research and education.

Before starting the operation, the participants toured the inside of the reactor to learn about its structure, then operated the control panel to adjust the reactor's criticality and change its power output following instructions from professors. When the reactor reached criticality, they measured neutron and gamma radiation dose rates around the reactor and observed how the radiation levels varied depending on the measurement location. In addition, with the cooperation of Tsuruga Training Center, the Japan Atomic Power Company (JAPC), the participants visited the full-scope simulator of Tsuruga Power Station Unit 2. They then experienced operating a nuclear reactor using an educational simulator for nuclear power generation. Through hands-on practice in reactor startup and shutdown, power control, and responses to abnormal situations, the participants deepened their understanding of reactor safety functions.

Educational simulator of nuclear power generation, Tsuruga Training Center, JAPC

Interview

Professor WAKABAYASHI Genichiro of the Atomic Energy Research Institute at Kindai University is making an effort to educate the younger generation about nuclear science by utilizing the university's nuclear reactor

Education for younger generations is crucial to promote the peaceful use of nuclear science and technology. As many university research reactors are being decommissioned one after another, Kindai University remains the only private university in Japan contributing to the development of nuclear human resources. To support this effort, it accepts students not only from its own university but also from 14 other universities across the country, providing hands-on training in reactor operation. In addition, leveraging its unique feature as the only reactor in Japan that can be operated by the general public, Kindai University also offers training programs for high school students and science teachers from secondary schools. These programs have been highly rated for enhancing understanding of nuclear energy and radiation. Furthermore, Kindai University welcomes visits from high school students and the general public, with approximately 1,000 people visiting its reactor each year. Moving forward, we will continue our educational activities to encourage more people to develop an interest in nuclear energy.

Measurement of neutron radiation dose during reactor operation by NTS participants under the guidance of Prof. WAKABAYASHI

Nuclear Energy Officials

Period: 2 December – 20 December 2024 (3 weeks)
Venue: Tsuruga, Fukui
Participants: 10

Outline : The course is open to governmental officials in nuclear administration. The course provides participants with lectures on a wide range of necessary topics for nuclear administrators such as nuclear energy policy, security administration, safety culture, safety measures and safety management for nuclear facilities, and human resource development. The course also offers tours to nuclear-related facilities as well as information exchange and discussion on each country's nuclear power generation plan. In JFY2024, the course provided 17 lectures, 8 facility visits and 3 discussions.

Learning about Nuclear Administration

The participants studied topics such as nuclear administration by local governments and Japan's nuclear regulations through lectures, learning how to carry out tasks necessary for management and operation under government administration. They also visited national nuclear emergency response centers and local radiation monitoring facilities to study emergency response measures, preparedness, and safety management through radiation monitoring. In addition, they engaged in discussions on leadership as nuclear administrators, applying what they had learned in the course.

Participants engaging in discussion

Basic Radiation Knowledge for School Education

Period: 27 June – 10 July 2024 (2 weeks)
Venue: Tokai, Ibaraki
Participants: 13

Outline : The course objective is to foster human resources who will disseminate correct knowledge of nuclear energy and radiation to the public and students in Asian countries. The course is open to persons in charge of public relations in nuclear research institutes or governmental agencies, persons involved in educational administrations and schoolteachers. In JFY2024, the course provided 7 lectures, 5 exercises and 6 facility visits.

Learning through Experiencing Outreach Activities

The participants learned about JAEA's outreach activities through hands-on experience in measuring radiation. The exercise was conducted for high school students with the cooperation of teachers and students from Mito Daini Senior High School in Ibarkai. After an explanation of basic radiation knowledge, participants and high school students formed groups to measure radiation emitted from household objects and examine differences in the shielding effect of materials such as stainless steel, lead, and plastic against gamma rays, a type of radiation. Through this experience, the participants learned outreach methods while enjoying interactions with the high school students.

Radiation measurement exercise with high school students

Site Preparation and Public Relations

Period: 23 October – 1 November 2024 (1.5 weeks)
Venue: Tsuruga, Fukui
Participants: 10

Outline : The course is open to governmental officials in nuclear regulation and public relations. The course provides participants with lectures on laws and assessment regarding site preparation of nuclear facilities, public relations activities, and risk communication as well as a visit to a planned construction site of nuclear power plants. Furthermore, participants exchange information and have discussions on each country's nuclear power generation plan. In JFY2024, the course provided 10 lectures, 5 facility visits and 2 discussions.

Learning about Nuclear Awareness and Site Selection

Participants visited the nuclear science museum "At-home", where they received an explanation of the facility's purpose and activities. They also learned about efforts to help visitors gain a deeper understanding of nuclear energy and general energy topics through interactive exhibits. Additionally, during a visit to the construction preparation site for Units 3 and 4 at the Tsuruga Power Station by the Japan Atomic Power Company, they were briefed on the measures being taken during the preparation phase and gained knowledge about the site selection and requirements for locating nuclear power plants.

Visit to Nuclear science museum "At-home"

TOPICS

Current Initiatives in NPP Sited Areas

Research guidance at the Suzuki Laboratory

Sparking Interest of Younger Scientists with "Creative ROBOCON for Decommissioning": Building New Strengths for Technological Research

An interview was conducted with Professor SUZUKI Shigekazu of National Institute of Technology (KOSEN*), Fukushima College in Iwaki, Fukushima.
* KOSEN is a unique five-year technical college in Japan where students enroll from age 15 after junior high to become highly demanded engineers.


Prof. SUZUKI Shigekazu, vice principal (in charge of Reconstruction Support) and professor of the Department of Mechanical System Engineering

JAEA Could you please tell us about your background and area of expertise?

Prof. Suzuki I was born and raised in Fukushima and graduated from the Department of Mechanical Engineering at this college, which is the first national technical college in the Tohoku region. I then continued my studies at Nagaoka University of Technology, specializing materials science and earned my degree. Initially, my area of expertise was in the processing of paper materials, which is not related to nuclear energy at all. However, in 2004, I started working as a faculty member at this college, which is located in a region hosting nuclear power plants. This opportunity led me to study nuclear energy through training programs and to contribute to nuclear human resource development. Currently, I am applying my expertise in materials science to work on materials evaluation for fusion reactors.

JAEA Could you tell us about the Creative ROBOCON for Decommissioning that you started?

Prof. Suzuki I have been involved in nuclear human resource development since 2008. In 2011, the Great East Japan Earthquake occurred, making research on decommissioning technology a critical issue for recovery. To overcome this challenge, we launched a project that combines advancing research with training the next generation of talent. We wanted students, not only from Fukushima and nearby areas but also from across Japan, to be curious about decommissioning. That's why we decided to focus on robot contests "ROBOCON", which are very popular among technical college students. What makes this contest unique is that it sets themes directly related to decommissioning, such as in-vessel inspections or debris* retrieval assistance. Another key feature is that the same theme is used for two consecutive years. This approach allows participants to learn from their mistakes, and we' ve seen significant improvement in the quality of work in the second year.
*Debris refers to solidified material formed when melted fuel and other substances cool and harden, as seen in the Fukushima Daiichi Nuclear Power Station accident.

JAEA What ideas and results have come from the Creative ROBOCON for Decommissioning?

Prof. Suzuki The first contest was held in 2016, and nine contests has been taken place so far. It's exciting to see creative ideas that even experienced engineers might not think of. For example, when we gave a task to simulate debris retrieval, one team developed a walking robot instead of using wheels or tracks. These ideas have led to collaborations with companies, and the contest has even encouraged students from other areas to enroll at our college. It has helped raise interest among younger generations and increased awareness of contributing to recovery efforts. We also use the full-scale mock-up building at JAEA's Naraha Center for Remote Control Technology Development as the competition venue, which helps make good use of the facility.

JAEA We heard that you are also conducting research on radiation-resistant materials. Could you share your goals and future plans?

Prof. Suzuki Protecting electronic components, especially memory, is one of the challenges in developing robots in the reactor. We are researching local shielding using radiation-blocking materials, and student ideas play an important role in this work. One of the students is studying sprayable shielding materials made by mixing metal powder into resin materials such as fiber-reinforced plastics for his graduation research. If successful, this could enable the shielding to conform to uneven surfaces. Through the robot contest, I aim to inspire more students to take an interest in decommissioning technology while also promoting recovery efforts and a better understanding of the current situation at the Fukushima Daiichi Nuclear Power Station.

Watch the Video of ROBOCON→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TOPICS

ITP NEWS

Thirty Years of Kazakh - Japanese Scientific and Technical Cooperation in the Field of Peaceful uses of Nuclear Energy


Presentation by Director of Nuclear Human Resource Development Center, JAEA

The International Scientific and Technical Seminar, 30 years of Kazakh - Japanese Scientific and Technical Cooperation in the field of Peaceful uses of Nuclear Energy, was held at the National Nuclear Center of Kazakhstan (NNC RK) in 2024. The seminar highlighted the cooperation between Kazakhstan and Japan in nuclear technology and peaceful use research since the establishment of NNC RK.

Six JAEA personnel, including the President of the JAEA, along with engineers and researchers from Japanese private companies collaborating with Kazakhstan, attended the event from 5 to 6 June. Director of Nuclear Human Resouce Development Center (NuHRDeC) at JAEA shared an overview of ITP and discussed its cooperation with NNC RK. From Kazakhstan, engineers and researchers from NNC RK, other research institutions, and universities participated. Mr. Vladimir Anatolyevich VITYUK, Deputy Director General of NNC RK, expressed gratitude for Japan's support through the ITP. In addition, Mr. Arman MINIYAZOV, a participant of the ITC on Reactor Engineering II in JFY2017 and a long-time contributor to the FTC, presented Kazakhstan's efforts in nuclear human resource development. We hope to continue strengthening the relationship between our two countries and contributing to the peaceful use of nuclear technology through ITP.

International Conference on Nuclear Knowledge Management and Human Resources Development: Past ITP Participants Actively Contributing

The International Conference on Nuclear Knowledge Management and Human Resources Development was held by the International Atomic Energy Agency (IAEA) in Vienna, Austria, from 1 to 5 July 2024. Representatives from the JAEA gave a presentation on their contributions to nuclear human resource development, including the Instructor Training Program (ITP). Participants from countries involved in the ITP expressed their appreciation for Japan's support over the years.

Past ITP participants also actively participated in the conference, showcasing their ongoing efforts to develop nuclear talent in their home countries. Mr. Zachariah John Aviles BELMONTE, a participant of the ITC on Reactor Engineering III in JFY2019 from the Technological University of the Philippines, presented his research on promoting nuclear science education for younger generations. He shared how his experience with the ITP deepened his interest in nuclear education and led to collaborative research with the University of Tokyo. Ms. Habibah ADNAN, a participant of the NTS Basic Radiation Knowledge for School Education in JFY2023 from Malaysian Nuclear Agency, shared her work on strengthening the foundation for sustainable nuclear human resource development through science education curricula.

We look forward to seeing past ITP participants continue to apply the knowledge and skills gained through the program to make meaningful contributions in the field of nuclear science and technology.


Vienna International Centre


Presentation by Mr. BELMONTE

Nuclear Science and Technology Training Initiatives in Counterpart Organisations

Ms. Habibah ADNAN

Director of Information Management Section, Management Programme Department
Malaysian Nuclear Agency (Nuklear Malaysia)

Malaysia

Nuclear Science and Technology Education Outreach by Nuklear Malaysia

Nuklear Malaysia plays an important role in assisting nuclear science and technology (NST) education, focusing on equipping the next generation with essential knowledge and experience. In collaboration with the Ministry of Education, NST topics have been integrated into the national curriculum for secondary school students, covering key areas such as the structure of atoms, radioactivity, radiation safety, and nuclear applications. These topics are to inculcate students' interest and deepen their understanding through engaging classroom learning experiences.

A key component of Nuklear Malaysia's strategy is empowering science teachers. The agency offers workshops that provide hands-on training and resources, helping teachers effectively deliver NST content. Teachers may also invite the Nuklear Education Outreach team to conduct class experiments, exhibitions, or talks related to NST. Programs like the "Sembang Santai Saintis" (Casual Chat with Scientists), enable scientists to share their expertise or experiences with students, fostering curiosity and engagement. Moreover, the Radiation Box Loan (RadBox) program allows teachers to deliver the topics using practical tools such as survey meters and electronic cloud chambers.

In addition to classroom support, Nuklear Malaysia welcomes students to visit the nuclear reactor and facilities. This experiential learning helps demystify nuclear technology and promotes confidence in its safety. Nuklear Malaysia also hosts NST competitions, including essay writing and video-making contests, to inspire students to explore the field creatively. The success of these efforts is evident in the enthusiastic participation of students, such as the 2,520 essay submissions received for the 2024 Nuclear Science Essay Competition.

Nuklear Malaysia's efforts aim to raise awareness of the vital role of nuclear technology in everyday life and inspire students to pursue careers in NST. By continuing to support teacher empowerment and curriculum development, Nuklear Malaysia is laying the foundation for a future generation that is well-equipped to navigate and contribute to the field of NST.

Observation of radiation tracks using a cloud chamber

Dr. Suwimol JETAWATTANA

Head of Academic Services Section, Nuclear Technology Research and Development Center
Thailand Institute of Nuclear Technology (TINT)

Thailand

Purpose and Strategy in NST Education

As a nuclear research and services organization, part of TINT's mission is to provide academic services, promote and support nuclear technology advancement, transfer knowledge, as well as educate and develop personnel skills in utilizing nuclear and radiation technology. The objective is to enhance the potential of individuals to become proficient in nuclear and radiation capabilities that align with their responsibilities and goals.

TINT's nuclear human resource development (HRD) training system incorporates the training needs arising from internal departments and external agencies. As the largest nuclear and radiation training provider in the country, Academic Services Section manages and conducts training programs. Training activities involve experts with varying levels of competence and requires systematic processes, such as assessing needs, planning, design, execution and evaluating the activities and their effectiveness. Training channels include onsite and online courses, as well as e-learning platforms utilizing a learning management system.

Different levels of nuclear HRD training are conducted, including basic training, training required by nuclear law and regulations, discipline- and function-specific training, and role-based training tailored to competencies and individual needs training. Each course has different target groups, an assigned course director, and an approved syllabus, while training materials are regularly amended or revised to remain up-to-date and aligned with relevant nuclear regulations.

The training courses are divided into two categories: one for internal staff and one for external participants. The courses include basic safety for radiation workers, radiation protection and preparation course for radiation safety officer, an annual radiation safety knowledge refresher course, and joint nuclear and radiation emergency exercises between agencies. Moreover, three training courses regarding reactor engineering, nuclear and radiological emergency preparedness, and environmental radioactivity monitoring are conducted in a cooperation with NuHRDeC, JAEA.

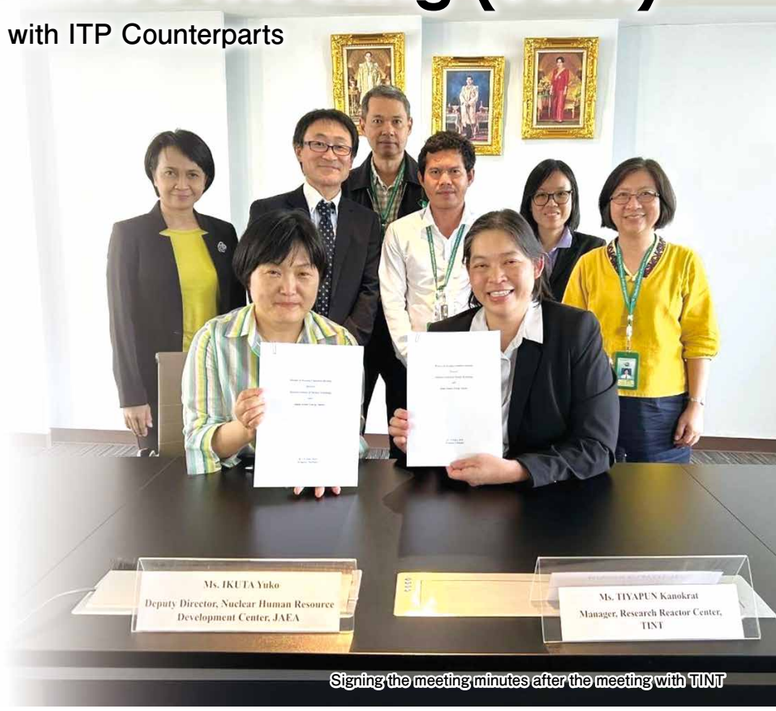
As we are committed to developing new generations of instructors to replace those who have retired, we are seeking new collaborations in training services. We welcome cooperation in training initiatives both domestically and internationally.

Radiation measurement exercise

Decontamination exercise

Steering Committee Meeting (SCM)

Opportunities to Exchange Views with ITP Counterparts



Signing the meeting minutes after the meeting with TINT

Overview of the Steering Committee Meeting (SCM)

Every year, staff from the Nuclear Human Resource Development Center of the Japan Atomic Energy Agency (JAEA) hold a Joint Steering Committee meeting with counterparts in the nine countries that have participated in the Instructor Training Course (ITC) (see p.2). These meetings serve as a platform for discussing and exchanging views on the status and future plans for nuclear human resource development, including the implementation of Follow-up Training Courses (FTC), as well as operational challenges related to the Instructor Training Program (ITP).

In addition to gathering information on each country's nuclear utilization status and future plans, JAEA staff also visit relevant organizations to promote cooperation in nuclear human resource development and identify specific needs in this area.

Under the ITP framework, each participating country designates a counterpart organization (see p.16), which is responsible for selecting ITC candidates and organizing FTCs. To ensure the smooth and effective implementation of activities, the program not only facilitates interactions between past ITC participants, FTC instructors and participants, and JAEA lecturers but also promotes engagement with key personnel from nuclear-related organizations in each country.

Expected Outcomes of the SCM

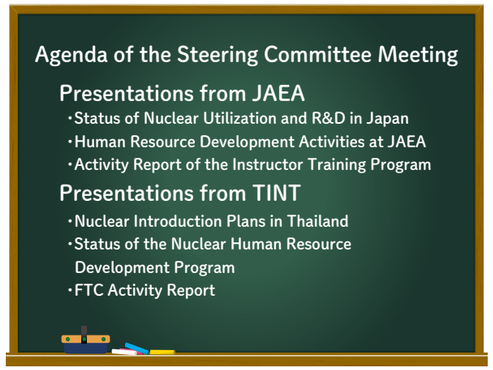
The understanding and full commitment of the counterpart organizations are essential for past ITC participants to successfully organize FTCs annually in their home countries and sustain nuclear human resource development. In the SCM, JAEA and its counterparts share information on the implementation of ITC and FTC, discuss challenges, and strengthen collaboration. By gaining deeper insight into each country's situation and identifying specific needs, JAEA can provide more tailored support and continuously enhance the program.

Report on the SCM with the Thailand Institute of Nuclear Technology (TINT)

From 18 to 19 June 2024, two staff members from the Nuclear Human Resource Development Center, JAEA visited the Thailand Institute of Nuclear Technology (TINT), the counterpart organization in Thailand, to hold a Steering Committee Meeting. The meeting was attended by 10 representatives from TINT, including Mr. Hannarong SHAMSUB, Acting Executive Director, who actively participated in the discussions. The agenda is shown on the right.

At the conclusion of the discussions, meeting minutes were prepared and signed by representatives from both sides for record-keeping. The outcomes of the discussions, along with nuclear-related information gathered from the country, are also shared with the Ministry of Education, Culture, Sports, Science and Technology (MEXT) of Japan.

After the SCM with TINT, the JAEA team visited the Office of Atoms for Peace (OAP) on 20 June and discussed the status of nuclear energy use in Thailand as well as potential areas of cooperation under the ITP, with Associate Professor Pasit Lorterapong (fourth from the right), Secretary General, and Ms. Pennapa Kanchana (third from the right), Deputy Secretary General of OAP. Thailand is planning to introduce Small Modular Reactors (SMRs), a more compact type of nuclear power plant compared to conventional reactors. Therefore, there is a growing need for nuclear human resource development across various fields.



After the discussion meeting with OAP

Message from Director of NuHRDeC

Director
NAKANO Yoshihiro
Nuclear Human Resource Development Center
Japan Atomic Energy Agency

The Instructor Training Program (ITP) stands apart from other training initiatives by uniquely combining the Instructor Training Course (ITC) in Japan with the Follow-up Training Course (FTC) held across various Asian countries. By linking ITC and FTC, the program plays a key role in developing instructors and advancing nuclear education throughout Asia. Additionally, the program fosters expertise in nuclear power and radiation basics through the Nuclear Technology Seminar (NST). To date, over 1,500 participants, including those enrolled in the online course, have engage in ITC and NST. Many of them now serve as instructors in FTCs and other related training programs. More than 7,400 individuals have been trained through FTCs in Asian partner countries, underscoring the program's impact and effectiveness.

These accomplishments are not solely the result of the efforts of Ministry of Education, Culture, Sports, Science and Technology (MEXT) of Japan and the Japan Atomic Energy Agency (JAEA). They also reflect the invaluable support and dedication of our partner countries across Asia. Today, the ITP has become a trusted and integral component of nuclear energy training in the region. As long as this program continues, I am confident it will keep growing. I extend my heartfelt thanks to all our Asian partners for their collaboration and commitment. I also deeply appreciate the ongoing support from our colleagues in Japan. We look forward to further strengthening our work together.

Memories of JFY2024

Delegates from the Royal Thai Embassy in Tokyo with participants

The newly appointed Ambassador Extraordinary and Plenipotentiary of the Kingdom of Thailand to Japan, H.E. Mr. Witchu Vejjajiva, along with his delegation from the Royal Thai Embassy in Tokyo, visited and observed the instructor training course. During their visit, the delegation observed practical training on decontamination methods for removing radioactive substances from the skin and attended a lecture on measurement techniques for tritium, a type of radioactive substance. In an interview following the visit, Ambassador Witchu expressed the following: "Although currently Thailand does not operate large scale nuclear power plants, we aim to enhance the quality of our nuclear human resources. Capacity-building initiatives, such as this instructor training course, also contribute to fostering friendly relations between nations." We were deeply honored by his gracious remarks.

Students from Mito Daini Senior High School in Ibaraki with participants

A participant explaining her country's culture to high school students

Furthermore, during the Nuclear Technology Seminar on Basic Radiation Knowledge for School Education, we collaborated with a high school in Ibaraki to conduct radiation measurement exercises, facilitating international exchange between Asian participants and students (see p.11). During the international exchange session, the participants introduced their home countries' cultures to the students using photos. Many of the cultural aspects introduced by the participants were new to the high school students, resulting in enthusiastic feedback such as: "It was fascinating to learn directly about the cultures of various countries.", "Communicating in English was a valuable experience. I want to study English more." Both participants and students engaged in discussions, creating a warm and friendly atmosphere.

ITP Counterparts in JFY2024

Country	Organization	Abbreviation
Bangladesh	Bangladesh Atomic Energy Commission	BAEC
Indonesia	Indonesia National Research and Innovation Agency	BRIN
Kazakhstan	National Nuclear Centre of the Republic of Kazakhstan	NNC RK
	Institute of Nuclear Physics	INP
Malaysia	Malaysian Nuclear Agency	Nuklear Malaysia
Mongolia	Nuclear Energy Commission	NEC
Philippines	Philippine Nuclear Research Institute	PNRI
Saudi Arabia	King Abdullah City for Atomic and Renewable Energy	KACARE
Sri Lanka	Sri Lanka Atomic Energy Board	SLAEB
Thailand	Thailand Institute of Nuclear Technology	TINT
Türkiye	Turkish Energy, Nuclear and Mineral Research Agency	TENMAK
Viet Nam	Vietnam Atomic Energy Institute	VinAtom

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