

Report

Amity University-National Institute of Advanced Studies (NIAS) Joint Workshop
on

Handling of Nuclear and other Radioactive Materials with Indian Security Agencies

25-29 March 2025

at

Amity Institute of Nuclear Science & Technology, Amity University Uttar Pradesh, Noida, U. P.

Amity University Uttar Pradesh (Noida, India) and National Institute of Advanced Studies (NIAS-Bengaluru, India) jointly conducted a workshop on Handling of Nuclear and other Radioactive Materials with Indian Security Agencies at the Amity Institute of Nuclear Science and Technology, Amity University Uttar Pradesh (Noida Campus) from 25 to 29 March 2025. 26 persons from key Indian security agencies, such as National Disaster Response Force (NDRF), Shastra Seema Bal (SSB), Border Security Force (BSF), Indo-Tibetan Border Police (ITBP), Indian Customs, and Karnataka State Police, actively participated in the workshop. The resource persons for conducting the workshop were drawn from eminent retired personnel from the Indian Department of Atomic Energy (DAE), Amity University, NIAS, Oak Ridge National Laboratory, and Texas A&M University.

During the inaugural function, Dr. W. Selvamurthy (Amity University Management), Prof. (Dr.) M. Sai Baba (NIAS) and Prof. (Dr.) Alpana Goel (Amity University) highlighted the importance and key objectives of the workshop. With the boost to India's nuclear energy program, this workshop was aimed to enhance the capacity and awareness of the participants in handling the nuclear and other radioactive materials, ensuring that they are better equipped to handle such materials with expertise and confidence, in the event of a security incident.

The 5-day workshop was structured into two distinct parts each day. Morning sessions consisted of lectures and the post lunch session were dedicated to precisely curated hands-on exercises to reinforce the theoretical concepts learned in the morning by the participants.

Key highlights:

- **Lectures:** 15 lectures covered a range of topics relevant to the theme of the workshop.
- During lectures, important topics covered were:
 - Nuclear technology for energy security and non-energy applications
 - Radioactivity and understanding radiation
 - Sources of ionizing radiation and biological effects of ionizing radiation
 - Basic concepts of radiation protection - quantities, units
 - Radioactive material hazards control
 - Safety and security of nuclear and other radioactive materials
 - Safety and security during transport of nuclear and other radioactive materials
 - Radiation hazards control measures and decontamination

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- Radiation detection and measurement.
- **Hands-on Exercises:** The 26 Participants were divided into six groups for better execution and discussion during the exercises. Groups comprising 4 to 5 persons from various security agencies were assigned names such as Alpha, Beta, Gamma, X-rays, Neutron, and Positron to create a sense of connection with the workshop's theme.
 - Hands-on exercises were conducted in Amity University nuclear security labs, simulating the real-life nuclear and radioactivity material detection scenarios (a list is given below in Table-1).
 - The first exercise session introduced a set of fundamental experiments designed to illustrate the principles of protection – using time, distance, and shielding principles, where light and sound sources utilized as analogies to radioactive sources. The laboratory exercises were thoughtfully designed and executed to accommodate participants with minimal background in nuclear science and engineering, ensuring effective learning for all.
 - The number of persons in the groups were apt to ensure that all participants get enough exposure/experience to handle the devices used, particularly, the handheld radioisotope identifier (RIIDs) systems, which is generally the work horse for some of these security agencies.
 - This practical exposure was vital for developing a deeper understanding of the processes involved in managing nuclear and radiological emergencies.

Table-1: List of hands-on exercises performed during the workshop

SI No.	Exercise name
1.	Demonstration of radiation detection laboratory at Amity Institute of Nuclear Science & Technology (AINST).
2.	Measurement of the variation in light and sound intensity with respect to cumulative time, various distance, and with different shielding materials.
3.	Measurement of radiation dose rate with respect to cumulative time, various distances, and shielding materials using Geiger Mueller radiation counter and standard gamma-radiation sources.
4.	Hands-on training with RIIDs, to demonstrate their key functionalities and capabilities for the next set of hands-on exercises.

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5.	Demonstration of radiation portal monitor and its sensitivity through a case study and by interactive role-play exercises mimicking realistic scenarios.
6.	To Identify and determine the location of a radioactive source in a room or laboratory mimicking radioactive source search and localization.
7.	To Identify and determine the location of a radioactive source in a building mimicking radioactive source search and localization in moderately larger areas using a backpack-based radiation detection system - an essential tool for survey and search operations in public spaces.
8.	Demonstration of the principles of radioactive material decontamination at the AINST radiochemistry lab
9.	Localization of a vehicle containing radioactive source using GPS - enabled detection devices carried out using a golf cart. The data was analyzed to identify areas with elevated radiation levels, mimicking targeted response in the case of a radioactive source out of regulatory control.

To conclude the workshop, Additional Director General of Indo-Tibetan Border Police (ITBP), Mr Abdul Ghani Mir, Prof. (Dr.) Balvinder Shukla, Vice Chancellor Amity University (Uttar Pradesh), Prof. (Dr.) M. Sai Baba, Visiting Professor, NIAS and Prof. (Dr.) Alpana Goel, Director & Head AINST were present. Welcome address was delivered by Prof. Goel and the highlights of the workshop was presented by Prof. (Dr.) Sai Baba. Mr Mir and Prof. (Dr.) Shukla highlighted the importance of such a workshop in this evolving world, where increased growth of nuclear science and engineering technologies are happening.

Feedback on exercises:

Few main feedback points are given here

- The workshop received overwhelmingly positive reviews from the participants.
- Most of them expressed their satisfaction with the quality and relevance of the content, highlighting the interactive nature of the sessions.
- The hands-on exercises were particularly appreciated for offering practical insights into the complexities of nuclear and radiological emergencies.
- NDRF has asked for an advanced version of this type of workshop.

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- Some participants have suggested to increase the duration of course from 5 days to 10 days. Also, suggested only 3 lectures with at least 5-minute break per day and remaining practical exercises for the day.
- Apart from the exercises, visit to Power plant or some other nuclear facility site may be arranged for better exposure.

It is not out of place to mention that the participants have also demonstrated their high levels of enthusiasm, asked questions, and actively engaged in discussions during the lectures/exercises.

Hospitality & Logistics: The hospitality and logistical arrangements made by the AINST team were highly praised. Participants appreciated the quality and variety of food, the comfort of the venue, and the overall organization of the event. The AINST team ensured that all requirements were met, creating a conducive learning environment. The smooth coordination and attention to the details made the workshop a memorable experience for all involved.



Group photograph after the inaugural function

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Table-2: List of Resource Persons

S.No.	Name	Affiliation
1.	Dr. M. Sai Baba	Former Director, Resource Management Group, IGCAR, Kalpakkam
2.	Dr. K. L. Ramakumar	Former Head, Nuclear Controls & Planning Wing, DAE, Mumbai
3.	Shri V. Rajagopal	Retired from Health and safety Group, IGCAR, Kalpakkam
4.	Dr. S. Murali	Retired Scientist (H), BARC, Mumbai
5.	Shri Anil Kumar	Former IG (Security), DAE, Mumbai
6.	Shri R.S. Sundar	Former Executive Director (Operation), Light water reactors, NPCIL
7.	Dr. Sunil S. Chirayath	Distinguished R&D Scientist, ORNL, USA
8.	Dr. Manit Shah	Verification Technologies Engineer, ORNL, USA
9.	Dr. Craig Marianno	Professor, TAMU, USA
10.	Prof. (Dr.) Alpana Goel	Director & Head, AINST, Amity University
11.	Ms. Archana Yadav	Assistant Professor, AINST, Amity University
12.	Dr. Arpita Datta	Assistant Professor, AINST, Amity University
13.	Dr. Sudatta Ray	Assistant Professor, AINST, Amity University
14.	Dr. Unnati Gupta	Assistant Professor, AINST, Amity University
15.	Dr. Abhishek Yadav	Scientist, AINST, Amity University

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Table-3: List of Participants

National Disaster Response Force (NDRF)		
1.	S. Vaithiyalingam	Deputy Commandant
2.	Deepak Tiwari	Second In Command
3.	Anupam	Second In Command
4.	Sanjeev Kumar Rattan	Deputy Commandant
5.	Kunal Tiwari	Deputy Commandant
6.	Akhilesh Kumar Chaubey	Deputy Commandant
Sashastra Seema Bal (SSB)		
7.	Rupesh Sharma	Deputy Commandant
8.	Dushyant Gaur	Deputy Commandant
9.	Ashok Sagar Desai	Deputy Commandant
10.	Prabhakar Chaturvedi	Deputy Commandant
11.	Pankaj Kumar Yadav	Deputy Commandant
Border Security Force (BSF)		
12.	Shiv Om	Commandant
13.	Devender Kumar	Second In Command
14.	Anoop Kumar	Deputy Commandant
15.	Pradeep Kumar Singh	Assistant Commandant
Indo-Tibetan Border Police (ITBP)		
16.	Sangharsh Kumar	Second In Command
17.	Anuj Kumar Mishra	Assistant Commandant
18.	Amit Devrani	Inspector
19.	Lokendra Singh	Inspector
20.	Dhiraj Kumar	Second In charge
Mumbai Customs		
21.	Anil Prajapati	Superintendent
22.	Wakle Vikas Bharurao	Superintendent
23.	Vignesh Natarajan Iyer	Superintendent
24.	Manish Kumar Meena	Superintendent
Karnataka Police		
25.	S. N. Suresh Kumar	DySP
26.	B. Shanthinath	PI

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Lighting of the lamp during Valedictory function



Group photograph after the valedictory function

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One of the snapshots of the lecture session



Exercise: time, distance and shielding demonstration using sound

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During portal monitor exercise



Radioisotope identifier device exercises

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Vehicle search exercise



Decontamination exercise

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Workshop Dinner