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A Questionnaire-based Analysis of International Training Courses on Safeguards in the Korean Nuclear Security Center of Excellence (COE)

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1. Introduction

In the 2010 Washington Nuclear Security Summit, the Korean government proclaimed dedication to reinforcing the international nuclear security regime by establishing the nuclear security center of excellence (COE) in the Republic of Korea. It has been materialized as the International Nuclear Nonproliferation and Security Academy (INSA) in 2014. One of the main mission of the INSA is to contribute to world peace through nuclear nonproliferation and security trainings. After the establishment of INSA, the curriculums for international training courses (ITCs) on nuclear security, safeguards, and export controls have been developed and delivered.

This paper analyses the outcome of INSA's ITCs on nuclear safeguards. Each INSA ITC receives feedback from the participants which can provide a guideline for improving curriculums and training effectiveness of the ITCs. The feedback has been accumulated from 2014 and it is worth analyzing the data at this point not only qualitatively and quantitatively. Considering the status of safeguards Agreement status, findings are derived for the improvement of the INSA ITCs.

2. Administering type of Questionnaires in INSA ITC

There are several ways of administering questionnaires. They may be self-administered or read-out by interviewers. Self-administered questionnaires may be sent by post, email, or electronically online. Interview administered questionnaires may be by telephone or face to face. The questionnaires were conducted under the form of self-administered questionnaires since it takes advantages in preserving confidentiality and respondent's convenience as well as in the managerial perspective.

3. An Analysis of the ITCs on Nuclear Safeguards Results

The 139 questionnaires from 163 trainees in 9 training courses over a period of five years were analyzed and the answers can be divided into four sections: 1) Profile of Trainees, 2) Overall Satisfaction, 3) Most Useful Modules, 4) Participating Countries' Safeguards (SG) Agreement Status

2.1 Profile of Trainees

Participants of the ITCs were selected from three different organization types: government, public, and private. Most participants were government officials. The courses have been open to maximum of 26 participants (the maximum number of participants has increased to 32 since 2019) and the selection of candidates is based on the ROK's intention.

The participants were asked their knowledge level in nuclear safeguards. Only 28% had working level background, while almost 72% had little knowledge or were somewhat familiar with nuclear safeguards.

2.2 Overall Satisfaction

Overall satisfaction is a fundamental index for the course evaluation. It includes not only the quality of the contents but also administrative support. The structured questionnaire provides an average indicator, 85%, to guide the level of assessment. Table 3 shows the overall satisfaction of participants each year. It presents 92.1% on average, and all the course are over the average indicator.

2.3 Participating Countries' SG Agreement Status

As the Comprehensive Safeguards Agreement (CSA) and Additional Protocol (AP) are essential treaties for building and strengthening the State System of Accounting for and Control (SSAC), 21 countries on INSA safeguards ITCs have concluded CSA, and 20 participating countries have concluded. Two countries additionally concluded Small Quantities Protocol (SQP). Overall, the participants' countries have more than 20 and 10 years after the CSA and AP entering into force, respectively, verifying that the countries have been steadily working on the national capabilities on the SSAC.

Table 1. The trainee's knowledge kevel of Nuclear Safeguards

Little knowledge	Familiarity	Working level	Expert
36.69%	34.54%	28.77%	0

Table 2. Overall Satisfaction of the ITC on Nuclear Safeguards

Theme	Year	Overall Satisfaction
Fundamentals of Nuclear Safeguards (Introductory)	2014	93.0%
	2016	92.4%
	2017	89.1%
	2018	89.9%
	2019	94.0%
Provision of Safeguards Information to the IAEA (Specialized)	2015	91.6%
	2018	90.0%
Strengthening State Safeguards Regulatory Authority (Specialized)	2017	92.5%
	2019	96.0%

Table 3. Current SG agreement status of participating countries

Country	SQP	CSA	AP
Philippines	-	16 Oct. 1974	26 Feb. 2010
Malaysia	-	29 Feb. 1972	22 Nov. 2005
Thailand	-	16 May 1974	17 Nov. 2017
Vietnam	-	23 Feb. 1990	17 Sept. 2012
Indonesia	-	14 July 1980	29 Sept. 1999
Taiwan	-	13 Oct.1969	6 Dec. 1971
Myanmar	o	20 April 1995	17 Sept. 2013
Mongolia	o	5 Sept. 1972	12 May 2003
Bangladesh	-	11 June 1982	30 March 2001
Japan	-	2 Dec. 1977	16 Dec. 1999
Kazakhstan	-	11 Aug. 1995	9 May 2007
Jordan	-	21 Feb. 1978	28 July 1998
UAE	-	9 Oct. 2003	20 Dec. 2010
Saudi Arabia	-	13 Jan. 2009	-
Turkey	-	1 Sept. 1981	17 July 2001
Ukraine	-	22 Jan. 1998	24 Jan. 2006
Belarus	-	2 Aug. 1995	15 Nov. 2005
Poland	-	1 March 2007	1 March 2007
Slovakia	-	1 Dec. 2005	1 Dec. 2005
Iran	-	15 May 1974	18 Dec. 2003
Egypt	-	30 June 1982	-
Algeria	-	7 Jan. 1997	14 Sept. 2004
South Africa	-	16 Sept. 1991	13 Sept. 2002

Table 4. Most useful modules of the ITC on Nuclear Safeguards

Theme	Most Useful Modules
Fundamentals of Safeguards (Introductory)	- IAEA Nuclear Materials Accounting Report (code 10) (E) - The State System of Accounting for and Control of Nuclear Material (SSAC) - IAEA Safeguards System - Facility Tour
Provision of Safeguards Information to the IAEA (Specialized)	- IAEA Nuclear Materials Accounting Report (code 10) (E) -Design Information Questionnaire (DIQ), Examination (DIE) and Verification (DIV) - Facility Tour
Strengthening State Safeguards Regulatory Authority (Specialized)	- Providing Information to the IAEA (E) - Information Management System (E) - Quality Management System - Facilitating IAEA Verification Activities (E) - Facility Tour

*E : Exercise

2.4 Most Useful Modules

The contents of this training programs usually consist of between 16 and 21 modules, including exercises. Table 4 reports that participants have most interested in exercises and facility tours which offer hands-on and field exercises. Compared to the decade(s) history of entering into force the Safeguards agreement(s), many countries rarely have nuclear activities (and own fissionable material of safeguards concerns). Therefore, the course provides prior learning opportunities to the participants by hands-on exercises and facility tours.

3. Conclusions

Since the Korean government established the INSA as the nuclear security center of excellence (COE), it has been contributing to an educational hub in Northeast Asia, providing nuclear nonproliferation and security training courses. This study reported the contribution to promoting and strengthening the international nuclear nonproliferation by performing a questionnaire-based analysis of the outcome of INSA's ITCs on nuclear safeguards. The feedback accumulated from 2014 to 2019 have been qualitatively and quantitatively investigated. Considering the status of safeguards agreement, three findings have been derived for the improvement of the INSA ITCs.

First, INSA needs to include additional fundamental contents in the course since more than 70% of participants below the working level of Safeguards knowledge.

Second, the Small Quantities Protocol (SQP) related contents are required. The implementation of nuclear Safeguards of each participating country essentially depends on the status of safeguards agreement as well as the industrial environment. INSA safeguards ITCs have been focusing on the CSA and AP. Additionally, over 100 NNWSs (non-nuclear-weapon States) parties to the NPT have very limited quantities of nuclear

material and have concluded SQP. Therefore, adding SQP contents open up the possibility of providing practical support for the participating countries.

Third, hand-on and field learning is worthwhile to have more portion in the INSA ITCs. Since participating countries rarely have nuclear activities (and own fissionable material of safeguards concern), INSA needs to utilize extensive domestic infrastructure in the nuclear industry.

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