

## **Implementation Status of the Additional Protocol at KAERI**

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### **Abstract**

The agreement between the government of the ROK and the IAEA for the application of nuclear safeguards was signed in Oct. 1975, and entered into force in Nov. of that year. The ROK signed on Model Protocol Additional to the safeguards agreements (AP) with IAEA in 1999, which entered into force in Feb. 2004.

KAERI submitted the initial expanded declaration in Aug. 2004 pursuant to its AP, and the IAEA has performed the Complementary Access (CA) for verification of the correctness and completeness of the ROK's initial declarations. Since then, the ROK has submitted the expanded declarations (ED) on the nuclear fuel cycle-related R&D activities not involving nuclear material by 15 May of each year to IAEA, and the IAEA has performed the complementary access in order to assure the absence of undeclared nuclear material and activities based on the ED.

This paper describes the experiences of AP implementation, internal procedures and the computerized system for preparing the ED including the status of the CAs at KAERI.

### **1. Introduction**

Before the Gulf War, IAEA inspectors could routinely inspect installations contained the nuclear material at the main Iraqi nuclear Research Centre according to Iraq's declarations. After the Gulf War in 1991, it was found that the Iraqi government had been carrying out a large programme unknown to the IAEA, for the production of enriched uranium for use in nuclear weapons. Iraq had also made considerable progress in secretly designing and constructing prototypes of such weapons. A year after the disclosure of Iraq's clandestine programme, the IAEA faced with disquieting evidence that pointed to the possibility of another secret nuclear programme in the DPRK.

To resolve the problems that the IAEA encountered in applying safeguards in Iraq and the DPRK, it needed a substantially broader and more effective safeguards approach accessing to much more data about the nuclear programmes of states having comprehensive safeguards. The IAEA's inspectors must have rights of access, not only in those plants using nuclear material that was already under safeguards, but also in any plant relevant to the national nuclear programme even if it did not contain nuclear material, and in any plant at a nuclear

site whether is was declared to be engaged in nuclear activities or not.

A special development programme to strengthen the effectiveness and improve the efficiency of safeguards which was dubbed the "programme 93+2" was launched in April 1993. The IAEA Secretariat approved a document INFCIRC/540 as the standard for additional protocols in May 1997 for IAEA to assure that the state has no undeclared nuclear material and activities.

The IAEA carried out the CAs for verification of the correctness and completeness of the KAERI's initial declarations in order to assure the absence of undeclared nuclear material and activities when it was submitted to IAEA pursuant to its AP in Aug. 2004. The Agency's verification activities on the past undeclared nuclear activities of KAERI were continued to 2007. The awareness of researchers at KAERI on the importance of compliance with the Safeguards Agreements was highly improved when CAs of the past undeclared nuclear activities were successfully completed.

KAERI shall submit the EDs on the nuclear fuel cycle-related R&D activities not involving nuclear material by 15 May of each year to IAEA. During the AP implementation, it caused several confusions on the guidelines and reporting criteria during the preparation of the ED, and on the implementation procedures and methods of CAs between the KAERI and IAEA.

This paper describes the overall implementation status of AP at KAERI since 2004, the preparation of the EDs and the issues caused during the preparation of EDs, the status of CAs and implementation system of AP at KAERI.

### **2. Status of AP implementation at KAERI**

The ROK shall provide the IAEA with a declaration containing Article 2.a.(i), Article 2.a.(iii), Article 2.a.(ix) and Article 2.a.(x) by the 15 May of each year pursuant to AP. A declaration submitted to IAEA under Article 2.a.(i) is a general description of and information specifying the location of nuclear fuel cycle related R&D activities not involving nuclear material, while Article 2.a.(iii) is a declaration on a general description of each building including temporary buildings such as structure and container at the site.

To submit a declaration containing Article 2.a.(i), Article 2.a.(iii), etc. to IAEA, KAERI has provided the relevant information to NSSC/KINAC by 31 March of

each year pursuant to a notification no. 2014-75. The figure 1 shows the frequencies of a declaration submitted to IAEA under Article 2.

The IAEA has carried out the CAs not only to assure the absence of undeclared nuclear material and activities but also to resolve questions or inconsistencies based on the declarations provided by KAERI. Table I also shows the activities of CAs conducted by IAEA at KAERI site.

Fig 1. Status of Expanded Declarations at KAERI

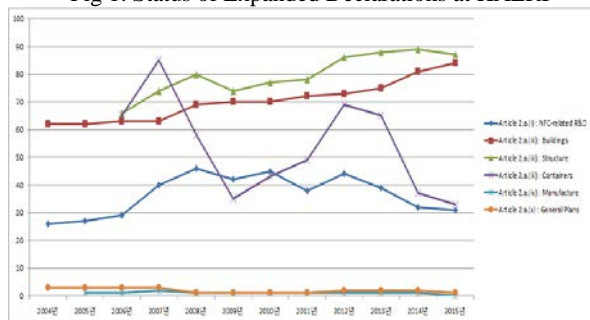


Table I. Status of CAs at KAERI site

Year	2004	2005	2006	2007	...	2012	2013	2014	2015
No. of CA	4	5	4	5	...	1	3	1	3

### 3. Preparation of Expanded Declarations at KAERI

The IAEA published ‘Guidelines and format for preparation and submission of declarations pursuant to Articles 2 and 3 of the Model Protocol Additional to Safeguards Agreements’ in May 2004 for the purpose of providing (1) specificity as to what information is required and at what level of detail, (2) a consistent reporting format. These guidelines are not mandatory, but rather intended as advice for States on preparing declarations.

KAERI was faced with the problems of making a decision on whether a R&D project is related to nuclear fuel cycle and it is not included in the theoretical or basic scientific research. As an example, KINAC requested to declare the R&D activities on the evaluation of corrosion cracking of steam generator under Article 2.a.(i) in 2008 while KAERI considered it is not included. KINAC questioned to IAEA whether it should be declared under Article 2.a.(i), and IAEA replied that it depends on the state’s decision, so KINAC decided not to declare it. After a few years later, IAEA requested to declare the R&D project performed by KAERI on LWR steam generator under Article 2.a.(i). KAERI noted that it is not related to any report area for AP declaration because the aim of the relevant R&D project is to test and evaluate the heat transfer of existing steam generators pipes in power plant conditions. During the implementation working group meeting in 2014, the Agency informed the ROK that the

R&D projects on the maintenance of steam generators does not need to be declared under AP Article 2.a.(i), however the laboratory where R&D is being carried out needs to be declared under AP Article 2.a.(iii). The Agency requested that the R&D activities on steam generators leading to critical issue (i.e. energy efficiency changes) be declared as per AP Article 2.a.(i). There are still remaining questions about why the Agency requested to declare the location carrying out the R&D activities of steam generators under AP Article 2.a.(iii).

The IAEA has requested to provide amplification or clarification on information provided by KAERI under Article 2.c in order to resolve questions or inconsistencies with respect to declarations under Article 2. KAERI has declared information on the fuel cycle-related R&D activities to IAEA if it is related with Article 2.a.(i) after the close review of the R&D projects performed in KAERI in order not to miss a declaration of R&D activities. To do that, KAERI has complied with the internal procedures for the preparation of an expanded declaration.

Considering the reporting criteria on a declaration under Article 2.a.(i) at KAERI, it is classified as two ways depending on the characteristics of R&D projects. One is a declaration of R&D project basis while the other is a declaration of sub-R&D projects basis. A R&D project basis is to report a R&D project as one declaration including the titles of sub-R&D projects if all sub-R&D projects should be declared under Article 2.a.(i). However, it is better to separately declare sub-R&D projects if it is not necessary to declare all sub-R&D projects under Article 2.a.(i).

### 4. Status of Complementary Access at KAERI

The Agency has CA right to all places on the sites of facilities and LOFs to assure the absence of undeclared nuclear material and activities. CA is exercised by the Agency on a selective basis. The Agency has performed the CAs in KAERI since 2004 as shown in table 1.

The verification activities of CAs have performed to confirm the past undeclared nuclear experiments such as U enrichment using AVLIS, U/Pu separation, U conversion and chemical enrichment experiment from 2004 to 2007. After completion of CAs on the past undeclared nuclear experiments, the Agency declared there was no indication of the diversion of declared nuclear material, and no indication of undeclared nuclear material and activities in the ROK at the safeguards implementation report for 2007 (GOV/2008/14). Therefore, the Agency drew a conclusion for the ROK that all nuclear material remained in peaceful activities.

There have been a few dis-agreements about the authorized activities of CA performed by IAEA inspectors at KAERI site since 2008 as follows.

a) The Agency inspector carried out the visual

observation for all offices in research building no. 6 and the DIV activities for the laboratories of the nuclear facility (KO-Q) during the CA in Sept. 2008. KAERI expressed concern over not complying with Article 4.a.(i) which is 'any place in the site on a selective basis in order to assure the absence of undeclared nuclear material and activities', and of carrying out DIV activities at existing nuclear facility during CA.

b) The Agency inspector requested to explain the purposes of each hot cell and equipment in IMEF in Oct. 2008. KAERI expressed concern on that CA activities are similar to the DIV activities at nuclear facility.

c) The Agency inspector carried out the CA to the laboratories, which are radiation protected areas, not designated during the pre-briefing meeting. It took times to get new entry permission from the relevant offices.

These issues were discussed and resolved during the implementation working group meeting, but both sides still have the different views on the application method and scope of AP.

## **5. Implementation System of AP at KAERI**

KAERI has established several measures for effectively implementing the AP as follows; a) establishment of the preparation and reporting procedures for the expanded declarations, b) internal preparation procedures for CAs, c) internal regulation for effectively implementing the AP, d) development of computerized system for preparing and managing the expanded declarations.

### **A) Establishment of the preparation and reporting procedures for EDs**

The most important factor for implementing the AP is to prepare a declaration on the nuclear fuel cycle-related R&D activities and descriptions of each building including temporary building on KAERI site. It is not easy to prepare a declaration on the nuclear fuel cycle-related R&D activities from a few thousands projects performed at KAERI per each year. The procedures for preparing a declaration under Article 2.a.(i) and Article 2.a.(iii) are followings:

- (1) KAERI Safeguards team requests the information of all R&D projects and the buildings from the relevant departments.
- (2) KAERI Safeguards team checks the KAERI site to survey the status of the buildings, structures and containers.
- (3) KAERI Safeguards team notifies the managers of all R&D projects to provide the descriptions of the article 2.a.(i), (iv) or (x) if the project needs to be reported under the article 2.a.(i), (iv) or (x) of the AP.
- (4) KAERI Safeguards team checks whether all R&D projects are correctly declared pursuant to Article

2.a.(i) by comparing all R&D projects performed at KAERI and information received from the managers of the R&D projects. If the R&D project is found to be declared, KAERI Safeguards team requests it's manager to review and provide the information on the article 2.a.(i), (iv) or (x) of the AP.

- (5) The relationship between the R&D projects and the location of the R&D project is reviewed and cross-linked between Article 2.a.(i) and Article 2.a.(iii)

### **B) Internal preparation procedures for CAs**

The Agency shall give advance notice of access of at least 24 hours to KAERI, and the period of advance notice shall be at least two hours if the Agency so requests, for access to any place on KAERI site that is sought in conjunction with DIV(Design Information Verification) or ad hoc or routine inspections pursuant to Article 4.(b).

For the preparation of CAs, KAERI revised the internal regulation on entry permission to KAERI site. KAERI site declared as a limited region to the public is classified into 2 areas such as limited area and controlled area considering the radiation protection area and physical protection system of nuclear facility.

Nuclear control department (NCD), which is responsible for safeguards implementation at KAERI, gets the entry permission for IAEA inspectors to access the limited area when IAEA gives 24 hours advanced notice to KAERI. And then, NCD has to get another entry permission for the limited area and controlled area designated by IAEA inspector within 2 hours when IAEA inspector gives 2 hours advanced notice during stayed at KAERI site.

### **C) Establishment of the implementation regulation for AP at KAERI**

The internal regulation for effectively implementing the AP was established at KAERI in 2008.

The internal regulation for AP describes the procedures for the preparation of a declaration on Article 2.a.(i) and submission of the expanded declaration to NSSC and KINAC. It also describes the entry permission to the limited area and controlled area for IAEA inspector to access the designated area within 2 hours. If NCD could not get the entry permission within 2 hours due to the absence of the authorized person, then it would be replaced with hard copy of application form for entry permission.

### **D) Computerized system for preparing Expanded Declarations at KAERI**

KAERI has used a protocol reporter provided from the IAEA for managing and producing information of expanded declarations since the Additional Protocol (AP) entered into force in 2004 in the ROK. It is not sufficient for managing the detail information of

expanded declarations under the AP at the KAERI site level.

To effectively collect and manage the expanded declarations related information from the R&D projects carried out at KAERI, the information management system for expanded declarations was developed, as shown in fig. 2. The major functions of the expanded declarations are as follows:

- 1) the automatic establishment of relationships on the R&D projects and site information,
- 2) collection of expanded declaration from the project managers through the Intranet of KAERI, creation and management of expanded declaration provided to the IAEA

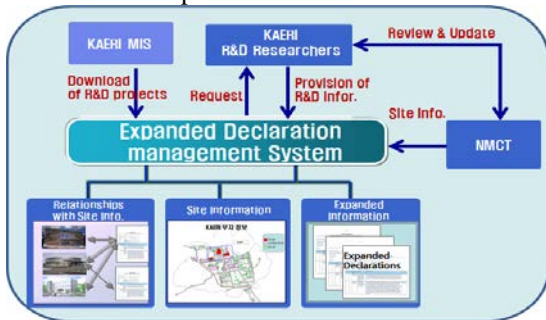


Fig 2. Schematic Diagram of Expanded Declaration

## 6. Summary

The IAEA has carried out the CAs not only to assure the absence of undeclared nuclear material and activities but also to resolve questions or inconsistencies based on the declarations provided by KAERI.

KAERI has continuously established an optimized implementation system in order to effectively cope with the preparation of expanded declarations submitted to IAEA and CAs performed under AP. However, it still remains about difficulties to make a decision on whether a R&D project is related to nuclear fuel cycle and it is not included in the theoretical or basic scientific research during the preparation of EDs at KAERI. There have been a few disagreements about the authorized activities of CA performed at KAERI site between IAEA inspector and nuclear control department of KAERI. Most issues occurred during the implementation of AP were discussed and resolved during the implementation working group meeting with IAEA.

KAERI has established several measures for effectively implementing the AP as follows; a) establishment of the preparation and reporting procedures for the expanded declarations, b) internal preparation procedures for CAs, c) internal regulation for effectively implementing the AP, d) development of computerized system for preparing and managing the expanded declarations.

KAERI will make continuous efforts to improve its abilities for preparing a declaration under Article 2 as

well as the appropriate implementation safeguards measures for AP.

## REFERENCES

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