

## Approach on origin management of nuclear materials at KAERI

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### 1. Introduction

The KAERI has provided the annual reports on the inventory and inventory changes of nuclear material subject to the bilateral nuclear cooperation agreement. In addition, KAERI had reported the origin information of nuclear material using IAEA accounting reports according to the notice of Nuclear Safety and Security Commission (NSSC). The NSSC revised the notice in Dec. 2013 to exclude the origin information in the accounting reports and to report the inventory status of nuclear material in each origin. Thus, KAERI developed the origin management system of nuclear material in 2015 to efficiently and effectively manage and report the inventory and its changes.

However the nuclear cooperation agreement between ROK and USA was amended in 2015 and administrative arrangement subject to the agreement took effect in March 2016. Thus ROK and US have to establish by mutual agreement an initial inventory of nuclear material, moderator material, equipment and components subject to the agreement. Through many discussions, the initial inventory subject to the ROK-US agreement was agreed in Feb. 2017. The initial inventory is included the obligated nuclear material and nuclear material exempted from safeguards which are not managed in the current system. Therefore it is necessary to supplement the origin management system to meet the requirement of the ROK-US agreement.

This paper describes the current origin management approach and reviews the requirement to be reflected to meet the bilateral agreements.

### 2. Origin management of nuclear materials

#### 2.1 Current origin management approach

KAERI consists of 11 nuclear facilities subject to IAEA safeguards and conducts research and development using various kinds and types of nuclear materials. Thus, it is impossible to track the origin on each batch of nuclear material because the nuclear materials are mixed with different origin of nuclear material during an experiment or process. It is difficult to manage the origin information whenever the internal inventory changes such as chemical/physical form changes, division of nuclear material, and integration with other nuclear material are occurred in a facility. In addition, the number of export and import is very small compared to large number of internal inventory changes, so it will be a burden for the facility operators to

manage the origin information on the internal inventory changes.

Therefore the origin management system was developed by focusing on inventory changes that affect the total amount of nuclear material at KAERI such as receipt/shipment from/to outside of KAERI, measure discards, MUF etc. except internal inventory changes.

#### 2.2 Origin management system

KAERI developed a web-based nuclear material accounting system with the function of a near real-time accounting system called KASIS (KAeri Safeguards Information treatment System) to cope effectively with random interim inspection under Integrated Safeguards. The facility operators input the accounting data into the KASIS when the inventory changes including nuclear material transfer are occurred in the facility.

Thus origin management system was developed by connection with the KASIS as shown in Fig. 1 to share the KASIS data on the inventory changes of nuclear material and to prevent duplicate input to the several systems. When the data on inventory changes is entered into the KASIS, it is automatically reflected in the origin management system. Then, the person in charge of origin control enters the origin information to the origin management system after the review of invoice, nuclear material transaction report or internal inventory changes etc. The origin information entered into the system is managed by inventory changes and the amount of nuclear material by origin is calculated to reflect the inventory changes.

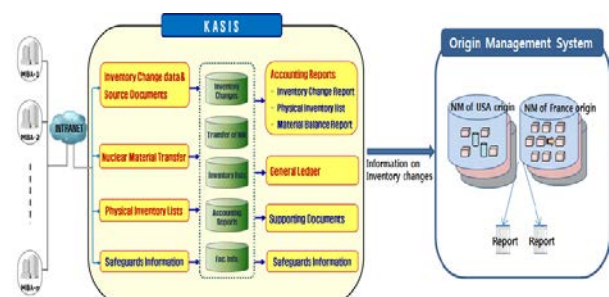


Fig. 1. Relationship between KASIS and origin management system

The origin management system has main features as follows;

- (1) Management of nuclear materials that consists of various origins

- (2) Management of nuclear materials that need to be managed as origin of several countries according to the bilateral agreements
- (3) Management of origin information by country, element, period, and inventory change
- (4) Creation of inventory status report according to the national law

The origin management system can reduce the human errors on the data of origin information that was previously managed by Excel program. Also, it is possible to derive the desired data immediately, if the person in charge of origin control inputs the origin information on the inventory changes occurred. However, if the bilateral agreements are changes, it is difficult to immediately reflect on the system because the system needs to be revised.

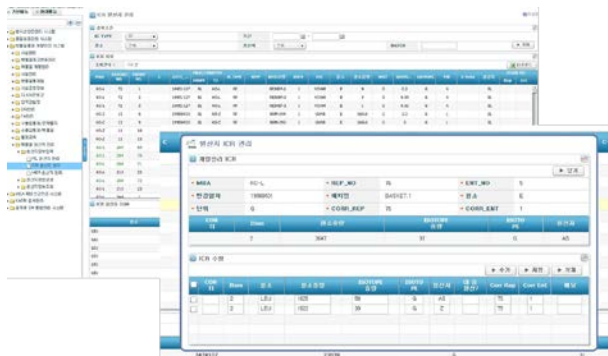


Fig. 2. Origin management system

### 2.3 Future plan

After development of origin management system the initial inventory of nuclear material subject to the ROK-US agreement was established in Feb. 2017. During the discussion on the initial inventory of nuclear material, some requirement of the US differed from the current origin management approach of nuclear material at KAERI.

Basically KAERI developed the origin management system based on the IAEA accounting reports. However, the nuclear materials exempted from IAEA safeguards were included in the initial inventory of nuclear material. The exempted nuclear material could be transferred to a domestic industry without IAEA accounting reporting. So there is no way to reflect the transfer of exempted nuclear material to the origin management system. In addition, the concept of the obligated nuclear material was introduced and the plutonium produced from nuclear reactors which were supplied pursuant to the ROK-US agreement was included in the initial inventory of nuclear material. The ROK-US cooperation meeting on administrative arrangement subject to the nuclear cooperation agreement was held in Feb. 2017. The experience of obligated nuclear material

management was discussed and shared during the meeting.

To clarify the requirement of the bilateral agreements the notice of NSSC will be revised in this year. Thus it is necessary to supplement the origin management system after revision of the notice.

### 3. Conclusions

KAERI developed the origin management system to efficiently and effectively manage the origin information. The system is connected with KASIS to share the information on the inventory changes of nuclear material. After development of the system, however, the new concept of obligated nuclear material is introduced according to the amended ROK-US agreement. Also, the origin management system based on IAEA accounting reports needs to revise to include the nuclear material exempted from safeguards. Therefore KAERI will improve the origin management system to meet the requirement of bilateral agreements and NSSC notice to be revised.

### REFERENCES

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