

Reviews on the efficient nuclear material accountability at KAERI

Hyun Sook Kim, Han Suk Ko, Seung Ho Lee, Ho Joon Park, Byung Doo Lee
Korea Atomic Energy Research Institute, 150-1 Deokjin-dong, Yuseong-gu Daejeon, 305-353, South Korea
hskim77@kaeri.re.kr

1. Introduction

KAERI(Korea Atomic Energy Research Institute) is constantly trying to efficiently implement safeguards in order to ensure international transparency and the credibility of KAERI safeguards.

In its continuing efforts to implement safeguards efficiently, KAERI has developed KASIS(KAERI Safeguards Information Treatment System)[1] and has linked KASIS with the RF ID system and HANARO fuel fabrication facility system.

This paper describes the status of enhanced nuclear material accountability through the development of KASIS at KAERI. The plans to more effectively implement nuclear material accountability at KAERI are also reviewed.

2. Nuclear material accountabilities at KAERI

There are 12 nuclear facilities subject to IAEA Safeguards at KAERI as shown in Fig.1. In each facility, records on the quantities of nuclear material held within each MBA(Material Balance Area) should be maintained and each facility operator should measure and record all transfers of nuclear material from one MBA to another or changes in the amount of nuclear material within MBAs due to, for example, nuclear production or nuclear loss[2].

Thus, each of KAERI facility operator records data on changes in inventory of nuclear material every day. In the case of a nuclear material transfer, the facility operators submit a nuclear material transfer sheet to the KAERI safeguards team before the date of the transfer.

The KAERI safeguards team prepares the IAEA reports, and documents for IAEA inspection using the inventory change data and nuclear material accountability data reported from each facility as follows

< IAEA reports >

- ICR (Inventory Change Report)
- PIL (Physical Inventory List)
- MBR(Material Balance Report)

< Documents for IAEA Inspection >

- GL (General Ledger)
- Nuclear material inventory record
- Nuclear material transfer sheet
- ICR, PIL, MBR



Fig.1. KAERI nuclear facilities subject to IAEA Safeguards

2.1 Development of KASIS

Fig.2 shows the KAERI Safeguards Information Treatment System. When facility operators input data such as nuclear material accountability data and nuclear material transfer information to KASIS, KASIS produces and manages nuclear material accountability documents automatically. The safeguards team controls the data reported from the KAERI facilities and nuclear material accountability documents produced from KASIS.

Near real-time nuclear material accountability through the development of KASIS is conducted at KAERI. KASIS allows KAERI to meet its safeguard obligations such as Random Interim Inspection under Integrated Safeguards. KASIS will be constantly improved for the sake of the facility operator convenience.

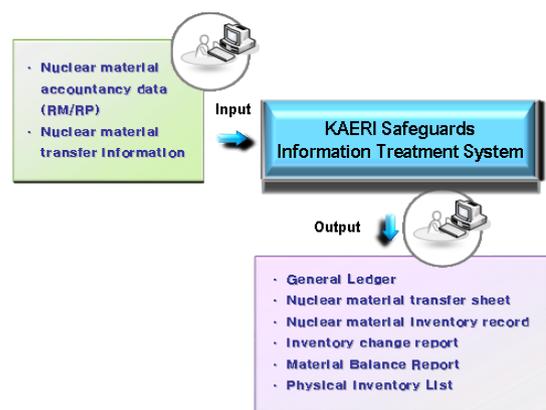


Fig.2. KAERI Safeguards Information Treatment System

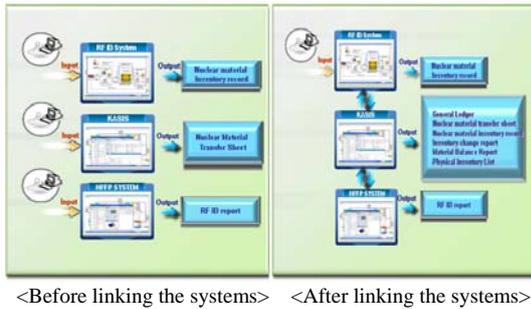


Fig.3. The reporting procedure on the nuclear material transfer from one MBA to another before and after linking the systems

2.2 Development of nuclear material accountability systems for KAERI facilities

Among the 12 KAERI nuclear facilities, a facility having its own nuclear material accountability system is HFFP(HANARO Fuel Fabrication Plant). HFFP has been operating its own near real-time nuclear material accountability system to control the fuel fabrication process such as atomizing, heat treatment, sieving, blending, extruding and assembly. It is very effective to maintain nuclear material accountability data. Also, HANARO(High flux Advanced Neutron Application ReactOr) is developing a system to control the nuclear material inventory in the fresh fuel storage, reactor core and spent fuel storage. It will be useful as a model system of the nuclear material accountability for a research reactor scheduled for construction in Kijang. In the case of other 10 other facilities, the operators have been recording the nuclear material accountability data by hand.

Therefore, it is essential for KAERI facilities to develop their own nuclear material accountability systems considering their own characteristics (like those of HFFP and HANARO) for effective maintenance of nuclear material accountability data.

2.3 Link between KASIS and KAERI facilities own nuclear material accountability systems

When nuclear material is transferred to an other MBA, the facility operator should input the same date to KASIS and its own nuclear material accountability system respectively before linking the systems. After linking the systems, the reporting procedure on the nuclear material transfer from one MBA to another can be simplified as shown in Fig.3. Therefore, it is necessary to link KASIS and the facility's own nuclear material accountability systems.

KAERI has already linked KASIS with the HFFP nuclear material accountability system. This has helped to reduce the burden on the facility operators such as duplicated data into the system. Also, KAERI has a plan to link the KASIS and HANARO nuclear material accountability systems.

In the future, if all of the KAERI facilities have their own nuclear material accountability systems and KASIS is linked with all the nuclear material accountability systems of the KAERI facilities, nuclear material accountability at KAERI will be more effective.

3. Conclusion

This paper has reviewed the status of the enhanced nuclear material accountability through the development of KASIS at KAERI. KASIS allows KAERI to meet the safeguard obligations such as Random Interim Inspection under Integrated Safeguards. KASIS will be constantly improved for the sake of the facility operator convenience.

Also, KAERI has a plan to develop nuclear material accountability systems for each facility, considering their specific characteristics and will link KASIS with these nuclear material accountability systems.

In this manner, KAERI will make constant effort to more effectively implement nuclear material accountability in order to ensure international transparency and credibility of KAERI safeguards.

REFERENCES

- [1] Transactions of the Korean Nuclear Society Autumn Meeting pp.1129-1230, 2010
- [2] IAEA Safeguards glossary 2001, P 37