Current Issues and Improvement Plans for Management and Disposal of Small Quantity Nuclear Material

Junghee Son*, Chul Heo, and Seungmin Lee

Korea institute of Nuclear Nonproliferation and Control, 1534, Yuseong-daero, Yuseong-gu, Daejeon, Rep. of Korea

*jhson@kinac.re.kr

1. Introduction

Small quantity nuclear material are not subject to use permit under the Nuclear Safety Act, but are subject to national accounting management and reporting under the Korea-IAEA safeguards agreement. Therefore, small quantity of nuclear material need to be managed at the national level. However, due to lack of relevant regulations and the smallness of the use agencies, practical management is difficult. In particular, there are no clear procedures or standards for the disposal of small quantity nuclear material, which may cause various problems in the future.

In this paper, we analyze the current system related to the disposal of small quantity nuclear material and propose a plan for the effective disposal of nuclear materials.

2. Related regulations and current issues

2.1 Scope and related obligations of small quantities of nuclear material

Small quantity nuclear material belong to the nuclear fuel material, and also belong to specific nuclear material, as defined by the Nuclear Safety Act. It is also a material exempted from the use permit in accordance with the law.

On the other hand, in the Additional Protocol to the IAEA Safeguards Agreement, there is no lower limit of the quantity of nuclear material that is exempted from the safeguards measure unlike the domestic law.

Therefore, nuclear materials used for nuclear purposes in Korea are subject to national safeguard regardless of whether they are included in the current law or not, and it is obliged to provide IAEA with information on the amount and use thereof and to receive inspections.

Most of the materials referred to as small nuclear materials in Korea are depleted uranium used radiation shielding for radiation projector.

In recent years, it has been used in various forms such as tracers, standard sources and chemical samples, and its usage and kinds are increasing.

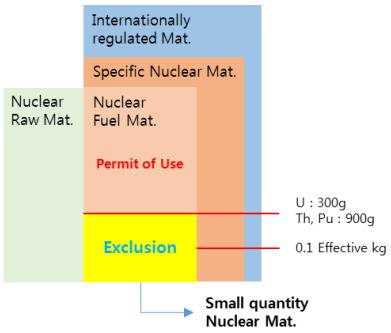

Fig. 1. Scope & definition of small quantity nuclear material.

2.2 Domestic criteria for disposal of nuclear fuel Material

Detailed criteria for radionuclide concentration related to radioactive waste disposal are presented by the Nuclear Safety and Security Commission (NSSC).

According to the NSSC, if the concentration of radionuclide in the waste is less than its self disposal limit, it is regarded as general industrial waste, not radioactive waste, and can be incinerated, buried or recycled. If it exceeds the self disposal limit, it should be classified as a radioactive waste and disposed of at an approved disposal facility.

Table 1. Self disposal limit level for each radionuclide

Radionuclide	Specific Activity (Bq/g)
Th-229, U-232, Pu-238, Pu-239, Pu-240, Pu-242, Pu-244	0.1
Pu-236	1
U-230b, U-236, Np-240, U-241	10
Pu-234, Pu-235, Pu-237 U-231, U-237, U-239, U-240,	100
Th-226, Pu-243	1,000

However, at present, small quantity nuclear material are not included in the scope of disposal because of the operation plan of domestic middle and low level disposal facilities. Therefore, there is no way to dispose of small quantities of nuclear material in Korea.

Because of this, small quantity nuclear materials, which are no longer used, are kept by the use agencies themselves, and there is a possibility of

unauthorized disposal and arbitrary disposal due to the burden of management and the smallness of the facility.

2.3 IAEA Safe Guard criteria for nuclear fuel Material

The criteria for judging the release of regulation on nuclear fuel materials are different between domestic laws and IAEA agreements.

In domestic law, the waste that meets the concentration criteria of radionuclide, which is judged to have no risk based on the radiation hazard, is defined as the object of release of regulation. The IAEA determines whether or not a safe guard termination is based on whether or not the subject material can be used for nuclear activities.

Therefore, even if it is subject to own disposal under the Nuclear Safety Act, there is a possibility it is still subject to safeguards from the viewpoint of the IAEA. In such cases, it will have administrative burdens such as reporting and inspections.

Also, it is difficult to know the quantitative level for safe guard termination by the agreement. And its applicability should also be judged by the IAEA.

Table 2. Safeguards termination article under the ROK-IAEA Agreement

Article 11 TERMINATION OF SAFEGUARDS Consumption or dilution of nuclear material • nuclear material upon determination by the Agency that the material has been consumed, or has been diluted in such a way that it is no longer usable for any nuclear activity relevant • or has become practically irrecoverable. **from the point of view of safeguards**

3. Improvement Plans

3.1 IAEA safeguards agreement reflected in domestic waste management system

It is necessary to reflect the IAEA safeguards agreement in the domestic waste management system in order to minimize the difference between the radioactive waste management standard in the Nuclear Safety Act and the IAEA safeguards agreement.

Therefore, it is necessary to establish an institutional apparatus that can confirm whether or not the activities are violating the IAEA safeguards agreement when disposing small quantity nuclear materials. In addition, through consultation with the IAEA, it will be possible to improve institutional efficiency by clarifying the criteria for quantitative safeguards termination and incorporating the IAEA safeguards agreement into the domestic waste management system.

3.2 Establishment of national disposal and management system for small quantity nuclear material

Currently, the radioactive waste disposal facility operation plan does not include nuclear material in the disposal of the first stage disposal facility.

Future plans for the disposal of nuclear materials will need to be made in consultation with relevant ministries and agencies in order to include management plans for small quantities of nuclear material in the future radioactive waste management plan.

4. Conclusion

At present, radioactive waste related standards have been established in view of safety. It would not be possible to challenge this approach because it is universal and reasonable to exclude materials that are considered to have no significant risk from safety as a criterion for radioactive waste regulation.

However, in Korea, where nuclear nonproliferation and state control of nuclear material are obligatory under the IAEA safeguards agreement, approaching regulations only from a safety standpoint is problematic. This causes difficulties in carrying out systematic management at the national level.

To minimize these administrative difficulties, it is necessary to introduce a safe guard perspective within the current regulatory framework.

And there is a need for a reasonable and realistic way to do this, and this requires discussions between relevant agencies and government departments.

REFERENCES

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