

A Trend Analysis on the Result Report of Safeguards National Inspections in the ROK

Sungho Yoon

Korea Institute of Nuclear Nonproliferation and Control

1418 Yuseong-daero, Daejeon, Republic of Korea

Corresponding author: shyoon@kinac.re.kr

Abstract

Since 2015, Korea Institute of Nuclear Nonproliferation and Control (KINAC) which is technical support organization of Nuclear Safety and Security Commission (NSSC) has introduced and implemented annual national inspections of nuclear facilities including power reactor, fuel manufacturing facility, research institute, and nuclear material use companies for State's System of Accounting for and Control of Nuclear Material (SSAC).

The national inspection consists of 6 inspection items as follows. Organization and job, record and report, measurement system, procedure of import/export and accounting of specific nuclear material, education and training, other matters related to accounting. The national inspection is usually conducted for 2 weeks and consists of document inspection, on-site inspection, and interview with a person in charge. As a result of the inspection, the authority can issue a legal corrective order to the operator.

In this paper, based on the national inspection results for 7 years, inspection trends that focus on corrective order were analyzed. The main factors influencing the inspection results were the inspector's propensity and the points pointed out by other facilities. Based on the analysis results, we proposed improvement points for future national inspections.

I. Introduction

In the past, Korea conducted national inspections by performing the same verification when performing IAEA Physical Inventory Verification (PIV). Since 2015, it has improved its inspection method and revised laws to differentiate itself from IAEA verification. In the changed method, the regulatory body (NSSC) and technical support organization (KINAC) reviewed and approved the nuclear materials measurement and management regulations established at each nuclear facility and checked the compliance of the facilities according to the regulations.

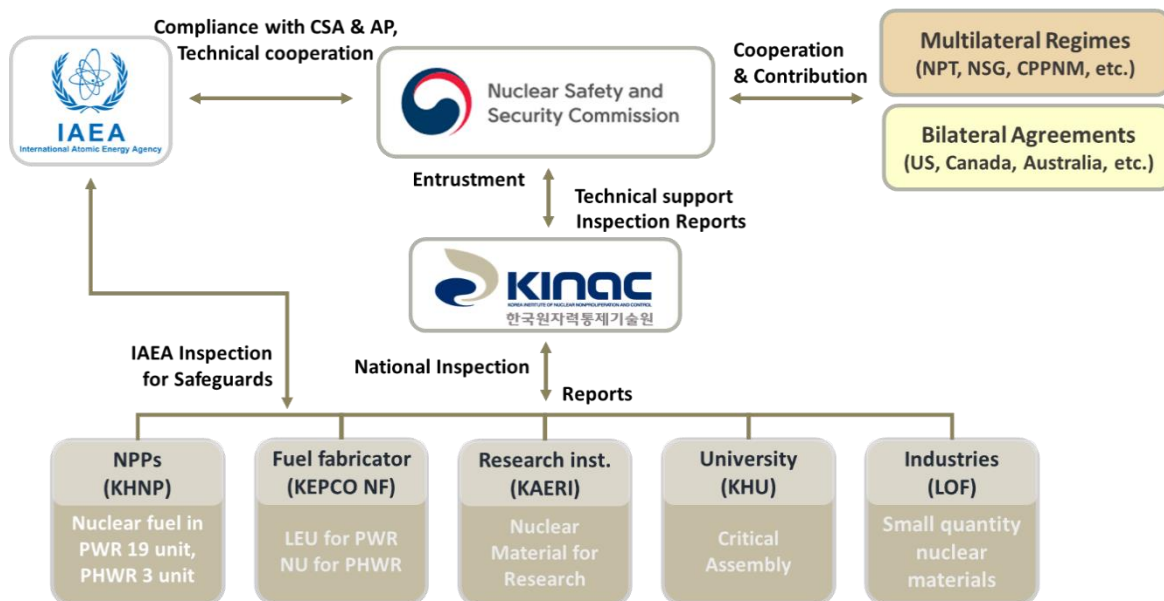


Figure 1 ROK SSAC configuration

Figure 1 shows This is the regulatory framework developed through the history of development, coordination, and adjustment. The NSSC is the government body responsible for nuclear regulation. As a technical support organization, KINAC inspects nuclear power plants, fuel fabricators, research institutions, and industries to utilize nuclear technology and materials for peaceful purposes.

National inspections are usually performed by three to four inspectors for two weeks. Interviews and on-site inspections are conducted in the first week, and the results of the on-site inspections are reviewed in the second week, and additional inspections are performed on specific matters or results reports are prepared. The inspection item consists of six items. inspection items as follows. organization and job, record and report, measurement system, procedure of import/export and accounting of specific nuclear material, education and training, other matters related to accounting.

If the inspection results in insufficient points, the national inspection will prepare a request for corrective order or recommendation for the facility. Upon receipt of such documents, the NSSC determines whether to issue them and imposes legal obligations by requesting corrective order to the facility. If the legal requirements are satisfied, but there is anything that needs improvement, a recommendation is issued, and the operator is not obligated to implement it.

Figure 2 shows detail of the inspection items described in NSSC Notice. In order to implement the regulations, the facility operator establishes and implements MC&A procedures.

Notice of NSSC (MC&A regulation for specific nuclear materials)

- 1. General**
 - Facility name, Location, type of license, KMP code, Approval of regulation
- 2. Duties and organization**
 - Organization, Duties, Responsibility, Authority
- 3. Recording and reporting**
 - Design information, Site information, MC&A report, Origin country report, Nuclear fuel cycle R&D etc.
- 4. KMP, Measurement methods, Equipment**
 - Key measurement point, Measurement management, Equipment
- 5. MC&A procedures of specific nuclear materials**
 - Nuclear material receiving/shipping record, Physical inventory taking, etc.
- 6. Education and training**
 - Compulsory education, Internal education
- 7. Other matters directly related with control and accountancy of specific nuclear materials**
 - Audit system, Surveillance and sealing, Others, etc.

Figure 2 Contents of the ROK safeguards national inspection

II. Trend Analysis on the Result of National Inspection

As a result of conducting regular inspections over the past seven years, the inspection reports issued were classified by inspection item, tabulated, and analyzed trends.



Figure 3 Number of Corrective orders and Recommendations by year

Fifty-eight corrective orders were issued, and forty-seven recommendations were issued. In 2015, there were not many corrective orders for three years to establish inspection standards and strengthen inspection capabilities, but from 2019, active requests for correction were carried out based on internally produced technical standards. However, from 2020, due to COVID-19, inspection activities were limited, so the number of corrective orders was reduced by conducting document review-oriented inspections.

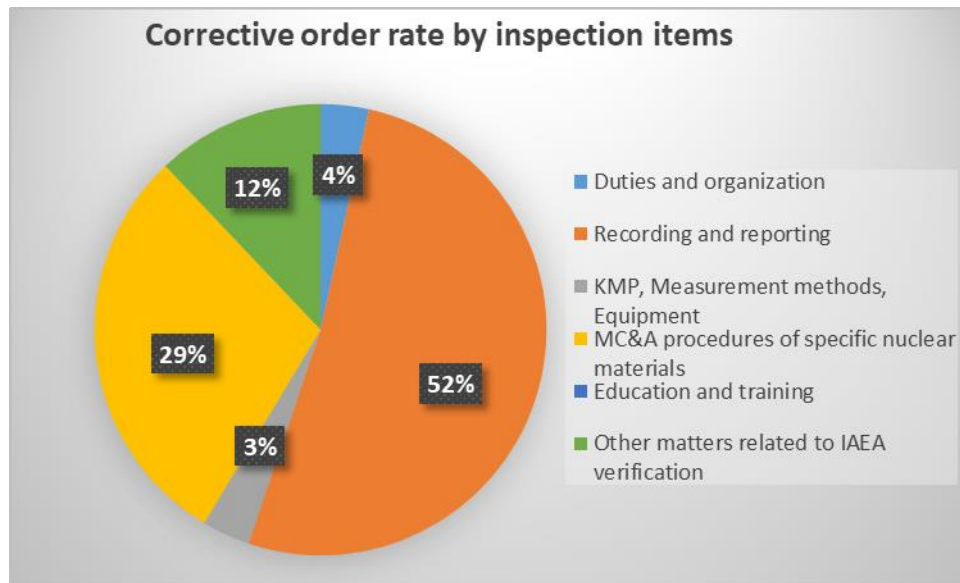


Figure 4 Corrective order rate by inspection items

Figure 4 shows the percentage of corrective orders by inspection items. Most of them are recording and reporting items, and the facility operator often omitted matters to report as government. In addition, when corrective orders that should be common to light water reactors (LWR) occurred, the number increased by applying the same correction request to other LWR power plants, and the lack of reporting by the bilateral agreements and the discrepancy between design information questionnaire and existing facilities accounted for a significant portion. Next, the MC&A procedures of specific nuclear materials items were cases in which the procedures were not properly familiarized due to the carelessness and inexperience of the facility operator.

Regarding recommendation, recording and reporting items accounted for a large proportion with 42%. There were many similar contents and levels to cases for recording and reporting items in the correction requirements, which is because the standards for correction requests and recommendations are not clear and are determined by the senior inspector or division director.

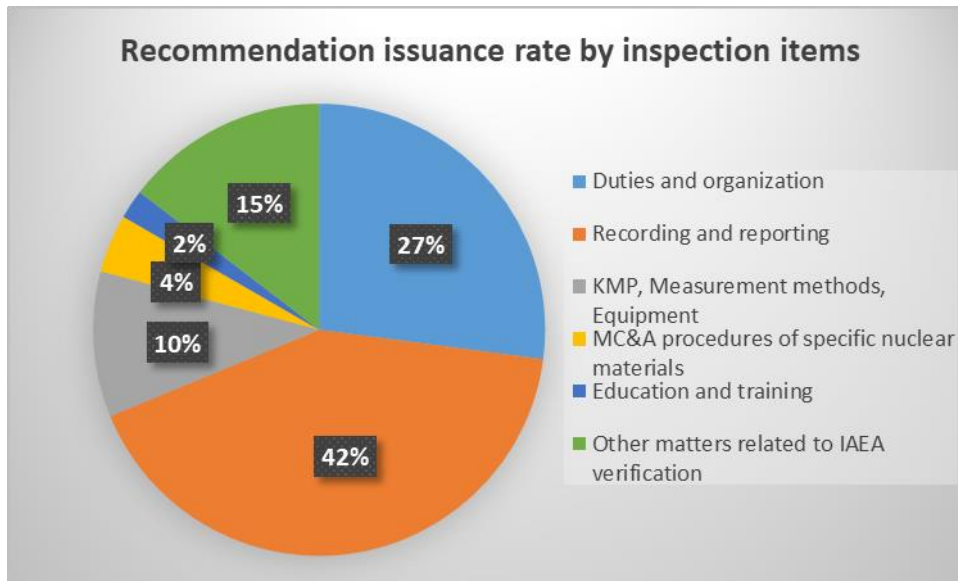


Figure 5 Recommendation issuance rate by inspection items

Due to the difference between corrective order and recommendation cases, the duties and organization items were prominent in the recommendation. A lot of recommendations were issued to secure human resources and strengthen responsibilities for quantitative management at the facility.

III. Conclusion

In this paper, based on the national inspection results for 7 years, inspection trends that focus on corrective orders and recommendations cases were analyzed. The main factors influencing the inspection results were the inspection environment, inspector's propensity and the repetition of the points that pointed out by other facilities.

Based on the analysis results, we proposed improvement points for future national inspections. Standards for corrective orders and recommendations should be established, and internal review procedures should be strengthened to ensure consistency in inspection results.

References

- [1] Republic of Korea, "Nuclear Safety Act", Act No.18972, 10. Jun, 2022.
- [2] Republic of Korea, "Regulation on Inspection for Nuclear Material Accounting and Control", NSSC Notice No.2017-83, 26. Dec, 2017.