

Comparison of application of ANSI/ANS3.2 quality assurance inspection and operational technology capability inspection

CahnGyu HAN¹

¹KINS, Div of. Safety Inspection, 62 Gwhak-ro, Yuseong-gu, Daejeon, KOREA 34142

E-Mail : k732hcg@kins.re.kr

1. Introduction

Legal inspections performed during the operation of nuclear power plants in Korea consist of pre-use inspections, regular inspections, quality assurance inspections, and supplier inspections. Among these, ANSI/ANS 3.2, the American technical standard, is commonly applied to quality assurance inspection and operational technical capability inspection, which is a field of regular inspection. In spite of the same technical standards, according to the inspection system for nuclear power plants in Korea, some sections are applied to quality assurance inspections, and some sections are applied to operational technical capability inspections. In this study, we will analyze the application status of ANSI/ANS 3.2 according to the type of inspection and study how to link the two inspections in order to consistently apply common technical standards.

2. Inspection Background and Current Status

All “inspections”, a means of confirming the safe operation of a nuclear power plant in operation, are based on Article 22 of the Nuclear Safety Act and are composed as follows.

<Nuclear Safety Act>

Article 22 (Inspections)

(1) Every person who has obtained a license pursuant to Article 20 (1) (hereinafter referred to as “operator of a nuclear power reactor”) or every supplier or performance testing institute shall undergo an inspection conducted by the Commission regarding the operation of the nuclear power reactor and relevant facilities, and the metrical control of the special nuclear materials, as prescribed by Presidential Decree. <Amended on May 21, 2014>

(2) Where the results of an inspection conducted under paragraph (1) fall under any of the following cases, the Commission may order the relevant operator of the nuclear power reactor or the supplier or performance testing institute to take a corrective or supplementary measure: <Amended on May 21, 2014>

1. Where he/she has failed to meet any of the standards for the license referred to in Article 21 or the measures taken pursuant to Article 26 (1) are insufficient;

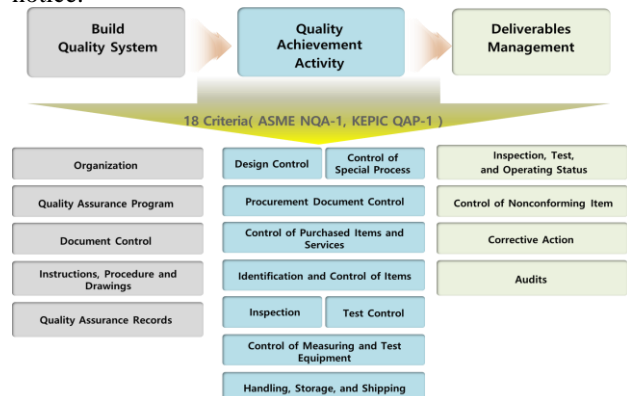
2. Where he/she has failed to observe as stated in the documents submitted to accompany his/her application under Article 20 (2), or the regulations for metrical

control under Article 15, which is applied *mutatis mutandis* in Article 29.

Inspection is performed by KINS, which has been entrusted with the task by law, and quality assurance inspection is stipulated to be performed once a year for each power plant [1], Operational technical capability inspection, which is a field of regular inspection, is stipulated to be carried out within 20 months for each power plant.[2]

2.1 Quality Assurance Inspection

Quality assurance inspection is an inspection to check whether the quality assurance plan of the licensee is being maintained in a state that meets the permit standards, and to confirm whether all tasks affecting safety are effectively performed in accordance with the quality assurance plan implementation system. 원자력 The 18 criteria constituting quality assurance are defined [3] and the inspection is performed in the form of checking the implementation status for each item. Inspection is carried out in accordance with Article 22 of the Nuclear Safety Act and Article 31 of the Enforcement Decree of the Nuclear Safety Act. The standards for inspection are Articles 65 (Quality Assurance Organization) to Article 85 (Audit) of the Rules on Technical Standards for Nuclear Reactor Facilities, etc. Applied technical standards are defined in the Nuclear Safety Commission Notification No. 2016-13 <Standards for the Detailed Quality Assurance requirements of Nuclear Reactor Facilities>. Quality assurance inspection is to check the implementation system and implementation status of licensees according to 18 nuclear quality assurance requirements. As a tool for inspection of operating power plants, ANSI/ANS3.2 is endorsed in the above-mentioned notice.



<Fig.1. Quality Assurance 18 Criteria>

2.2 Regular Inspection
(Field of Operation Technology Capability))

Regular inspections will be conducted in accordance with Article 22 of the Nuclear Safety Act, Article 35 of the Enforcement Decree of the Nuclear Safety Act, and Article 19 of the Enforcement Rules of the Nuclear Safety Act, and will be conducted on 11 items. In addition, in accordance with Article 50 (2) of the Rules on Technical Standards for Nuclear Reactor Facilities, etc., the inspection in the field of operational technical capability is also included in the regular inspection. Among the operational technical capability Inspection, the operating organization, qualifications and training are required to comply with ANSI/ANS 3.2 as specified in the final safety analysis report[4], which is a legal licensing document, and the regular inspection guide of the KINS

3. Configuration and Inspection Application of ANSI/ANS 3.2

3.1 Configuration of ANSI/ANS 3.2

ANSI/ANS 3.2 is a document describing the requirements and recommendations for operational management and quality assurance plans necessary to ensure that activities related to the operation of nuclear power plants are carried out so as not to endanger public health and safety. [5] In U.S.A, NRC endorsed ANSI/ANS 3.2 at Regulatory Guide, it gained its status as a technical standard for regulation, and as described above, Korea is adopting this technical standard in the notification of the Nuclear Safety and Security Commission. ANSI/ANS 3.2 consists of a total of 6 sections, and each section is structured as shown in the table below.

<Table 1. Configuration of ANSI/ANS 3.2-1994>

Section 1	Scope and Purpose
2	Definitions
3	Owner Organization
4	Quality Verifications
5	Program, Policies, and Procedures
6	References

3.1 Quality Assurance Inspection Applicable Items

According to the table above, in Korea's nuclear quality assurance inspection, ANSI/ANS3.2 is used as the technical standard for inspection, but it does not confirm that all contents of the document are complied with, and some provisions are applied depending on the nature of inspection. Through the comparison table of 18 nuclear quality assurance criteria and ANSI/ANS 3.2, it can be confirmed how this technical standard is reflected in quality assurance inspection.

Comparison Chart
of
10 CFR 50 Appendix B
and
ANSI/ANS-3.2-1994 Requirements

10 CFR 50 Appendix B Criterion	ANSI/ANS-3.2-1994 Sections	Comments
I	1, 3.1, 3.3	
II	3.1, 3.3, 3.4.2, 3.5, 4.4.3.2, 5.1, 5.3	Refs.: for 3.4.2, ANSI/ANS-3.1-1993, ANSI/ASME NQA-1-1994; for 3.5, ANSI/ANS-3.1-1993; for 4.4.3.2, ANSI/ASME NQA-1-1994
III	5.2.9, 5.2.10	Refs.: for 5.2.9, ANSI/ASME NQA-1-1994
IV	5.2.16	Refs. ANSI/ASME NQA-1-1994
V	5.2.9, 5.3	Refs.: for 5.2.9, ANSI/ASME NQA-1-1994, ANSI/ASTM D3843-80
VI	5.2.18	
VII	5.2.16.2	
VIII	5.2.16.3	
IX	5.2.21	
X	5.2.20	
XI	5.2.22	
XII	5.2.19	Refs. ANSI/ASME NQA-1-1994
XIII	5.2.16.4	Refs. ANSI/ASME NQA-1-1994
XIV	5.2.6, 5.2.17	Refs.: for 5.2.17, ANSI/ASME NQA-1-1994
XV	5.2.17	Refs. ANSI/ASME NQA-1-1994
XVI	5.2.14	
XVII	5.2.15	Refs. ANSI/ASME NQA-1-1994
XVIII	4.4.3	Refs. ANSI/ASME NQA-1-1994

<Fig.2. Comparison Table of 18 Criteria and ANSI/ANS 3.2>

3.2 Regular inspection applicable items

In accordance with the KINS regular inspection guideline and final safety analysis report, ANSI/ANS 3.2 is applied to the operating organization and qualification and training fields in the field of operational technical capability, and the main application provisions are as follows.

<Table 2. Regular Inspection Application Item>

ANSI/ANS3.2-1994	Regular Inspection
3.2 Assignment of Authority and Responsibility	Operation Organization
3.4 Plant Operating Organization	
4.4.4 Plant Safety Review Committee	
5.2.1 Control of Plant Operations	
3.5 Indoctrination and Training	Qualification and Training

3.3 Differences between inspection items

In the case of organizations, in the quality assurance inspection, the contents of the quality assurance team or quality inspection team, which are business organizations mainly related to quality, are checked. On the other hand, in the operation technology capability inspection, the overall organizational system of power plant operation, including the plant operation team and plant operation support team, which are organizations mainly related to operation, is checked. In addition, in the field of qualification and training, the quality assurance inspection mainly checks the qualifications of inspectors or testers required by the quality assurance

plan or the qualifications of auditors who perform internal audits, whereas in the operational technical capability inspection, employees working in power plants Alternatively, they are mainly checking the qualifications and education and training of employees of resident partner companies. Despite these differences, checking the detailed items separately from two legally separated inspections for items with continuity within the same document called ANSI/ANS 3.2 not only reduces inspection efficiency, but also reduces the original technical standards. There may also be doubts as to whether or not it is sufficiently achieving its intended purpose.

Of course, the first goal is to achieve the content required by the provisions of the law that is applied to the operational technical capability inspection and to maintain it in a satisfactory state, and the technical standard is applied to establish a quantitative judgment standard for it, so the current practice. It cannot be said that there is an error or that it is wrong. However, since confirmation of the operator's actions, quality assurance system, and work is the common purpose of both inspections, it will be possible to find ways to increase inspection efficiency and effectively use regulatory resources through linkage between inspections.

4. Conclusions

The operating organization, qualifications, and training of quality assurance inspection and operational technical capability inspection are inspections classified according to the Korean Nuclear Safety Act, and are separate inspections with different matters to be checked by each law. However, there are many parts in common in the content and purpose of inspection, and in particular, in the case of ANSI/ANS 3.2 presented in this study, the same technical standards and items were repeatedly applied to each individual inspection. Currently, in the legal system, the two inspections are completely independent, and there is no device in which the results of one inspection affect the other. However, if the two inspections can be linked, the inspection can be made more substantive, and if the results of one inspection are fed back to the other inspection so that a more in-depth inspection can be made on the weak areas, the safety of nuclear power plants can be secured. In this study, the differences and commonalities between the two inspection fields were checked through the technical standard of ANSI/ANS3.2, in future research, it is judged that more in-depth research on specific linkage methods and provisions of the law is necessary.

REFERENCES

- [1] 품질보증검사 업무처리 세부규정
- [2] 발전용 원자로 및 관계시설 정기검사 지침서(웨스팅하우스형원전) KINS/GI-N0001, Vol1, Rev.7, 2021.

[3] ASME NQA-1-1994 Quality Assurance Requirements for Nuclear Facility Applications, 1994.

[4] YGN Final Safety Analysis Report Chapter 13. Conduct of Operation

[5] ANSI/ANS-3.2-1994 Administrative controls and quality assurance for the operational phase of Nuclear Power Plants

[6] G. F. Knoll, Radiation Detection and Measurement, John Wiley & Sons, New York, pp.612-613, 1999.