

Review of Regulatory Quality Assurance Requirements for the Operation of Nuclear R&D Facilities

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1. Introduction

Korea Atomic Energy Research Institute (KAERI) has many R&D facilities in operation, including HANARO research reactor, radioactive waste treatment facility (RWTF), post-irradiation examination facility (PIEF) and irradiated material test facility (IMEF). Recently, nation-wide interest is focused on the safety and security of major industrial facilities. Safe operation of nuclear facilities is imperative because of the consequence of public disaster by radiological release/contamination, in case of an accident. Recently, Ministry of Science and Technology (MOST) of the Korean government announced amendments of Atomic Energy laws to enforce requirements of the physical protection and radiological emergency. In this paper, the context of amended Atomic Energy laws were reviewed to confirm quality assurance measures and identify additional QA activities, if any, that is required by the amendment.

2. Atomic Energy Act (AEA)

All provisions on nuclear safety regulation and radiation protection are entrusted to the AEA that was established in 1958. The AEA is enacted as the main law concerning the safety regulation of nuclear installations. The AEA includes provisions on the construction permission and the operation license of nuclear installations for nuclear power reactors, research reactors, nuclear ships, nuclear fuel fabrication facilities, spent fuel treatment facilities, etc. Basic regulatory requirements for the regulatory inspection and the safety measures for operation are also defined in the Act.

3. Enforcement Decree of the Act

The Enforcement Decree of the AEA as the Presidential Decree is necessary for the enforcement of the main Act (AEA) and it describes technical standards and particulars, entrusted by the AEA. It supplements the Act by specifying requirements of QA inspection and safety measures for operation of spent fuel treatment facilities.

4. Enforcement Regulation of the Act

The enforcement Regulation of the AEA states particulars such as detailed procedures and document

forms, as entrusted by the AEA and the Decree. It supplements the Act and the Decree by specifying requirements of 18 Criteria for QA programs.

The Enforcement Decree on the technical standards for Nuclear Installations is also established to specify requirements which include elements of 18 criteria in detail and fire protection planning measures.

5. Notice of the MOST

The Notice of the MOST prescribes specific issues including regulatory requirements and technical standards, as entrusted by the AEA, the Decree and the Regulation. Detailed QA requirements for nuclear installations are specified differently, depending upon the type of facility.

The industrial standards applicable to atomic energy activities are endorsed by MOST, and are applied to the design and operation of nuclear installations. For example, KEPIC-QAP is endorsed for the construction of nuclear power reactors, while ANS/ANSI 15.8 is endorsed for research reactors. The guidelines for safety reviews and regulatory inspections are developed by the Korea Institute of Nuclear Safety (KINS), which is an expert organization for safety regulation.

6. Conclusion

QA requirements in the Atomic Energy laws are cross checked and summarized in the matrix comparison table (see Table 1). The table shows that QA requirements are defined quite well in the laws to ensure clear understanding and implementation of the laws by the nuclear industry and the regulatory body. It is concluded that there are no specific QA activity that is required, in addition, by the amendment of the Atomic Energy laws. KAERI has developed the Basic QA Program which meets all the QA requirements for various nuclear operations and now adapts the Program in a satisfaction. But, separate QA programs are submitted for each operation to meet the regulatory requirements.

REFERENCES

- [1] MOST and KAERI, Atomic Energy Laws of the Republic of Korea, 1985.
- [2] Internet www.most.go.kr, English version, Aug. 2005.
- [3] Internet www.kins.re.kr, Atomic Energy Laws (updated versions), Aug. 2005.
- [4] KEPIC Code, Korea Electric Association, 2000.

Table 1. Matrix Comparison of Regulatory QA Requirements

	Atomic Energy Act (Law)	Enforcement Decree (Presidential)	Enforcement Regulation (Ordinance of MOST)	Regulation of Technical Standards for Nuclear Reactor Facilities	Notice by MOST
Construction of Nuclear Power Reactors	Article 11(Construction Permit) Para.2 Submission of QA program for construction Article 12(Requirement of construction permit) QA program shall meet the requirement of Enforcement Regulation Article 16(Inspection)	Article 31(QA Inspection)	Article 7, Para.4(18Criteria)	Article 67(Scope of Application) -Article 68-Article 85 (18criteria in detail) Article 67, Para.2 -Requirement specified in Notice by MOST	#2001-47(Specific QA Requirement for Nuclear Facilities(Article 3(Specific Requirement) -KEPIC-QAP -#2005-04(Application Guide of KEPIC Code for Nuclear Facilities)
Operation of Nuclear Power Reactors	Article 21(Operating License) Para.2 submission of QA program for operation Article 22(Requirement of License) QA program shall meet the requirement of Enforcement Regulation Article 23-2(Inspection) Article 29(Safety Measures for Operation) Para.1	Article 43(M.M. Application) -Article 31(QA Inspection) Article 102(Safety Measures for Operation) Para.1	Article 16, Para.3 -Article 77, Para.4(18Criteria)	Article 67(Scope of Application) Para.1 -Article 68-Article 85(18criteria in detail) Article 67, Para.2 -Requirement specified in Notice by MOST Article 59(Fire Protection Plan)	#2001-47(Specific QA Requirement for Nuclear Facilities(Article 3(Specific Requirement) -KEPIC-QAP and ANSI/ANS3.2 -#2005-04(Application Guide of KEPIC Code for Nuclear Facilities) #2003-19(Fire Protection Planning/Performance Requirement) -Article 5 Para.1 (8) QA Activities
Nuclear Research Reactor	Article 33(Permit) Para.2 Submission of QA program for construction and operation Article 36(M.M. Application) -Article 16, Article 23-2 Article 36(M.M. Application) -Article 29(Safety Measures for Operation)	Article 49(M.M. Application) -Article 31(QA Inspection) Article 102(Safety Measures for Operation) Para.1	Article 23(Application for Construction&peration Permit) Para.4 Submission of QA program for construction and operation -Article 7(18Criteria) & Article 16	Article 67(Scope of Application) Para.1 -Article 68-Article 85 (18criteria in detail) Article 67, Para.2 -Requirement specified in Notice by MOST Article 59(Fire Protection Plan)	#2001-47(Specific QA Requirement for Nuclear Facilities(Article 3(Specific Requirement) -ANSI/ANS15.8 #2003-19(Fire Protection Planning/Performance Requirement) -Article 5 Para.1 (8) QA Activities
Nuclear Fuel Fabrication	Article 43(Permit) Para.3 submission of QA program for operation Article 44(Requirement of Permit) Article 45(Inspection) Article 53(Safety Measures for Operation) Para.1	Article 140(QA Inspection) Article 165(Safety Measures for Operation) Para.1	Article 37(Application for Permit) Submission of QA Program for operation Article 40(M.M. Application) -Article 7, Para.4(18Criteria)	Article 101(QA) -Article 68-Article 85 (18criteria in detail) Article 96(Scope of Application) -Article 97-Article 100	#2001-47(Specific QA Requirement for Nuclear Facilities(Article 3(Specific Requirement) -Article 68-Article 85(18criteria in detail) Article 67, Para.2 of the left Regulation
Spent Nuclear Fuel Processing	Article 43(Permit) Para.3 submission of QA program for operation Article 44(Requirement of Permit) Article 45(Inspection) Article 53(Safety Measures for Operation) Para.1	Article 154(M.M. Application) -Article 140(QA Inspection) Article 165(Safety Measures for Operation) Para.1/Para.2* *Excluded in case of research & test purposes	Article 45(M.M. Application) -Article 77, Para.4(18Criteria)	Article 101(QA) -Article 68-Article 85 (18criteria in detail) Article 96(Scope of Application) -Article 97-Article 100** **No requirement of QA activities	#2001-47(Specific QA Requirement for Nuclear Facilities(Article 3(Specific Requirement) -Article 68-Article 85(18criteria in detail) Article 67, Para.2 of the left Regulation