Regulatory Activities on Civil Nuclear Safety Equipments in China

Lu Gaoshang [a*], Kwang Sik Choi [b]
[a]*KINS-KAIST International Nuclear Safety Master's Degree Program, Korea Advanced Institute of Science and Technology., Nuclear and Quantum Dept., 335 Gwahangno Yuseong-gu, Daejeon.*
[b]*Korea Institute of Nuclear Safety(Adjunct Professor, Nuclear and Quantum Dept. KAIST)*
[*]*Corresponding author: nrolvgsh@163.com*

1. Introduction

It is stipulated in IAEA Fundamental Safety Principles (SF1) that the fundamental safety objective is to protect people and the environment from harmful effects of ionizing radiation. The fundamental safety objective applies for all facilities and activities and for all stages over the lifetime of a facility or radiation source, including planning, sitting, design, manufacturing, construction, commissioning and operation, as well as decommissioning and closure [1].

So, according to the requirement, the related activities such as design, manufacturing, installation and non-destructive test that conducted on civil nuclear equipments should be well controlled by the vendors, the owner of the nuclear power plants and the regulatory body. To insure the quality of those equipments, Chinese government had taken a series of measures to regulate the related activities on them.

2. Regulatory Works on Civil Nuclear Safety Equipments

2.1 Definition and Ranges

In China, only the civil nuclear safety equipments (CNSEs) are regulated by the regulatory body named National Nuclear Safety Administration (NNSA). The CNSEs are the equipments that perform one or several safety functions in the civilian nuclear utilities, including pressure retaining equipments and non-pressure retaining equipments. Based on different functions, the CNSEs can also be divided into two types, one is called nuclear safety mechanical equipments, and another is called nuclear safety electrical equipments. For example, the reactor, the containment, the steam generator etc. are nuclear safety mechanical equipments while the emergency diesel generator, the electric motor, electrical penetration assembly, etc. are nuclear safety electrical equipments [2].

At the end of 2007, to intensify the surveillance and avoid the misunderstanding of the range of the CNSEs by the licensees, the NNSA had released the first catalog of the nuclear safety equipments that need be supervised by the NNSA. There were 18 types of nuclear safety mechanical equipments and 9 types of nuclear safety electrical equipments in the catalog.

2.2 Legislative Works on CNSEs

Nowadays, the legislative system on CNSEs is well established, and it consists of laws, administrative regulations, department rules, guiding documents and reference documents.

The state laws, which have higher legal effects than the administrative regulations and department rules, are enacted by the National People's Congress and its Standing Committee. The existing state laws applicable to CNSEs field are "Constitution of the People's Republic of China", "Environmental Protection Act of the People's Republic of China".

Administrative regulations, which have legal binding effects, are promulgated by the State Council according to the Constitution and the laws. Chinese government issued "Regulations on the Safety Regulation for Civilian Nuclear Safety Equipment" which is the main regulations on CNSEs.

There are four departmental rules that stipulate specific implementing measures on CNSEs, namely, "Rules on Civilian Nuclear Safety Equipment in Design, Manufacture, Installation and Non-destructive Testing ", "Rules for Qualification Management on Non-destructive Testing Personnel of Civilian Nuclear Safety Equipment", "Rules for Management of Qualification Management on Welder and Welding Operator of Civilian Nuclear Safety Equipment" and "Rules on the Safety Regulation for Imported Civilian Nuclear Safety Equipment".

There are also many nuclear safety guides and reference documents on the regulation of CNSEs.

The main contents of above regulations are listed as follows [2-4].

1) The first important provision is about the national standards on the CNSEs. It is prescribed that the NNSA shall prepare and issue some nuclear safety related national standards on the basic principles and technical requirements of the CNSEs, and the related authorities who in charge of the nuclear industry will prepare and issue other national standards on the CNSEs.

2) The second one is about the licensing system. All the units, no matter state owned or private, must gain the permission from the NNSA, if they want to do one or more activities of design, manufacturing, installation and non-destructive testing on CNSEs. There are also some very strict requirements to the applicants prescribed in the decree. Compared to the former laws (1992 Vision), the licensing system for the non-destructive testing units was a new system adopted by the NNSA. The non-destructive testing licensees are the units that specialized in the non-destructive testing of

CNSEs. If one licensee has the qualified NDT personnel and related devices then it can do the related activities of NDT by it selves, otherwise, it must invite the professional NDT licensees to conduct the related activities.

3) The third one is the reporting requirements of the related activities. The licensees of the related activities on CNSEs must submit some documents such as the technical specifications, the quality assurance programs, and qualities plans to the related authority before they begin the related activities. The licensees must submit reports and get permission from the NNSA when the main terms of the license had been changed, such as the change of registered address or the legal representative.

4) The fourth one is about the importing and exporting of the CNSEs. It is prescribed that the NNSA will conduct the safety inspection of the imported CNSEs, and only after get the permission from NNSA, the commodity inspection by the State Administration of Quality Supervision could be conducted on the imported CNSEs. And for the foreign unit, who wants to conduct one or more activities of the four type of licensing on the CNSEs for the Chinese nuclear power plants programmes, must get the registration license from the NNSA.

2.3 Organizational framework on CNSEs in China

To perform the related responsibilities stipulated in the above administrative regulations and department rules, the NNSA had built up a management system to conduct the supervision of the relative activities on the design, manufacturing, installation and non-destructive testing of the CNSEs (See Figure1). The system is consists of the division of nuclear equipments who take the responsibility of licensing system and enforcement, the division of staff qualification who take the responsibility of the evaluation on the welders , NDT personnel and regulatory inspectors, 4 regional offices who conduct the inspection on the installation of the CNSEs in the nuclear power plants , and a special division in northern regional office(NRO) who conduct supervision on the design, manufacturing and non-destructive test activities on CNSEs nationwide.

2.4 Typical CNSEs inspection process

If a manufacturer wants to fabricate the CNSEs, it must act with the following steps:

The first step, the manufacturer must submit an application to the NNSA, the NNSA will organize the review group of TSOs to evaluate the ability of the manufacturer, and will issue the related approval to the applicant, if all the requirements being met.

The second step, if the manufacturer get an equipment manufacturing contract from the NNPs, he must submit some documents including the technique requirement specifications, QA programs and the quality plans to the special division of the NRO 30 days before the beginning of the fabrication. After receiving the documents, the equipment inspectors who in charge of the type of the equipments will firstly review the documents and then decide the check point (R, W, H) of the fabrication process.

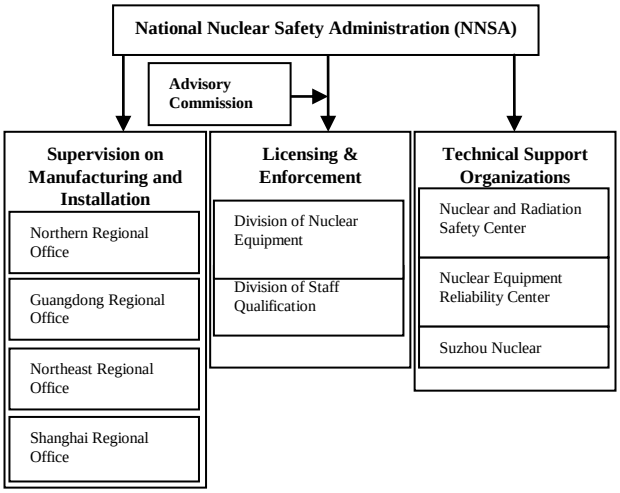

Fig.1 Regulatory Framework on CNSEs in China

The third step, when the check point is coming during the fabrication of the equipments, the manufacturer must notice the related equipment inspectors, and the inspectors will conduct the inspection and finalize the Inspection Findings. There will be some requirements in the Inspection Findings if related requirements can be met. The manufacturer must correct its activities according to the Inspection Findings, and submit the reports after the corrections to the NRO. The related nuclear equipments can be conveyed to the NPP site after the equipment inspectors close the Inspection Findings.

3. Conclusions

From the above, we can know that the Chinese government had set up a legislative framework and a reasonable organizational framework of licensing and inspection on CNSEs. Up to now, the regulatory activities on CNSEs are well performed, and the quality of the nuclear equipments is also well controlled.

REFERENCES

[1] IAEA Safety Standards- Fundamental Safety Principles, No. SF-1, 2006.
[2] Regulations on the Safety Regulation for Civilian Nuclear Safety Equipment, 2007.
[3] Rules on Civilian Nuclear Safety Equipment in Design, Manufacture, Installation and Non-destructive Testing, 2007.
[4] Rules for Qualification Management on Non-destructive Testing Personnel of Civilian Nuclear Safety Equipment, 2007.