

Research on the management and endorsement of nuclear safety standards in the United States and its revelation for China

Ting Liu, Yu Tian, Lili Yang, Siyi Gao and Dahu Song*

Nuclear and radiation safety centre of MEP, Beijing 100082, China

*Corresponding author e-mail: songdahu@126.com

Abstract. This paper introduces the American standard system, the Nuclear Regulatory Commission (NRC)'s responsibility, NRC nuclear safety regulations and standards system, studies on NRC's standards management and endorsement mode, analyzes the characteristics of NRC standards endorsement management, and points out its disadvantages. This paper draws revelation from the standard management and endorsement model of NRC and points suggestion to China's nuclear and radiation safety standards management. The issue of the "Nuclear Safety Law" plays an important role in China's nuclear and radiation safety supervision. Nuclear and radiation safety regulations and standards are strong grips on the implementation of "Nuclear Safety Law". This paper refers on the experience of international advanced country, will effectively promote the improvement of the endorsed management of China's nuclear and radiation safety standards.

1. Introduction

American standard system made up of voluntary standards and government special standard. Voluntary standard system includes standards endorsed by the American national standards institute ANSI, and standards endorsed by ANSI. It includes three components: federal government special standards, national standards, and professional group standards. In the United States, national standards are voluntary, and a very small percentage of them are made by ANSI, and most of the rest are made by ANSI's recognized standards drafted organization (SDO) [1]. Only standards endorsed by ANSI could be approved by ANSI as the American national standard. Standard text not approved by ANSI can't become a part of the American national standards, which should be specified in the standard text, or overprinted on the cover, or had explanatory words such as "this attachment (or some part of the standard text) is not part of the national standard, and also don't process in accordance with the requirements of the American National Standards Institute"[2]. The American standard system is shown in figure 1.

American standards system				
Local special standards supervision standards	purchasing standards	volunteer standards		
		states standards issued by ANSI	SDO standards issued by ANSI	common civil group standards

Figure 1. American standards system



2. NRC standard management mechanism and standard endorsement overview

2.1. NRC responsibility and system of regulations standards

2.1.1. NRC responsibility. The U.S. nuclear regulatory commission (NRC) established by the energy reorganization act of 1974, NRC took over the U.S. atomic energy commission, which is responsible for the development and regulation of nuclear activities at the same time, research and development work, and now the federal government nuclear weapons production under centralized to the office of energy (DOE). NRC's regulatory activities include regulation and guidance, policy formulation, licensing, retirement and certification, research, supervision and enforcement, emergency preparedness and response, and committee decision support. Among them, regulation and guidance include rule formulation, guidance setting and standard setting.

2.1.2. NRC regulations and standards system of nuclear safety [2]. American federal regulations and NRC supervision process play a key role in protecting the public and the environment. The supervision of NRC is mainly based on the 10CFR of the American Federal Regulations, that is "Title 10 of the Code of Federal Regulations (CFR), 'Energy'". After the establishment of NRC, NRC has further improved the relevant regulations and standards system. NRC regulations and standards system of nuclear safety is as shown in figure 2 below.

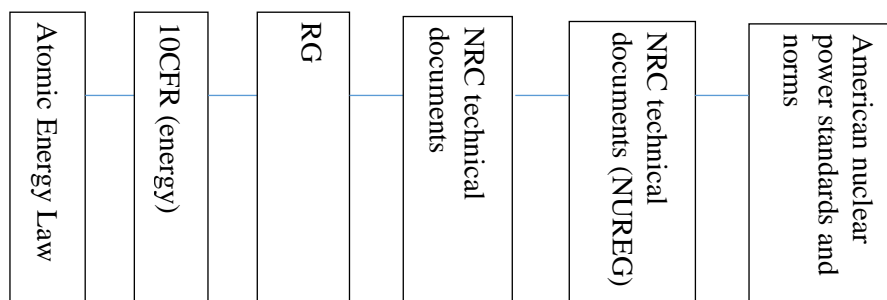


Figure 2. American nuclear safety regulations and standards system

Level 1 is the law - Atomic Energy Law which was ratified and issued by both houses of congress in 1954. It is the fundamental basis for American peaceful applicate management of atomic energy and military. Level 2 is regulations and NRC directives, including the 10CFR "energy", industry directives including bulletins and orders, etc. Level 3 is the industry management guide RG developed by NRC, which gives a reference standard to meet certain requirements. Since these RGs describe how to meet the regulatory requirements, the RGs are also a support to supper regulations. Level 4 is NRC internal work instructions, including NUREG files which are technical documents worked out by NRC reactor administration. NUREG/CR files are technical documents entrusted by various research institutions, that are all recommended reference files, but sometimes NUREG files and RG have the same functions. Level 5 is a large number of norms and standards. The relevant work division of all kinds of nuclear power standards and norms is clear.

2.2. NRC standards management and endorsement [4]

NRC standards management is embodied in the following aspects.

(1) Most standards used by NRC come from the consistency standards established by civil standards organizations.

(2) NRC management policy requires NRC staff should be regular training who participate in the activities of the standard. The purpose is to how to improve the communication of NRC and standards organizations, to reduce the time of a standard endorsement. The policy also provides that the conditions under which NRC can formulate and use the government's only standard, rather than using

industrial consistency standards. NRC appoints a senior executive as the agency "standard executive" to responsible for coordinating the agency's standard activities and also responsible for implementing the agency's standard policies.

(3) Generally speaking, the American standard is recommended, even if it has become a national standard. But American standards referenced by federal regulations become mandatory requirements and enforced, or conditionally used in accordance with regulations. NRC specific provides the requirements and constraints specific provisions by RG and other documents based on the federal regulations. The documents effectively absorb the industry standardization results and success in building the American nuclear and radiation law standard system.

NRC standard endorsement methods are these ways: (1) specific regulations and RG to endorsement requirements of certain series of standards and norms; (2) references to norms and standards of other NRC regulatory documents. The same norm standard in different NRC documents are various from limiting conditions or acceptability, because of the difference in the professional field background or the standard version. Other standards contained in the accepted standards don't endorsed with the endorsement of parent standard, unless they are endorsed by other RG or regulations. However, as long as it can be proved that these standards comply with the regulatory requirements of NRC, it is also allowed these standards to be adopted by companies. In the same regulatory document, NRC will track the change of standards and revise its adopted standards specific descriptions and restrictions on the ion of in its dated process.

2.3. NRC standard endorsement management characteristics analysis

2.3.1. Endorsement management characteristics. (1) NRC can design their own special organization standard (i.e., the government special standard), but according to the American regulations, NRC will as possible prefer to using standards set by the folk standards organizations, unless these standards do not agree with NRC regulations or have other situation not accord with. (2) In NRC standard document system, the standard is used in compliance with NRC regulations. (3) Endorsed standards have mandatory status required by NRC requirements, and the licensee or the applicant must comply them. But the licensee or applicant may also choose an alternative, which must meet the requirements of 10 CFR 50.55a (z). (4) The form of endorsed standards is to be required by specific regulations or RG, or to be quoted and specified in the relevant parts of the specific regulatory and RG. The standard are generally assessed and provide the limiting use conditions, such as whether to be fully accepted or partially accepted, referred use or rejected to use. (5) When NRC endorses a standard in the regulation and RG, the acceptance of the standard is determined according to the relevant field regulations requirements and the actual situation of technological development. (6) When the endorsed standard quoted other standards, which will not be regarded as being equivalent endorsed, unless they are endorsed by NRC in other regulations or RG, or proved to accord with NRC regulations. (7) NRC has appointed a "standard executive" for standard affairs, responsible for the standard activities of NRC agency and the coordination between NRC and the standard organization. (8) NRC closely traces and focuses on the changes of relevant standards, evaluates the standards in time, and regularly updates or upgrades the relevant RG and regulatory documents.

2.3.2. Deficiencies in existing NRC endorsement management mechanism. Standards need to endorse are many kinds and huge quantities. The standard management endorsement system has obvious deficiencies. The main problem is the lack of top-level design and no comprehensive and systematic planning. There are only a few NRC regulations and RG to systematically endorse and provide standards specifically. On the one hand, it is difficult for NRC to carry out systematic and clear statistics of quoted or endorsed standards in many different documents; on the other hand, if there are changes in a specification or standard, all relevant regulatory documents need to be revised accordingly. Revision work is tedious, and also easy to omission, which requires comprehensive

management work to a regulatory document for maintenance. Amount work is heavy. NRC specially commissioned the Pacific Northwest National Laboratory to finishing work is to prove that.

3. Revelation to endorsement management of China's nuclear and radiation safety standards

Learn from the successful experience of NRC endorsement management, it needs to strengthen the endorsement management of nuclear safety related standards in China. National Nuclear Safety Administration(NNSA) jointly with the National Energy Administration (NEA) have agreed to carry out the endorsement of energy industry nuclear standard NB, but it is still in its infancy, many systems and mechanisms need to improve in the pilot.

In NRC regulatory system, the standard status and character are detailed provided in 10CFR laws and regulations, so that NRC has the legal basis for the endorsement and adoption of relevant standards in other management norms. China should pinpoint responsibilities and division of standards management in the relevant laws and regulations. It to improve related management system according to “Nuclear Safety”, play a leading role of the government, fully embody the authority of regulations and standards. For management and endorsement procedure of nuclear safety standards, relevant regulatory authorities should come on more detailed explanations, and as part of the issued armed scheme, make each work steps is clearly related personnel or department. That makes endorsement and management work process more depend on and rule-based, the implementation of the specific procedures more smooth.

NRC specialist is responsible for communication and coordination with standards organizations work, tracing the development and change of nuclear safety related standards, and endorsing, citing and requiring them in NRC regulations and RG. NNSA should establish similar mechanisms to enhance coordination with standard agencies and promote endorsement management of standards. But it should avoid the disadvantages of too fragmented and difficult to manage as NRC. After a period of groping, nuclear safety standard endorsement in China can consider that large numbers of materials and equipment safety standards are endorsed by series. That can shorten the endorsement time, be easier to centralized management, more advantageous to implement nuclear safety regulatory requirements to technical standards.

In the process of standard management and endorsement, it should encourage research institutes and universities to actively participate in relevant research projects and participate in the process of revising and endorsing nuclear safety standards.

References

- [1] Federal participation in the formulation and adoption of voluntary conformity criteria and qualified assessment activities (OMB Notice A-119). R., Washington D. C., 1982.
- [2] Liu. Q. Ch. et al., Introduction to Standardization of Japan Russia and United States, M., China Standards Publishing Inc., Beijing, 2012.
- [3] NRC. American NRC annual report, R. NRC, Washington D. C., 2013-14.
- [4] NRC. Standard management policy, M. NRC, Washington D. C.