Transactions of the Korean Nuclear Society Spring Meeting
Gwangju, Korea, May 30-31, 2013

Regulatory Initiative to Oversee Licensees' Safety Culture

Young Sung Choi
Safety Policy Department, Korea Institute of Nuclear Safety
cys@kins.re.kr

1. Introduction

In recent years, international discussions relating to regulatory oversight of licensees' safety culture have taken place and several attempts have been made to establish practical approaches to the oversight. The event at Kori unit 1 in February 2012 made a new stage of regulator's engaging in licensee's safety culture in Korea. This paper presents the regulatory initiative of regulator's engagement into safety culture and suggests a systematic scheme to implement it for the operation of nuclear power plants in Korea.

2. Roles of Regulators in Ensuring Nuclear Safety and Promoting Healthy Safety Culture

The fundamental objective of all nuclear safety regulatory bodies is to ensure that nuclear facilities are operated at all times in an acceptably safe manner [1]. The nuclear regulator's responsibility is to oversee the operator's activities in order to assure that the facility is operated safely [2]. A major lesson from accidents is the need for the regulator to be sensitive to such early signs of weaknesses and problems and to take pre-emptive actions to require improvements before severe accidents can occur.

Relationship between regulators and operators has to be independent but not isolated. Thus, the presence of regulator must be influential on operators' priorities on safety and also production goals. However, the role of the regulator with regards to safety culture is fully aligned with the responsibilities and functions of the regulatory body as stated in IAEA Safety Standards GSR Part 1 [3]. Roles of regulators with regards to safety culture can be summarized as follows:

- Promoting safety culture: Regulator should show a firm attitude for continuing to pursue a high level of nuclear safety. Competence, high standards, professional manner, etc. have to be embedded in every regulator.
- Evaluating safety culture through observation and inspection: Outward operational manifestations and quality of work should be examined and attention should be paid to signs of performance decline and symptoms of weak safety culture.
- Intervening in licensees' safety culture: If operators would not take actions despite apparent problems, regulators have to intervene in so that the problems would not go to severe consequences.

International experience on this topic has led to identify several consensuses on the regulatory approach to overseeing licensees' safety culture. These are:

- Resident/site inspectors play a key role in gathering safety culture data.
- Periodic focused safety culture inspections can help to raise the profile of safety culture. The results should be considered alongside other sources of information.
- Periodic gathering of information is recommended both in a proactive way (ex. site observations, review of licensee self-assessments) and in a reactive way (ex. response to events, performance degradations).
- Influence is preferred to "enforcement". Enforcement is likely to be associated with tangible manifestations of safety culture issues, such as license condition violations.
- Licensee self-assessment should be encouraged, and some countries have introduced regulatory requirements for this.
- There is a need for ongoing development of regulatory competence in safety culture and specific topics such as root cause analysis, influencing and communication skills, how to gather and analyze safety culture information.
- Further development is needed for a structured process for analyzing and interpreting safety culture information, and for using this to inform regulatory interventions.

3. Effects of Safety Culture on Safety Performance

As shown in Figure 1, safety culture can be identified only through a comprehensive approach to various implications residing in its concept. Major lessons from the international and domestic attempts to assess safety culture described above were that it is indispensable to adopt various types of data collection methods in order to understand the whole features of safety culture, particularly the lower level of culture. Findings from one area of the plant should not be used to draw conclusions about the organization as a whole.

In addition, considerations should be given to the relationship of safety culture and safety performance. With regards to this, an informative report was published by the US Nuclear Regulatory Commission [4]. The report found several important points:

- An event occurs due to multiple errors. Four or more human errors in combination with hardware failures contributed to the events that the report analyzed.
- Latent errors are more involved with events than active errors. About 81% were latent errors and others were active error (19%).

- The diversity of the human errors and nature of failed unavailable components precluded identification of common themes or trends in events. This means that additional automation may be no longer effective.
- Omissions and commissions in following procedures or taking actions within a given time were not found to be major determinants of risk increase. This implies that more procedures may not be effective to improve safety performance.

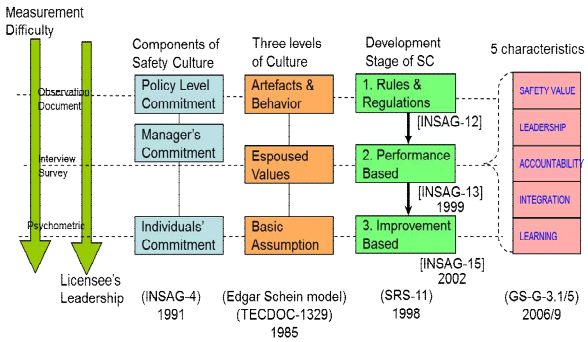

Figure 1. Components, levels, development stages and characteristics of safety culture

Then, it can be thought that the final resort to enhancing safety must be to reduce the latent errors, which is the basic idea of continuous identification and resolution of problems. The final stage of safety culture asserts that an organization will improve continuously through management system and its own characteristics.

The linkage between safety culture and safety performance can be described in figure 2, which shows the defenses and safety culture components that affects the integrity of defenses.

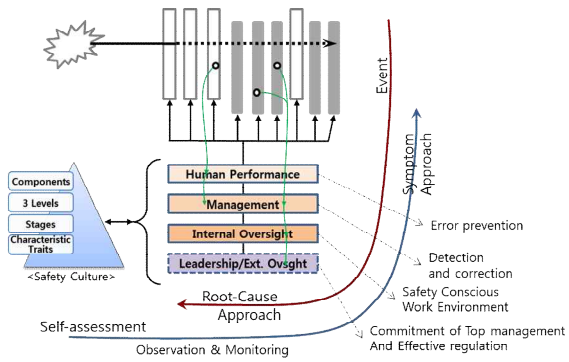

Figure 2. Linkage between safety culture and multiple levels of defenses that prevent hazards from occurring

4. Basic Direction for Regulatory Oversight

Acted upon the Kori-1 event, the Korean regulator set its expectations for licensee to implement. These are:

- A management system shall be established and implemented to promote a strong safety culture in the organization.
- In compliance with relevant international standards and best practices, the management system includes the definition and model of safety culture, and its implementation framework.
- The implementation framework consists of regular assessments, monitoring and analysis, and corrective actions, the processes of which are based on the most advanced methodologies.
- Monitoring is conducted to detect early signs of decline in safety culture and analysis is performed to assess the trends and to identify causal factors which are related to potential safety culture issues.
- The management system shall establish, as a key element of safety culture, a working environment in which staff can raise safety concerns or issues without fear of harassment, intimidation, retaliation or discrimination.

Based on the management system to be established by the licensee, regulatory oversight would be implemented. The oversight scheme is suggested as figure 3 that shows three data collection activities and two major regulatory actions in accordance with the severity of the problems identified or events. If regulatory oversight is successfully implemented, it is necessary to have common understanding among the government, safety culture inspector, licensees and the public as well. Concerted efforts are needed henceforth.

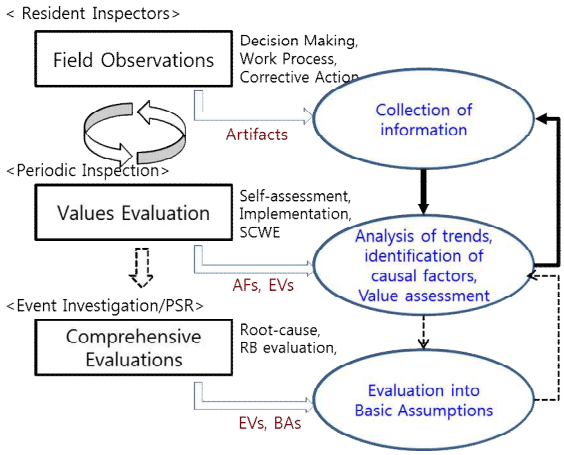

Figure 3. Systematic framework for regulatory oversight of licensee's safety culture

REFERENCES

[1] OECD/NEA, Improving Versus Maintaining Safety, 2002
[2] OECD/NEA, The Regulatory Goal of Assuring Nuclear Safety, 2008
[3] IAEA, Governmental, Legal and Regulatory Framework for Safety, IAEA Safety Standards Series No. GSR Part 1, IAEA, Vienna, 2010
[4] US NRC, Review of findings for human performance contribution to risk in operating events, NUREG/CR-6753, 2002