Towards Nuclear Safety for North East Asia

- Oriental way of thinking after Fukushima Daiichi Accident -

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1. Current Situation in Japan

After the nuclear accident at Fukushima, which was caused by the tsunami disaster that followed the Great East Japan Earthquake, nuclear power units in Japan were totally shut down by May 2012 for reviewing and verifying the conformity to the new regulatory standards that was required by NRA (Japan Nuclear Regulatory Agency).

Increase of fossil power generation due to all nuclear power plants off-line, which amounts to approximately 90% of generated electricity, has been bringing fragility to the national energy security in terms of reliance on imported energy resources.

Ministry of Economy, Trade and Industry of Japan have announced the nuclear energy policy as the Strategic Energy Plan 2014 that nuclear power will maintain its share of 20 to 22 % of total electricity as a base load. That means nuclear industry should make much more effort to be accountable for promoting nuclear energy. Because more than half of the public in Japan has not been convinced for the safety of existing nuclear reactors yet. Of course, Japanese nuclear operators have already introduced countermeasures based on the operating experience at Fukushima Daiichi Accident. For example, they have strengthened capabilities for emergency response with variety of equipment, trained staff, flexible skill, and cooperative system. In addition, ceaseless efforts for risk reduction at all times should be indispensable to restoring nuclear safety. Moreover, it becomes significant for the staff of nuclear operators to keep motivation for pursuing excellence.

On the other hand, China, Korea and India have the challenging plan to produce more nuclear power generation to the great part of energy in Asia with strong political and economic leaderships. Some of other countries in Asia also have plans for developing nuclear energy. Major part of development of nuclear energy in the world will be located in Asia by the middle of twenty-one century.

Based on this situation, safety culture must be more crucial for our Asian countries. Therefore, discussion on the way of promoting safety culture should be necessary for these Asian countries with not only the International style but also the Oriental one.

2. Oriental Internalization of Lessons learned

2.1 Continuous Learning

Recently OECD/NEA published the report[1)] titled by “Five years after the Fukushima Daiichi Accident-Nuclear Safety Improvement and Lessons Learnt-”. In this report, as for nuclear safety, human and organizational factors and safety culture are described as essential issues to all aspects of nuclear safety. OECD/NEA emphasizes the necessity for focusing on attitude towards safety, organizational capability, decision-making processes and the commitment to learn from experience.

Especially as for the commitment to learning from operating experience, IAEA stresses the importance of leadership and adequate management with specification and application of adequate safety measures[2)]. Learning from operating experience is certainly one of the key issues of safety culture to prevent the recurrence of safety significant events and to continuous improving towards excellent plant performance.

Nuclear Regulatory Commission of USA also published NUREG-2165[3)] on nuclear safety culture to clarify as a common language that described ten traits such as patterns of thinking, feeling, and behaving that emphasize safety. Continuous learning is one of these traits. The commission said in 4.6 Continuous Learning of NUREG-2165: “Opportunities to learn about ways to ensure safety are sought out and implemented”. As for the operating experience, the commission illustrates the traits of learning attitude of operating experience in CL.1 Operating Experience of NUREG-2165 that the organization should “systematically and effectively collects, evaluates, and implements relevant internal and external operating experience in a timely manner”.

However, it is very difficult for those who engage in the nuclear industry if they do not experience events directly. Indirect experience is likely to put reality away from their tangible risk awareness. According to the industry statistics of IAEA, “about 50% of the safety significant events that occurred in the past

several years could have been prevented or mitigated if the operating experience from past safety significant events had been internalized and corrective actions to prevent recurrence had been implemented"[4]. If the nuclear operator had introduced robust emergency electric supply systems such as waterproof buttery and emergency diesel generator at the Fukushima Daiichi site based on the other plant operating experience, the result of the accident must be completely different.

Therefore, in such a case, the words or phrases that are familiar to the people should be utilized to be effective to internalize risk awareness. For example, this learning attitude can be found in the expression in the Orient words or the Analects of Confucius, the philosopher who left many thoughtful words for success of business and daily life. For example, in the Analects, "Master said when we see men of worth, we should think of equaling them; when we see men of a contrary character, we should turn inwards and examine ourselves". "Master also said learning without thought is labor lost; thought without learning is perilous".

Looking back again at cause and analysis of Fukushima Daiichi Accident, I dear to say that this modest attitude mentioned above was regrettably insufficient for the nuclear operator to implement proactive measures towards design basis events and beyond the design basis accident.

2.2 Questioning Attitude

I also would like to introduce the audience into the Buddhism and Zen world that roots one of the traditional lives in Asia especially in Japan. Zen is a form of Buddhism developed in China in early T'ang period, that is, in the eighth century, responding to Indian thought as represented by Buddhism. Zen aims at an ultimate objective that discards all the superficialities that have accumulated around the daily life through the experiences of human beings.

Daisetz T. Suzuki, one of mentors of Zen priests, assumed that there were three kind of knowledge.[5]

The first was the knowledge gained from reading or hearsay, which we memorize and usually hold as an important possession. The second was the result of observation and experiment, analysis and speculations. The third was the one gained from intuitive mode of understanding.

Japanese nuclear operators had regrettably remained at the stage of first

knowledge pertaining to severe accident while others in overseas tackled to introduce countermeasures for responding to severe accidents or beyond design basis events at the second stage of knowledge in 1990s to 2000s.

As one of the Zen-riddle, a cryptic dialogue between Zen priest and his disciple, I would like to show a phrase of “a piece of hair swallows the huge sea”. It is certainly illogical and ridiculous due to the meaning beyond real world. This kind of phrase, for Zen discipline, illustrates a trial of breaking existing conceptual image in pieces and disposing existing confidence out. By doing it, Zen priests and disciples are aiming at attaining the mental stage of the very foundation of existence. Suzuki assumed “the deprecation of formalism, conventionalism, or ritualism tends to make the sprit stand in all its nakedness or aloneness or solitariness.” Questioning attitude, another significant principle of safety culture, stands on such a basement of intellectual dialogue.

Taking it for granted is not always assured by the certainty. Reviewing the fact whether it is usual or not can lead ourselves to the entrance of pursuit for tangible safe.

When Nuclear Regulatory Commission of USA says about “Questioning Attitude” in the NUREG-2165, it emphasizes that those who engage in nuclear energy “should avoid complacency and continuously challenge existing conditions and activities in order to identify discrepancies that might result in error or inappropriate action”. There is no difference between Western concept and Oriental ones. The question of “How safe is safe enough?” will be equivalent to this Oriental way of thinking.

If people who engage in nuclear energy recognize the importance of this questioning attitude with either way of thinking, they could certainly reduce latent risks and give thanks to the peaceful mind.

2.3 Diversity

Mandala represents the Buddhist universe and is a symbol of fusion and unity, expressing that the universe and people are fundamentally linked.

From this Mandalas world, I am inspired by the significance of diversity. Respect for diversity will encourage the nuclear safety from the viewpoint of total optimization, not partial one. Introducing diversity will ensure the effect of oversight. The Oriental way of thinking as Mandalas, way of assuming total optimization, will easily lead us to realize the excellence of nuclear safety.

3. Conclusion

Continuous learning and questioning attitude are essential for people who engage in nuclear energy.

Questions defying our confidence, like the Zen riddle, make us realize and appreciate the value of the things that rarely exist. Thus, we recognize the value of nuclear safety that does not naturally exist but has to be created with our maximum effort.

Mandala is a symbol of respect for diversity that leads to total optimization in nuclear safety, but not partial optimization. We, Asians, can respect our diversity with Oriental scope of values.

To realize more enhanced nuclear safety in Asia, where nuclear energy is developing in high speed, we need to define nuclear safety culture in Oriental style of thinking or way of speaking by accepting diversity.

Reference

1) OECD/NEA, Five Year after the Fukushima Daiichi Accident -Nuclear Safety Improvement and Lessons Learnt-, 2016.
2) IAEA, Leadership and Management for Safety No. GSR Part2, 2016.
3) NRC, Safety Culture Common language NUREG-2165, 2014.
4) IAEA/NSR/2015, Nuclear Safety Review 2015, 2015.
5) Daisetz T. Suzuki, “Zen and Japanese Culture”, Kodan-sya, 2005, originally published in England as Zen Buddhism and its Influence on Japanese Culture, the Eastern Buddhist Society, 1938.