

The Fukushima Nuclear Crisis and Chernobyl's 25th Anniversary: Lessons for Nuclear Power Industry around the World¹

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The world commemorated the 25th anniversary of the Chernobyl nuclear power plant catastrophic accident in Ukraine on April 26, 2011. However, this event did not do justice to the significance and impact of this plant on the world, as I saw and felt about it in 1997.

When I got the first sight of the Sarcophagus of the Chernobyl nuclear power station while riding in the Exclusion Zone toward the plant on a bright day in May 1997, I felt that Chernobyl was domineering, amazing, captivating, stunning, and memorizing. Like a mysterious temple of eternal doom which 'radiates' supernatural power, its eerie presence commanded respect, and its ominous Sarcophagus demands solemnity. Spending a few days in the control room of, then operating, Reactor #3, which was identical to the exploded #4 and mingling with its operators, was another quintessential experience.

The long-distance travelling fallout and wide-reaching aftermath of this accident has been characterized as, 'a nuclear accident anywhere is a nuclear accident anywhere.' I think there is no other site, or any other structure on earth which has had such a devastating effect on the lives of millions of people and on the environment. Going through the Exclusion Zone, seeing the Sarcophagus from a very close distance, visiting the (deserted, ghost) town of Pripjat, talking with 'liquidators,' and discussing nuclear safety issues with the General Director and his Deputy in charge of the Sarcophagus, re-confirmed my conviction, more than ever, that our interdisciplinary effort research on the risk mitigation of technological systems has the potential to offer a lot to humanity.

According to many seminal studies by the International Atomic Energy Agency and other sources, the root cause of the Chernobyl nuclear power plant accident was attributed to primarily deficient safety culture, not only at the Chernobyl plant, but throughout the Soviet design, operating and regulatory oversight for nuclear power that existed at the time of accident in 1986.

The safety culture is typically defined as the assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, safety issues receive the attention warranted by their significance. Creating and nurturing a positive safety culture basically means to instill thinking and attitudes in organizations and individual employees that ensure safety issues are treated as high priorities. A plant fostering a safety culture would encourage employees to cultivate a questioning attitude and a rigorous and prudent approach to all aspects of their job, and would set up necessary open communications between line workers and mid- and upper management.

And of course, in Fukushima's wake we should be concerned with the risks of a major earthquake and prepare to fend off hazards of its ensuing tsunami on nuclear power plants

anywhere. However, based on my 25 years of research on nuclear safety in the US and in Japan, I believe that the earthquake and tsunami natural hazards were only acted as triggering mechanism and it was the ensuing anthropogenic disaster that causes the Fukushima Daiichi nuclear crisis. The root causes of this man-made disaster can be found in the lax or non-existent independent nuclear regulatory oversight system in Japan as well as in the ineffective or woefully weak safety culture of the utility – Tokyo Electric Power Company (TEPCO). The natural disasters that can trigger secondary events with safety implications are probabilistic events, which occur rarely and too far in between. On the other hand, the safety culture related problems and their adverse impact that compromise plant’s safety barriers are 24/7 deterministic phenomena, that exist and are present 365 days a year.

Despite the Chernobyl accident and the crisis at the Fukushima nuclear plant in Japan, I believe that nuclear power, as far as two critical objectives of energy security and supply diversity are concerned in the US, will play a major role in the future. According to many recent credible reports, because of the concerns about carbon dioxide emissions causing global warming as well as uncertainty about and high cost of imported oil, nuclear energy is being considered a viable option.

However, we need a paradigm shift in dealing with nuclear power plant safety. The era of continuing piecemeal approach toward addressing safety issues at our plants is over. As Mr. Yukiya Amano, Director General of the International Atomic Energy Agency said on Monday April 4th, “the crisis at Fukushima Daiichi has enormous implications for nuclear power and confronts all of us with a major challenge (and) we cannot take a 'business as usual' approach”.

We should learn from Chernobyl and Fukushima and be prepared to face the nuclear power realities, including the added post-Fukushima expectations from the public. We shouldn’t give up, as we can do better than Chernobyl or Fukushima for our 104 nuclear power reactors in the US, as the American Philosopher Willam James once said, “Great emergencies and crises show us how much greater our vital resources are than we had supposed.”

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