Six Years After Fukushima

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Fukushima Disaster and Public Concern

The 2011 Fukushima nuclear disaster was covered throughout the world, mainly focusing on the safety of NPPs for the general public. One of the repercussions emphasized by the media was the impact the disaster had on society. Tsunami waves generated by an earthquake from the eastern region of Japan overpowered the tsunami barriers in the nuclear power plant. The primary and backup power plants were flooded, as were the heat sink chambers of all the units in the power plant (Funabashi, 2012). Compounding the off-site loss of power that happened prior to the tsunami, the engulfing waters caused on-site loss of power together with the destruction of the off-site supply systems. The Fukushima Nuclear power plant, which comprises six units and boiling water reactors, was situated 180 kilometers from the epicenter of the earthquake (Abe, 2014).

Cultural and Organisational Causes

The fundamental causes of the disaster can be found ingrained in the Japanese culture: reluctance to question the authorities, devotion to sticking with the program as well as the insularity of the Japanese people. There is some truth in this in the close relationship between the TEPCO officials and the people of Japan. However, that alone cannot be used as an explanation for a cause that is not unique to Japanese society. Other considerations, such as technical issues, possibilities of ecological destruction, and mitigation of climate change, are components that should be used to feed the process of making decisions regarding nuclear safety.

Reactor Damage and Emergency Conditions

When the disaster hit the Fukushima Daiichi power plant, three units of the six had extensive destruction of their reactors as well as the buildings that housed them. It is often alleged that the reactor cores for each of the three reactors experienced certain levels of melting. To analyze the disaster, experts used initial calculations focusing on design conditions regarding the reported actions by the operators. A series of sensitivity cases were conducted in order to reproduce a comprehensive analysis of the accidents. This included the pressure history of the affected reactors and hydrogen explosion time, among other things. The sensitivity analysis comprised the injection of high-pressure coolant operations, alternative injection, failure of various parameters and venting.

Radiological Contamination and Risk Assessment

To better understand the impact of the Fukushima Daiichi nuclear disaster, it would be necessary to have a background analysis of the scales of contamination that resulted from the disaster. According to the standards set by the IAEA, radioactivity levels beyond 40kBq m2 are viewed as contamination of the environment. While the agency repeatedly emphasizes that most of the radiation was carried out into the ocean, that does not imply that a negligible amount of contamination was on the land (Hasegawa, 2012). The way a reactor behaves during an event such as flooding is often determined by space and energy in it as well as the distribution of neutrons. Thus, the key problem of the theory behind nuclear reactors is how to speculate and analyze the distribution. The distribution can be speculated by evaluating the neutron transport equation, often known as the Boltzmann equation. The issue of neutron distribution can be calculated if the total interaction section is put together with the level accommodation of the active reactor core (Holt, 2012). Then the numerical solution can be obtained by using the Monte-Carlo technique. However, practically, this might be impossible.

Natural Hazards and Nuclear Safety Planning

It is important to mention that nuclear facilities are established in a natural environment. Therefore, it is necessary for a nuclear operator to carry out detailed hazard analysis, including the salient features of the natural environment as well as natural events such as earthquakes, flooding and the probability of these events occurring. It should also incorporate the internal events in the existing analysis. The guidelines provided under the IAEA emphasize the inclusion of both internal and external events in safety assessment measures. After the Fukushima nuclear disaster, there is now an awareness that numerous issues play a huge role in the remediation actions. This has been the focus of many nuclear projects after the Fukushima Daiichi disaster, leading to the creation of a multidisciplinary approach where safety measures are guided by social and ethical issues.

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