

17. My Thoughts and Reflections

Tom Morgan

President, Maracor Software & Engineering, Inc., USA

I am honored to have been asked by JANUS to provide my thoughts and reflections on the recent accident at Fukushima Daiichi. I have been involved with the Japanese nuclear industry since the early 1980s, and have supported JANUS projects to improve nuclear plant maintenance and safety in Japan since the early 1990s. In the US, my primary role has been in the assessment and reduction of the risks of severe accidents using techniques known as Probabilistic Risk Assessment (PRA). So, I have been following the developments associated with the accident and its recovery actions both from a professional perspective and because of my long association with Japanese colleagues and the Japanese nuclear industry.

The accident at Fukushima Daiichi has caused tremendous losses for the people and the environment in the areas surrounding the plant. For TEPCo, this accident has caused much financial harm and I know that the employees of TEPCo feel a great personal responsibility for the events that occurred, even though the cause of the accident was largely outside of human control. The people of Japan are now more anxious about the use of nuclear power. However, all energy production methods have costs or drawbacks; other sources of power may be more expensive, be limited to only certain locations where it is viable (e.g., solar or wind power), or may pose other hazards to

the environment.

The Fukushima Daiichi event is the third significant accident to occur since civilian nuclear power was introduced. The Three Mile Island and Chernobyl events were caused (or made much worse) by human errors. The Fukushima Daiichi accident had a different cause: a natural disaster that was far greater than was thought to be possible. In this case, the plants at the Fukushima Daiichi site were subjected to conditions beyond those imagined by the designers and operators of the plant. It appears that the plants performed better than they were designed for, given these extreme conditions; however, the design margins that existed within the plants were not sufficient to prevent serious core damage from occurring. More detailed examination of the events following the earthquake might show that some decisions or actions by the plant staff or others may not have been the most optimum or effective; however, the primary cause of the accident remains the tsunami itself. I believe that the plant staff worked diligently with the tools and knowledge that they had available to help delay the onset of damage and to lessen its impact where possible.

Among the most important lessons to be learned from this event is that the “impossible” must always be considered, especially when working with technologies that can have significant

consequences, such as nuclear power production. As engineers, it is sometimes easy to be lulled into a false sense of security by believing that a design has been created that can withstand all possible situations. This accident demonstrates that one can never be too prepared for unforeseen events. In the field of PRA, we consider the possibility of extreme events, even those with very low probability, as part of the spectrum of accident scenarios that we evaluate. While PRA has been used to some extent in Japan, greater use of such techniques, with an “open mind” for considering events that could overwhelm the design features built into each plant, should be encouraged. Doing so should help lead to better training for plant staff and better preparedness overall to respond to a wider range of possible situations.

I would remind the citizens of Japan, who are now debating the future of energy production in your country, to consider both the benefits and risks of nuclear power. Your nuclear plants are very well-designed and operated, and the lessons learned from the unfortunate events at Fukushima Daiichi will be used to make other plants in Japan and throughout the world safer. Nuclear power creates the electricity that is needed to power Japan’s economy without carbon emissions and other environmental pollutants. The risks of serious accidents are understood by the staff of each plant and many layers of defensive measures are provided to help prevent the release of radioactivity to the environment.

To my colleagues in the Japanese nuclear industry (engineers, operators and maintenance personnel), I urge you to incorporate the lessons learned from the event into each of your plants, and to communicate openly with the public about how these changes have made the plants safer and more reliable. Do not hesitate to plan for the “impossible”, even if you may not be able to exactly define what those events might be. Public trust will not be regained overnight, and it is only through years of consistently safe performance that the public will recognize the value of nuclear power to society.

After the accident at Three Mile Island in the US, nuclear plants throughout the world made significant changes that improved safety and also improved plant performance. I am hopeful that, using the knowledge gained from the unfortunate Fukushima Daiichi event, the nuclear power industry will once again experience a period of improvement that will benefit power plants in all countries.

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