

# Lessons to be Learned from Fukushima

**Dr Donald J Higson**

**Fellow of the Australasian Radiation Protection Society  
260 Glenmore Road, Paddington  
NSW 2021, Australia**



By the beginning of 2011, most major nations in the world had come to the conclusion that nuclear power must play a central role in their energy strategies for the 21st Century. This was driven mainly by concerns about emissions of carbon dioxide but a necessary factor was that public acceptance of nuclear power had recovered from the shocks of the reactor accident at Three Mile Island in 1979 and the Chernobyl disaster in 1986.

The great tsunami on 11th March 2011 in North Eastern Japan changed all that when it caused the nuclear emergency at Fukushima Daiichi. A number of nations decided to phase out their use of nuclear power or shelve plans for its use. Others have adopted a more realistic approach, *viz*: to learn the lessons of Fukushima and incorporate them into their plans for a nuclear future.

**Lesson 1:** At Fukushima Daiichi, the reactors shut-down safely when struck by the fourth largest earthquake ever recorded. The nuclear emergency was due entirely to loss of on-site power supplies when the power station was

inundated by a much larger tsunami than had been anticipated in its design. Clearly, the design of nuclear plants against the risk of flooding (from any cause) needs to be brought up to the level of design against seismic risk.

**Lesson 2:** Rating the nuclear accident at Fukushima as 7 on the International Nuclear Event Scale (INES) has given the misleading impression that it was as bad as the Chernobyl accident. At Fukushima, no physical health effects of radiation have been observed among the general public and effects on workers have been far lower than those at Chernobyl. The INES was meant to aid public understanding of nuclear safety but has, in fact, made it more confused. If the INES is not to be scrapped, it should be substantially modified.

**Lesson 3:** As at Chernobyl, the major public health effect of the Fukushima accident has been psychological, due to the forced relocation of population and exaggerated fears about radiation. In such circumstances, of course, the public must be evacuated as a precaution when it is not known how the situation will develop. However, they would be better off being allowed to return to their homes once it is certain that the situation is under control and that potential exposure levels are not dangerous. Using a dose rate of 20 mSv/y as a reference for this purpose is conservative. Many people in the world are exposed naturally to higher levels of radiation than this without discernible adverse health effects. It is counterproductive to behave as though 20 mSv/y is a dangerous dose rate.

The news media bear a heavy responsibility for exaggerating the fears of radiation from Fukushima.

**Lesson 4:** Outside the former USSR, the nuclear industry continues to be one of the safest industries in which to work and the safest way to generate most of the electricity that the world needs.

There are clearly many people in the world who fear a nuclear renaissance. Although such fears are understandable, they overlook several important facts, in particular:

- The health effects and risks from radiation exposure at Fukushima were actually quite small.
- Engineers learn from experience.