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Fukushima Accident: Sequence of Events and Lessons Learned

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The Fukushima Dai-Ichi nuclear power station suffered a devastating Richter 9.0 earthquake followed by a 14.0 m tsunami on 11 March 2011. The subsequent loss of power for emergency core cooling systems resulted in damage to the fuel in the cores of three reactors. The relief of pressure from the containment in these three reactors led to sufficient hydrogen gas release to cause explosions in the buildings housing the reactors. There was probably subsequent damage to a spent fuel pool of a fourth reactor caused by debris from one of these explosions. Resultant releases of fission product isotopes in air were significant and have been estimated to be in the $3.7 \rightarrow 6.3 \times 10^{17}$ Bq range (~ 10 MCi) for ^{131}I and ^{137}Cs combined, or approximately one tenth that of the Chernobyl accident. A synopsis of the sequence of events leading up to this large release of radioactivity will be presented, along with likely scenarios for stabilization and site cleanup in the future. Some aspects of the isotope monitoring programs, both locally and at large, will also be discussed. An assessment of radiological health risk for the plant workers as well as the general public will also be presented. Finally, the impact of this accident on design and deployment of nuclear generating stations in the future will be discussed.