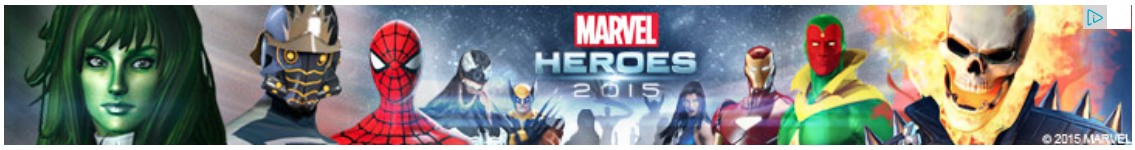

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Fast Facts about Radiation from the Fukushima Daiichi Nuclear Reactors

Elevated radiation levels have been detected at and around the stricken nuclear power station in Japan, but the Chernobyl accident remains far more catastrophic

By John Matson | March 16, 2011 | 0

Since a magnitude 9.0 earthquake rocked Japan and set loose a massive tsunami March 11, the Tokyo Electric Power Co. (TEPCO) has been scrambling to avert a nuclear disaster at its hardest hit plant. The Fukushima Daiichi nuclear power station, home to six nuclear reactors, has witnessed explosions at three reactors and a fire in a spent-fuel pool at a fourth. At two reactors, unit Nos. 2 and 3, the vessels containing the nuclear material are suspected to be compromised.

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A handful of plant workers remain on the site, implementing emergency cooling measures at the stricken, overheating reactors. Radiation levels have fluctuated wildly during the crisis, and the extent to which the workers' health has been endangered may not become apparent for years. But so far, the radiation releases have been limited compared with the 1986 Chernobyl disaster in Ukraine, an explosive event that caused dozens of cases of fatal radiation poisoning among plant workers and that has been implicated in thousands of thyroid cancer diagnoses in the years that followed. (Nuclear fission of uranium fuel produces radioactive iodine, which gathers in the thyroid gland.) As many nuclear experts have noted, the Fukushima reactors are better designed than the failed Chernobyl reactor.

Below are some facts and figures about the radiation hazard posed by the Fukushima breakdown and how it compares with other nuclear accidents in history. Many of the figures are measured in millisieverts, an international unit of radiation dosage. (One sievert is equal to 100 rems, which is a dosage unit of x-ray and gamma-ray radiation exposure; one millisievert is 0.1 rem.)

Radiation dose at the boundary of the Fukushima Daiichi nuclear power station on March 16: 1.9 millisieverts (mSv) per hour

Peak radiation dose measured inside Fukushima Daiichi on March 15: 400 mSv per hour

Maximum allowable exposure for U.S. radiation workers: 50 mSv per year

Average exposure of U.S. residents from natural and man-made radiation sources: 6.2 mSv per year

Estimated total exposure at the boundary of the Three Mile Island site in Pennsylvania during the 1979 accident there: one mSv or less

Average total radiation dose to the 114,500 individuals evacuated during the 1986 Chernobyl disaster: 31 mSv

Half-life of iodine 131, a dangerous radioactive isotope released in nuclear accidents: eight days

Half-life of cesium 137, another major radionuclide released in nuclear accidents: 30 years

Decay products of iodine 131 and cesium 137: both emit gamma rays and beta particles (electrons or positrons)

Amount of nuclear fuel in Chernobyl reactor No. 4 that exploded in 1986: 190 metric tons

Amount of nuclear fuel and fission by-products released into the atmosphere during Chernobyl disaster: 25 to 57 metric tons

Approximate amount of nuclear fuel in each crippled Fukushima Daiichi reactor: 70 to 100 metric tons

Sources: Japan Atomic Industrial Forum, International Atomic Energy Agency, U.S. Nuclear Regulatory Commission, National Council on Radiation Protection and Measurements, U.S. Environmental Protection Agency, United Nations Scientific Committee on the Effects of Atomic Radiation, National Institute of Standards and Technology, Nuclear Energy Institute

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