

TARGET EVENT

Fukushima Daiichi, Normal Accidents, and Moral Responsibility: Ethical Questions about Nuclear Energy

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On March 11, 2011, at 2:46 pm Japan Standard Time, an earthquake measuring 9.0 on the Richter scale rumbled off the northeast coast of Japan. Not far from the epicenter of this quake the Fukushima Daiichi nuclear power complex, including three functioning and three off-line ‘boiling water’ reactors, hummed in the towns of Okuma and Futaba, within the Fukushima Prefecture. At the first detection of tumult, all three operating reactors automatically shut down to protect their cores. Crews scrambled to ensure that all was in order, which it was. For a time.

An hour and five minutes after the initial shockwave, the churning sea let fall a violent tsunami upon the coastline of Japan. In a matter of minutes, thousands of homes and businesses were submerged and compacted by a powerful bulldozer of water, thousands of unsuspecting people were swept out to sea, and the Fukushima Daiichi complex underwent an unfathomably complicated string of natural events and unanticipated challenges. First the plant lost power, as emergency diesel generators were knocked out by the tsunami. Then the batteries used to control steam-driven emergency pumps lost power. Then, the first three reactors began to overheat, oxidizing their protective cladding and partially melting their radioactive cores, producing hydrogen. As this happened, the explosive hydrogen in reactors 1, 2 and 3 eventually did what explosive hydrogen in a tight, hostile environment is given to do: it exploded, blowing the containment vessels and further jeopardizing the reactor cores. Meanwhile, spent fuel stored in pools at units 1, 3 and 4 lost critical cooling water, threatening a release of radioactive material into the environment.

What ensued over the next several weeks was a chronology of human interventions that in turn both amplified and downplayed the disaster. With Japan facing so much devastation and such a daunting clean-up, news of the nuclear crisis trickled out slowly, over days and weeks, not hours and minutes. The Japanese government, as it

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had done other times in the past, sought to minimize hysteria. They deferred to the pronouncements of Tokyo Electric Power Company (TEPCO). TEPCO moved cautiously, trying to stem the tide of misinformation but also to downplay the severity of the event. The United States Nuclear Regulatory Commission immediately deployed personnel to Japan, while the US Department of Energy deployed an airborne monitoring system. Meanwhile, the radiation readings were rising. The Japanese Government created an evacuation zone around the facility. They began to exempt workers from previous safety standards, permitting them greater radiation exposure in order that they may spend longer working to fix the ailing reactor.

By the end of the first stage of the crisis, three of the six reactor cores underwent a partial meltdown. The event was ranked a Level 7 nuclear disaster on the International Nuclear Event Scale (INES), which means that there was a major release of radioactive material with widespread health and environmental effects, including an 'external release of a significant fraction of reactor core inventory.'¹ The nuclear industry has since been reeling.

Before the event, 54 total reactors were producing power in Japan. By June 2011, most of these had been shut down, limiting power production to 19 of the 54.² The international community has also taken notice. In May 2011, in response to the disaster in Japan, German Chancellor Angela Merkel upended a decade-long nuclear policy and committed to phasing out all of its nuclear power plants by 2022. By June, the German government had made it official. Officials in other countries, including the United States, Britain, China, France, and Spain, have re-evaluated their nuclear sites.

Considered together, the Fukushima Daiichi disaster raises numerous questions about the future of nuclear power. What makes this issue challenging is not only that it poses discrete problems for Japan and the citizens of Japan, but that it is a symptom of many looming environmental conflicts. It is one of several "bite the bullet" technologies. While nuclear power suffered devastating blows after Three Mile Island and Chernobyl, thus earning the scorn of the environmental community and for decades languishing as a politically viable option, in the face of rising energy demands and concern over the deleterious climate-altering effects of carbon fossil fuels, public sentiment and acceptance of nuclear power has been on the rise. In environmental circles, some advocates insist that the environmental community must 'bite the bullet' and accept nuclear as a viable energy source. And the public appears to be listening: by 2009, approximately 59% of the American public favored of nuclear power. There is no telling yet how the Fukushima Daiichi disaster will influence public opinion.

Yet political viability is not the only concern. The catastrophe raises further questions about the nature of what Charles Perrow once called 'normal accidents,' or what Ulrich Beck termed the 'Risk Society.' It also raises justice questions about which communities must shoulder the risks, or accept the burden for the benefits of many.

For this issue of *Ethics, Policy & Environment*, we have invited commentaries from environmental ethicists and political theorists on the state and future of nuclear power. In our initial call, we asked contributors to raise concerns regarding risks, benefits, harms, costs, uncertainties, responsibilities, future generations, natural

impacts, energy needs, alternative energies, wedge technologies and so forth, though we left the call open. We asked that commentators try to steer their commentaries toward complicated ethical or philosophical dimensions of the nuclear challenge and avoid straight polemics.

Encouragingly, the submission pool was so large and so strong that we were forced to divide the commentaries into two parts, one appearing in this Fall 2011 issue and the next appearing in our Spring 2012 issue. Even with this distribution, we still needed to rein in our contributors and limit their commentaries. We have divided the commentaries into two related categories. In this first collection, you will find a series of essays addressing, primarily, concerns about risk, risk assessment, damage, harm and stability. We have included contributions from Kristin Shrader-Frechette, Niklas Möller and Per Wikman-Svahn, Celine Kermisch, Ibo van der Poel, Kenneth Shockley, and Craig Steele. In our spring issue, we expand the discussion to consider wider concerns regarding justice and the global environment. We have commentaries by Andrew Brook, Thom Brooks, Nobuo Kazashi, Paul Kelleher, Deborah Oughton, Sean Parson and Behnam Taebi. Hopefully these contributions mark the beginning of a productive dialogue among the academic community about the ethical and justice considerations associated with nuclear power.

Notes

¹ Available at <http://www.iaea.org/Publications/Factsheets/English/ines.pdf>

² Slodkowski (2011).

Reference

Slodkowski, Antoni (2011, June 15) Japan anti-nuclear protesters rally after quake. *Reuters*. Available at <http://www.reuters.com/article/2011/06/15/columns-us-japan-nuclear-protest-idustRE75A0QH20110615>