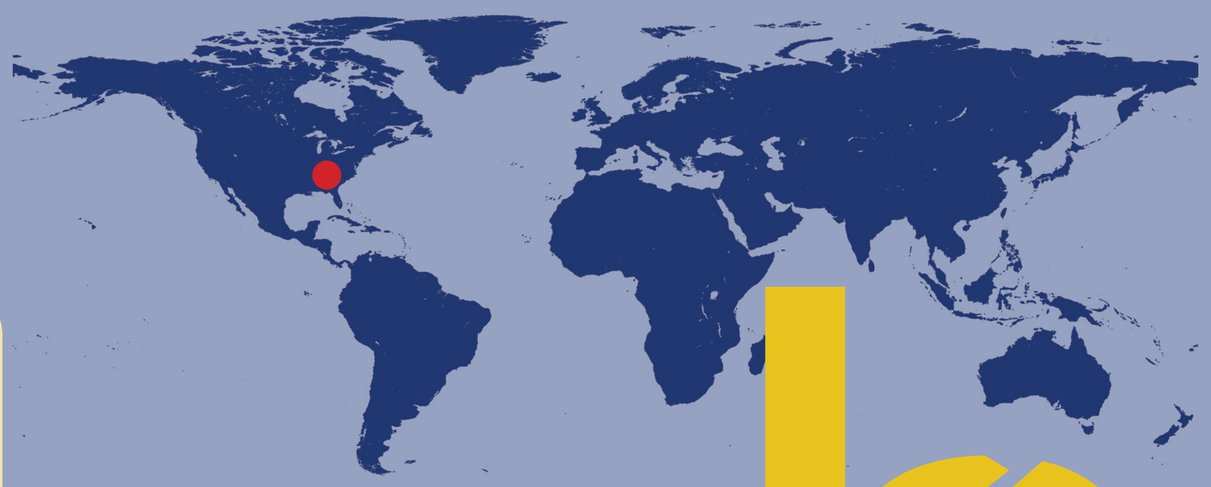
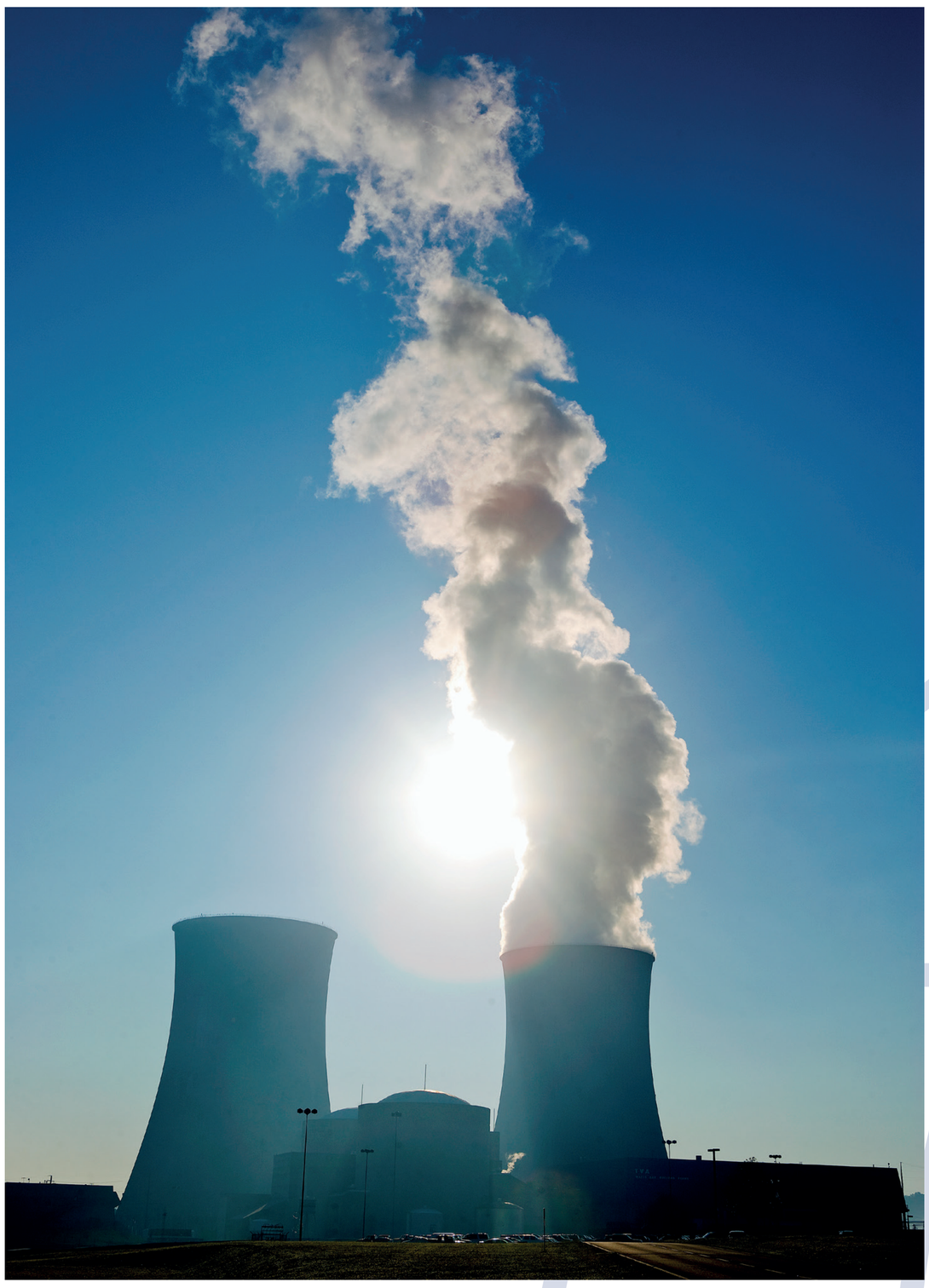
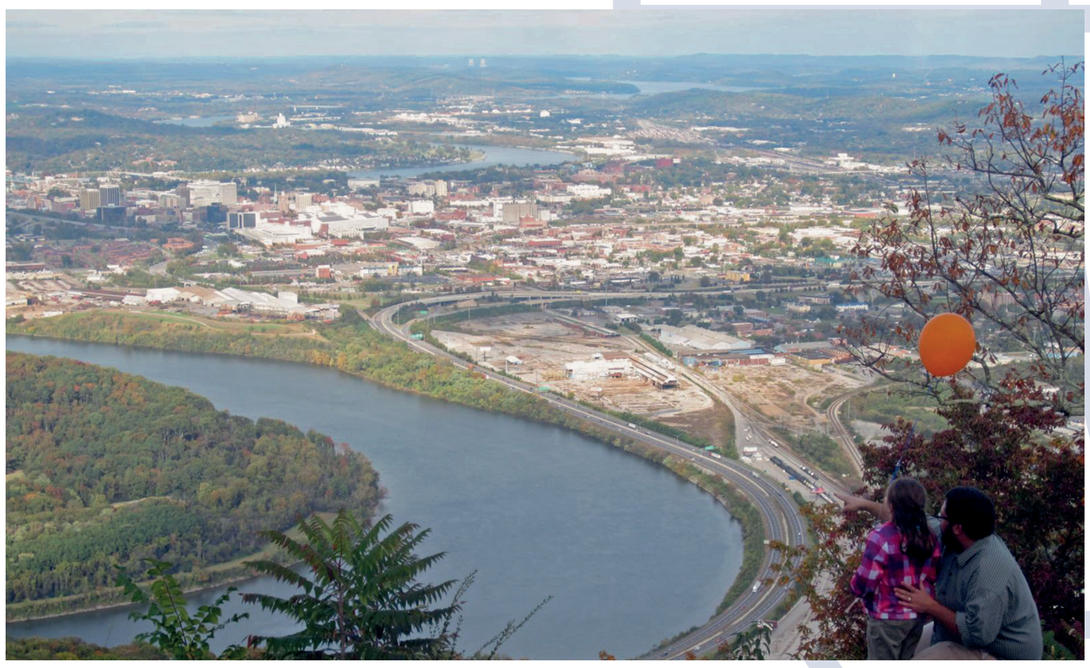
Sequoyah and Watts Bar, USA, Nuclear power plants



The twin nuclear power plants of Sequoyah and Watts Bar were included in this exhibition in order to represent nuclear reactors around the world, all of which pose a danger to public health and the environment even without any massive catastrophes – through chronic leakage, spills and malfunctions. In addition, Watts Bar produces tritium for the U.S. nuclear weapons program.



The nuclear facility Watts Bar on the Tennessee River. Besides electricity, this civil nuclear power plant produces tritium, an important component of nuclear warheads. This is just one example of how civil nuclear infrastructure is used by military nuclear weapons programs. Photo credit: TVA Web Team / creativecommons.org/licenses/by/2.0



View over Chattanooga on the Tennessee River. In the distance, you can see the cooling towers of the Sequoyah nuclear power plant. In December of 2011, TVA found elevated levels of up to 700 Becquerel per liter of radioactive tritium in groundwater samples taken only 23 meters from of Sequoyah's discharge canal into the river.
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History

The Sequoyah and Watts Bar nuclear power plants, located in Eastern Tennessee between the cities of Chattanooga and Knoxville, are run by the Tennessee Valley Authority (TVA) and have been in operation since 1981 and 1996, respectively. Sequoyah has a bad track record for nuclear incidents: On January 19, 1981, a generator tube malfunctioned, forcing the TVA to shut down the entire plant. On February 11, an operator error triggered an emergency alert: as a result, more than 370,000 liters of radioactive water rained down on 14 workers during the plant shutdown because, in order to cut cost, management had decided to use radioactively contaminated water as emergency coolant rather than fresh, uncontaminated water. Steam leaks, tube malfunctions and overflowing drainage tanks were just some of the reported failures at the plant in the following years.[1] Between 1985 and 1988, Sequoyah was forced to shut down again after an independent review concluded that the plant did not comply with current safety standards. Similar concerns forced another shutdown less than five years later.[2] In 1999, the U.S. Department of Energy selected Watts Bar for the production of tritium, an important component of nuclear weapons. This is just one example of how civil nuclear facilities are used to supply military nuclear components.

According to the independent Union of Concerned Scientists, Sequoyah has a core damage frequency of 1 in 26,525 reactor years, while Watts Bar's risk of a nuclear meltdown is eight times higher – 1 in 3,030 reactor years – despite having been built 15 years later. The nuclear authorities only require a core damage frequency of less than 1 in 1,000, so that even Watts Bar meets these requirements.[3] By comparison, the nuclear power plant at Three Mile Island experienced a meltdown one year after it was commissioned. The Chernobyl meltdown came three years, and Fukushima 40 years, after commissioning. All three plants were constructed with much longer service times in mind.

Health and environmental effects

Tritium, a radioactive isotope of hydrogen, has a half-life of twelve years and emits beta-radiation. It is considered dangerous to inhale or ingest tritium, because, once incorporated, it can damage DNA, causing mutations and cancer. In December 2011, TVA found elevated levels of up to 700 Becquerel per liter of radioactive tritium in groundwater samples taken only 23 meters from of Sequoyah's discharge canal into the Tennessee River. According to TVA, the contamination was most likely caused by a spill in the 1980s or an overflow of the canal in 2003.[4,5] This raises many questions, such as how many leaks occurred in total, how many of these were actually reported and how high the concentration levels would have been at the time of the incidents. Normal tritium levels in inland waterways are usually well under 10 Bq/l, while rivers around power plants have been found to contain tritium with concentrations of up to 3,000 Bq/l in other Western countries.[6] The effects of radiation exposure on workers and nearby residents around Sequoyah have not been studied so far. A German study, however, published in the "International Journal of Cancer" in 2008, found increased rates of childhood cancer in the vicinity of nuclear power plants.[7] One possible explanation is the leak of radioactive isotopes, including tritium through system failures or the routine exchange of fuel rods, during which the reactor core is opened.

Outlook

After the Fukushima nuclear meltdowns, the U.S. Geological Survey found that the Sequoyah plant, positioned in a seismic zone, has the fourth-highest earthquake risk of all U.S. nuclear reactors. The chances of an earthquake causing a meltdown in one of Sequoyah's reactors was calculated to be 1 in 19,608 – 25 times more likely than being struck by lightning. At Watts Bar, the risk is slightly lower, at 1 in 27,778. In addition, the dams above the Sequoyah plant would not withstand a massive flood of the Tennessee river, putting the nuclear plant and its emergency generators at risk.[8] The people in Tennessee do not want to become Hibakusha like the people in Fukushima.

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