Three Mile Island

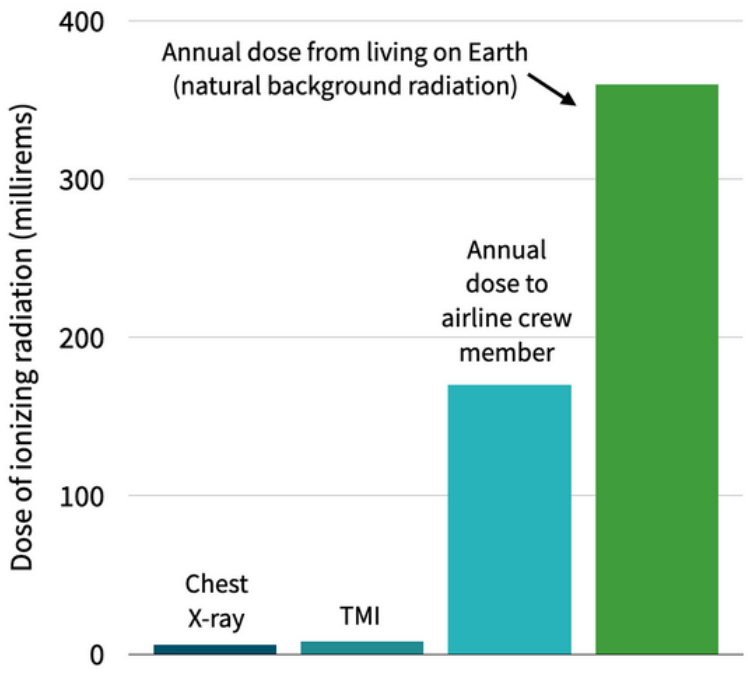
- In 1979 at the Three Mile Island nuclear power plant in Pennsylvania, a cooling malfunction caused a partial meltdown of one of the plant's two reactors.
- There were no deaths, injuries, or discernible health impacts as a result of the accident.
- The other reactor (TMI-1) continued to produce power until it was decommissioned in 2019 due to temporarily-low natural gas prices driving down the price of electricity near the station.

What happened?

- On March 28, 1979, a reactor coolant relief valve did not close when it was supposed to. The instrumentation wrongly reported the valve had closed.
- As a result of the instrumentation failure and operator error, the reactor core got hot enough to melt about half of the reactor's fuel. Consequently, a very small amount of radioactive material was eventually released outside of the reactor containment dome.
- In response to the accident, there was a voluntary evacuation around the plant. About half of the local population declined to evacuate and those that did evacuate returned within three weeks.

What were the health impacts of TMI?

- There were no deaths or injuries associated with the accident.
- The approximately 2 million people nearby during the accident received an estimated radiation exposure of between one and ten millirems. This dose is comparable to an X-ray (although not nearly in as short a time period, lowering peak dose rate compared to an X-ray).[1, 2]
- The official report commissioned by President Carter concluded that the most serious health effect of the accident was the stress it caused, "which was short-lived."[3]



What were the environmental impacts of TMI?

- There was no harm to the surrounding environment or river because the reactor vessel contained the extreme majority of radioactive materials.

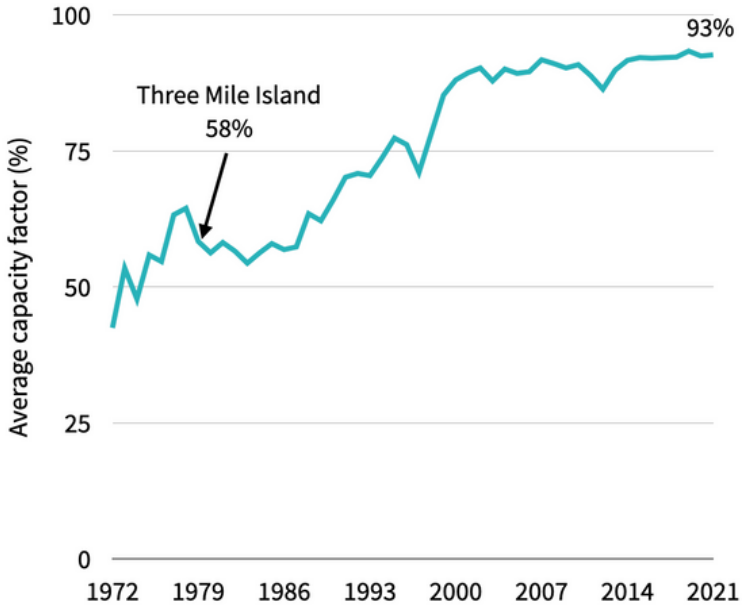
- Detailed studies were conducted by the U.S. Nuclear Regulatory Commission, the Environmental Protection Agency, and other state and independent groups. They concluded no significant environmental impact would result from the accident.[4]

How did TMI change the nuclear industry?

- The federal government strengthened requirements for safety controls and emergency response planning.

- The nuclear industry established the Institute of Nuclear Power Operations to provide additional training and support to nuclear operators and workers.

- The changes in training and operations as a result of TMI made the U.S. nuclear fleet more reliable. The efficiency of U.S. nuclear plants increased from 58% in 1980 to almost 90% in 2000.[5]



Lessons

- **Containment works.** Despite melting of the fuel core, the reactor vessel contained the damaged fuel.
- **Clear communication with the public is vital.** The confused communications during and after the accident contributed to unnecessary panic and public fear, which was by far the most dangerous part of the accident.
- **Experience Matters.** The type of reactor used at Three Mile Island had gotten progressively larger and more complicated for many years. Safety comes in part from deep experience on similar plants around the world. This experience was relatively thin in 1979 but has increased immensely since then.

Endnotes

1. "Backgrounder on the Three Mile Island Accident." United States Nuclear Regulatory Commission, June 21, 2018. https://www.nrc.gov/reading-rm/doc-collections/fact-sheets/3mile-isle.html.
2. Roger J. Levin. "Incidence of thyroid cancer in residents surrounding the Three Mile Island nuclear facility." The Laryngoscope vol. 118,4 (2008): 618-28. doi:10.1097/MLG.0b013e3181613ad2
3. John G. Kemeny et al. "Report of the President's Commission on the Accident at Three Mile Island." October 1979.
4. "Backgrounder on the Three Mile Island Accident." United States Nuclear Regulatory Commission, June 21, 2018. https://www.nrc.gov/reading-rm/doc-collections/fact-sheets/3mile-isle.html.
5. U.S. Energy Information Administration