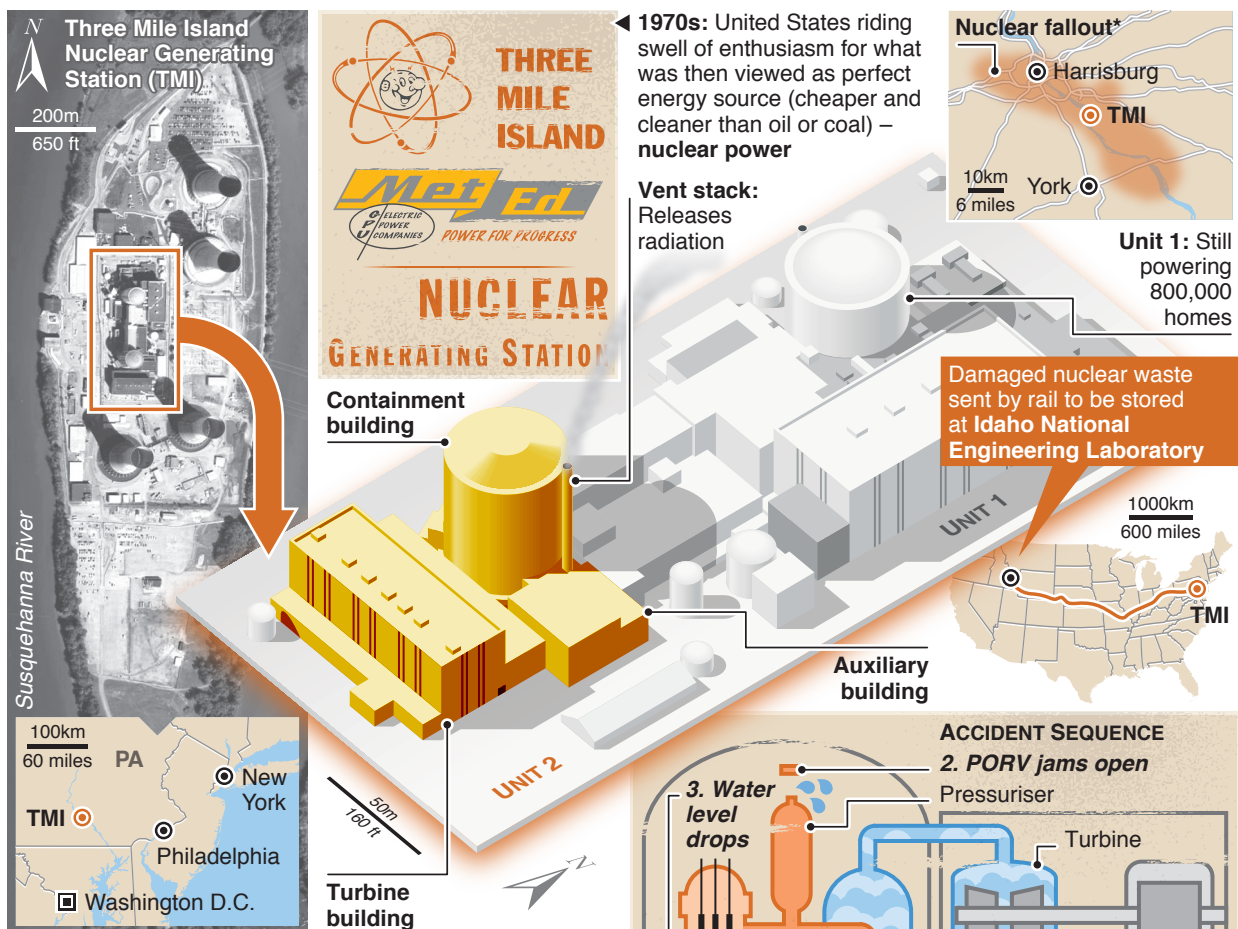


# The Three Mile Island nuclear accident

On March 28th, 1979, a partial meltdown of a nuclear reactor at a Pennsylvania power station caused a radiation leak that remains America's most serious nuclear incident to date



## HOW HUMAN ERROR, DESIGN DEFICIENCIES AND COMPONENT FAILURES CAUSED NEAR CATASTROPHE

**1. Mar 28, 1979 – 4am:** Pump fault stops circulating water coolant through reactor (running at 97%). System overheats and computer shuts it down

**2. Pressure Operated Relief Valve (PORV)** automatically opens to vent pressure but **fails to close** when pressure normalises

Control room instrument wrongly indicates PORV has closed, when in reality radioactive steam and water are escaping

**5am:** Gauges falsely show water is filling **pressure tank**, potentially bursting cooling system – event known as **going solid**

**3.** Water level is actually dropping as reactor heats up and vaporises liquid (there is no control room instrument to show water level inside pressure tank)

**4.** Supervisor turns off reactor water pumps, thinking it will prevent it going solid – instead makes matters far worse

**6am:** Worker discovers stuck PORV – **113,000kg** of coolant has evaporated or leaked into plant basement. Parts of reactor are **2,200°C** but operators are unaware as core monitoring meters only read up to **370°C** (if core reaches **2,760°C**, it will melt through containment building and reach outside)

**Babcock & Wilcox** (B&W, reactor designers) try to contact TMI control room but its single phone line is constantly busy

**7:30am:** Station Manager **Gary Miller** declares state of emergency

**11am:** Radiation leak outside plant detected

Levels inside reactor **containment building** reach **10,000 rems<sup>†</sup>**

**7:30pm:** B&W tell workers to restart pumps to send water through core again. Reactor finally stabilises. **There are no fatalities**

In following days, build-ups of toxic gas are vented into atmosphere to alleviate growing pressure inside

**Apr 27:** Cold shutdown achieved – reactor core being cooled by natural movement of water

**Sept 2019:** Still functioning (but loss-making) **Unit 1** scheduled to permanently close down

**2040:** Entire plant to be decommissioned, when **Unit 2** radioactive decay levels have decreased sufficiently

Sources: U.S. NRC, GOA, Union of Concerned Scientists, History, World Nuclear Association, Encyclopaedia Britannica, ABC, StateImpact Pennsylvania, AP, Google Maps Picture: Apple Maps \*Residents received radiation dose about 1 millirem higher than usual background dose (area's natural radioactive background level is about 100-125 millirem per year) <sup>†</sup>Unit of radiation dosage (humans can safely be exposed to 5 rems per year) © GRAPHIC NEWS