3MILE ISLAND ACCIDENT

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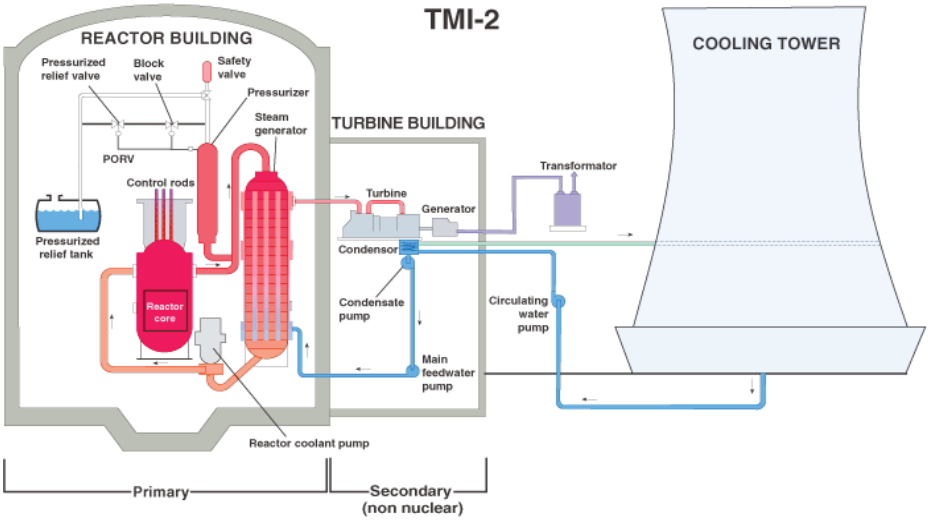
The Three Mile Island (TMI) nuclear power plant was built in 1974 on a sandbar on Pennsylvania's Susquehanna River, just 10 miles downstream from the Pennsylvania state capitol in Harrisburg. In 1978, a second state-of-the-art reactor began operating on Three Mile Island, which was lauded for generating affordable and reliable energy in a time of energy crises.

It had two pressurized water reactors. One PWR was of 800 MWe (775 MWe net) and entered service in 1974. It remains one of the best-performing units in USA. Unit 2 was of 906 MWe (880 MWe net) and almost brand new.



HOW THE ACCIDENT OCCURRED.

At 4 a.m. on March 28, 1979, the worst accident in the history of the U.S. nuclear power industry begins when a

pressure valve in the Unit-2 reactor at Three Mile Island fails to close. Cooling water, contaminated with radiation, drained from the open valve into adjoining buildings, and the core began to dangerously overheat.

After the cooling water began to drain out of the broken pressure valve on the morning of March 28, 1979, emergency cooling pumps automatically went into operation. Left alone, these safety devices would have prevented the development of a larger crisis. However, human operators in the control room mis-read confusing and contradictory readings and shut off the emergency water system. The reactor was also shut down, but residual heat from the fission process was still being released. By early morning, the core had heated to over 4,000 degrees, just 1,000 degrees short of meltdown.

As the plant operators struggled to understand what had happened, the contaminated water was releasing radioactive gases throughout the plant. The radiation levels, though not immediately life-threatening, were dangerous, and the core cooked further as the contaminated water was contained and precautions were taken to protect the operators. Shortly after 8 a.m., word of the accident leaked to the outside world. The plant's parent company, Metropolitan Edison, downplayed the crisis and claimed that no radiation had been detected off plant grounds, but the same day inspectors detected slightly increased levels of radiation nearby as a result of the contaminated water leak. Pennsylvania Governor Dick Thornburgh considered calling an evacuation.

Finally, at about 8 p.m., plant operators realized they needed to get water moving through the core again and restarted the pumps. The temperature began to drop, and

pressure in the reactor was reduced. The reactor had come within less than an hour of a complete meltdown. More than half the core was destroyed or molten, but it had not broken its protective shell, and no radiation was escaping. The crisis was apparently over.

Two days later, however, on March 30, a bubble of highly flammable hydrogen gas was discovered within the reactor building. The bubble of gas was created two days before when exposed core materials reacted with super-heated steam. On March 28, some of this gas had exploded, releasing a small amount of radiation into the atmosphere. At that time, plant operators had not registered the explosion, which sounded like a ventilation door closing. After the radiation leak was discovered on March 30, residents were advised to stay indoors. Experts were uncertain if the hydrogen bubble would create further meltdown or possibly a giant explosion, and as a precaution Governor Thornburgh advised "pregnant women and pre-school age children to leave the area within a five-mile radius of the Three Mile Island facility until further notice." This led to the panic the governor had hoped to avoid; within days, more than 100,000 people had fled surrounding towns.

On April 1, President Jimmy Carter arrived at Three Mile Island to inspect the plant. Carter, a trained nuclear engineer, had helped dismantle a damaged Canadian nuclear reactor while serving in the U.S. Navy. His visit achieved its aim of calming local residents and the nation. That afternoon, experts agreed that the hydrogen bubble was not in danger of exploding. Slowly, the hydrogen was bled from the system as the reactor cooled.

At the height of the crisis, plant workers were exposed to

unhealthy levels of radiation, but no one outside Three Mile Island had their health adversely affected by the accident. Nonetheless, the incident greatly eroded the public's faith in nuclear power. The unharmed Unit-1 reactor at Three Mile Island, which was shut down during the crisis, did not resume operation until 1985. Cleanup continued on Unit-2 until 1990, but it was too damaged to be rendered usable again. In the more than two decades since the accident at Three Mile Island, not a single new nuclear power plant has been ordered in the United States.

THREE MILE ISLAND ACCIDENT ROOT CAUSES.

The accident to unit 2 happened at 4 am on 28th March 1979 when the reactor was operating at 97% power. It involved a relatively minor malfunction in the secondary cooling circuit which caused the temperature in the primary coolant to rise. This in turn caused the reactor to shut down automatically. Shut down took about one second. At this point a relief valve failed to close, but instrumentation did not reveal the fact, and so much of the primary coolant drained away that the residual decay heat in the reactor core was not removed. The core suffered severe damage as a result.

The operators were unable to diagnose or respond properly to the unplanned automatic shutdown of the reactor. Deficient control room instrumentation and inadequate emergency response training proved to be root causes of the accident.

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