

## Re: TMI...what happened

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*Source:* <http://sci.tech-archive.net/Archive/sci.energy/2007-09/msg00147.html>

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- *From:* nada <[dwaltersMIA@xxxxxxxxxx](mailto:dwaltersMIA@xxxxxxxxxx)>
  - *Date:* Wed, 26 Sep 2007 10:32:27 -0700
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Rolf, you written but only with suppositions and innuendo...not a shred of evidence. There is no one, from the operators and union members there at the time to engineers to anyone that could show, imply or otherwise wind-and-a-nod that sabotage took place. This is especially true to since they didn't use computers to control anything in the plant, but cut-outs (literally toggle switches) would have to be cut out openly in front of everyone, in a control room with video cameras rolling and always staffed with at least 4 reactor operators.

The above explanation I posted doesn't allow for sabotage. But...could it of happened? Sure, anything is possible but just suggesting it doesn't make it so to prove a non-existent political position.

David

On Sep 24, 4:04 am, rolf.mart...@xxxxxxxxxx (Rolf Martens) wrote:

More interesting in this respect is it to see how capitalism in its imperialist stage works, in such respects.

This I've written about before, and also about how you can see that this "accident" was not an actual such.

Rolf M.[www.rolf-martens.com](http://www.rolf-martens.com)

In article <1190505403.962018.314...@xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx>, dwalters...@xxxxxxxxxx says...

[TMI could not happen again, not that any one was harmed or injured in anyway. It is good, however, to reveiw what happened. Here a example of an serious contribution to the debate on nuclear energy--David Walters]

## Re: TMI...what happened

We have come a long way in the years following Three Mile Island.

The accident at the Three Mile Island Unit 2 (TMI-2) nuclear power plant near Middletown, Pennsylvania, on March 28, 1979, was the most serious in U.S. commercial nuclear power plant operating history(1), even though it led to no deaths or injuries to plant workers or members of the nearby community. But it brought about sweeping changes involving emergency response planning, reactor operator training, human factors engineering, radiation protection, and many other areas of nuclear power plant operations. It also caused the U.S. Nuclear Regulatory Commission to tighten and heighten its regulatory oversight. Resultant changes in the nuclear power industry and at the NRC had the effect of enhancing safety.

The sequence of certain events – – equipment malfunctions, design related problems and worker errors – – led to a partial meltdown of the TMI-2 reactor core but only very small off-site releases of radioactivity. – Source: nuclear Regulatory Commission Fact Sheet on the Three Mile Island Accident

Without giving away possible classified information, I'll try to explain what happened at TMI.

First, I'll try to explain in simple terms how a nuclear power plant works.

The way a nuclear power plant works is to use the heat given off by nuclear fission to heat water. That water, which is maintained on the contained side of the nuclear plant is then used to heat water on the secondary side of the plant and turn it into steam so that the steam can propel a turbine attached to a generator.

This may be more easily conceived if put it into something that many will understand. Imagine your car's engine is a nuclear power plant. Extend the length of the hoses on your car's radiator, and place the radiator in the pool. If you run your engine, the water pump causes water to flow through the radiator. Since the radiator is in the pool, the heat from your engine would be transferred to the pool. Notice that the coolant from your radiator does not mix with the water in the

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pool.

In a nuclear power plant we want that water to get hot enough to make the water on the other side of the radiator turn to steam. This presents us with two problems. In order for the water on the reactor side to turn the water on the other side to steam, it must be hotter than 212 degrees Fahrenheit. Water above 212 degrees is not easy to pump, because it would be steam. To increase the temperature, and still keep the water liquid, we need to increase the pressure on the water. This is done in modern, pressurized, automotive cooling systems. Since the water is liquid, and doesn't compress very well, we need to have a way of controlling the pressure by changing the volume of the container. This is done by using a pressurizer. Many home well systems use a similar method to control fluctuations in pressure as the pump turns on and off. This pressurizer maintains a steam bubble on top of the liquid. In homes this is generally done by using an inert gas bubble. If pressure gets too high steam is bled out thru a valve on top of the pressurizer. This causes a very small change in the amount of liquid and provides better control of the pressure in the plant.

Now that you have a basic understanding of how a nuclear power plant works, let's look at the TMI accident.

The accident began about 4:00 a.m. on March 28, 1979, when the plant experienced a failure in the secondary, non-nuclear section of the plant. The main feedwater pumps stopped running, caused by either a mechanical or electrical failure, which prevented the steam generators from removing heat. First the turbine, then the reactor automatically shut down. Immediately, the pressure in the primary system (the nuclear portion of the plant) began to increase. In order to prevent that pressure from becoming excessive, the pilot-operated relief valve (a valve located at the top of the pressurizer) opened. The valve should have closed when the pressure decreased by a certain amount, but it did not. Signals available to the operator failed to show that the valve was still open. As a result, cooling water poured out of the stuck-open valve and caused the core of the reactor to overheat.

As coolant flowed from the core through the pressurizer, the instruments available to reactor operators provided confusing information. There was no instrument that showed the level of coolant in the core. Instead, the operators judged the level of water in the core by the level in the pressurizer, and since it was high, they

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assumed that the core was properly covered with coolant. In addition, there was no clear signal that the pilot-operated relief valve was open. As a result, as alarms rang and warning lights flashed, the operators did not realize that the plant was experiencing a loss-of-coolant accident. They took a series of actions that made conditions worse by simply reducing the flow of coolant through the core.

Because adequate cooling was not available, the nuclear fuel overheated to the point at which the zirconium cladding (the long metal tubes which hold the nuclear fuel pellets) ruptured and the fuel pellets began to melt. It was later found that about one-half of the core melted during the early stages of the accident. Although the TMI-2 plant suffered a severe core meltdown, the most dangerous kind of nuclear power accident, it did not produce the worst-case consequences that reactor experts had long feared. In a worst-case accident, the melting of nuclear fuel would lead to a breach of the walls of the containment building and release massive quantities of radiation to the environment. But this did not occur as a result of the Three Mile Island accident.

The accident caught federal and state authorities off-guard. They were concerned about the small releases of radioactive gases that were measured off-site by the late morning of March 28 and even more concerned about the potential threat that the reactor posed to the surrounding population. They did not know that the core had melted, but they immediately took steps to try to gain control of the reactor and ensure adequate cooling to the core. The NRC's regional office in King of Prussia, Pennsylvania, was notified at 7:45 a.m. on March 28. By 8:00, NRC Headquarters in Washington, D.C. was alerted and the NRC Operations Center in Bethesda, Maryland, was activated. The regional office promptly dispatched the first team of inspectors to the site and other agencies, such as the Department of Energy and the Environmental Protection Agency, also mobilized their response teams. Helicopters hired by TMI's owner, General Public Utilities Nuclear, and the Department of Energy were sampling radioactivity in the atmosphere above the plant by midday. A team from the Brookhaven National Laboratory was also sent to assist in radiation monitoring. At 9:15 a.m., the White House was notified and at 11:00 a.m., all non-essential personnel were ordered off the plant's premises.

By the evening of March 28, the core appeared to be adequately cooled and the reactor appeared to be stable. But new concerns arose by the morning of Friday, March 30. A significant release of radiation from the plant's auxiliary building, performed to relieve pressure on the primary system and avoid curtailing the flow of coolant to the core,

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caused a great deal of confusion and consternation. In an atmosphere of growing uncertainty about the condition of the plant, the governor of Pennsylvania, Richard L. Thornburgh, consulted with the NRC about evacuating the population near the plant. Eventually, he and NRC Chairman Joseph Hendrie agreed that it would be prudent for those members of society most vulnerable to radiation to evacuate the area. Thornburgh announced that he was advising pregnant women and pre-school-age children within a 5-mile radius of the plant to leave the area.

Within a short time, the presence of a large hydrogen bubble in the dome of the pressure vessel, the container that holds the reactor core, stirred new worries. The concern was that the hydrogen bubble might burn or even explode and rupture the pressure vessel. In that event, the core would fall into the containment building and perhaps cause a breach of containment. The hydrogen bubble was a source of intense scrutiny and great anxiety, both among government authorities and the population, throughout the day on Saturday, March 31. The crisis ended when experts determined on Sunday, April 1, that the bubble could not burn or explode because of the absence of oxygen in the pressure vessel. Further, by that time, the utility had succeeded in greatly reducing the size of the bubble.

We learn from our mistakes. In the many years since TMI we have done a pretty good job of keeping nuclear power plants safe. Solar and wind power are good alternatives, but numerous small nuclear plants may be our best option.