

Excerpt from J. Samuel Walker, Three Mile Island: A Nuclear Crisis in Historical Perspective (Berkeley: University of California Press, 2004), chapter 10.

THREE MILE ISLAND IN HISTORICAL PERSPECTIVE

Before the Three Mile Island accident, as the controversy over nuclear power became increasingly bitter and divisive, nuclear critics warned that a technological system as complex as a nuclear plant could never be made foolproof. They claimed that a major accident that seriously threatened

public health and safety was possible and perhaps inevitable. Nuclear proponents countered those claims by insisting that nuclear plants had so many redundant safety features that an accident that released large amounts of radiation to the environment was highly unlikely and probably impossible.

Despite the apparent incompatibility of those positions, Three Mile Island offered substantial support for both. The events at TMI-2 on the morning of March 28, 1979, demonstrated vividly that operating deficiencies could defeat the efforts of designers, owners, and regulators to prevent a serious nuclear accident. Although the safety systems in the plant worked as designed, they could not save it from the combined forces of management weaknesses, limited operator training, inattention to human factors, confusing instrumentation, and other problems. The result was a meltdown that converted the core of the reactor into a pile of radioactive rubble.

Yet even though the core of the TMI-2 plant was destroyed, the accident did not release large amounts of hazardous radiation into the surrounding countryside. It did not cause a failure of the reactor's pressure vessel or approach a breach of containment. The concept of defense-in-depth, the basic philosophy that guided the regulatory decisions of the AEC and the NRC, was tested as never before. In the face of a massive core meltdown, it worked. Although the serial equipment malfunctions and operator errors that occurred at Three Mile Island had never been anticipated, they did not trigger the China syndrome. The consequences of the accident could conceivably have been worse if more of the core had melted and the pressure vessel had failed, but reactor experts concluded that, even in that event, there was "little chance" that containment would have been breached in a way that allowed an uncontrolled release of radiation.⁴⁹ The applicability of the Three Mile Island accident to other plants under different conditions was uncertain. But the results suggested that nuclear proponents had underestimated the risks of a major accident at a nuclear plant in the United States, and that nuclear critics had overstated the likely consequences.

The Three Mile Island accident, despite its favorable outcome in terms of releasing only small quantities of the most dangerous forms of radiation to the environment, was a harrowing experience. During five days of crisis, experts struggled to figure out what was happening inside the reactor building while federal and state government officials deliberated over whether the population of the area should be evacuated. Those officials were forced to weigh the risks of conducting a general evacua-

tion against the chances of a massive release of radiation from the plant. The dilemma was made excruciating by the lack of reliable data about the condition of the plant and by the absence of experience in carrying out a full-scale evacuation under the threat of serious public exposure to radiation. Operating in extraordinarily trying circumstances, NRC officials and authorities in other agencies made mistakes. But they kept their goals and priorities in proper order. They made decisions in light of the sometimes confusing and usually insufficient information available to them, with the protection of public health and safety foremost in their minds. From the time the accident occurred, responsible officials in the state government, the NRC, the White House, and other agencies treated the welfare of the people of central Pennsylvania as their highest concern.

In retrospect, the irony of the agonizing deliberations over how to respond to the accident is that nobody knew that the core of the plant had melted. NRC experts and other reactor authorities made reasonable judgments about the condition of the reactor but failed to diagnose the extent of the damage it suffered. Had they recognized the true status of the plant, they would have recommended, and Thornburgh would have ordered, a full-scale evacuation. This would have been an easy and obvious, though unwelcome, decision. However, the process of evacuating the population, perhaps out to a twenty-mile radius, would have been difficult and costly. The nuclear industry, the NRC, and the state were ill prepared for an evacuation on such a massive scale, the inherent hardships of which were likely to be compounded by intense public fears of radiation.

Several years after the accident, NRC commissioner Gilinsky commented, "What shook the public the most was seeing the men in white coats standing around and scratching their heads because they didn't know what to do. The result was that accidents were taken seriously in a way they never had been before."⁵⁰ Three Mile Island exposed a multitude of weaknesses that had to be addressed, as several comprehensive postaccident reports made clear. The blame for the oversights, lapses, and failures that led to the crisis fell on both the U.S. nuclear industry and the NRC. The accident drove them out of a prevailing and dangerously complacent consensus that they had resolved the most critical reactor safety issues. Although they had never claimed that a major accident that released dangerous quantities of radiation was impossible, they regarded it as virtually inconceivable. Three Mile Island made the possibility disturbingly credible. As a result, both the industry and the NRC

adopted wide-ranging reforms intended to focus ample attention on human factors in reactor safety, improve equipment and instrumentation, strengthen communications, upgrade emergency planning, and monitor the effectiveness of plant management. In that way they sought to avoid another Three Mile Island. Engineers often learn more from technological failure than they do from success, and the accident provided a succession of failures from which to draw lessons.⁵¹

The extensive reforms that the nuclear industry and the NRC introduced within a short time after Three Mile Island did not resolve all nuclear safety issues. Charles Perrow, a Yale University sociologist who had served as a consultant to the Kemeny Commission, asserted in a widely noticed book published in 1984 that, “unless we are very lucky,” one or more severe nuclear accidents “will appear in the next decade and breach containment.”⁵² Perrow’s prediction did not come true, and the safety improvements that followed the Three Mile Island crisis, along with a fundamentally conservative regulatory and design approach, deserved more credit than he allowed. Nevertheless, the accident graphically revealed that serious consequences could arise from unanticipated developments in a nuclear power plant and fueled the already intense controversy over nuclear power.

Opponents of nuclear technology cited the experience of Three Mile Island in objecting to the start-up of some plants in the years following the accident. Pointing to the confusion and uncertainty about evacuating the vicinity of the plant, antinuclear forces raised the issue of emergency planning to a new level of concern and sustained debate. Other long-standing issues, including operational safety, radiation standards, risk assessment, waste disposal, and licensing procedures, continued to stir animated and sometimes bitter disputes between nuclear critics and nuclear proponents. The controversy lost some of its immediacy as a national issue in the 1990s as the last plants ordered during the pre-TMI era received operating licenses. But it flared again when the terrorist attacks on the World Trade Center towers and the Pentagon building on September 11, 2001, spawned greatly enhanced apprehensions about nuclear plant security. Nuclear power facilities were not specifically designed to guard against airplanes flown by terrorists into containment structures or spent-fuel storage buildings. In such cases, as in many other aspects of nuclear safety, no definitive answers were available for the questions that arose. Government authorities, nuclear industry experts, nuclear critics, and the general public had to make judgments about nuclear power based on extensive but incomplete evidence, informed but contestable

projections, and increasing but still limited operating experience. Evaluating the risks and the advantages of the technology remained an uncertain and inherently controversial process.

With the exception of the fears of a terrorist attack by means of a hijacked commercial airliner, the nuclear power debate of the 1970s had framed the basic issues that caused so much continuing conflict. Three Mile Island transformed mostly theoretical projections about a severe nuclear power accident into a starkly and alarmingly real emergency. It heavily influenced public attitudes toward nuclear power. As the single most familiar and memorable event in the history of commercial nuclear power in the United States, it played a major, and in many ways, decisive role in spurring controversy, increasing uncertainty, and elevating public fears of the technology. The apprehension and distrust that citizens expressed so vividly in the Harrisburg area after the emergency reflected in an acute form the widespread misgivings about nuclear technology throughout the United States. After the accident, a significant percentage of Americans moved from ambivalence to opposition in their views on building more nuclear plants.

The public anxieties that the TMI-2 accident created or heightened often obscured the fact that it fell far short of a catastrophe. It did not reach or even come close to producing the disastrous consequences that antinuclear activists had predicted in their campaigns against nuclear power during the 1970s, and that reactor experts had envisioned in their worst-case projections. Three Mile Island did not cause any immediate loss of life. According to a consensus of authorities, the effect on public health in the area was at worst slight and more probably negligible. At least for the periods covered in extensive epidemiological studies, the accident did not increase rates of cancer or other diseases among the neighboring population. Except for the plant itself, it did not destroy or damage property in the region.

Nevertheless, the memories of the tension, uncertainty, and confusion so prominent during the Three Mile Island emergency made a much stronger impression on popular perceptions than the generally favorable outcome or subsequent efforts to improve reactor safety. For that reason, the accident was widely recalled as a major catastrophe. Two books published in 2002 about Three Mile Island for children aged nine to twelve, for example, were each a part of a series on disasters that included volumes on the sinking of the *Titanic* in 1912, the explosion of the *Challenger* space shuttle in 1986, the oil spill in Alaska from the Exxon tanker *Valdez* in 1989, the bombing of the Alfred P. Murrah federal building in

Oklahoma City in 1995, and the terrorist attack on the World Trade Center in New York.⁵³ Three Mile Island clearly demonstrated and considerably strengthened the potent and probably unique capacity of nuclear power among modern civilian technologies to inspire public fear.⁵⁴ The dual legacy of the crisis was, on the one hand, to galvanize regulatory and operational improvements that reduced the risks of another severe accident and, on the other hand, to increase opposition to the expansion of nuclear power. In those regards, Three Mile Island remained a “big deal,” as the Rogovin Report described it in 1980, for decades after the accident that riveted the attention of the world on a scenic, peaceful, and previously obscure corner of the Susquehanna River valley.