

What happened at Three Mile Island

NRC report contradicts own findings to discount nuclear plant sabotage

On Aug. 3, the Nuclear Regulatory Commission (NRC) released its official report on its investigation of the March 28 incident at the Three Mile Island Unit-2 nuclear plant near Harrisburg, Pa. The report poses the possible causes of the initiating events of the nuclear accident, including sabotage or criminal negligence. But after eliminating all but one in the course of the investigation, the NRC stops short of concluding what its findings dictate: that the Three Mile Island incident was caused by a willful act of sabotage or negligence.

The report, titled "Investigation into the March 28, 1979 Three Mile Island Accident by the Office of Inspection and Enforcement" (NUREG-0600), contains some very revealing and important information concerning the two initiating events: the loss of main feedwater flow which was followed by the loss of all emergency feedwater flow. This information tends to confirm what the investigative staffs of *Executive Intelligence Review* and the Fusion Energy Foundation charged in our original coverage of the incident (see Vol. VI, No. 14, April 10-16). The events that initiated this incident were manually induced. The loss of main feedwater flow was caused by personnel performing maintenance on the filter system, while the emergency feedwater systems had been manually put out of service.

The report pointed out another item that could bear on the charge of sabotage. It was the case that for several weeks before the incident there had been significant and continual leakage of reactor primary coolant water out of the electromatic relief valve (EMOV) and/or one or both of the pressurizer code safety valves which are connected to the pressurizer tank system. It was the EMOV valve that failed to close after opening automatically some six seconds into the incident in order to relieve the initial pressure build up. This stuck valve went undetected by the operators for over two hours and it eventually caused the damage to the reactor core fuel.

Without visually inspecting the valve, the NRC investigators could not ascertain whether this coolant leakage contributed to its failure. But, during the same weeks, the valves' temperature was in the range of 180

degrees to 200 degrees Fahrenheit, up to 70 degrees over its specified normal temperature of 130 degrees Fahrenheit. Considering the fact that the valve had a previous history of sticking open and what normal engineering judgment of the expected operation of a relief valve that had been operating for weeks well above its normal operating temperatures would be, it is not unreasonable that the valve should fail.

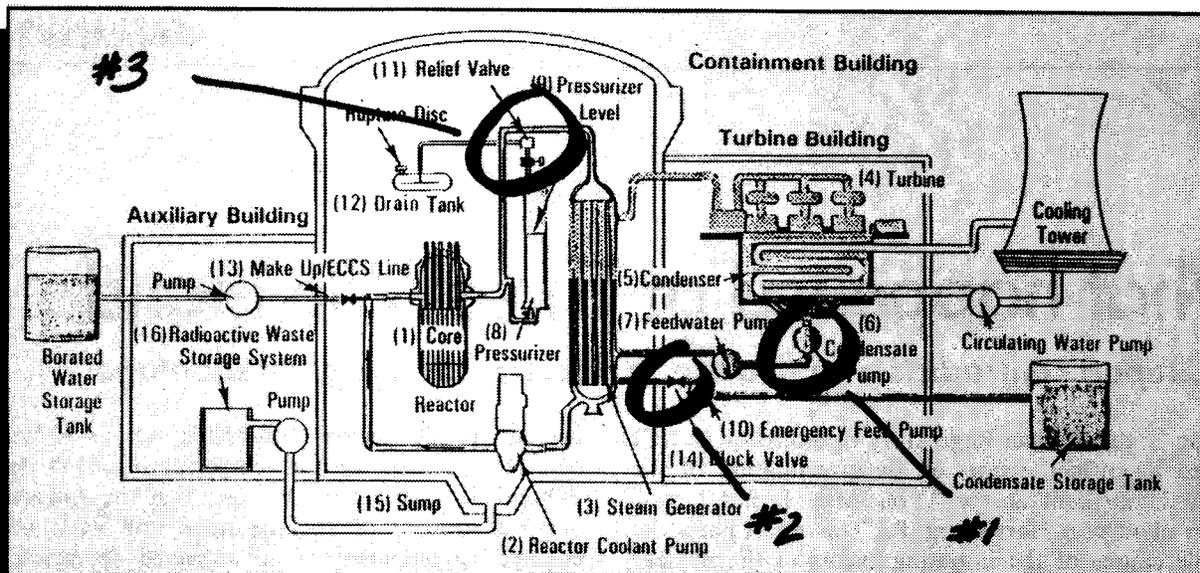
If someone knew this condition (and it was generally known among plant personnel), that person could reasonably expect this valve to stick open, particularly if the emergency feedwater system were shut off ensuring a high primary coolant system temperature and pressure. Furthermore, with this valve stuck and all heat removal capabilities shut off because of the closed emergency feedwater valves, plant operators would have a very difficult time figuring out what had happened.

This is precisely what did happen, as the NRC report points out, and it is important to investigate the why and how the valve stuck open relative to who manually closed the emergency feedwater valves, one of the two initiating events.

Sabotage or negligence

It continues to be our contention that the two initiating events were caused either by sabotage or through gross negligence by the reactor plant operators. There is no question that the operators are competent, experienced and qualified personnel who would not have bypassed every safety precaution and procedure. Sabotage remains the most likely cause.

That contention is supported by a report produced by a nuclear safety expert at the Massachusetts Institute of Technology—The Rasmussen Report—that places the probability of the sequence of events which occurred at Three Mile Island in the order of magnitude of one in a million. Until it is determined who closed the emergency feedwater valves and why, an investigator has to presume that the reactor was set up, waiting for a loss of main feedwater flow to initiate at least a very serious abnormal operating condition.



The chain of events at Three Mile Island

This schematic of the Three Mile Island nuclear plant was part of the testimony given by General Public Utilities President Herman Dieckamp at congressional hearings on May 24. We have circled the location of the first three events in the incident which unfolded in this manner.

1. Both main feedwater pumps (and therefore all main feedwater flow) shut down due to an automatic protective action trip caused by plant personnel performing maintenance on the feedwater filtering system. The exact cause of the trip is as yet undetermined, but was probably due to maintenance personnel "inadvertently" allowing water to back up in all lines. The shutdown of the feedwater pumps automatically caused the turbine to trip as well.

2. All three emergency feedwater pumps automatically started up as designed. The flow control valves on each of the two emergency feedwater systems began opening automatically. The plant operators noted these actions and assumed that the emergency feedwater systems were both on, when in fact they weren't. Unknown to them, the block valve in each system had been manually closed prior to the protective trip. Therefore, there was no emergency feedwater flow in either system and no flow in the steam generators.

3. Six to eight seconds into the incident the electromatic relief valve on the pressurizer tank opened as designed to release small amounts of steam and reduce pressure in the reactor coolant system. A few seconds later, as the pressure

decreased, this valve failed to close as designed and continued to release steam.

4. The temperature, pressure and pressurizer level conditions in the reactor coolant system during the first few minutes into the incident began to return to what the operators would expect following a main feedwater flow trip. This misled the operators into believing everything was now normal, and they based their operating decisions on this belief.

5. Eight to nine minutes into the incident, and several minutes after the steam generators had boiled dry, the operators realized that the emergency feedwater flow had been shut off. They flipped the two switches on the control panel which opened the two block valves and allowed feedwater flow back into the two steam generators. The warning lights on the control panel for each valve had indicated that these valves were closed. Apparently, these went unnoticed by the operators for some time prior to the incident.

6. The effects of this combination of events and the resulting operator actions (correct and incorrect) produced conditions in the reactor that again misled the operators for nearly 27 hours. During this time, the operators did not know that the electromatic relief valve was stuck open. When finally discovered, the operators closed a downstream block valve which stopped the blow-down of steam. The combined effects continued for several more hours before everything was brought under control.

Considering the possibilities

The question of the closed emergency feedwater valves was addressed in the NRC report. They pose six possible ways the valves could have come to be closed, but concluded that a "review of all possible causes revealed no reason to believe that any of them was the specific cause of the closed valves."

Yet their findings do not support this general conclusion. Their findings in fact eliminate four of the six possible causes and, if the operators sworn testimony and signed testing documents are considered, remove a fifth. According to all information available to date, including that from the presidential commission's investigation, these valves were opened following a surveillance test of the emergency feedwater system 42 hours before the incident.

The report states: "The operators and supervisors responsible for conducting the surveillance test on March 26, 1979 were interviewed. The operator who acted as the witness for the valves involved stated that he specifically recalled opening that valve. The investigation found no basis for rejecting his assertion. If his assertion is correct and the valves were left closed after the test, the investigation found no information to explain how the valves would have gone unnoticed during the 42 hours between the test and the accident."

Thus, how these valves got closed remains a mystery to the NRC. They then proceeded to the sixth possibility: "the valves were closed by the overt act of an individual." Through a convoluted argument, the NRC report concludes that this isn't very likely either. The NRC says it simply does not know how the valves were closed.

On review of their information and reasoning on this sixth possible cause, it is clear that the NRC commission never really investigated the possibility of sabotage nor did they want to. Yet based on their own information presented in their report, sabotage or criminal negligence is the only possible cause remaining for the closure of the two valves.

The report does devote a small section on the "Possibility of Plant Sabotage"—included "as a result of the high degree of public concern associated with the possibility of sabotage or adverse human actions having caused or contributed in some manner to the severity of the March 28 incident at TMI." The questions were asked by a technical NRC inspector to a technical plant operator or employee in an informal discussion. The "responses ranged from direct negative responses to disbelief that sabotage could even be considered." Under such circumstances, who would admit to closing or knowing who closed the emergency feedwater valves?

The report goes on: "vocal antinuclear sentiment appears to have been relatively absent prior to the

incident. Relationships between the local governments and licensee management appear to have been of a tolerant nature." Therefore, "those conditions commonly associated or viewed as causative factors precipitating industrial sabotage were not identified by the investigation as being present at the time of the incident."

Such a statement either comes from the mouth of babes or liars. Nuclear power and the nuclear industry have been barraged with environmentalist attacks for years and, particularly since the formation of the Department of Energy, has faced budgetary cutbacks, court delays, and program cancellations. As a result of this "antinuclear sentiment," the U.S. nuclear industry is for all intents and purposes shut down.

Too much effort

Having thus reasoned, the commission then proceeds to discuss the amount of effort needed to determine who closed the valves in question and why it isn't worth pursuing. "This investigation evaluated the effort that would be required to attempt to identify the party or parties who closed the emergency feedwater system block valves for whatever undefined reason that may have motivated them. The investigation revealed that the two valves in question were capable of being operated from three specific locations: the control room, the 480V Substation panels at the 305 elevation of the auxiliary building, and the physical location of each valve.

"Checks of the licensee's security access badging records showed approximately 470 licensee personnel and 260 contractor/vendor personnel would have had unescorted access to one or more of these locations on any of the two work days preceeding the March 28 incident. Records exist whereby the identity of the contractor/vendor personnel entering the protected area could be retrieved. However, the 470 licensee personnel are only logged in at the site perimeter and need only display their photo ID badge (issued only after psychological screening and preemployment checks are complete) to secure access to the TMI protected areas (Units 1 and 2, auxiliary building, turbine building and environs).

"Further investigative effort of the magnitude that would be required to specifically identify which of the more than 600 personnel did access the protected areas during the period of March 26, 1979 through March 28, 1979 was deemed unwarranted at this time in view of the absence of any intelligence that adverse human activity was involved in the accident."

Far from being an argument against further investigation, the NRC commission actually outlines the sort of effort undertaken by VEPCO, the owners of the Surry-II reactor in Virginia, following a nuclear accident there one month after the Three Mile Island

incident. In one month's time, the two individuals responsible for sabotaging the plant were identified.

Contradiction after contradiction

One might ask at this point why the NRC concludes that it is not worth trying to find out how the valves got closed. Was it not important in the chain of events? Would not the electromechanical relief valve (EMOV) have stuck open anyway?

Again the NRC is caught in a self-contradiction. Saying it isn't worth investigating, the NRC's evaluation of the effect of these closed valves is: "The delay in automatic initiating of emergency feedwater for eight minutes contributed to an early recovery towards normal values of certain RCS (Reactor Coolant System—JG) parameters upon which the operators concentrate. This recovery of key turbine trip/reactor trip RCS parameters misled the operators into believing that their actions had been successful in limiting the severity of the transient. This erroneous belief led them to initiate the routine subsequent operator actions that were normal for the assumed transient. These actions occupied the operators' attention and detracted from their opportunity to establish a correct analysis of the plant conditions.

"This investigation did not conclude what the ultimate course of events of the accident would have been, had emergency feedwater been introduced to the OTSGs (Once Through Steam Generators—JG) as designed."

The closure of these valves caused pressure, temperature and pressurizer level conditions in the reactor that led the plant operators to act essentially the opposite of how they would have acted if the valves had been open. These conditions led the operators into believing that the EMOV valve had closed when in fact it remained open.

It took nearly 20 minutes (after the valves were

finally opened) to get feedwater flow completely reestablished in the two steam generators, which had boiled dry, so that decay heat could be normally removed from the reactor.

The closed valves caused reactor conditions which misled and confused the operators for at least the first 30 minutes into the incident.

Discounting the facts

Another question unresolved by the investigation is just how the loss of the main feedwater flow (and turbine-trip) was initiated in the first place by the filter maintenance crew—a question which also bears on the issue of sabotage.

The loss of main feedwater flow is expected from time to time because the reactor plant protective system is extremely sensitive to the slightest malfunction or abnormal operating condition. The slightest "mistake" by the maintenance crew—intentional or unintentional—during the filter cleaning procedures that were ongoing at the time could easily have caused the automatic loss of main feedwater flow and trip-out of the turbine.

Yet the commission report maintains "that the closure of the emergency feedwater valves was only of secondary importance since the accident would have happened anyway."

Thus, it is not surprising that the report's conclusions, upon which the press accounts of the NRC's findings focused, did not even mention the two initiating events of the incident: the loss of main feedwater flow followed by the loss of all emergency feedwater flow.

Instead, the NRC's conclusions blame the event and its severity primarily on operator error, misjudgments, "mind sets," and equipment failure—conclusions not backed by their own findings.

—Jon Gilbertson