Report details 14 “near-misses” at US nuclear power plants in 2010

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A new report by the Union of Concerned Scientists documents in chilling detail 14 instances of “near-misses” at US nuclear power plants in 2010. Published in the midst of the Japanese nuclear emergency following the earthquake and tsunami, the report exposes the danger posed to the population and the planet by the for-profit US energy companies overseen in an often slipshod manner by US government regulators.

The Union of Concerned Scientists (UCS), a Cambridge, Mass.-based environmental and nuclear watchdog group, accuses the Nuclear Regulatory Commission (NRC), the government agency tasked with overseeing the nuclear energy industry, of allowing plant operators to compromise safety and ignore or delay repairs. This led to 14 significant events posing the potential of a nuclear catastrophe.

Problems at the plants included leaking roofs, floods near safety equipment, rusty pipes, faulty pumps, fires and inadvertent shutdowns. Plant owners in some cases knowingly disregarded protocol while NRC inspectors turned a blind eye to the violations. Energy companies filed false reports and delayed repairs, cutting corners to increase their bottom line.

David Lochbaum, author of the report and director of UCS’s nuclear safety program, noted in a prepared statement, “It’s like the spinning wheels on a slot machine.” With the safety problems occurring at a rate of more than one a month, the report notes, “That plant owners could have avoided nearly all 14 near-misses in 2010 had they corrected known deficiencies in a timely manner suggests that our luck at nuclear roulette may someday run out.”

The report adds ominously that the severe accidents at Three Mile Island in 1979 and Chernobyl in 1986 “occurred when a handful of known problems—aggravated by a few worker miscues—transformed fairly routine events into catastrophes.”

The report’s Executive Summary provides a table listing the reactors involved in the 14 near-misses in 2010, the energy companies owning the reactors, and a brief explanation of the incidents that occurred in 12 states: Arkansas, Illinois, North Carolina, Maryland, South Carolina (three events), Florida, Ohio, California, Alabama, Nebraska, Virginia and Kansas.

Four of the 14 incidents involved reactors owned by one company, Progress Energy. The Raleigh, North Carolina-based company reported ongoing earnings of $142 million in the fourth quarter of 2010.

The other nuclear facilities cited are operated by Entergy, Exelon, Constellation Energy, Duke Energy, FirstEnergy, Pacific Gas & Electric, Southern Nuclear, Omaha Public Power District, Dominion Generation and Wolf Creek Nuclear.

In 13 of the incidents, the NRC dispatched a special inspection team (SIT), which is utilized when an event or condition increases the chance of reactor core damage by a factor of 10.

The most significant near-miss event took place at Progress Energy’s HB Robinson nuclear plant in Florence, South Carolina on March 28, 2010, the 31st anniversary of the Three Mile Island accident. The NRC sent an SIT to the nuclear site to investigate electrical fires.

After uncovering multiple problems, including “design and procurement of safety equipment, maintenance, operations, and training—over many years,” the NRC upgraded the SIT to an augmented inspection team (AIT), used when the risk of reactor core damage rises to a factor of 100.

What ensued at the plant that day was what could be described as a black comedy of errors, with one misstep exacerbating the next. The following is an abbreviated account of the March 28 events as described in the UCS report:

- An electrical cable shorted out and started a fire.
- A breaker designed to automatically open and de-energize power to the shorted cable failed to do so, allowing electricity to flow from a circuit through the shorted cable into the ground, reducing the circuit’s voltage.
- This circuit, which powered a pump circulating water through the reactor core, experienced a drop in power. The

pump's output dropped, triggering an automatic shutdown of the reactor.

• "The electrical problems damaged the main power transformer between the plant and its electrical grid." About half of the plant's equipment was then left without power.

• Without power, valves on drain lines remained open, allowing heat to escape from the reactor more rapidly that normal. "The operators did not notice the open drain valves or abnormally fast cool down."

• When pumps transferring water from a tank to the reactor vessel failed to automatically realign, plant operators failed to notice this failure for nearly an hour.

• Four hours into the event, operators attempted to restore power to the de-energized circuit without checking first to ensure workers had fixed the original fault, which they had not.

• "When the operators closed the electrical breaker to repower the circuit, they reenergized the shorted cable, and it cause another fire. The electrical disturbance also triggered alarms on both sets of station batteries, prompting the operators to declare an emergency Alert."

The AIT also documented other equipment failures. The cable that started the first fire, installed in 1986, did not meet specified facility parameters. A light bulb replacing a bad bulb in 2008 failed to illuminate, causing an electrical breaker not to open.

The report writes of the March 28 incident: "There is simply no excuse for the fact that the company and the NRC had not detected and corrected at least some of these problems before this event."

UCS also notes that Progress Energy informed the Nuclear Regulatory Commission, in writing, that certain diagnostics and testing had been performed at the HB Robinson plant when, in fact, they had not been done.

The NRC sent another SIT to the Florence, South Carolina plant on October 7, 2010, after an automatic shutdown of the reactor, followed by equipment failures and operator errors. The NRC team determined that the motor failure initiating the event was caused by degradation of insulation on the motor winding. While Progress Energy had been aware of the problem, and had a plan in place in 2003 to deal with it, the motor had never been fixed.

Nearly all of the 14 near-misses documented in the UCS report were the result of known safety problems that went uncorrected. Most of them followed similar scenarios to that at the HB Robinson plant documented above, described in the report as an "error-fest."

For its part the Nuclear Regulatory Commission, through a combination of incompetence and cavalier disregard, failed to identify any of these safety problems, despite having personnel at each nuclear plant and conducting about 6,300 man-hours of oversight at each facility.

The report's author asks: "Why didn't this NRC inspection army identify all, some, or at least one of the problems contributing to these 14 near-misses?"

The report documents the particularly egregious performance of the NRC at the Peach Bottom nuclear plant in Delta, Pennsylvania. (The serious safety problem at Peach Bottom is the subject of a previous UCS report, "Artful dodgers at Peach Bottom.")

The plant, operated by Exelon, includes two boiling water reactors (BWRs), both with 185 control rods that can be inserted in the BWRs to stop a spike in the power level to stop a nuclear chain reaction. The fatal incidents at Chernobyl and the SL-1 nuclear plant in Idaho in 1961 took place when increases in reactor power caused massive steam explosions.

The report states that NRC inspectors were fully aware that a number of the control rods were slow, which was due to a part that had been found to be defective in the 1990s. This should have prompted plant operators to shut the plant down, an action the company did not take. The report warns: "Had Unit 2 encountered an event that required rapid insertion of the control rods before employees finished playing their games, the results could have resembled those at Chernobyl and SL-1."

As it is, the NRC is only tasked with auditing 5-10 percent of practices at each reactor every year. The Union of Concerned Scientists makes the correct observation that by failing to detect such safety violations by the energy companies, or willfully allowing them to occur, they encourage such practices among the remaining 90-95 percent of activities at the nuclear reactors.

In numerous cases, companies are cutting corners on safety in the interest of boosting profits. In a February 18 incident at the Calvert Cliffs reactor in Annapolis, Maryland, owner Constellation Energy's efforts to trim costs resulted in problems in the plant's replacement program for safety equipment.

The NRC's full report, "The NRC and Nuclear Power Plant Safety in 2010: A Brighter Spotlight Needed," can be found here.