

The NRC and Nuclear Power Plant Safety in 2013

More Jekyll, Less Hyde

OUR FOURTH ANNUAL REPORT CARD

The U.S. Nuclear Regulatory Commission (NRC) is charged with enforcing safety regulations at U.S. nuclear power plants to protect the public from harm. To do this it must actively monitor reactors and aggressively engage with owners and workers when it does find safety violations.

The Union of Concerned Scientists has evaluated safety issues at U.S. nuclear power plants for more than 40 years. We have repeatedly found the NRC to be capable of enforcing its safety regulations—yet we have also repeatedly found its enforcement to be not timely, consistent, or effective.

This report, like its three predecessors, examines NRC actions during the previous year and chronicles what the commission did right and what it did wrong. Our goal is to help the NRC achieve more of the former and avoid more of the latter—before an avoidable accident costs American lives.

Robert Louis Stevenson's classic *Strange Case of Dr. Jekyll and Mr. Hyde*, first published in 1886, dealt with the split personality experienced by the friendly and mild-mannered Dr. Henry Jekyll and his alter ego, the evil Mr. Edward Hyde. Stevenson's short novel is brought to mind by the apparent dual personality and bizarre behavior traits of the U.S. Nuclear Regulatory Commission (NRC).

On one hand, the NRC is a fair and effective regulator, establishing and enforcing safety regulations that subject neither nuclear plant owners to undue burdens nor workers and the public to undue risks. While no one can count the number of accidents that the NRC's efforts have averted, the trend over the past three decades in the declining number of "near-misses" and safety problems is highly suggestive that much of the time the agency does its job well. On the other hand, the NRC sometimes acts as if it is channeling Mr. Hyde.

Inconsistencies in the NRC's actions and inactions last year (2013) invoked both Jekyll and Hyde. As described in Chapter 2 of our report (online at www.ucsusa.org/nrc2013), the NRC's inspectors repeatedly compelled the owner of the Columbia Generating Station to identify and correct the underlying causes of recurring problems with a vital air conditioning unit. But after identifying several examples of inadequate procedures and training at the LaSalle nuclear plant, the NRC's inspectors let the owner off the hook entirely. Yet, when very similar problems



The NRC conducts routine inspections of nuclear plants and investigates unusual events at the plants.

Near-Misses at Nuclear Power Plants in 2013

Reactor and Location	Operator	Highlights
Arkansas Nuclear One Units 1 and Unit 2 London, AR	Entergy Operations, Inc.	AIT: A crane moving a heavy component during a refueling outage on Unit 1 collapsed. The component fell through an opening in the floor into the turbine building's basement. Debris disabled electrical equipment that caused Unit 2 to automatically shut down from full power and left Unit 1 disconnected from the offsite power grid.
Browns Ferry Nuclear Plant Units 1, 2 and 3 Athens, AL	Tennessee Valley Authority	SIT: Security problems prompted the NRC to conduct a special inspection. Details of the problems, their causes, and their fixes are not publicly available.
Columbia Generating Station Benton County, WA (first incident)	Energy Northwest	SIT: Security problems prompted the NRC to conduct a special inspection. Details of the problems, their causes, and their fixes are not publicly available.
Columbia Generating Station Benton County, WA (second incident)	Energy Northwest	SIT: Security problems prompted the NRC to conduct a special inspection. Details of the problems, their causes, and their fixes are not publicly available.
Columbia Generating Station Benton County, WA (third incident)	Energy Northwest	SIT: An air conditioning unit for rooms containing essential electrical equipment was found degraded due to inadequate maintenance and testing practices.
Fort Calhoun Station Fort Calhoun, NE	Omaha Public Power District	SIT: Workers replacing rusted bolts used to anchor a cooling water pump to the concrete floor discovered the anchorage configuration did not conform to the design specification and would not properly support the equipment against forces during an earthquake.
LaSalle County Station Units 1 and 2 Marseilles, IL	Exelon Generation Co., LLC	SIT: A lightning strike near the plant caused an electrical disturbance that disconnected both units from the offsite power grid. The response to the dual-unit shutdowns revealed some procedure and operator training deficiencies.
Oyster Creek Nuclear Generating Station Forked River, NJ	Exelon Generation Co., LLC	SIT: Hurricane Sandy caused high water levels and disconnected the plant from its offsite power grid.
Shearon Harris Nuclear Power Plant New Hill, NC	Duke Energy	SIT: Workers preparing for inspections to be conducted during an upcoming refueling outage reviewed results from inspections conducted during the last refueling outage and found indications of cracks in tubes passing through the reactor vessel head that had not been fixed. The reactor was shut down for the repairs.
Susquehanna Steam Electric Station Unit 2 Salem Township, PA	PPL Susquehanna, LLC	SIT: Workers replaced the original analog control system for the pumps providing makeup flow to the reactor vessel with a digital system. During a reactor startup, deficient procedures and training prevented the operators from using the pumps to supply sufficient flow to the vessel. The reactor automatically shut down when the water level inside the vessel dropped too low.

Note: AIT = augmented inspection team; SIT = special inspection team.

The NRC's Dr. Jekyll ordered some plants with earthquake protection deficiencies to be shut down, but its Mr. Hyde allows Diablo Canyon to operate.

surfaced at the H.B. Robinson and Browns Ferry nuclear plants, the NRC compelled the owners to rectify the deficiencies.

The strange cases of the Fort Calhoun and Diablo Canyon nuclear plants provide further evidence of the NRC's dichotomy. As described in Chapter 4, the NRC did not allow the Fort Calhoun reactor in Nebraska to operate until known safety shortcomings were corrected. Yet as described in Chapter 5, the NRC allowed the two reactors at the Diablo Canyon plant in California to continue operating despite its owner failing to resolve known safety shortcomings. The unresolved problems at Diablo Canyon involve inadequate protection against earthquakes. When similar earthquake protection deficiencies were identified at the Beaver Valley, Humboldt Bay, Maine Yankee, San Onofre, Surry, and West Valley nuclear facilities, the NRC's Dr. Jekyll ordered them shut down until their owners had provided adequate protections against the earthquake hazards. Yet today, the NRC's Mr. Hyde allows Diablo Canyon to operate despite the known risks.

Giving the NRC the benefit of doubt, one might assume there are nuances explaining why entirely opposite reactions

to the same set of facts can somehow both be right. The strange case of Oconee clearly shows this is not the case. As described in Chapter 5, the NRC approved an amendment to the operating licenses for the three reactors at the Oconee Nuclear Station in Seneca, South Carolina, in 2010 contingent on its owner completing safety fixes by December 31, 2012. The owner asked the NRC in July 2012 for permission to extend this deadline by two years. In January 2013, the NRC's Dr. Jekyll denied the request on the grounds that the risk was too high to allow the fixes to be delayed that long. But in July 2013, the NRC's Mr. Hyde ordered the company to complete the fixes no later than November 15, 2016—nearly two years after the owner's initial extension request that had been rejected as being too unsafe.

A second strange case of Oconee covered in Chapter 5 involved the NRC's Dr. Jekyll formally requiring the plant's owner in June 2010 to take more than a dozen measures to lessen the chances that the upstream Jocassee Dam (owned by the same company) could fail and to better protect the plant against flooding in the event the dam fails anyway. The NRC's justification for this mandate included its determination that if the dam failed, there was a 100 percent chance that flooding would cause the three reactors at Oconee to melt down. The NRC's Mr. Hyde then intervened to improperly withhold all the correspondence about this hazard from the public. Worse still, the NRC conducted its annual public meeting in the community near the Oconee nuclear plant in April 2011, a month after tsunami flooding caused three reactors at Japan's Fukushima Daiichi Nuclear Power Station to melt down. The exact same flooding hazard that exists today at the Oconee nuclear plant was not mentioned by the NRC—so the public was actually misled into believing no such problems existed.



An accident moving heavy equipment at the Arkansas Nuclear One power plant led to the only AIT in 2013.



Reactor operators using unapproved procedures led to problems at the Susquehanna plant in Pennsylvania.

To be sure, the NRC is far more Jekyll than Hyde, as evidenced by the improving trends over the past three decades. But with so many American lives at stake, even a cameo appearance by the NRC's Mr. Hyde is too much. If an earthquake near Diablo Canyon or a failure of the Jocassee Dam harmed people, the NRC would be unable to look Americans in the eyes and honestly claim it had taken every reasonable measure to prevent the disaster.

More Jekyll, less Hyde is this critic's choice for the NRC's future.

Recommendations

Chapter 2 summarizes near-misses that the NRC reported at U.S. nuclear plants last year. The lessons learned from the near-misses described in Chapter 2 are:

- The NRC and the nuclear industry should study the Arkansas Nuclear One near-miss to identify and institutionalize the elements that contributed to the successful response on the part of plant operators.
- The NRC should periodically re-inspect fixes to safety problems, such as those mandated by the agency's generic communications program, to determine whether they continue to be effective.
- The NRC should revise its license renewal process to provide assurance that reactors are operating in a manner consistent with applicable regulatory requirements.
- The NRC and the nuclear industry should protect against human performance impairment caused by fatigue at all times, not just when reactors are operating.

As Chapter 3 shows, such near-misses have been occurring at a rate of more than one per month over the past four years. Given enough chances, it seems only a matter of time before near-misses become an actual hit. Public safety would be better

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served by reducing the frequency of near-misses. The NRC should take two steps to better protect the public:

- Each special inspection team (SIT), augmented inspection team (AIT), and incident inspection team (IIT) should include a formal evaluation of the NRC's baseline inspection effort. The baseline inspection effort covers the array of routine inspections conducted by the NRC at every nuclear plant. When an SIT, AIT, or IIT identifies safety violations that contributed to the near-miss, the NRC's evaluation should determine whether the baseline inspection effort could have, and should have, found the safety violations sooner. Such insights from the near-misses may enable the NRC to make adjustments in what its inspectors examine, how they examine it, and how often they examine it to increase the chances of finding potential violations.
- Plant owners must be required to formally evaluate why their routine testing and inspection regimes failed to find long-standing problems. Many of the near-misses in Chapter 2 involved design and operational problems that existed for years, sometimes decades. The testing and inspection regimes are intended to find and fix such problems preventively, but clearly failed to do so. Plants' programmatic weaknesses must be remedied to offer better protection against future near-misses.

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