Union of Concerned Scientists

U.S. Nuclear Power after Fukushima

SUMMARY

Common Sense Recommendations for Safety and Security

THE RECENT EVENTS IN Japan remind us that while the likelihood of a nuclear power plant accident is low, its potential consequences are grave. And an accident like Fukushima could happen here. An equipment malfunction, fire, human error, natural disaster or terrorist attack could—separately or in combination—lead to a nuclear crisis.

Our nation will continue to obtain a significant portion of its electricity from nuclear power for many years to come, regardless of how rapidly energy efficiency measures and other sources of electricity are deployed. Nuclear reactors currently account for about 20 percent of U.S. electricity, and the Nuclear Regulatory Commission (NRC) has granted or is in the process of granting 20-year license extensions for most of the country's 104 operating reactors.

Given this reality, the United States must take concrete steps now to address serious shortcomings in nuclear plant safety and security that have been evident for years. No technology can be made perfectly safe, but the United States can and must do more to guard against accidents as well as the threat of terrorist attacks on reactors and spent fuel pools.

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The Responsible Parties

Nuclear power safety and security must be given the serious attention they deserve—and have not consistently received—from the nuclear industry, the NRC (which oversees the industry), Congress (which oversees the NRC), and the president (who appoints the NRC commissioners and bears ultimate responsibility for ensuring public safety).

The industry must address *known* risks and ensure that adequate safety margins are in place to compensate for *unknown* risks. Doing so is in the industry's self-interest, because nothing would affect public acceptance of nuclear power in the United States as much as a serious accident or terrorist strike. For example, reactor owners could reduce the safety and security risks associated with spent fuel by transferring it from pools to dry casks once it is cool enough. Yet for reasons of cost, they have chosen to fill the pools to maximum capacity rather than use dry casks.

The NRC must strengthen its safety requirements. For example, it does not require U.S. reactor owners to plan for and be able to cope with severe accidents like the one that occurred at the Fukushima Daiichi plant. Nor does it require new reactors to be safer than existing ones. Because additional safety features generally entail additional costs, safer designs may lose out in the marketplace to those that reduce costs by cutting safety features.* If the NRC does not change its regulations, new reactors will not be significantly safer, and as the number of reactors increases so will the chances of a catastrophic event.

The NRC must also consistently enforce its regulations. Even when the agency has imposed strong standards, serious safety problems have continued to arise because of lax enforcement. For example, following a serious fire at an Alabama

* A current example is the Areva EPR (Evolutionary Power Reactor), which has safety systems not required by the NRC and has attracted much less interest in the United States and abroad than the Westinghouse AP1000, which meets but does not exceed NRC requirements.

plant in 1975, the NRC issued fire protection regulations in 1980 and again in 2004. Yet today, more than three dozen reactors still do not comply with either set of regulations (despite the fact that fire remains a dominant risk factor for reactor core damage).

Congress must take its oversight role seriously and ensure that the NRC does its job well. Moreover, Congress should not order the NRC to further "streamline" its regulations and processes, which could result in inadequate technical reviews of complex issues.

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The president must appoint people to the Nuclear Regulatory Commission who will make public safety their top priority. This is not the case today. For example, four of the five commissioners recently voted to extend the deadline for nuclear power reactors to comply with fire protection regulations until 2016 at the earliest.

Change Is Needed Now

Since its founding in 1969, the Union of Concerned Scientists has worked to make nuclear power safer and more secure. We have consistently advocated most of the measures listed below to address the serious shortcomings in U.S. nuclear plant safety and security against terrorist attack. So although most of these recommendations are not new, the situation in Japan underscores their importance. We have also developed several new recommendations in response to the Fukushima crisis.

We strongly urge the NRC to make U.S. nuclear power safer and more secure by adopting *all* the following measures, and we urge Congress and the administration to ensure the NRC follows through on its commitments.

Key Recommendations

Below we list our top eight recommendations for changes the NRC should make in its regulations and actions to improve U.S. nuclear power safety and security. The NRC should make these changes its top priority.

A complete list of our recommendations, with additional explanation of each, can be found on the UCS website at *www.ucsusa.org/nuclear_power*. If the NRC does not implement these changes on its own, Congress should exercise its oversight role and require the agency to do so.

Extend Regulations to Cover Severe Accidents

The NRC should extend the scope of its regulations to include the prevention and mitigation of severe accidents.

The NRC defines "severe" accidents as those more serious than the so-called "design-basis" accidents that U.S. reactors are designed to withstand. While unlikely, severe accidents can occur—as in Fukushima—and can cause substantial damage to the reactor core and failure of the containment building, leading to large releases of radiation. However, NRC regulations are focused on design-basis accidents and are far less stringent in addressing severe accidents. For example, the agency does not evaluate or test the severe accident management guidelines that reactor owners have voluntarily developed, so neither the NRC nor the public can be confident these guidelines would be effective. Extending NRC requirements, inspections, and enforcement to cover a wide range of severe accident conditions would ensure that effective plans and the equipment needed to deal with such accidents are put in place.

Strengthen Emergency Planning Requirements

The NRC should ensure that everyone at significant risk from a severe accident—not just people within the arbitrary 10-mile zone currently used for emergency planning—is protected.

In the United States, emergency planning for a nuclear reactor accident is limited

Following the Fukushima accident, high contamination levels were found well beyond 10 miles from the plant (the distance used for emergency planning in the United States).

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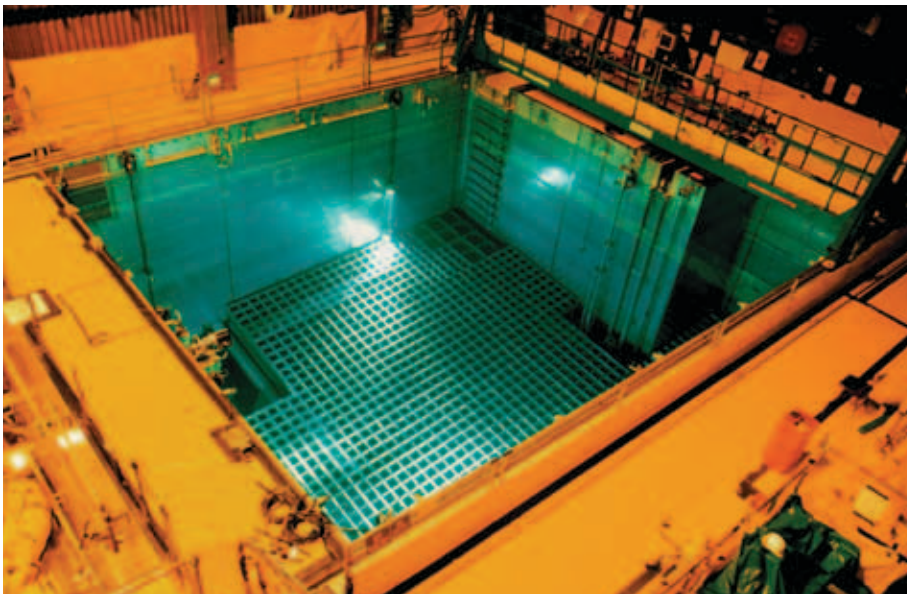
to a 10-mile radius around the reactor. Yet the U.S. government advised Americans within 50 miles of the Fukushima Daiichi reactors to evacuate—a decision validated by the high contamination levels recorded well beyond 10 miles from the plant. A severe accident at a U.S. reactor could similarly require the evacuation of people outside the 10-mile planning zone and other protective measures to avoid high radiation exposures. The NRC should therefore require reactor owners to develop emergency plans for a larger area, based on a scientific assessment of the populations at risk for each reactor site.

Move Spent Fuel to Dry Casks

The NRC should require plant owners to transfer fuel from storage pools to dry casks when the fuel has cooled enough to do so.

The Fukushima crisis illustrated the dangers of keeping spent fuel in storage pools when the plant lost power needed to cool its pools. It is still unclear whether cooling was resumed in time to prevent the spent fuel from overheating and melting, and releasing radiation. However, the spent fuel pools at U.S. reactors could have fared worse, since they are far more densely packed than those at Fukushima and pose even greater hazards.

The safety and security risks associated with spent fuel would be reduced by transferring the fuel from pools to dry casks once it is cool enough (i.e., five years after removal from the reactor). With less fuel in the pools, the remaining fuel would be easier to keep cool if power is lost, and less radiation would be released in the event of an accident or terrorist attack. However, because dry casks are expensive, reactor owners have chosen to fill their pools to maximum capacity, and the NRC has not required owners to transfer their spent fuel to dry casks.



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Spent nuclear fuel stored in pools is more vulnerable to accidents, natural disasters, and attack than fuel in the reactor core, and more likely to release radiation into the atmosphere.

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Dry casks are more secure than spent fuel pools, and with a few modifications could likely be made a viable storage option for at least 50 years.

Enforce Fire Protection Regulations

The NRC should compel the owners of more than three dozen reactors to comply with fire protection regulations they currently violate.

Because a fire can disable both primary and backup emergency systems, it is a leading risk factor for reactor core damage. Following a 1975 fire at the Browns Ferry nuclear plant in Alabama, the NRC issued regulations in 1980 intended to reduce the fire hazard at all reactors, and it amended those regulations in 2004 to provide an alternative option for compliance. However, more than

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Set Timeliness Goals for Safety Issues

The NRC should apply the same type of timeliness goals to nuclear plant safety that it does for business-related requests from reactor owners.

The NRC has established goals for completing business dealings in a timely manner, but has not done so for resolving outstanding safety issues. By treating safety with the same urgency it gives to business dealings, the agency can provide the robust, timely oversight that is needed.

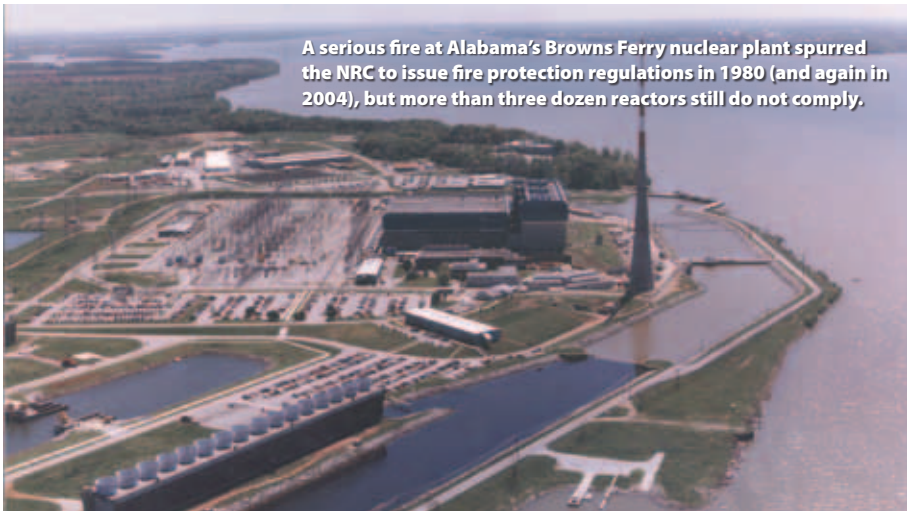
Improve Protection against Terrorist Attacks

The NRC should make more realistic assumptions about the capabilities of terrorists who might attack a nuclear power plant, and these assumptions should be reviewed by U.S. intelligence agencies.

Current assumptions about potential attackers are unrealistically modest and do not reflect real-world threats. For example, they may ignore the possibility that terrorist groups could use rocket-propelled grenades—a weapon widely used by insurgents around the world. New assumptions developed by the NRC should be reviewed by an interagency body that includes the intelligence community, the National Nuclear Security Administration, and the Department of Homeland Security.

Strengthen Safety Standards for New Reactor Designs

The NRC should require any new reactors to be safer than existing reactors.



A serious fire at Alabama's Browns Ferry nuclear plant spurred the NRC to issue fire protection regulations in 1980 (and again in 2004), but more than three dozen reactors still do not comply.

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Even though plant owners are given advance notice of mock attacks, their security forces too often fail to repel the unrealistically modest threats envisioned by the NRC.

Current policy only requires advanced reactors to provide the same level of protection as existing reactors—most of which were built at least 30 years ago. To ensure that any new nuclear plant is significantly safer than existing ones, the NRC should require features designed to prevent severe accidents and to mitigate such an accident if one occurs.

Assign an Appropriate Value to Human Life in Cost-Benefit Analyses

The NRC should increase the value of human life in its analyses so it is consistent with other government agencies.

The NRC currently uses a dollar value for a human life that is only one-half to one-third the value used by other agencies. Bringing that value in line would have a major effect on nuclear plant license renewals and new reactor approvals: plant owners would have to add safety features that the NRC now considers too expensive (because it underestimates the value of the lives that could be saved).

Union of Concerned Scientists
Citizens and Scientists for Environmental Solutions

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The Union of Concerned Scientists is the leading science-based nonprofit working for a healthy environment and a safer world.

The full set of recommendations is available online (in PDF format) at *www.ucsusa.org/nuclear_power.*

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