

# Union of Concerned Scientists

Citizens and Scientists for Environmental Solutions

**TESTIMONY SUBMITTED BY**

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**TO THE**

**SUBCOMMITTEE ON CLEAN AIR AND NUCLEAR SAFETY**

**COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS**

**UNITED STATES SENATE**

**OCTOBER 3, 2007**

Mr. Chairman and members of the Subcommittee, on behalf of the Union of Concerned Scientists (UCS), I thank you for this opportunity to present our views on the Nuclear Regulatory Commission's (NRC's) reactor oversight process.

My name is David Lochbaum. After obtaining a degree in nuclear engineering from The University of Tennessee in 1979, I worked more than 17 years in the nuclear power industry, mostly at operating reactors in Georgia, Alabama, Mississippi, Kansas, New Jersey, Pennsylvania, New York, Ohio and Connecticut. I joined UCS in October 1996 and am the Director of the Nuclear Safety Project. Since nearly its inception in May 1969, UCS has maintained an interest in nuclear power plant safety. UCS is neither an opponent nor a supporter of nuclear power – our perspective is that of a nuclear safety advocate.

In 2001, the Nuclear Energy Agency, formed in February 1958 as part of the Organization for Economic Co-operation and Development (OECD), released a report titled "Improving Nuclear Regulatory Effectiveness." A task group consisting of representatives of regulatory bodies from around the world, including the NRC, developed this report. A nuclear regulator was defined to be effective when it:

- Ensures that an acceptable level of safety is being maintained by the regulated operating organizations.

- Takes appropriate actions to prevent degradation of safety and to promote safety improvements.

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- Performs its regulatory functions in a timely and cost-effective manner as well as in a manner that ensures the confidence of the operating organizations, the general public, and the government.

- Strives for continuous improvements in its performance.

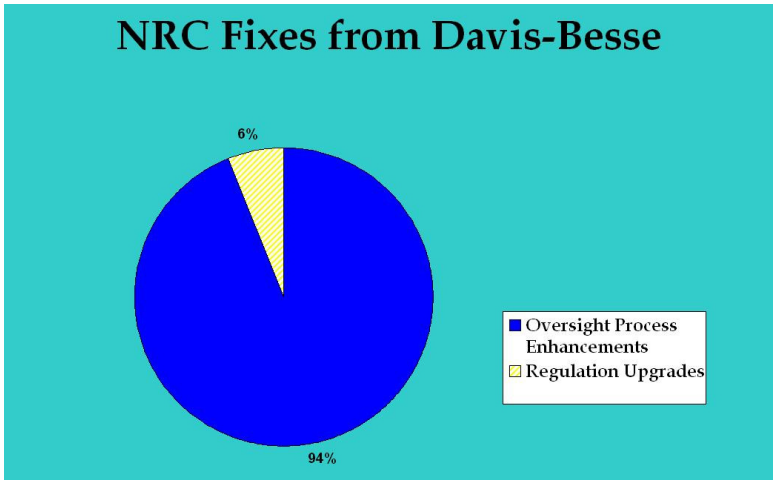
As discussed below, we evaluated the NRC against these four attributes. The bad news is that the NRC does not warrant a passing grade in all of these areas. The good news is that the NRC does score well in some of the areas, providing hope that reforms can be successfully implemented to make the NRC into the effective regulator Americans deserve. The best news is that the needed reforms have already been identified and road-tested and merely need to be applied to the NRC.

### ☺ ENSURES THAT AN ACCEPTABLE LEVEL OF SAFETY IS BEING MAINTAINED BY THE REGULATED OPERATING ORGANIZATIONS

To distinguish this criterion from the second one ("takes appropriate actions to prevent degradation of safety"), UCS considered this first criterion to involve establishing appropriate regulations such that the safety bar is set at the proper level.

From the inception of our nuclear safety project in the early 1970s, we have seldom contended that the NRC's regulations were too lax and the safety bar needed to be raised. Thus, we firmly believe the NRC deserves a passing grade, perhaps with honors, for establishing regulations that provide an acceptable level of safety.

Our conclusion is confirmed by assessments made by other evaluators, including the NRC itself. The recommendations by the U.S. Government Accountability Office, the NRC's Inspector General, and other public interest groups rarely involve revising or supplementing existing regulations, implicit concessions that these regulations adequately protect public health (if only they were followed). The quintessential example comes from the NRC's own lessons learned task force probe into the recent debacle at Davis-Besse. This effort produced 49 recommendations on things the NRC should do to prevent another debacle. Only 3 of these 49 recommendations entailed revisions to or additions to the regulations. The overwhelming majority of the recommendations involved more effective enforcement of the existing regulations.




UCS, without reservations or qualifiers, concludes that NRC has earned a passing grade with respect to establishing regulations that set the safety bar at the proper level.

☹ **TAKES APPROPRIATE ACTIONS TO PREVENT DEGRADATION OF SAFETY AND TO PROMOTE SAFETY IMPROVEMENTS**

UCS considered this second criterion to entail consistent, effective, and timely enforcement of regulations. Whereas the first criterion sets the safety bar at the proper level, this criterion protects the public from any nuclear reactor doing the limbo beneath the bar.

By any reasonable measure, the NRC deserves a failing grade in this area. Among an abundant stockpile of ineffective regulation examples are:

- Since 1966, there have been fifty-one (51) outages lasting one year or longer at U.S. nuclear power reactors to restore safety levels to the proper side of the safety bar. An effective regulator would not be so unaware or unconcerned about nuclear reactor safety levels to let them repeatedly drop as low as to require more than a year to restore them to acceptable levels. These 51 outages – with an estimated price tag of over $82 billion – are described in our September 2006 report, "Walking a Nuclear Tightrope: Unlearned Lessons of Year-plus Reactor Outages," available online at http://www.ucsusa.org/clean_energy/nuclear_safety/unlearned-lessons-from.html

- From 1986 to 2006, the emergency backup power system at the Fermi Unit 2 reactor in Michigan was tested dozens – perhaps hundreds – of times using the wrong answer key. Workers and NRC inspectors had literally thousands of opportunities over these two decades to catch this error, but all failed to do so. This fiasco is documented in our February 2007 report, "Futility at the Utility: How use of the wrong answer key for safety tests went undetected for 20 years at Fermi Unit 2," available online at http://www.ucsusa.org/clean_energy/nuclear_safety/two-decades-of-missed.html

- From 1996 until 2005, repeated leaks from the discharge line at the Braidwood nuclear plant in Illinois dumped more than 6 million gallons of radioactively contaminated water into the ground, some of which migrated offsite and into the drinking wells of nearby homeowners. Although federal regulations prohibit the unmonitored and uncontrolled release of radioactive air or liquid to the environment, the NRC intentionally opted to ignore those regulations and instead apply regulations governing monitored and controlled releases. In doing so, the NRC verified that Braidwood met the regulation that did not apply to the situation. That's nice, but irrelevant.

- From around 1999 to 2002, borated water leaked through a cracked nozzle at the Davis-Besse reactor in Ohio causing extensive damage to its reactor vessel lid. Although regulations require a reactor to shut down within 6 hours when such leakage occurs and both the owner and the NRC agreed in early October 2001 that one or more nozzles was leaking, the reactor was allowed to continue operating for roughly 500 times longer than permitted by the safety regulations.

- Beginning in 2002, the NRC conducted more than a dozen targeted inspections at reactors seeking approval for extended power uprates (i.e., more than a 7 ½ percent increase in the maximum licensed power level). The NRC inspectors never identified a single problem at any reactor. Since 2002, reactors for which the NRC has approved extended power uprates have experienced many uprate-related problems that forced the

reactors to shut down or operate at reduced power levels. We do not expect the NRC to have found and prevented all these problems, but they certainly can be faulted for not finding even one among so many serious problems.

- On January 31, 2006, the NRC ordered that emergency sirens for the Indian Point nuclear plant in New York be provided with back-up power supplies by January 30, 2007. On January 23, 2007, the NRC relaxed the order to give the owner until April 15, 2007, to provide the back-up power supplies for the sirens. On April 23, 2007, the NRC proposed a civil penalty of $130,000 because the April 15th deadline had passed without compliance to the order. The company paid the fine and committed to comply with the order by August 24, 2007. The company did not meet the August 24th date, either. The NRC's regulations permit a civil penalty of $130,000 to be levied for each day of a continuing violation. Indian Point has been in violation of the NRC's order, as revised, since April 15, 2007, yet the NRC opted to ignore its own regulations and instead apply a one-time fine of merely $130,000. The NRC is not an aggressive enforcer of regulations, it is a meek and mild enabler of non-conforming behavior.

- During FY 2006, the owners of operating nuclear reactors provided the NRC with the results on 1,854 performance indicators. These performance indicators constitute a large part of the NRC's reactor oversight process for monitoring safety levels. The performance indicators parse safety levels into four color-coded bins: green, white, yellow, and red in order of increasing significance. During FY 2006, 99.4 percent of the performance indicators were green. But the actual safety levels at the reactors did not warrant such green-washing. In the 4th quarter 2006 Action Matrix, 30 of the 103 reactors were identified as requiring heightened NRC attention due to performance problems. The performance indicators have morphed into entirely useless measures that allow genuine safety problems to be undetected until they surface via other means.

- In the current license renewal proceeding involving the Oyster Creek reactor in New Jersey, the intervener's expert witness calculated that the thickness of the containment's steel liner was less than that allowed by the American Society of Mechanical Engineers (ASME) code, which the NRC formally adopted within its regulations. The NRC reacted to this finding by claiming that complying with the ASME code did not matter because the NRC thought – without providing any supporting documentation – that the thickness was good enough. In doing so, the NRC essentially established a safety bar and finds above the bar and below the bar to be acceptable.

Any one of the above regulatory breakdowns warrants a failing grade on this criterion. The presence of them all, along with many additional examples, explains why the NRC received a failing grade on the next criterion, public confidence.

### ☹ PERFORMS ITS REGULATORY FUNCTIONS IN A TIMELY AND COST-EFFECTIVE MANNER AS WELL AS IN A MANNER THAT ENSURES THE CONFIDENCE OF THE OPERATING ORGANIZATIONS, THE GENERAL PUBLIC, AND THE GOVERNMENT

There is considerable talk on Capitol Hill and around the country about Independent Safety Assessments (ISAs). UCS considers this talk to reflect lack of confidence in the NRC. After all, if the NRC had the trust and confidence of the public and the government, there would be little

interest on the part of the Governors, Public Service Commissions, and public in a special, extraordinary safety inspection at their nuclear reactor.

In addition to this ISA barometer of confidence in NRC, there are plenty of other indicators showing the NRC deserves a failing grade for this criterion. The States of Massachusetts, New Jersey, New York, and Vermont have legally intervened opposing changes at the nuclear reactors in their states that the NRC supports. Again, if these states had confidence that the NRC was an effective regulator adequately protecting the health of their residents, such interventions would not occur. Because this lack of confidence is real, UCS supports bill S.1008 introduced by Senator Bernie Sanders as a means to restore confidence in the NRC as a reliable guardian of public health and safety.

Senator James M. Inofe, Ranking Member of the Committee, spoke directly to the public confidence issue in his July 13, 2007, letter to NRC Chairman Dale E. Klein:

> *Unfortunately, there has been a considerable lack of communication on the part of the Commission. In particular, I am referring to the leak of high-enriched uranium at the Nuclear Fuel Services plant in Erwin, Tennessee. This event happened prior to your chairmanship, but the communication failure continued well after you assumed the helm. I am both surprised and sorely disappointed.*
>
> *The foundation of the Commission's credibility is the public's trust. That foundation is shaken when events like these are obscured by the Commission's lack of disclosure. While there may be aspects of Nuclear Fuel Services' activities that should rightly be withheld from the public domain, clearly the secrecy over the event's mere occurrence is beyond any reasonable definition of openness.*

Like Senator Inofe, we were disappointed by the NRC's behavior in this matter. But there is a silver lining. In a letter dated one week prior to Senator Inofe's letter (attachment 1 to this testimony), UCS commended Commissioner Gregory B. Jaczko for his role in causing the Nuclear Fuel Services event to be publicized, albeit belatedly. His efforts reminded us that while the NRC's document vetting process has to be non-public, it is encouraging that there are dedicated individuals at the NRC guarding against and correcting wrong calls.

### 😐 STRIVES FOR CONTINUOUS IMPROVEMENTS IN ITS PERFORMANCE

If this criterion were "Attains continuous improvements in its performance," the NRC would get a failing grade. The regulatory shortfalls cited above happen year-in and year-out with little evidence of abatement that would result from continuous improvements in performance.

But this criterion is merely striving for continuous improvements. The NRC has many self-assessment processes and some formal solicitations of external stakeholder comments about its regulatory programs, suggestive of an agency striving for improvement.

But chronic inability to consider these self-assessments and external comments is hardly basis for a passing grade, even when the criterion is merely striving for continuous improvements. Thus, UCS believes the NRC should get a non-passing, non-failing grade.

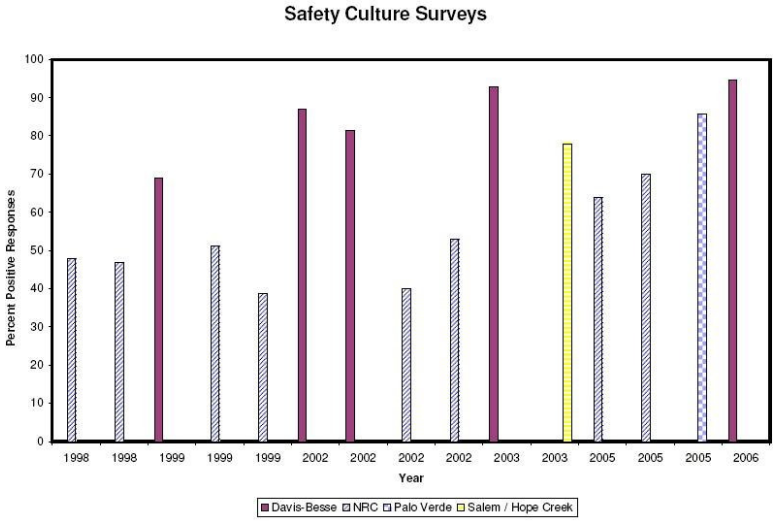
## THE REFORMS NEEDED AT NRC

The NRC today is very much like FirstEnergy was when the depths of the problems at Davis-Besse were discovered in 2002, or like Arizona Public Supply System was when the extent of problems at Palo Verde were discovered in 2005, or like Northeast Utilities was when problems at Millstone surfaced in 1996, or like Indiana Michigan Power Company was when problems at D C Cook arose in 1999, or like PSEG was when problems at Salem and Hope Creek were identified in 2004, or like the Tennessee Valley Authority was when problems at Sequoyah and Browns Ferry cropped up in the mid 1980s, or like any one of a dozen other companies were when their shortcomings were detected. The solutions at FirstEnergy, Arizona Public Supply System, Northeast Utilities et al involved two common threads: (1) bringing in senior managers from outside the organization to become the catalysts needed to drive the necessary reforms, and (2) improving the safety culture so the entire work force – management and labor – share the proper focus on safety.

But while the NRC suffers from the same chronic performance malaise, it has never received the same treatment. Thus, while Davis-Besse, Millstone, and others are operating today at higher performance levels than in their problem years, NRC remains at the same level it has been at for the past decades. No better, no worse, no excuse.

For the same reasons it happened at FirstEnergy and elsewhere, the NRC cannot reform until senior managers are brought in from the outside. These new senior managers are not necessarily smarter than those they replace, but they are free of the baggage that in-house managers carry with them. In-house managers are shackled by the inertia of always having done it a certain way. In addition, it is hard for in-house managers to be agents of change because every reform they undertake carries an implicit concession of their past sins. Outside managers are free from these impairments and can more readily implement the necessary reforms. It worked at Davis-Besse, Palo Verde, Millstone, D C Cook, et al. The NRC will never get out of its performance rut without senior managers brought in from the outside to blaze a different path and herd folks along it.

The second remedy involves safety culture improvements. With a good safety culture, workers can identify problems without fear of retaliation and with confidence the problems will be properly fixed in a timely manner. This Subcommittee compelled the NRC to do a better job of evaluating safety culture at reactor sites and responding appropriately when problems were indicated. It is now time for the NRC to hold this safety culture mirror up to itself and undertake the same corrective measures. The NRC's safety culture appears worse than that ever measured at Davis-




**Safety culture surveys record workers' answers to questions like "I can raise safety concerns without fear of retaliation." If all worker answered "yes," the score would be 100. If half of the workers answered "yes," the score would be 50.**

**The 2002 surveys at Davis-Besse were conducted after the near-miss was discovered.**

**The NRC's survey results lagged far behind the surveys at Davis-Besse.**

Besse or other plagued sites. In fact, although the Davis-Besse plant was physically ready to restart in the fall of 2003, the NRC determined that its safety culture had not yet sufficiently improved. The NRC did not approve restart of Davis-Besse until March 2004. Ironically, the safety culture at Davis-Besse in the fall of 2003 was substantially better than ever measured at NRC. Likewise, the safety culture measured at Salem and Hope Creek that compelled the NRC to write to the PSEG Chief Executive Officer in January 2004 to compel reforms was better than that measured at NRC. If it's vital that the owner of a single reactor have a good safety culture before restarting that reactor, it's equally vital that the regulator of 104 reactors have a good safety culture.

## CONCLUSION

The Nuclear Energy Agency defined four attributes of an effective nuclear regulator. The NRC clearly possesses one of those attributes in having established regulations that set the safety bar at the proper height. The NRC just clearly lacks two attributes in failing to effectively enforce its safety regulations which results in a lack of confidence in the agency. The NRC neither passes nor fails the fourth attribute because it has processes seeking continuous improvement in its performance but never realizes any of those sought after gains.

In many ways, the NRC resembles the organizations responsible for serious safety problems at Davis-Besse, Millstone, Salem, Palo Verde, and elsewhere. Those organizational problems were remedied when outside senior managers were brought in to take the necessary reform steps and instill a good safety culture. By not taking these same remedies, the NRC is unable to cure itself of the same disease.

The NRC helped these organizations on the road to reform. The Congress must help the NRC embark upon its own road to reform. Just as true performance turnarounds resulted from the reforms undertaken at Davis-Besse et al, the NRC can be reformed into an effective regulator. In doing so, Americans will not receive nuclear power at higher cost and lower safety as they have in the past.

On behalf of the Union of Concerned Scientists, I thank you for conducting this hearing and for including our perspective. We look forward to the steps you take to bring about the reforms needed at NRC.

## AFTERWORD

Although not directly related to the subject of today's hearing – the NRC's reactor oversight process for existing reactors – we want to bring to the Subcommittee's attention two concerns related to the NRC's current plans for new reactors.

First, we are concerned about the NRC's plans to train its staff who will be conducting the safety and environmental reviews for new reactors. UCS attended the April 17, 2007, briefing on new reactors conducted by the NRC Commissioners. We asked about plans for training for all the new staff who would be performing tasks they had never done before or not done in decades. We anticipated the answer would include a role played by the NRC's technical training center outside Chattanooga, Tennessee. We were both surprised and disappointed to receive an answer

that was exclusively confined to on-the-job training. We see an important role for on-the-job training. We see it as mortar to fill in the gaps between formal training bricks. The NRC plans a wall of mortar. We hope the Subcommittee will help the NRC abandon this notion and significantly ramp up the formal training provided to staff that will be working on new reactor issues.

Second, we are concerned about the NRC's plans to out-source safety and environmental reviews of new reactor applications to private companies. This would be an outrageous error of judgment on the NRC's part. As Congressman Edward J. Markey stated in his September 24, 2007, letter to NRC Chairman Dale Klein:

> *If Congress has intended to allow private companies to regulate private companies in the extraordinarily sensitive nuclear sector, we would not have established the NRC.*

During the aforementioned April 17, 2007, Commission briefing on new reactors, the NRC staff informed the Commissioners that they would be out-sourcing the reviews to contractors. But the discussion and very clear implication throughout that briefing (transcript available online at http://www.nrc.gov/reading-rm/doc-collections/commission/tr/2007/20070417a.pdf) was that the talented and capable staffs at our national laboratories, like Argonne, Brookhaven, Sandia, and Pacific Northwest Nuclear, would provide the NRC with this supplemental work force. Instead, the NRC wants to farm out safety and environmental reviews for new reactors to private companies. We hope the Subcommitte will get the NRC to halt this unwise step before it is taken.