



# Union of Concerned Scientists

Citizens and Scientists for Environmental Solutions

## THE NRC'S "TWO-EDGED" RISK-INFORMED SWORD: RAZOR SHARP ON ONE SIDE, NERF-LIKE ON THE OTHER

The Nuclear Regulatory Commission (NRC) often talks about wielding a two-edged sword when making risk-informed regulatory decisions:

Thomas King, NRC Office of Research

*With that, let's turn to Slide 4 and talk about the objectives of the Part 50 modification and why are we proposing to modify Part 50 at all to be risk-informed. The paper defines three specific objectives, and these are summarized on Slide 4.*

*The first one is to enhance safety by focusing NRC and licensee resources in areas commensurate to their importance to safety. Now, as you talked about earlier, this is a two-edged sword. This means some things could be removed from regulation that aren't important and other things could be brought in. In that sense, it can improve safety and it can reduce unnecessary burden.<sup>1</sup>*

Shirley A. Jackson, NRC Chairman

*My position certainly is that the chips have to fall where they may and that you don't walk down one side of the street with risk-informed regulation. And the point has to be made, and it has to be reinforced by the Commission, that if we find opportunities for "unnecessary burden reduction" we will allow licensees to take advantage of that if the use of, you know, a risk-informed approach leads us to that. On the other hand, if that same approach uncovers an area where there is real risk that we heretofore had not been fully aware of or taken into account, then we have to deal with that and they have to deal with that.*

*I think we do have to look at the application of the backfit rule within that context and not have it thrown up as a basis never to have us be able to have both edges of the two-edged sword of risk-informed regulation.<sup>2</sup>*

Edward McGaffigan, Jr., NRC Commissioner

*On backfit considerations, I agree with the staff that a voluntary alternative does not require a formal backfit analysis. It is permissible, as stated in the SECY, for risk-informed alternative rules to "include a combination of elimination, modification, and addition of requirements" without a backfit analysis. Indeed, this is central to the "two-edged sword" of risk-informed regulation.<sup>3</sup>*

The NRC is not backing up these statements with actions. In fact, the regulatory fiasco that is Davis-Besse strongly suggests that the NRC's risk-informed sword is razor-sharp on the side that cuts regulatory requirements but is dull as a NERF knife on the side that imposes requirements.

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<sup>1</sup> Presentation on January 11, 1999, by Thomas King, NRC Office of Research to Chairman and Commissioners, Nuclear Regulatory Commission, "Briefing on Risk-Informed Initiatives," transcript p. 21 line 25 to p. 22 line 12.

<sup>2</sup> Nuclear Regulatory Commission gathering on June 15, 1999, "All Employees Meeting B," transcript page 48 lines 10 to 24.

<sup>3</sup> Comments of Commissioner Edward McGaffigan, Jr., in Nuclear Regulatory Commission Voting Record dated January 19, 2001, "SECY-00-0198 - Status Report o Study of Risk-Informed Changes to the Technical Requirements of 10 CFR Part 50 (Option 3) and Recommendations on Risk-Informed Changes To 10 CFR 50.44 (Combustible Gas Control)."

## THE NRC'S "TWO-EDGED" RISK-INFORMED SWORD: RAZOR SHARP ON ONE SIDE, NERF-LIKE ON THE OTHER

After cracks and through-wall leaks in control rod drive mechanism (CRDM) nozzles and thermocouple penetrations were discovered at the Oconee nuclear plant, the NRC required all owners of pressurized water reactors to evaluate potential reactor vessel head penetration cracking at their plants.<sup>4</sup> The NRC staff reviewed the evaluations for sixty-nine (69) pressurized water reactors and identified approximately a dozen with high vulnerability. The NRC sought to have the reactor vessel head penetrations for these highly vulnerable reactors inspected by December 31, 2001.

When the owner of the Davis-Besse nuclear plant did not accept NRC's considered invitation to shut down its reactor by the end of last year for the prescribed inspections, the NRC staff drafted an order requiring the reactor to be shut down:

*"The core basis for the proposed DB [Davis-Besse] order is the safety concern that there is a high likelihood, given the experience at other similar facilities, that DB could have significant circumferential cracking that could result in a LOCA [loss of coolant accident]. There are compliance issues, e.g., the tech specs, GDC and Appendix B, but the safety issue is the driving force for the proposed DB order."*<sup>5</sup>

Senior management at Davis-Besse did not dispute the NRC's conclusion that CRDM nozzles were probably cracked and leaking:

*"I told him [Guy Campbell, FirstEnergy Vice President in charge of Davis-Besse] that based on the operating experience there is a high likelihood that they have leaks – he agreed. I told him that reactor coolant pressure boundary leakage would not satisfy the regs or tech specs, that it would eliminate fail to maintain defense in depth and margins, and that there could be crack large enough to cause them problems before April."*<sup>6</sup>

The NRC thought it had sufficient grounds for immediate shut down, but graciously planned to allow Davis-Besse to operate until the end of last year:

*"As Larry Chandler [NRC Office of General Counsel] and Sam [Collins, Director of the NRC's Office of Nuclear Reactor Regulation] also said, we could have made an argument for immediate shutdown, but we are exercising discretion in allowing them to go to December 31<sup>st</sup>, but not beyond."*<sup>7</sup>

"...but not beyond" were words that embodied two-edged saber rattling. The NRC allowed Davis-Besse to operate beyond December 31, 2001, despite uncontested conclusions that:

*"It is likely that, if inspections were performed today, current regulations would not be met with respect to TS [Technical Specification] requirements and GDC [general design criteria]"*

and

*"It is likely that one of 3 barriers is degraded"*

and

*"It is likely that safety margins are reduced"*<sup>8</sup>

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<sup>4</sup> Nuclear Regulatory Commission, Bulletin No. 2001-01 dated August 3, 2001, "Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles."

<sup>5</sup> Allen Hiser, Nuclear Regulatory Commission, e-mail to Brian Sheron and Stacey Rosenberg, Nuclear Regulatory Commission, dated November 27, 2001, 12:03 pm, "Re: Fwd: Davis Besse Order."

<sup>6</sup> Jack Strosnider, Nuclear Regulatory Commission, e-mail to Steven Long and others, Nuclear Regulatory Commission, dated November 8, 2001, 6:02 pm, "After Meeting Discussions."

<sup>7</sup> Brian Sheron, Nuclear Regulatory Commission, e-mail to Brian McCabe, Joseph Shea and Stacey Rosenberg, Nuclear Regulatory Commission, dated November 15, 2001, 7:06 pm, "Re: Follow-up Question – CRDM."

<sup>8</sup> Nuclear Regulatory Commission, Slides from Presentation to Commissioners' Technical Assistants on November 30, 2001, "Status of NRC Staff Review of FENOC's Bulletin 2001-01 Response for Davis-Besse."

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The subject Technical Specification required Davis-Besse to be down within six (6) hours of the inception of reactor coolant pressure boundary leakage.<sup>9</sup> The plant continued operating into January and then February 2002 despite a consensus in early November 2001 that it was most likely in a six-hour limiting condition for operation. Why didn't this consensus trigger a shut down?

*"We can argue this, but this agency does not take precipitous action to shut down a nuclear plant because we have a suspicion of something without enough evidence to warrant it,"* said Brian Sheron, who, as an associate director in the NRC's office of nuclear reactor regulation, helped lead the staff evaluation of Davis-Besse. *"If we were in the same situation again, we'd probably make the same decision"* to allow them to operate until Feb. 16.<sup>10</sup>

Thus, the plant's owner and the regulator agreeing there was a "high likelihood" of reactor coolant pressure boundary leakage did not, and apparently would still not, constitute "enough evidence to warrant" shut down of a nuclear plant — the six-hour requirement to do so notwithstanding. The consensus apparently raised merely a "suspicion of something" awry.

Fair enough, provided the plant's owner and the regulator applied the same high evidentiary standard when justifying continued operation. But both accepted a significantly lower standard. To justify deferring the planned end of year shut down, the plant's owner proposed to reduce the operating temperature of the reactor, to dedicate an operator to the switchover of emergency pumps to long-term recirculation mode, and to defer maintenance on the high-pressure and low-pressure safety injection systems until the next refueling outages. The plant's owner claimed each of these three commitments would reduce the risk by approximately 16 percent.<sup>11</sup>

But the NRC knew, or should have known, the utter fallacy of these claims:

Reduced Operating Temperature: The NRC assessed the value of the proposed commitment and reported *"Based on the attached calculation, it does not appear that EMCB would require any discussions with Davis-Besse on Wednesday regarding the effects of reducing operating temperature prior to their next outage, because the effects are negligible within the time frame discussed by the licensee."*<sup>12</sup> So, the NRC knew that the commitment did not lower risk by 16 percent before it approved the shut down deferral.

Dedicated Operator for Switchover: The NRC assessed the value of the proposed commitment and reported *"From talking to operating crews in the past, the switchover to recirculation is such a critical action that the whole control room crew is focused on it when it occurs. It seems the most the "dedicated operator" could add is another pair of eyes to watch the RWST level and other indications. I can't imagine this would result in a significant increase in safety, particularly since there appears to be no reason that he be in the control room, though I suppose if this is a medium to small LOCA, he would have time to get there."*<sup>13</sup> So, the NRC knew that the commitment did not lower risk by 16 percent before Davis-Besse entered the deferral period.

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<sup>9</sup> Davis-Besse Technical Specification Limiting Condition for Operation 3.4.6.2 and association Action (a).

<sup>10</sup> John Mangels and John Funk, "NRC's Flip-Flop," *Plain-Dealer*, August 4, 2002.

<sup>11</sup> Letter dated November 30, 2001, from Guy C. Campbell, Vice President – Nuclear, FirstEnergy Nuclear Operating Company, to Nuclear Regulatory Commission, "Supplemental Information in Response to the November 28, 2001 Meeting Regarding the Davis-Besse Nuclear Power Station Response to NRC Bulletin 2001-01."

<sup>12</sup> Allen Hiser, Nuclear Regulatory Commission, e-mail to Stephen Sands, Nuclear Regulatory Commission dated November 26, 2001, 4:30 pm, "Fwd: Davis-Besse Operating Temperature Change."

<sup>13</sup> Gareth Parry, Nuclear Regulatory Commission, e-mail to Steven Long, Nuclear Regulatory Commission, dated December 13, 2001, 8:44 am, "Fed: Re: Inspections of Davis-Besse's commitments."

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Postponed Safety System Maintenance: The NRC has granted numerous license amendments and inspected numerous activities involving on-line maintenance of safety systems. The NRC's position is that the reduction in system availability from on-line maintenance is offset, perhaps even exceeded, by the increase in system reliability from the maintenance. It stands to reason, therefore, that postponing safety system maintenance increases availability at the sake of reducing reliability. If deferring said maintenance actually lowered risk by 16 percent over an eight-week interval as claimed by the plant's owner, then conducting such maintenance with the reactor operating—as the NRC permits at nuclear plants across the United States— would increase risk by considerably more than 16 percent over the plants' 18-month and 24-month operating cycles. So, the NRC either knew that the commitment did not lower risk by 16 percent or that it has repeatedly allowed nuclear power plants across the United States to operate at higher risk.

The NRC balanced its probabilistic information that Davis-Besse had leaking CRDM nozzles with its probabilistic information that three commitments significantly lowered risk. The NRC concluded that the CRDM leakage information did not constitute "enough evidence" to be acted upon. Yet the NRC concluded that the risk reduction information, which its own staff soundly refuted, was indeed "enough evidence." Enough is enough!

Davis-Besse epitomizes the fact that the NRC's self-proclaimed two-edged sword is razor-sharp on the side used to slice and dice regulatory requirements but is NERF-like on the side it would use to enforce regulatory requirements. The NRC should keep its sword in its scabbard until it achieves parity: both sides razor-sharp or both sides NERF-like. If it takes incontrovertible evidence for the NRC to impose a requirement, then it must also take incontrovertible evidence for the NRC to relax a requirement. When the NRC declines to act based upon a "suspicion of something," that inaction must be consistent with respect to enforcing and eliminating requirements.

We may not be so lucky as we were this time at Davis-Besse if the NRC continues with its "business as usual" swordsmanship.

Presentation by David Lochbaum, Nuclear Safety Engineer for the Union of Concerned Scientists, at the NRC's Nuclear Safety Research Conference, October 30, 2002.