

**BEYOND NUCLEAR
NORTH CAROLINA WASTE AWARENESS & REDUCTION NETWORK
UNION OF CONCERNED SCIENTISTS**

VIA MAIL & EMAIL

May 5, 2010

Hubert Bell
Inspector General
Office of the Inspector General
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Re: Petition to Issue Show Cause Order (Fire Protection)

Dear Mr. Bell:

The organizations listed above are petitioning your office to issue a show cause order to the Nuclear Regulatory Commission (“NRC”) to justify the rationale the agency staff are using to allow the operators of nuclear power plants to disregard rules for fire protection in direct contradiction of its own regulations. Fires are the leading safety risk at operating nuclear reactors.

As part of your jurisdiction, this matter falls under the “failure by NRC management to ensure that health and safety matters are appropriately addressed.” We recommend that your investigation address both the conduct of the individuals within the agency that have allowed the fire protection laws to be circumvented as well as identify the institutional weaknesses and regulatory lapses that have allowed this problem to occur.

This investigation should be fast-tracked as it is our understanding from recent discussions with Chairman Jaczko and the NRC Staff that the agency is prepared to issue a license amendment to the Shearon Harris Nuclear Power Plant (“Harris”) in the near future. This license amendment allows Harris to base its fire protection on a new “pilot project” of risk-based fire protection rather than follow the NRC rules requiring fire barriers, cable separation and other fire prevention measures pursuant to 10 CFR 50.48 and Appendix R.¹

The fundamental function of the NRC rules is to protect public health and safety; this has been the long-standing policy of the NRC going back to its inception. In 1973, the Atomic Safety and Licensing Appeal Board stated in the Vermont Yankee proceeding:

Nor can [the applicant or the NRC staff] avoid compliance by arguing that, although an applicable regulation is not met, the public health and safety will still be protected. For, once a regulation is adopted, the standards it embodies represent the Commission's definition of what is required to protect the public health and safety.

We have been following the continuing violations of the fire protection standards at Harris. After years of noncompliance, the groups prepared a report, "*Delaying with Fire: The Shearon Harris Nuclear Plant and 14 Years of Fire Safety Violations*," 2006.² This report provided the basis for a 2.206 Petition filed with the NRC Director in September 2006 requesting an investigation of the continuing deficiencies in Harris's compliance with fire safety. During its review, the NRC staff admitted that the plant was out of compliance and that they no longer even inspect the cable trays because the staff knew that they are out of compliance.

The NRC Office of Inspector General also issued a report on January 22, 2008, "*NRC's Oversight of Hemyc Fire Barriers*," Case 05-46, that criticized the agency's acquiescence in allowing fire protection deficiencies to linger.

The ongoing deficiencies were also the subject of a study by the Government Accountability Office (GAO), "*Nuclear Safety: NRC's Oversight of Fire Protection at U.S. Commercial Nuclear Reactor Units Could be Strengthened*,"³ requested by Representative David Price. That report concluded that the NRC had allowed the plants to be out of compliance since 1994.

In response to these investigations, the agency then allowed Harris, and Duke Energy's Oconee Plant, to initiate pilot projects to conduct a risk assessment pursuant to NFPA 805, rather than ordering compliance.⁴ NRC Staff directed the pilot projects to use guidance document NUREG 6850, "*Fire PRA Methodology for Nuclear Power Facilities*," to calculate electric cable ignition and flame spread. The authors of NUREG 6850, which include representatives from Sandia National Labs, NRC and the Electric Power Research Institute, emphasize that the models have not been verified or validated, that it reflects only experimental conditions, and that it cannot be relied on in real world conditions. They also note that NUREG 6850 reflects that "cables are probably the most common combustible in nuclear power plants."

Being able to predict how quickly cables catch fire, and how fast a fire spreads to secondary fire sources, are central elements of NFPA 805, "*Performance-Based Standard for Fire Protection for Light Water Reactor Electrical Generating Plants*," 2001.

One of the fundamental and ongoing hurdles in the NFPA 805 process is the preparation of models that could be used to assess the risk of fires leading to the unsafe shutdown of the reactors. The rules are quite clear that the models used are required to be validated and verified so that the risk from fire in cable trays and other sensitive pathways could be assessed. Without reliable models, the risk is unknown and unknowable and the process becomes little more than a charade.

Only verified and validated models are acceptable for NFPA 805 assessments. NFPA 805, Section 2.4.1.2, states "only fire models acceptable to the Authority Having Jurisdiction (AHJ) shall be used in fire modeling calculations." Sections 2.4.1.2.2 and 2.4.1.2.3 state "fire models shall only be applied within the limitations of the given model" and "the fire models shall be verified and validated." Section 2.7.3.2 concludes "each calculation model or numerical method used shall be verified and validated through comparison to test results or comparison to other acceptable models."

In a series of studies and reviews, the risk-based fire models have been found to be unvalidated and unverified. In NUREG 1824, published in May 2007, the NRC reviewed the five fire models developed in the NFPA process, and found none of them appropriate for use. As shown in the attached table, the models were inconsistent for most of the parameters, or under-predicted or over-predicted the results.⁵

Moreover, scientific review panels, with NRC Staff participating, have severely criticized the risk models presented by Harris. The Phenomena Identification and Ranking Table (PIRT) panel was facilitated by the Sandia National Laboratories and developed NUREG 6978, November 2008. Many of the modeling issues were deemed by the panel of critical importance and at the same time, it found the models inadequate in many respects.

The International Collaborative Fire Modeling Project, another panel of fire science experts including representatives from the NRC and National Institute of Standards and Technology, conducted a series of benchmark experiments. This panel criticized the fire protection models used by the NRC because they did not consider radiative heat transfer, a significant contribution to thermal load.

In an NRC briefing on fire protection issues held on July 17, 2008, Commissioner Jaczko declares that unapproved operator manual actions are "simply unacceptable for a regulator." Page 32, line 21. He then states that he does not "think there is one plant right now that is in compliance with those regulations that doesn't rely on unapproved operator manual actions." Page 33, lines 12-14. "Compliance" relying on the unapproved operator manual actions was exchanged for "compliance" relying on unvalidated and unverified models. The outcome is still the same – noncompliance with Federal safety regulations protecting public health and safety.

The NRC's regulatory position has continued to evolve – if after 18-plus years of noncompliance, an operator who does not want to comply with the prescriptive

standards for fire protection, can try unreviewed fire patrols, and then when those prove inadequate, it can then go into a multi-year, risk-based pilot project, and then if the models it uses are faulty, the operator is allowed to ignore another set of standards. This backsliding is not just leading to inadequate fire protection at the two reactors in the pilot projects, but to other operating reactors and likely to the proposed reactors under application review.

This is the "NFPA 805 trap," in that the NRC is allowing the nuclear plant operators another free ride because they have "assessed" the fire problem, rather than fixing it. The NRC rules require that the models cannot be relied upon until they are validated and verified. To date, the risk-based fire models have not been validated or verified.

As shown in the attached correspondence, we raised the issue in a meeting with Chairman Jaczko and his staff on March 17, 2010. To date, we have not heard a reply to our specific concerns nor has the agency provided its rationale for using invalid and unverified models.

Recently we were alarmed to discover that the NRC may issue the license amendment to Harris in the near future. It appears that this license amendment will be issued even though the fire risk models will not be validated and verified. There is no justification for the NRC to allow an unreliable and unlawful process to be substituted for its own rules.

We therefore petition your office to investigate this serious breach by the NRC in not requiring that the NRC rules are followed. Any risk-based assessment of fire protection should be a legitimate process.

Please contact us at the addresses below on any action you take on this matter.

Sincerely,

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Enc.

Endnotes

1. 10 CFR 50, Appendix R, III.G.2. prescribes three acceptable methods of protecting at least one shutdown train during a postulated fire when redundant trains are located in the same fire area: 1. separation of the redundant system by a passive barrier able to withstand a fire for at least three hours; or 2. Separation of the redundant system by a distance of twenty feet containing no intervening combustible material, together with fire detectors and an automatic fire suppression system; or 3. Separation of the redundant system by a passive barrier able to withstand a fire for one hour, coupled with fire detectors and an automatic fire suppression system.
2. Available at www.ncwarn.org/pdf/WP%20DELAYING%20W%20FIRE%20REP.pdf
3. GAO-08-747, available at <http://www.gao.gov/new.items/d08747.pdf>
4. The GAO study also questioned the ability of the plants to convert to a risk-based assessment under NFPA 805. This concern has come to fruition given the problems in finding reliable risk-based models for the assessment.
5. NUREG 1824, Vol. 1, May 2007, Table 3-1.

Parameter		Fire Model				
		FDT	FIVE R1	CFAST	MAGIC	FDS
Hot gas layer temperature (upper layer temperature)	Room of Origin	YELLOW +	YELLOW +	GREEN	GREEN	GREEN
	Adjacent Room	n/a	n/a	YELLOW	YELLOW +	GREEN
Hot gas layer height (layer interface height)		n/a	n/a	GREEN	GREEN	GREEN
Ceiling jet temperature (target/gas temperature)		n/a	YELLOW +	YELLOW +	GREEN	GREEN
Plume temperature		YELLOW -	YELLOW +	n/a	GREEN	YELLOW
Flame height		GREEN	GREEN	GREEN	GREEN	YELLOW
Oxygen concentration		n/a	n/a	GREEN	YELLOW	GREEN
Smoke concentration		n/a	n/a	YELLOW	YELLOW	YELLOW
Room pressure		n/a	n/a	GREEN	GREEN	GREEN
Target temperature		n/a	n/a	YELLOW	YELLOW	YELLOW
Radiant heat flux		YELLOW	YELLOW	YELLOW	YELLOW	YELLOW
Total heat flux		n/a	n/a	YELLOW	YELLOW	YELLOW
Wall temperature		n/a	n/a	YELLOW	YELLOW	YELLOW
Total heat flux to walls		n/a	n/a	YELLOW	YELLOW	YELLOW

GREEN

The model is appropriate for the parameter being examined and calculated results agree with experimental results. "A grade of GREEN indicates the model can be used with confidence to calculate the specific attribute."

YELLOW

The model is appropriate for the parameter being examined but the calculated results under-predict and over-predict results obtained by experimentation with no consistent pattern.

YELLOW -

The model is appropriate for the parameter being examined but the calculated results consistently under-predict results obtained by experimentation.

YELLOW +

The model is appropriate for the parameter being examined but the calculated results consistently over-predict results obtained by experimentation.

n/a

The validation and verification effort did not investigate this capability.

Source: Nuclear Regulatory Commission NUREG-1824 Vol. 1, May 2007, Table 3-1