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General Comment

See file attached/uploaded.

Attachments

20191003-lochbaum-comments-rop-changes

Comments on Reactor Oversight Process Enhancement Initiative
NRC-2019-0155

The NRC staff in SECY-19-0067 (ML19070A050) often referred to the agency's Principles of Good Regulation. For example:

> *The staff worked with the NRC's Office of Public Affairs to reinforce the existing guidance with respect to issuing press releases for White inspection findings. Guidance states that press releases are not normally issued for White inspection findings; however, the guidance was inconsistently applied.* ***This effort aligns with the clarity and reliability Principles of Good Regulation****.* (page 5, boldfacing added for emphasis)
>
> *The Column 2 outreach to external stakeholders would be revised from the current "State Governors" to "outreach to State, local, and Tribal officials based on established protocols with external stakeholders," with no proposed change to required notification for security-related issues.* ***This change is consistent with the openness and clarity principles of good regulation.*** (page 6, boldfacing added for emphasis)
>
> *The revised lower range is to realign with the original estimates to close uncomplicated White inputs, while the upper range applies to more complicated issues, or when multiple White Action Matrix inputs overlap.* ***This change is aligned with the efficiency principle of good regulation.*** (page 6, boldfacing added for emphasis)
>
> ***The elimination of the minimum four-quarter requirement is consistent with the efficiency and reliability Principles of Good Regulation.*** (page 7, boldfacing added for emphasis)

It is troubling that the NRC staff bases recommendations on things being consistent with one, or perhaps two, of the Principles of Good Regulation. After all, there are five principles. The NRC staff should strive to conform to all five principles, not a small subset.

After all, U.S. laws give accused persons the right to speedy and fair trials. Police could truly contend that shooting and killing a suspect en route to his or her arraignment was consistent with speediness goal. But it would lose points big-time on the fairness goal.

The NRC staff must stop cherry-picking among the five principles to cite the one that affords it the best excuse for whatever roll-back of oversight and relaxation of requirements it seeks to slip through. When and if the Principles of Good Regulation are invoked, it would be consistent with the openness principle to show how all five principles are met.

Principles of Good Regulation

As a responsible regulator with a very important safety and security mission, our values guide us in maintaining certain principles in the way we carry out our regulatory activities. These principles focus us on ensuring safety and security while appropriately balancing the interests of the NRC's stakeholders, including the public and licensees. The following table briefly describes these principles.

Independence:	Nothing but the highest possible standards of ethical performance and professionalism should influence regulation. However, independence does not imply isolation. All available facts and opinions must be sought openly from licensees and other interested members of the public. The many and possibly conflicting public interests involved must be considered. Final decisions must be based on objective, unbiased assessments of all information, and must be documented with reasons explicitly stated.
Openness:	Nuclear regulation is the public's business, and it must be transacted publicly and candidly. The public must be informed about and have the opportunity to participate in the regulatory processes as required by law. Open channels of communication must be maintained with Congress, other government agencies, licensees, and the public, as well as with the international nuclear community.
Efficiency:	The American taxpayer, the rate-paying consumer, and licensees are all entitled to the best possible management and administration of regulatory activities. The highest technical and managerial competence is required, and must be a constant agency goal. NRC must establish means to evaluate and continually upgrade its regulatory capabilities. Regulatory activities should be consistent with the degree of risk reduction they achieve. Where several effective alternatives are available, the option which minimizes the use of resources should be adopted. Regulatory decisions should be made without undue delay.
Clarity:	Regulations should be coherent, logical, and practical. There should be a clear nexus between regulations and agency goals and objectives whether explicitly or implicitly stated. Agency positions should be readily understood and easily applied.
Reliability:	Regulations should be based on the best available knowledge from research and operational experience. Systems interactions, technological uncertainties, and the diversity of licensees and regulatory activities must all be taken into account so that risks are maintained at an acceptably low level. Once established, regulation should be perceived to be reliable and not unjustifiably in a state of transition. Regulatory actions should always be fully consistent with written regulations and should be promptly, fairly, and decisively administered so as to lend stability to the nuclear operational and planning processes.

WHAT AREAS OF THE ROP ARE WORKING WELL?

As evidenced by the process leading up to SECY-19-0067, a virtue of the ROP that cannot be over-valued is its open, transparent process. The ROP was developed via an open, collaborative process involving literally hundreds of NRC staff, industry representatives, state officials, and NGO representatives. Any one wishing to participate had multiple opportunities and various means to do so. This commendable template remains in place when changes to the ROP are considered.

An over-lapping virtue of the ROP is the crisper, clearer communication of the NRC's expectations. The procedures used by NRC inspectors in implementing the ROP are readily available online (in ADAMs and links on the NRC's public website for ADAMS-shy individuals). The schedules for upcoming inspections are provided by the NRC to plant owners well in advance. And the reports for NRC inspections are also readily available online to calibrate, or re-calibrate, the agency's expectations. This transparency makes it easier for plant owners to meet and exceed expectations and makes it harder for them to excuse shortfalls. Thus, the ROP is consistent with the agency's independence, openness, efficiency, clarity and that other principle.

William Bennett, U.S. Secretary of Education from 1985 to 1988, was interviewed after the tragic shootings at Columbine High School. Asked whether the shooting demonstrated that schools were woefully ill-protected, he answered something to the effect that while failures could be seen and counted, successes were largely invisible. Bennett went on to say that no one can count the number of tragedies averted by various efforts.

The ROP suffers from a similar impairment. No one can point to and count the number of times the ROP successfully intervened and prevented what would otherwise have been a costly outcome, both in terms of dollars and lives adversely affected. That does not mean the ROP is not effectively preventing bad outcomes, just that it's harder to quantify this effectiveness.

While quantitative evidence may be scant, qualitative analyses by diverse parties suggest that the ROP is superior to prior oversight programs. The challenge when considering adjustments to the ROP is to abide by the adage "If it ain't broke, don't break it."

WHAT AREAS OF THE ROP ARE NOT WORKING WELL?

Problem Identification & Resolution Ineffectiveness

The Problem Identification & Resolution (PI&R) Inspection (IP 71152 at ML14316A042) is the single most important inspection conducted within the ROP, yet it is the least effective inspection. While the "most" and "least" adjectives might be debatable, the NRC staff in SECY-19-0067 addressed the basic theme of this contention. Specifically, quoting from page 19 of the SECY paper:

> *A fundamental input assumption of the ROP is that each licensee has a mature CAP* [Corrective Action Program] *that is effective in identifying and correcting problems. The biennial Pl&R inspection is meant to verify the adequacy of the licensee's ability to identify, evaluate, and correct problems.*

Despite a mature and effective CAP being a fundamental assumption of the ROP and an immature and/or ineffective CAP having serious safety implications spanning the breadth of the ROP's safety and security cornerstones, the NRC staff in the SECY paper noted:

> *In its current state, the Pl&R inspection guidance does not include criteria for assessing CAP effectiveness.*

Thus, while the ROP depends more than a smidgen on an assumption that the CAP at all operating reactors being mature and effective, the P&IR effort fails to even ask—yet alone answer—whether that assumption is valid. A mature and effective CAP is just taken on faith and faith alone. And the NRC staff in the SECY paper explained that this faith has been optimistic at best and misplaced at worst:

> *In 18 years, no biennial Pl&R inspection has concluded that a licensee's CAP was ineffective; however, programs have been deemed ineffective during subsequent IP 95003, "Supplemental Inspection for Repetitive Degraded Cornerstones, Multiple Degraded Cornerstones, Multiple Yellow Inputs or One Red Input," dated December 18, 2015 (ADAMS Accession No. ML 15188A400), inspections of significant issues.*

What is troubling about these NRC staff positions regarding the importance of and the inadequacy of the PI&R effort is that (a) it is not an emerging issue but a long recognized ROP weakness, and (b) resolution of this known ROP weakness is being deferred while other perceived ROP weaknesses are being "fast-tracked" to accommodate the industry's financial imperatives.

The NRC staff has long known about the PI&R effort not achieving its expectations. The fairly recently Baseline Inspection Program re-assessment, among many others, identified the need to enhance the effort (see ML14017A340 and ML14051A591). While there is recurring agreement that the PI&R effort needs improvement, that need has never transitioned from the "To Do" list to the "Completed" bin. The NRC staff needs to move this unresolved matter from the road ahead to its rear-view mirror ASAP.

The Davis-Besse nuclear plant experienced problems that kept it shut down between February 2002 and March 2004. The NRC staff formed a Lessons Learned Task Force[1] to examine what it could have done to prevent the accumulation of so many safety problems that required nearly two years for an army of workers to remedy. The NRC task force made 51 recommendations. The overwhelming majority of those recommendations (49 of 51) involved detecting violations of safety requirements sooner. In other words, it wasn't that the safety bar wasn't set at the proper height to protect the public; it was that the NRC failed

[1] The task force's report is available online at https://www.nrc.gov/reactors/operating/ops-experience/vessel-head-degradation/lessons-learned/lltf-report.html

to notice how often Davis-Besse was doing the limbo beneath that bar. Among the things that NRC required to be fixed before it allowed Davis-Besse to restart was the plant's corrective action program.

Turning to the NRC staff resolving industry's financial imperatives quicker than known PI&R weaknesses that have the real potential (how's that for an oxymoron?) for jeopardizing public and worker safety, the NRC staff cites evidence on page 10 of SECY-19-0067 comparable to that quoted above about the inadequacy of past PI&R efforts in detecting real problems:

> *The staff evaluated the potential impacts if the minimum four-quarter requirement had not existed when the ROP was implemented. The staff reviewed the performance of 75 reactor units that transitioned to Column 3 (Degraded Performance column) of the Action Matrix because of aggregating White inputs and concluded that, since the inception of the ROP, only three reactor units would not have transitioned to Column 3 if the first White input had been closed before the fourth quarter.*

On one hand, the NRC staff is using a small handful of instances over the past 18 years as part of its justification for changing how Greater-than-Green findings are handled within the ROP. On the other hand, the NRC staff cites a small handful (which could easily grow to at least two handfuls with even a modest search of ADAMS) of PI&R failures over the same period to concede there is a problem that can be addressed at some time in the future. It's unfathomable why the NRC staff fast-tracks industry's financial imperatives while slow-walking matters of public health and safety.

False Assumption Underlying Baseline Inspection Program

The Baseline Inspection Program provides consistent oversight (in terms of what gets examined when using how many resources) of all operating reactors in the Licensee Response Column of the Action Matrix. This approach is intended to provide the NRC with sufficient insights to verify that the safety and security performance properly warrants placement in the Licensee Response Column.

Yet this well-intended approach implicitly assumes that all operating reactors have comparable risk such that X inspection hours here protects workers and the public as well as X inspection hours expended everywhere else. Yet it is well known and established that the risks of all operating reactors is not equivalent. In addition, the NRC staff cites in SECY-18-0091 (ML17166A238) risk differences between existing reactors and the AP1000 reactors under construction in Georgia in proposing a significant reduction in the Baseline Inspection Program for the new reactors. Quoting from pages 2 and 3 of this SECY paper:

> *The staff recognizes that Generation Ill+ reactors like the AP1000 have core damage frequencies that are lower than currently operating reactors due, in large part, to incorporating operating experience and risk insights at the design phase. ... Consequently the risk profiles of the AP1000 are lower, and the plants should be safer to operate.*
>
> *In its integrated review in assessing oversight resources for the AP1000, the staff attempted to ensure that agency is able to obtain sufficient information regarding licensee performance in each of the ROP cornerstones while reducing effort to oversee performance in the reactor safety cornerstones to reflect the AP1000's inherently safer design. As described further in this document, the staff anticipates a reduction in the NRC's oversight efforts of the AP1000 operating reactors of between 25 to 36 percent as compared to currently operating reactors.*

Thus, the NRC staff relied on lower risk profiles of the AP1000 design to call for a significant reduction in the Baseline Inspection Program. Note that the NRC staff believed that it will "*be able to obtain*

sufficient information regarding licensee performance in each of the ROP cornerstones" despite the reduced inspection effort.

This comment is not to suggest that the AP1000 risk is not lower than the risk of current operating reactors or that the proposed reduction in Baseline Inspection Program effect is unwarranted. Rather, the point is that the NRC is tailoring the baseline effort to reactor risk for new reactors but is not doing so for existing reactors. NRC staffer Donald A. Dube authored a paper in 2008 about the relative risks of current and proposed reactors (ML082400370). Figure 1 in Dr. Dube's paper showed the core damage frequency (CDF) for existing pressurized water reactors (PWRs) and boiling water reactors (BWRs) as well as for proposed new reactors.

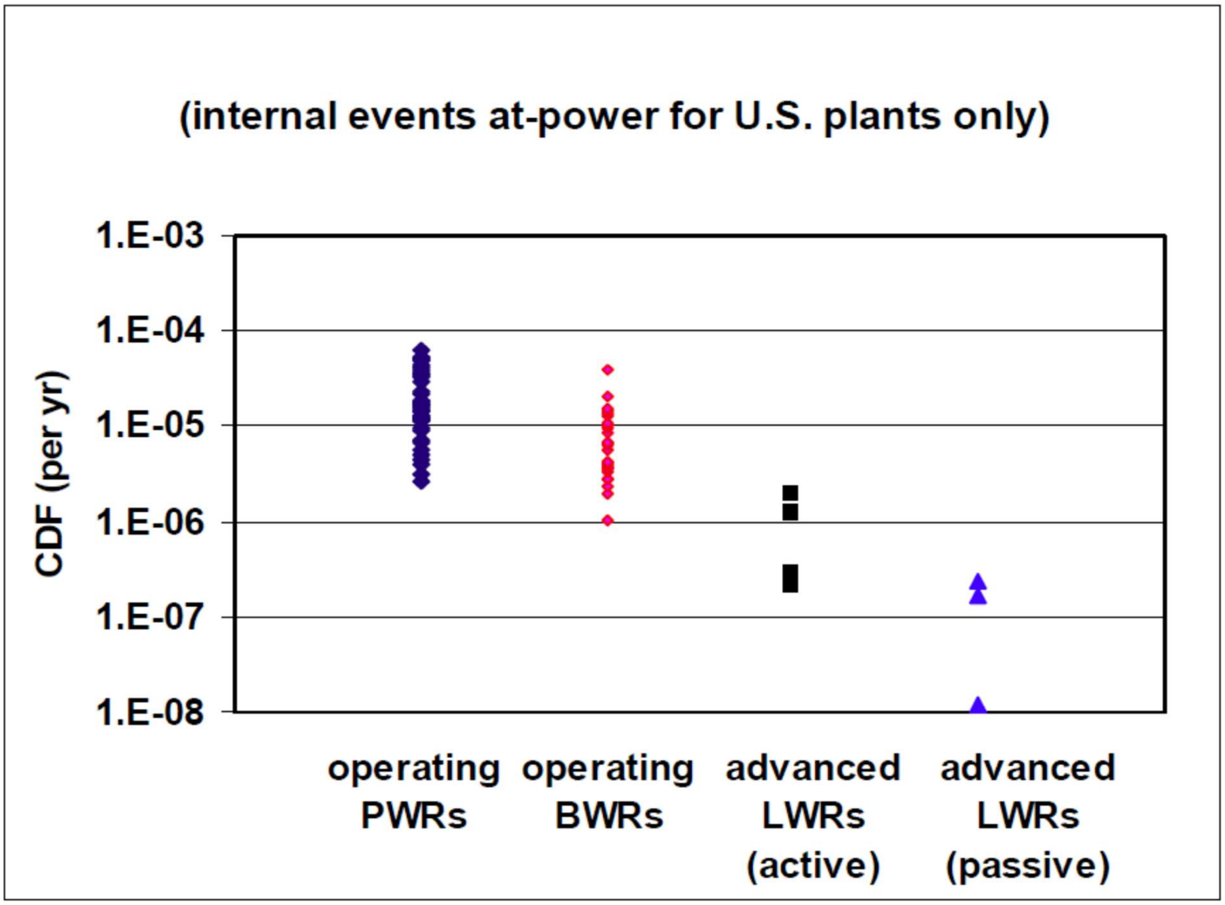

Figure 1. CDF by plant type

The stack of data points for operating PWRs and BWRs reflects the results for individual operating reactors. For each of these two operating reactor types, the difference between the highest CDF risk and lowest CDF risk is nearly two orders of magnitude (i.e., a factor of 100). That's about the difference between the lowest CDF risk for existing reactors and highest CDF risk for new reactors. In other words, a risk difference large enough to prompt revamping the Baseline Inspection Program for new reactors is not sufficient to revamp the Baseline Inspection Program for reactors actually operating in communities.

Figure 1 in Dr. Dube's paper illustrated the overall CDF risk per reactor. The overall risks are the summation of risks from various credible hazards. For example, Figure 2 in Dr. Dube's paper plotted the risks from fire hazards for existing and new reactors.

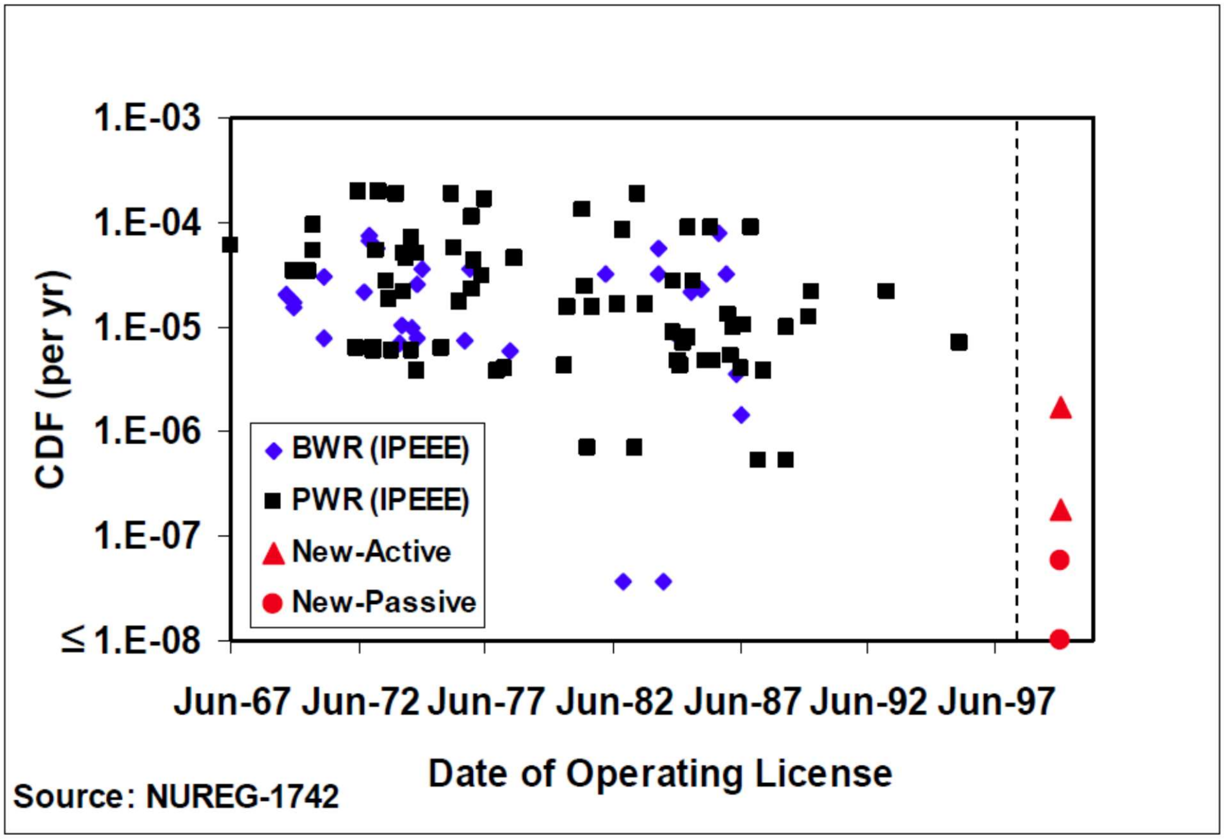

Figure 2. Fire CDF (at-power only)

The gap between the highest CDF risk and lowest CDF risk posed by fire is nearly four orders of magnitude—a factor of about 10,000.

Similarly, Figure 4 in Dr. Dube's paper illustrated the difference in Large Release Frequency (LRF) for operating PWRs and BWRs and for new reactors. The LRF essentially reflects the reliability of containment systems in preventing the release of radioactive materials to the environment in event of an accident.

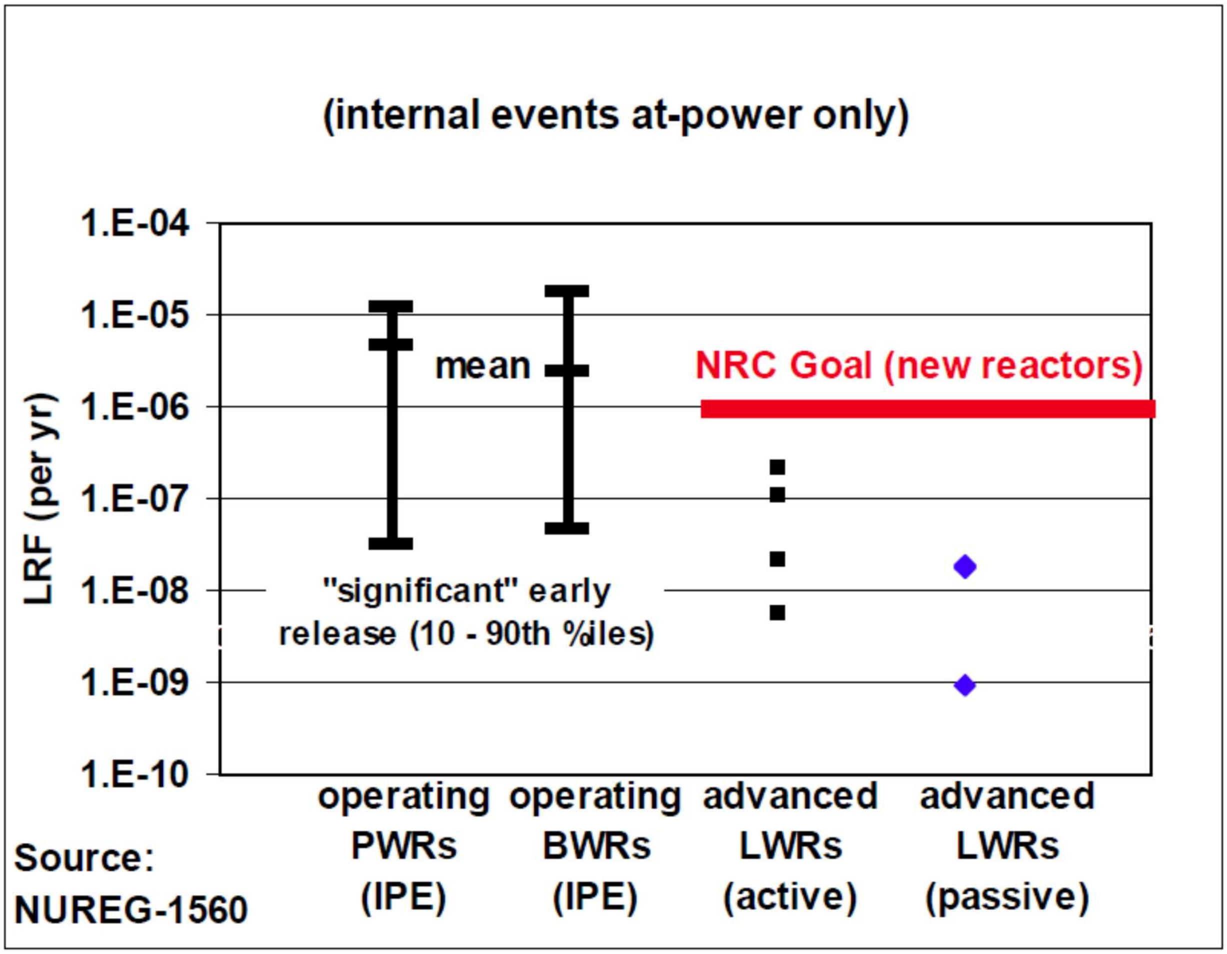

Figure 4. LRF by plant type

Dr. Dube's data indicates that some of the PWRs and BWRs operating today have LRFs greater than the NRC's safety goal.

The point of all this is to question why the NRC staff would cite design differences in AP1000s that reduce their risk profile in recommending significant reductions in the baseline inspection program effort, but not cite design differences in existing reactor designs to recommend better tailoring of the baseline inspection program effort to actual, real reactor risks.

And Dr. Dube's conclusions are not unique to himself or contrary to the NRC's positions on relative reactor risks. For example, the NRC examined the effectiveness of its station blackout (SBO) risk rule and reported the results in NUREG-1776 (ML032450542). Table B.1 summarized risk information for operating PWRs while Table B.2 – wait for it – summarized risk information for operating BWRs.

Plant-Specific Station Blackout Information by Reactor Type and Operating Status

Table B-1 Operating pressurized-water reactors

Plant	Plant CDF	SBO CDF	Percent SBO CDF of Plant CDF	Coping time in hours/EDG reliability/Aac access time in minutes/ extremely severe weather	Modification summary including dc load shed procedural modifications	SBO factors					
						PRA LOOP initiating event frequency	Number of LOOP events at power since commercial operation			LOOP event recovery times ≥ 240 minutes	
							Plant	Weather	Grid	Power	Shutdown
Arkansas Nuclear One Unit 1	4.67E-05	1.58E-05	33.8	4/.95/10/1	Added 1 DG and crosstie	3.58E-02	2	1			
Arkansas Nuclear One Unit 2	3.40E-05	1.23E-06	3.6	4/.95/10/1	Added crosstie	5.84E-02	1	1			
Beaver Valley Unit 1	2.14E-04	6.51E-05	30.4	4/.975/60/1	Added crosstie	6.64E-02	2				
Beaver Valley Unit 2	1.92E-04	4.86E-05	25.3	4/.975/60/1	Added crosstie	7.44E-02	1				
Braidwood Units 1&2	2.74E-05	6.20E-06	22.6	4/.95/10/1		4.53E-02	2				
Bryon Units 1&2	3.09E-05	4.30E-06	13.9	4/.95/10/1		4.43E-02					
Callaway	5.85E-05	1.80E-05	30.8	4/.975/-/1		4.60E-02					
Calvert Cliffs Units 1&2	2.40E-04	8.32E-06	3.4	4/.975/60/4	Added 1 EDG and one 1 DG	1.36E-01	3				
Catawba Units 1&2	5.80E-05	6.0E-07	10.3	4/.95/10/1		2.0E-03	1			330	
Comanche Peak Units 1&2	5.72E-05	1.5E-05	26.2	4/.95/-/1							

As shown in this portion of Table B.1, the overall CDF values (Plant CDF column) vary by over an order of magnitude and the SBO contribution to CDF risk varied from as low as 3.4 percent of overall risk to as high as 33.8 percent (and that's just for this subset of PWRs and none of the BWRs).

It's hard to fathom why the NRC staff would seek to tailor the Baseline Inspection Program to the risk profile of new reactors and fail to do so for existing reactors. Instead, the Baseline Inspection Program assumes a "one-size-fits-all" approach on the implicit assumption that all operating risks are the same – an assumption its own efforts prove to be patently false.

The Baseline Inspection Program features a suite of inspections conducted at varying frequencies. Yet this suite of inspections is consistently applied across all operating reactors in the Licensee Response Column of the Action Matrix. The rationale used by the NRC staff in recommending tailoring the baseline effort to the AP1000's actual risk profile should be used to tailor the baseline effort to individual reactor risk profiles. Reactors with significantly higher fire risks would then receive more fire protection inspections under the baseline program than reactors with lower fire risks. Likewise, reactors with higher SBO risks would receive more electrical distribution system inspections under the baseline program than reactors with lower SBO risks. And so on down through the full suite of baseline inspections. NRC knows that risks vary from reactor to reactor to reactor—why not oversee those known hazards accordingly?

The NRC has often stated that risk-informed regulation is a two-edged sword, increasing or decreasing regulatory oversight as the risk numbers warrant. Yet the NRC's actions and inactions over the past two decades strongly suggest, if not outright prove, that its sword is razor-sharp when it comes to scaling back oversight efforts but Nerf-like when it comes to beefing up oversight efforts.

Tailoring the Baseline Inspection Program to the risk profiles for existing reactors could be conducted as a "zero-sum" effort. By this approach, the overall Baseline Inspection Program for all operating reactors

in the Licensee Response Column could entail the same number of inspection hours. But those inspection hours would be allocated differently to better match the risks at the plants.

Furthermore, tailoring the Baseline Inspection Program effort more closely to individual reactor risks would better align this front-end ROP function with a back-end ROP function; namely, the Significance Determination Process (SDP). The SDP recognizes that risks are not uniform across the fleet of operating reactors. The SDP recognizes that the fire risk may be higher here than there and evaluates fire protection violations differently based on that reality.

The risk assessment tools and resulting information used by the NRC staff in SDP space should be used by the NRC staff to tailor the ROP's Baseline Inspection Program to known risks.

HOW CAN THE NRC IMPROVE THE ROP IN THE FOLLOWING AREAS: THE PROBLEM IDENTIFICATION AND RESOLUTION INSPECTION PROGRAM, THE CROSS-CUTTING ISSUES PROCESS, RADIATION PROTECTION INSPECTIONS, ISFSI INSPECTIONS, AND THE SDP?

As discussed above, the Problem Identification and Resolution (PI&R) inspection (IP 71152 at ML14316A042) is the most important but least effective inspection performed by the NRC. Inadequate corrective action programs are a common thread among reactors experiencing year-plus outages to restore safety levels placed in Columns 4 and 5 of the Action Matrix. It makes sense—finding and fixing problems in a timely and effective manner limits the extent to which safety margins become compromised. The PI&R inspection has not demonstrated an ability to accurately gauge corrective action program failings until the evidence becomes what Thomas Jefferson characterized as "self-evident."

The PI&R inspection should enable the NRC to put previous findings from other inspections in proper context. Every ROP inspection inherently touches upon corrective action programs. Thus, findings identified during other ROP inspections say something about corrective action programs. But the NRC's follow-up to findings from other ROP inspections is largely concentrated on whether the cause of those specific problems have been properly identified and whether the solutions implemented will effectively prevent recurrences. The PI&R inspection needs to evaluate the findings from a more general perspective, seeking to answer questions like:

1. Are the testing and inspection regimes frequent enough and sufficiently adequate to achieve the desired reliability of safety components?

2. Do the majority of findings from other ROP inspections suggest a common denominator (e.g., most involving deficient maintenance practices or inadequate modifications/replacements of safety equipment, etc.)?

3. Are the causes of the findings often associated with cross-cutting issues (e.g., inadequate budgeting to implement preventative maintenance and/or corrective actions in a timely fashion, insufficient staffing levels, or less-than-proper corporate priorities and support)?

A PI&R inspection could review findings from other ROP inspections conducted since the last PI&R inspection to see if they suggest questions to be answered during the PI&R inspection. As applicable, a PI&R inspection could also review findings from other ROP inspections conducted at other reactors operated by the same owner since the last PI&R inspection.

The goal of each PI&R inspection must be to develop as accurate as achievable understanding of the corrective action program at the reactor. When that understanding is inaccurate, it matters little whether the corrective action program is deemed superior, adequate, sufficient, or pathetic. Fixing a non-problem is no more correct than failing to a true problem.

If the NRC had an effective and timely PI&R inspection procedure, it would obviate the need for the cross-cutting issues process. The cross-cutting issues process is essentially an operator work-around for valid regulatory insights into corrective action programs at plants. The NRC defines a Cross-cutting Area as being:

> *"Nuclear plant activity that affects most or all safety cornerstones. These include the problem identification and resolution, human performance, and "safety-conscious work environment.""*

As SECY-19-0067 explicitly states:

> *"This inspection* [the PI&R one] *is also used to evaluate the licensee's SCWE* [Safety-Conscious Work Environment] *and Employee Concerns Program."*

Cross-cutting issues are therefore encompassed by the PI&R inspection procedure. If the PI&R inspection procedure were transformed into something useful and effective, it would address cross-cutting issues and eliminate the need for this separate but equally ineffective effort. Thus, getting the PI&R inspection right has the dividend of eliminating the need for, and wasteful effort at, the cross-cutting issues process. That'd be such a great achievement that not only would all five Principles of Good Regulation be satisfied, but additional principles might be necessary to become the Principles of Great Regulation.

Comments prepared and submitted by:

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