

**“Perspectives from Commissioner Baran”
2018 Regulatory Information Conference
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Thanks, Mike. Good morning. It’s great to see everyone here.

This is my fourth RIC. And that means this is my fourth RIC speech. So I’m just going to admit it. I’m out of clever ideas for a humorous opening. So here’s what we’re going to do. We’re going to jump right into the cheesy nuclear jokes. We all know they’re inevitable. And you heard me right. There are more than one. Multiple cheesy nuclear jokes. Think of it as an opportunity for stakeholder feedback. I share two jokes, you let me know which one you like more, I get a better sense of your collective sense of humor, and we go from there. Ready?

Joke number 1. Two atoms were walking across the road when one of them said, “I think I lost an electron!” “Really?” the other replied, “Are you sure.” “Yes, I’m absolutely positive.”

Okay. Okay. Let’s see what you think about joke number 2. Why can’t you trust an atom? They make up everything.

Based on that response, it sounds like people actually preferred the first joke. I’m not sure what that says about you as an audience. Now, if you’re one of the very, very, vanishingly few people who thought both jokes needed work, feel free to send some suggested material my way on the comment cards. This is your big chance to wow us. We’re not going to read them today. Instead, we’ll save them for a future occasion that calls for a high-quality nuclear joke.

In the meantime, we should probably get down to business. There are a lot of important issues before the agency right now. Let me start with post-Fukushima safety enhancements.

Almost every plant in the country has finished the work to comply with the NRC order on mitigating strategies. That order requires plants to have equipment onsite and offsite to respond to beyond-design-basis events. Every site also has new spent fuel pool instrumentation in place so that operators have reliable information on the water levels in their spent fuel pools. The installation of severe-accident-capable hardened vents at BWR units with Mark 1 or Mark 2 containments requires physical modifications to the plants during outages and will be completed by the end of June 2019. The remaining flood hazard integrated assessments are due by the end of this year. And the seismic probabilistic risk assessments should all be submitted by the end of next year. Based on those analyses, the NRC staff will determine whether any additional site-specific steps need to be taken to better protect plants from earthquakes or floods. Overall, the NRC staff’s focus has largely shifted to inspecting implementation of these safety enhancements and natural hazard evaluations.

The pending work for the Commission is the draft final rule establishing requirements for the mitigation of beyond-design-basis events at nuclear power plants. This draft final rule is the culmination of years of work and is a key component of the agency’s response to the March 2011 Fukushima Dai-ichi accident in Japan. The rule responds to Near-Term Task Force recommendations 4 and 7 by making the requirements in previous NRC orders for mitigation of

beyond-design-basis events and for reliable spent fuel pool instrumentation generally applicable to all nuclear power plants. It requires the mitigating strategies to address each plant's re-evaluated seismic and flooding hazards. The rule also responds to Near-Term Task Force recommendations 8 and 9 by requiring an integrated emergency response capability and "sufficient staffing, command and control, training, drills, communications capability, and documentation of changes to support the integrated response capability." To address Near-Term Task Force recommendations 10 and 11, the rule sets requirements for enhanced onsite emergency response capabilities.

The staff submitted the draft final rule to the Commission for its review fifteen months ago, in December 2016. I voted on it last June and agree with the NRC staff that the provisions of this rule are necessary to ensure adequate protection of public health and safety. Unfortunately, the Commission has not yet finalized the rule. This delay matters because it impacts the timing of compliance. The draft final rule was written to generally provide two years for plants to comply with the rule's requirements, with some exceptions and flexibilities proposed by the staff. If the rule had been issued during the summer of 2017, the general compliance deadline would have been mid-2019. Given that the rule will be finalized much later than anticipated by the staff, we will need to look at adjusting the compliance timeframes in the draft final rule. Seven years after the Fukushima accident, it is crucial that the Commission issue these updated safety standards so that nuclear power plants can meet them without further delay.

Power plant decommissioning is another major focus area for the agency. In the last few years, six U.S. reactors have permanently shut down and eight more have announced plans to close in the coming years. In late 2014, NRC embarked on a decommissioning rulemaking to establish clear rules of the road for reactors transitioning from operations to decommissioning. The goals were to move away from regulating by exemption in this area and to take a fresh look at our decommissioning process and requirements. Since that time, the agency has gone through two rounds of public comment – first in response to an advanced notice of proposed rulemaking and then in response to a draft regulatory basis. During the two comment periods, we received a total of about 200 public comments – from licensees, states, local governments, non-profit groups, and other interested stakeholders. I read them all. And I can tell you that there are some very good suggestions in those letters. As the NRC staff prepares the draft proposed rule for the Commission's review later this spring, we need to thoughtfully consider the ideas presented by all stakeholders with an open mind. We should be aiming to produce a balanced rule that considers the interests of a broad range of engaged stakeholders.

Because complex rulemakings take time to complete, we probably still have a couple years before the decommissioning rule is finalized. During that time, I anticipate that the agency will continue to receive exemption requests from plants moving towards decommissioning. Some of these exemption requests will be of high public interest, like those related to emergency planning, security, and decommissioning trust funds. But, under our current approach, the public has no opportunity to weigh in on these important regulatory decisions. I think NRC can do better than that. We can be more transparent and involve the public in the process. There is nothing that prevents us from doing that while we work to finalize the decommissioning rulemaking. So, for the near term, I support improving the existing exemption process by soliciting stakeholder comments on decommissioning exemption requests that the staff expects

will be of high public interest. The staff would then consider and respond to the public comments during its evaluation of those exemption requests. States, local governments, and the communities around these plants are very engaged and want to share their views. We need to give them a chance to do so. Our regulatory decisions can benefit from their valuable insights.

Even as some existing plants are decommissioning, we're seeing a lot of interest in new nuclear technologies – whether it's advanced reactors, accident tolerant fuel, or digital instrumentation and controls. The NRC staff has launched a transformation initiative to identify any steps the agency should take to improve its approach to reviewing new and novel technologies. I think that's a good focus for the transformation team and look forward to hearing the results of their outreach and brainstorming.

Of these new technologies, NRC has probably done the most thinking about how we adapt our regulatory framework to prepare for advanced reactor applications. Five vendors have begun pre-application discussions with the staff, and we anticipate additional vendors may reach out soon. We want to make sure that we have an efficient and effective licensing process for non-light water reactors, so we are ramping up our activities in this area. With our current resource levels, the staff is primarily focused on identifying and addressing key technical and policy issues that should be resolved early. For example, the staff is finalizing guidance for crafting principal design criteria for advanced reactors. The staff is also creating a risk-informed, performance-based approach for selecting license basis events. In addition, the staff is working to develop the necessary computer codes to perform regulatory reviews. A significant amount of stakeholder interaction supports all of these efforts.

Vendors and licensees are also increasingly focused on developing accident tolerant reactor fuels that can better withstand higher accident temperatures and provide longer coping periods during station blackout conditions. In response, the NRC staff is working to prepare the agency for accident tolerant fuel applications. While incremental fuel design changes could largely rely on existing data, models, and methods, designs that depart more dramatically from existing fuels may require a substantial amount of new testing and modeling. Just as with advanced reactors, the agency needs to determine whether any updates to our regulatory framework will be needed to enable the agency to perform efficient and effective licensing reviews.

One long-delayed rulemaking pending before the Commission would certainly help the agency get ready for new fuel technologies. And that's the 50.46(c) rulemaking. Here's why this rule is important. Currently, NRC's regulations recognize only two types of fuel cladding for a full core: Zircaloy and Zirloy. The regulations also recognize only one type of fuel pellet made of uranium oxide. But vendors are looking at other cladding and pellet materials, such as silicon carbide and uranium silicide. Because these new materials are not addressed by our regulations, licensees would need to seek regulatory exemptions to use them. That's not efficient. And it makes it harder to innovate in ways that could improve safety.

The 50.46(c) rule would move the agency to a technology-neutral, performance-based approach that would apply to all cladding materials and fuel designs. So applicants would no longer need to seek regulatory exemptions from the existing requirements.

There is also an important safety component to the rulemaking. New findings from an extensive research program call into question the technical basis of the existing regulation. The latest science shows that the combination of temperature and oxidation limits established in the current regulation are not stringent enough to prevent embrittlement of the fuel cladding. And the existing regulation does not address the new degradation mechanisms revealed by the latest research, such as breakaway oxidation.

In the absence of adequate regulatory requirements, the NRC staff has been performing annual safety assessments of each nuclear power plant in order to ensure that there is no imminent safety hazard related to the integrity of the fuel cladding during a design basis accident. Essentially, the staff is conducting after-the-fact, backward looking reviews to see if the fuel at each plant would have performed safely during an accident in the prior year. Because the existing regulations do not prevent licensees from taking certain core reloading actions that could reduce the safety margins at nuclear plants, each year the staff looks back at the prior year to confirm that safety margins did not erode in a way that could cause a safety issue. This is no way to provide reasonable assurance of adequate protection of public health and safety. The draft final rule has been sitting with the Commission for two years. I voted on it 19 months ago. We need to finalize the rule to address this safety issue and to adopt a technology-neutral approach that lifts a current barrier to innovative fuel designs.

That brings us to digital instrumentation and controls. I listed this as the third new technology that the transformation initiative is looking at. But, let's face it, digital isn't really a brand new technology. It's been around for quite some time in most other sectors of the economy. But when I visit an operating reactor and go into the control room, I see a lot more analog instruments than digital ones. And the operators in that control room share their concerns about the obsolescence and reliability issues associated with analog technology. I think there is broad agreement that safety would generally be improved if more instruments transitioned to digital. Unfortunately, we have not yet been able to resolve this complex issue so that plants can safely and efficiently upgrade to digital systems. The staff is implementing an action plan, and I think we're starting to make some progress on a path forward. But, let's be frank. It has been slow going. That's not a criticism of the staff or the industry. It's just a recognition that this area of regulation has proven to be a real challenge. So we need to rejuvenate our efforts on digital instrumentation and controls. As the safety regulator, we need to make sure that digital upgrades are done safely and don't introduce any unacceptable risks. But we also need to make sure that there is a reliable regulatory framework for making these upgrades. I look forward to hearing the transformation team's ideas for how we can accelerate our progress in this area.

I want to touch on two other key topics that relate to operating reactors: risk informed regulation and security.

We're seeing a significant increase in the number of risk-informed licensing submittals. In particular, there's growing interest in applications under section 50.69 to risk-inform the categorization and treatment of structures, systems, and components. 50.69 is a potentially far-reaching provision that hasn't been used much until recently. The effort to risk-inform technical specification completion times has also ramped up in last couple years. It's an important

initiative that addresses the question of how we should deal with issues of lower safety significance. And I think it's a far superior approach to some of the past efforts in this area. For example, in trying to come up with a way to address so-called "low-risk compliance issues," the NRC staff began exploring different concepts and approaches. One iteration of this effort basically envisioned a type of long-term enforcement discretion that could last for years.

It's no secret I think that's a terrible idea. If our regulations, in this case technical specifications, need to be updated and risk-informed, let's focus our energy and resources on risk-informing the technical specifications rather than on developing a process to bypass our own regulatory requirements. Fundamentally, compliance with our regulatory requirements is how NRC ensures adequate protection of public health and safety. We should not go down the path of allowing long-term non-compliance. And the Commission's 1995 probabilistic risk assessment policy statement recognizes this. In the policy statement, the Commission endorsed the use of risk insights, but also stated: "It is, of course, understood that the intent of this policy is that existing rules and regulations shall be complied with unless these rules and regulations are revised."

So my view is: if our technical specifications would require a licensee to address an issue of very low safety significance within 72 hours or shutdown, but a 1-week or 2-week or 30-day deadline would be more appropriate, we should work on revising and risk-informing the technical specifications. Let's focus on getting to the right regulatory requirement, not coming up with a process to permit prolonged non-compliance with the tech specs. At the May 2017 Commission meeting on risk-informed regulation, I heard a lot of stakeholder agreement on this point. And I'm glad to see that the NRC staff has responded by re-thinking where it focuses its attention and resources.

Maintaining strong physical and cyber security programs is another key priority for NRC and our licensees. The potential threats facing power plants, fuel cycle facilities, and radioactive materials licensees are constantly evolving. NRC has already established performance-based cyber security standards for the reactor fleet. And a proposed cyber security rule for fuel cycle facilities is now being reviewed by the Commission. NRC must also maintain effective physical security requirements, including force-on-force inspections conducted by NRC.

Although the Commission is still considering a paper on potential changes to the force-on-force program, I can tell you how I am approaching the issue. Currently, NRC conducts two force-on-force exercises at each nuclear power plant every three years. Under the staff's recommended option, there would be no second NRC-conducted force-on-force exercise. Instead, NRC would perform an "enhanced" inspection and evaluation of a regularly scheduled force-on-force exercise planned and conducted by the licensee. The licensee would both develop the exercise scenario and provide personnel for the adversary force.

I do not support this option because it does nothing to enhance the effectiveness of the force-on-force program. Going from two NRC-conducted force-on-force exercises to one would provide no security benefits. The only potential benefit would be to reduce the costs of conducting the exercises, and that outcome is far from certain. If a licensee were to be rated "ineffective" or "marginal" during the sole NRC-conducted force-on-force exercise or if the

results were “indeterminate,” then there are two possibilities. Either NRC and the licensee would need to schedule, plan for, and participate in a second NRC-conducted exercise, which would eliminate the modest cost savings that the staff anticipated for this option, or a nuclear power plant licensee would be allowed to operate without passing a single NRC-conducted force-on-force exercise during a three-year period. The first outcome offers no advantages over the current program, while the second outcome would be unacceptable.

I support maintaining the current security baseline inspection program, which already reflects a number of recent efficiency improvements. However, I think the NRC staff should explore the pros and cons of holding an ungraded, NRC-conducted, active violent insider exercise in lieu of the second full-scope force-on-force exercise whenever a licensee is rated “effective” in the first full-scope exercise. Given the global trend toward “lone wolf” terrorist attacks, it would be prudent to further ensure that nuclear power plants could effectively protect against an attack by an active violent insider with access to the plant. Instead of NRC formally grading a licensee’s performance, any issues found during such an exercise could be entered into and addressed through the licensee’s corrective action program. I think it’s a potential change worth considering.

I’ve talked a lot about reactor issues. Let me close with a radioactive materials issue. And that’s source accountability. Unlike for Category 1 and 2 sources, there is currently no regulatory requirement for a vendor to verify the authenticity of a license for Category 3 sources before selling them. The Government Accountability Office highlighted this regulatory gap in 2016, when it found that a fictitious company established by GAO could produce counterfeit Category 3 possession licenses and obtain commitments from vendors to sell it a sufficient amount of material to reach Category 2 levels. In light of GAO’s findings, I proposed that the NRC staff take a fresh look at the question of whether and how to track Category 3 sources. My Commission colleagues agreed, and the NRC staff provided its recommendations in August 2017. The Commission is currently considering those recommendations.

NRC’s existing License Verification System allows radioactive materials licensees, including the manufacturers and distributors that sell radioactive materials to other licensees, to confirm that a license is valid and that a buyer is authorized to acquire the quantities and types of radioactive materials being requested. Use of the system is currently required for Category 1 and Category 2 quantities of radioactive materials.

The core finding of the GAO report is that licenses can be altered or counterfeited to allow bad actors to illegally obtain radioactive material. In response, I believe we should amend NRC’s regulations to require verification of Category 3 possession licenses through the License Verification System or the appropriate regulatory authority. License verification is a targeted solution to closing the regulatory gap highlighted by GAO because it occurs prior to the transfer of a source, in real time, and can proactively prevent an illegal transfer. This would meaningfully address the problem identified by GAO by preventing unauthorized entities from using counterfeit or altered licenses to obtain radioactive materials.

We did not wait for an armed attack on a nuclear power plant to establish physical security requirements or for intelligence indicating an imminent cyber-attack before requiring

plants to take steps to address cybersecurity. Likewise, we should not wait for an adversary to exploit the failure to verify the validity of Category 3 radioactive materials licenses before closing this regulatory gap. A small number of Category 3 sources can be aggregated to Category 2 levels. Given the Commission's past determination that Category 2 quantities of radioactive material warrant the suite of regulatory requirements that NRC has applied to them, including license verification, tracking in the National Source Tracking System, and physical security, it makes sense to take the basic step of ensuring the validity of licenses to obtain Category 3 sources.

We also need to take another look at whether to continue issuing general licenses for Category 3 sources. Generally licensed devices, such as self-luminous exit signs, do not require specific possession licenses, but the radioactive material in a generally licensed device is no different than the material in a specifically licensed device. Right now, NRC does not regularly conduct inspections to ensure that generally licensed sources are used and maintained safely and securely. Although there are hundreds of thousands of generally licensed devices nationwide, there are a relatively small number containing Category 3 quantities of radioactive material.

The NRC staff has expressed concern about the lack of routine oversight and accountability of generally licensed Category 3 sources. The Agreement States have expressed similar concerns. In fact, there is broad consensus among the states on the need for change. When the NRC's technical experts and our Agreement State partners reach the same conclusion that general licenses for Category 3 sources do not provide for adequate oversight, we need to take action. So I support the NRC staff's recommendation to re-evaluate the practice of issuing general licenses for Category 3 sources. As a safety and security regulator, we need to have an open mind about the need for regulatory change in this area.

Of course, that's true for everything we do. It's essential for NRC to tackle tough regulatory issues with an open mind. It's not enough to say "that's the way we've always done it" or "we looked at that 30 years ago." We need to be open to new ideas and new approaches. More than that, we need to actively seek them out. Stakeholder interactions are a big part of that, which is one of the reasons why the RIC is very valuable. So if you have feedback on NRC's work or a suggestion or a new idea, please let us know. I look forward to talking with many of you this week and during my future visits to power plants and other licensed facilities. I'm also happy to answer your questions now. We have about 20 minutes. Thank you.