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**The Regulatory Craft: Ensuring Sound Policy and Sound Science in Nuclear Regulation
Remarks of NRC Chairman Stephen G. Burns
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William Shakespeare said “What is past is prologue” and Yogi Berra is credited with saying “It’s déjà vu all over again.” And both might agree that you need to “Learn from history or be doomed to repeat it.”

Good morning. I’m pleased to be speaking to you, at my second RIC as Chairman of the NRC. Welcome to my fellow Commissioners, members of the public, and distinguished national and international guests.

As you know, I joined the NRC in 1978 as a newly minted attorney. Today, 38 years later, I’m speaking to you as an older, hopefully wiser, certainly greyer, Chairman of the agency.

I want to take a few minutes today to reflect on where the NRC was in 1978 and where it is in 2016. And I’d like to project where we might be going in 2017 and beyond, particularly as it relates to how the NRC regulates in an increasingly risk averse world.

Let me start by reminding you about 1978.

Dallas won the Super Bowl, the New York Yankees won the World Series and the Washington Bullets took the NBA Championship.

Sony introduced the Walkman. The first test-tube baby was born in London. The upgraded Apple II came with a new 5 1/4 inch floppy drive! And a first class stamp cost only 13 cents.

Sweden banned aerosol sprays. Fantasy Island premiered on ABC. And now-Senator Dianne Feinstein became San Francisco's 1st female mayor.

It was also an interesting year for the NRC.

Some of you may remember NRC headquarters staff worked out of a dozen office locations in Maryland and DC, with the Commission offices located in an H Street building designed to survive an atomic bomb.

There were 70 reactors licensed to operate and 88 had construction permits, with more announced or in various stages of the NRC licensing process that would have represented some 200,000 MWe of capacity if all had been completed. As you know, many were not.

Public Service Gas and Electric of New Jersey deferred construction on a floating nuclear power plant and DOE's Task Force on Nuclear Waste Management estimated the earliest date for operating a high level waste repository would be 1988 not 1985.

My thanks to NRC Historian Tom Wellock for that information.

Today, of course, we have a consolidated headquarters complex, 100 operating reactors with a sharp decline in anticipated new ones, and, well we know the path forward for high level waste disposal is still muddled.

Yet safety and security remain our fundamental regulatory objectives. We are still bound by the language of the Atomic Energy Act, with a focus on "adequate protection" and "reasonable assurance," broad terms in a statute purposefully left free of prescriptive language by the Congress.

Or as the U.S. Court of Appeals for the DC Circuit said in *Siegel v AEC* in 1968, somewhat paraphrased – The Atomic Energy Act sets out a regulatory scheme under which broad responsibility is given to the administering agency as to how it shall achieve the statutory objectives.

In other words, the NRC has, over the decades, wrestled with how much is too much regulation and what regulation is deemed necessary to be "safe enough." The bottom line is always how much risk are we willing to take? How much risk is acceptable? It must be acknowledged that the NRC does NOT regulate to no risk – to zero risk. Not in '78 and not now.

"Adequate protection" is a difficult phrase to explain to lay audiences when adequate in the usual vernacular signifies just OK. For us, of course, it means the Commission must consistently and over time use its broad discretion to impose requirements it believes meets this mandate. We can be neither too lax nor too strict. And we must not conduct our decision making in a vacuum. We must consider real life and actual operating experience, and we must weigh public and stakeholder input to guard against making decisions in isolation.

This balancing act is the essence of what I call the regulatory craft.

Part of the regulatory craft, I believe, is listening to the opinions of those outside of the NRC. While the NRC is independent, that does not mean we are isolated. It's important the NRC communicate with and engage in meaningful dialogue with the industry, the Congress, the states, local governments, non-governmental organizations, international entities and the public. You know – like what we're doing today at the RIC!

We can be independent while still listening and considering the opinions of others.

In a speech I gave last year, I talked a bit about my regulatory philosophy.

I am registered as an Independent – not a Democrat or a Republican. Along those lines, I believe I am independent in my thinking and philosophy. I don't adhere to a rigid ideology that compels a certain outcome each time, though I believe I'm predictable in my approach of evaluating each matter on a case-by-case basis and applying rules deliberately and consistently across the board.

I am also independent in that I'm open to new ideas and solutions others may offer. I listen open-mindedly to all stakeholders without becoming beholden to just one point of view. I believe problems must be clearly defined, but I think there is rarely only one solution to a problem. Nor do I believe the NRC always has the right answer to address a given problem.

In my experience, often times the best decision, the consensus-based solution is reached through meaningful dialogue among all affected stakeholders.

Let me give you an example. When the Commission was assessing the best approach to dealing with beyond design basis external events in response to the accident at Fukushima Dai-ichi, the industry developed a concept for FLEX equipment and thus was born the National Response Centers. To me, that is a collaborative problem-solving effort and innovation as its best.

What I hope is clear from my voting record, my Congressional testimony and my previous speeches is that I do not compromise on safety and security for the nation's commercial nuclear facilities. And what I hope is clear from the voting record of the Commission as a whole is our commitment to independent decision making.

While we at the Commission may not always agree among ourselves, while our staff may disagree with each other as they formulate positions, while we may reach conclusions in ways others may not always agree on – we are doing what we believe is necessary to meet our mandate of reasonable assurance of adequate protection. Or, per the back-fit rule, we have determined that a new regulation or requirement provides a substantial increase in overall safety and that additional costs are justified.

Part and parcel of everything we do is an assessment of risk. And I think that is an area where there has been a significant shift in public perception and acceptance since 1978. If you are my age and were raised in the U.S., think back for a moment about the risks we took as children – or that our parents accepted on our behalf.

We didn't wear seat belts. We didn't wear bicycle helmets. We smoked – well some of us did – we wandered our neighborhoods freely. We ate white bread and TV dinners and processed meats and no one lectured us about the nutritional deficits or the health risks. We had no idea that one day the World Health Organization would announce the dangers of a BLT.

To be sure, changes in some behaviors and practices have saved lives. Wearing seat belts in cars is perhaps the most obvious example.

Today, for reasons I'll leave to the sociologists to describe, there is a considerable level of risk aversion, of fear, even paranoia, about what could be considered relatively small risks. And we need only look at the headlines and see the arguing on social media to realize how differently people perceive the risks facing the world today. The arguing over the administration of vaccines is a good example.

At the same time, counterintuitively, we may dismiss as meaningless or unsubstantiated what others consider to be considerable risk. The global debate over climate change seems to fall into that latter category. How did assessment of risk become so fraught with politics and emotion?

Supreme Court Justice Stephen Breyer wrote a fascinating book, published in 1991, on the subject of risk and regulation. The book is titled “Breaking the Vicious Circle: Toward Effective Risk Regulation.”

In this book, Breyer points out that regulators generally have a two-part job – risk assessment (i.e. measure it) and risk management (i.e. what are we going to do about it). In the risk assessment part of the equation, the NRC will be informed by the probability and consequence of an event. For the management part of it, we’re going to use our broad discretion to act through the lens of adequate protection with an eye on predictable and stable decision making.

Breyer’s book underscores that the public’s evaluation of risk often differs radically from the experts. The book includes a table with survey results from two groups of what might generally be called “the lay public.” Both put nuclear power at the top of their perceived risk list, while experts in the field ranked nuclear 20 out of 30, behind car accidents, handguns, smoking, police work and food preservatives.

Says Breyer: “when we treat tiny, moderate and large risks too much alike we begin to resemble the boy who cried wolf.”

While Breyer doesn’t single out the phraseology “adequate protection” as a verbal stumbling block, he might well have. Risk makes people nervous and mere invocation of “adequate protection” – even “reasonable assurance” -- may not provide the confidence they need that their regulator, basically, has their back. So what is a regulator to do?

This might be where I lay out my “five point plan” or give you “three things to think about.” Instead, I’m going to give you just one concept to think about, and that concept’s connection to risk and the public’s perception of the NRC’s regulatory role.

That concept is trust. Or, as the agency’s Strategic Plan states as our vision: A trusted, independent, transparent, and effective nuclear regulator.

Let’s focus just on trust for the moment. Researchers have found – and we know this intuitively -- that trust plays an important role in how we accept and respond to risk. Our acceptance of risk in, say, smoking, eating bacon, global warming, nuclear power – is related in no small part to how much we trust the person or institution telling us what the risk is.

If we don’t trust them – or we don’t know them well enough to place our trust in them – we are skeptical of their risk calculations and risk communication. We won’t believe in the reliability of their information or trust their judgement or their decisions. We may not believe them when they say there is no wolf at the door.

This can be a very difficult situation for a federal regulator overseeing a highly technical and complex industry that many people simply don't understand, especially when what we're regulating – radiation -- cannot be seen or felt or heard.

The NRC must make decisions and function in an environment where, I believe, government as a whole is often not trusted and where there is a tremendous public division over the trustworthiness of science in general and federal government scientists in particular. In my opinion, there is also a certain distrust of big industry – which the nuclear power companies are certainly familiar with.

Breyer's book also lays out the dynamic – the vicious circle of his title – between public fears, political response to those fears by lawmakers and the independent regulator. And while his solution of a new, professional bureaucracy with interagency jurisdiction may not be wholly feasible, his notion that this dynamic is worth attending to, I believe, is an important one.

I don't have a magic wand to wave and create trust. But it appears to me that both the NRC and the industry need to look even more closely than in the past at how trust is achieved.

For the NRC, I believe it is achieved with decision making done openly, with ample explanation of our conclusions so the public can understand our actions. It can be achieved, incrementally and over time, by consistently applying “reasonable assurance of adequate protection” to our actions. It can be accomplished by being responsive to our oversight committees in Congress and attending to their concerns about risks.

We must remain vigilant in explaining our role. I believe, we must be seen as collaborative inside the agency, and open to ideas and concerns of stakeholders outside the agency. We are not a regulatory island.

It appears to me, we further build confidence by constantly reassessing “how safe is safe enough” based on experience and analysis. By practicing “the regulatory craft.”

I believe there needs to be a sense of craftsmanship to good regulation – although you may consider that pursuit the regulatory equivalent of the unattainable Holy Grail.

But I argue that the regulator needs to constantly pursue the “sweet spot” between under regulation and over regulation, to pursue effective regulation without imposing undue burden and stifling innovation. We need to set certain boundaries – a fuzzy bright line, some might say – that allow the licensee to innovate within the framework.

We, at the NRC, don't operate nuclear power plants. We don't push the buttons or manipulate the valves. We have to set parameters within which the operators can operate.

We cannot remain static and assume everything done in the past is always right and never needs to be re-evaluated and re-assessed under a new lens.

I believe that changes last year to the Reactor Oversight Program are a good example. We first established certain levels within the program to some extent as our informed best guess. It was, after all, a new way of doing business.

These levels were never intended to be set in stone, and I believe recent adjustments underscore the importance of the NRC looking at itself with a critical eye and making changes when data, circumstances, experience and input indicates it is appropriate to do so. And making those changes with vigorous debate, in the open so everyone understands how these changes came to be and why – with unfounded notions of our motivations kept to a minimum.

Our response to the Fukushima Da-ichi accident – five years ago this week – is another example of our ability to be flexible and adjust to changing circumstances. We faced a regulatory problem and we worked through it in a calm, thoughtful, and systematic way.

Our expert staff came up with a variety of options, which the Commission focused based on safety significance. We listened to stakeholders and took appropriate actions. And now, at the anniversary, we find ourselves in a better place in relation to the safety of the U.S. fleet of nuclear reactors. We are now rolling the Fukushima lessons learned activities into our day-to-day operations.

I have seen what is left at the Fukushima site and the surrounding community and I know everyone in the audience shares my deep commitment to never letting such an accident happen here.

While we're never going to convince everyone that we are practicing regulatory craftsmanship and being transparent in our processes, I believe the past year has shown the NRC's ongoing commitment to these ideals. Ever more information is made available to the public, and the Commission as a whole has been forthcoming with explanations for voting decisions -- and generous with time for stakeholder conversations.

Project Aim is an example of our desire to be good stewards of our resources as a measure of trust for how we conduct our business. Our public outreach continues to be among the highest of any nuclear regulator in the world.

You can trust this much -- the agency as a whole and myself as Chairman will continue to work to build and maintain public trust so there is confidence in our assessment of risk and the measures needed to minimize it appropriately.

Our craftsmanship may not be perfect, but perfection is a continuous journey.

Llewellyn King, who used to own the trade publication Energy Daily, wrote an op-ed last November underscoring his perception of our lack of perfection. He derided the NRC as an agency so “sclerotic, pusillanimous and risk-adverse that it has priced new reactors out of the possibility of being built in the U.S.”

I mention this for two reasons – one it's rare to find an occasion to say the word pusillanimous. But secondly, and more seriously, I want to end today by talking about adequate protection and reasonable assurance, risk and trust related to what could be the future for the agency, the industry and the country – small, modular reactors, and advanced reactors.

These new reactors could be important generators of electricity in the future. They could be sources of innovation for the United States and bring a host of benefits from jobs to a reduced impact on climate change. While the benefits are not for the NRC to tout, we can work hard to ensure the public trusts us to do the right thing when reviewing and possibly licensing these new designs.

Within our current framework, we have been working with NuScale in preparation for NuScale's expected design certification application at the end of 2016. And we expect to receive an Early Site Permit application from TVA later this spring.

For advanced, non-light water reactors, our 2017 budget proposal includes \$5 million in non-fee billable activities relating to developing a regulatory infrastructure for advanced reactor technologies.

This is an arena in which we can exhibit our regulatory craftsmanship – assessing risk, balancing risk and regulation, setting boundaries but without stifling innovation.

The public needs us to do our job, and our job is going to depend on getting the right information at the right time to make the right decision.

That was true in 1978 and it is true now. We may no longer watch Fantasy Island on one of only three network channels or eat a BLT without at least some level of trepidation, but we still must make hard decisions in the open after a clearly understood assessment process based on science in order to provide reasonable assurance of adequate protection to every neighborhood in every community in every state in the country.

Thank you for your attention today. Before we go to Q&A, I'd like to note one other development. Commissioner Ostendorff has announced that he will be moving on to a position at the Naval Academy when his term ends in June. I want to take this moment to publicly wish him well as he completes his service at the NRC.

It has been an honor to work with him during my tenure earlier as General Counsel and now as Chairman. He brought a wealth of experience to the Commission and helped guide the agency through the challenges of Fukushima, a changing industry environment and other issues.

His straightforward, thoughtful approach has earned him the respect of the NRC staff, and served the American public well in ensuring NRC carries out its safety and security mission.

I'm happy to take questions now.