SCHEDULING NOTE

Title: **TRANSFORMATION AT THE NRC (Public)**

Purpose: The purpose of the meeting is to provide the Commission with a discussion of the NRC staff's transformation recommendations and external stakeholders' views on transformation.

Scheduled: **October 29, 2018**
9:00 a.m.

Duration: Approx. 3 hours

Location: Commissioners' Conference Room, 1st fl OWFN

NRC Staff **15 mins.***

Dan Dorman, Acting Deputy Executive Director for Materials, Waste, Research, State, Tribal, Compliance, Administration, and Human Capital Programs

Andrea Kock, Deputy Director, Division of Decommissioning, Uranium Recovery and Waste Programs, NMSS

Topic:
Overview of transformation initiatives and recommendations

Commission Q & A **5 mins.**

Panel 1 **30 mins.**

Maria Korsnick, President and Chief Executive Officer, Nuclear Energy Institute (NEI) **5 mins.**

Dale Atkinson, Chief Operating Officer and Chief Nuclear Officer, NuScale Power, LLC **5 mins.**

Geoffrey H. Fettus, Senior Attorney, Nuclear, Climate & Clean Energy Program, Natural Resources Defense Council **5 mins.**

Mark MacNichol, International Representative, International Brotherhood of Electrical Workers **5 mins.**

Danny Bost, Executive Vice President and Chief Nuclear Officer, Southern Nuclear — **5 mins.**

Lee Cox, Chief, North Carolina Radiation Protection Section, Department of Health and Human Services — **5 mins.**

Topic:

- Perspectives on NRC Staff transformation recommendations
- Stakeholder suggestions for other ideas the agency should explore

Commission Q & A — **50 mins.**

Break — **5 mins.**

Panel 2 — **30 mins.***

Bryan Hanson, Senior Vice President, Exelon Generation, and President and Chief Nuclear Officer, Exelon Nuclear — **5 mins.**

Dr. Todd Allen, Senior Visiting Fellow, Third Way — **5 mins.**

Jeff Semancik, Director, Radiation Division, Bureau of Air Management, Connecticut Department of Energy and Environmental Protection — **5 mins.**

Dave Lochbaum — **5 mins.**

José Emeterio Gutiérrez, President and Chief Executive Officer, Westinghouse Electric Company — **5 mins.**

Heather Westra, Consultant, Prairie Island Indian Community — **5 mins.**

Topic:

- Perspectives on NRC Staff transformation recommendations
- Stakeholder suggestions for other ideas the agency should explore

Commission Q & A — **50 mins.**

Discussion – Wrap-Up — **5 mins.**

*For presentation only and does not include time for Commission Q & A's

U.S.NRC

United States Nuclear Regulatory Commission

Protecting People and the Environment

Transformation at the Nuclear Regulatory Commission

Commission Meeting

October 29, 2018

U.S.NRC

United States Nuclear Regulatory Commission

Protecting People and the Environment

Deputy Executive Director for Materials, Waste, Research, State, Tribal, Compliance, Administration and Human Capital Programs

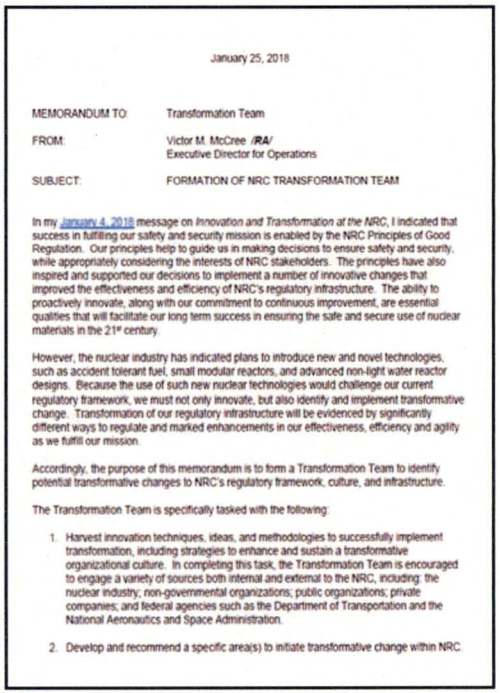
Daniel Dorman

NRC Panel will Address the Following Topics

- Overview of Transformation Initiatives and Next Steps
- Stakeholder Feedback and Recommendations

Proactive Efforts to Transform our Regulatory Framework

- Self- initiated effort to identify proposed changes to our framework, culture, and infrastructure
- Narrow focus on enabling safe and secure use of technologies
- Engagement of a broad range of stakeholders
- 90 day effort focused on specific areas



January 25, 2018

MEMORANDUM TO: Transformation Team

FROM: Victor M. McCree /**RA**/
Executive Director for Operations

SUBJECT: FORMATION OF NRC TRANSFORMATION TEAM

In my January 4, 2018 message on *Innovation and Transformation at the NRC*, I indicated that success in fulfilling our safety and security mission is enabled by the NRC Principles of Good Regulation. Our principles help to guide us in making decisions to ensure safety and security, while appropriately considering the interests of NRC stakeholders. The principles have also inspired and supported our decisions to implement a number of innovative changes that improved the effectiveness and efficiency of NRC's regulatory infrastructure. The ability to proactively innovate, along with our commitment to continuous improvement, are essential qualities that will facilitate our long term success in ensuring the safe and secure use of nuclear materials in the 21st century.

However, the nuclear industry has indicated plans to introduce new and novel technologies, such as accident tolerant fuel, small modular reactors, and advanced non-light water reactor designs. Because the use of such new nuclear technologies would challenge our current regulatory framework, we must not only innovate, but also identify and implement transformative change. Transformation of our regulatory infrastructure will be evidenced by significantly different ways to regulate and marked enhancements in our effectiveness, efficiency and agility as we fulfill our mission.

Accordingly, the purpose of this memorandum is to form a Transformation Team to identify potential transformative changes to NRC's regulatory framework, culture, and infrastructure.

The Transformation Team is specifically tasked with the following:

1. Harvest innovation techniques, ideas, and methodologies to successfully implement transformation, including strategies to enhance and sustain a transformative organizational culture. In completing this task, the Transformation Team is encouraged to engage a variety of sources both internal and external to the NRC, including: the nuclear industry; non-governmental organizations; public organizations; private companies; and federal agencies such as the Department of Transportation and the National Aeronautics and Space Administration.

2. Develop and recommend a specific area(s) to initiate transformative change within NRC.

Modern Risk Informed Regulation Cannot Wait

- Our strong regulatory framework has served us well; the NRC mission will remain unchanged
- We need to integrate our strong safety culture, organization, and principles into a culture that embraces change
- There is a strong sense of urgency and energy that modern risk informed regulation can't wait
- The key transformational change is cultural

Ongoing Actions and Next Steps

Communication of the Staff's Recommendations

- Implemented communication plan

Initial Actions:

1. Referred some ideas to:
   - Specific Offices
   - Innovation Forum
2. Developed a change management plan

Leveraging Ongoing Agency Efforts

- Leadership model
- Innovation Forum

Future Actions

Implementation Plan

U.S.NRC

United States Nuclear Regulatory Commission

Protecting People and the Environment

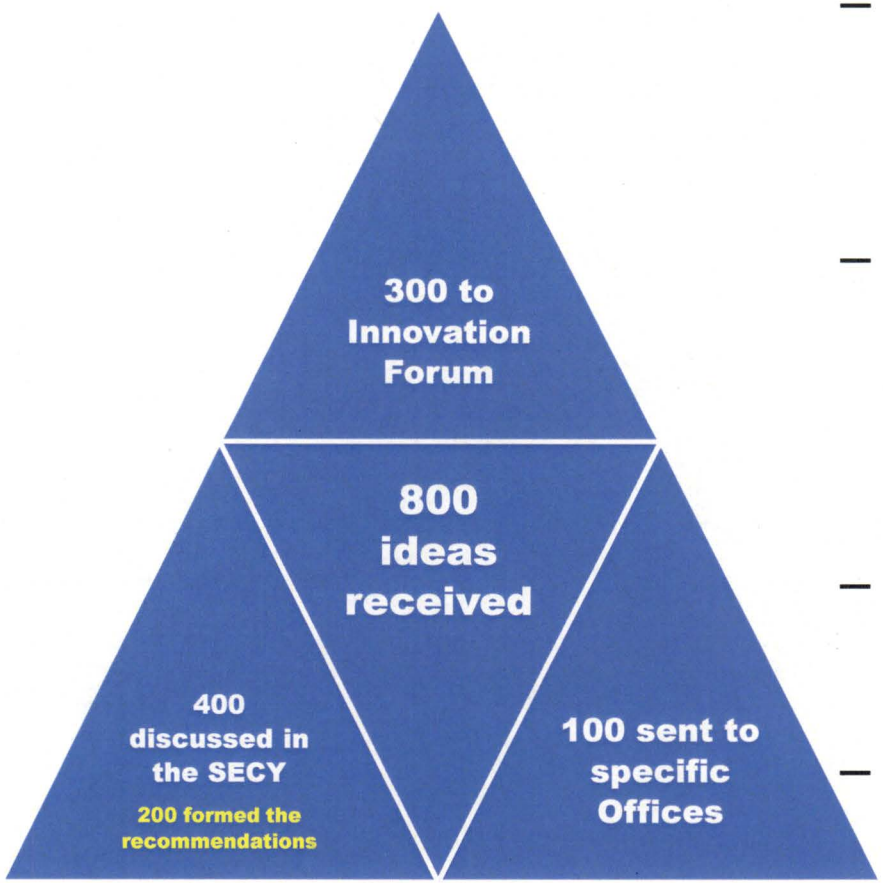
Division of Decommissioning, Uranium Recovery, and Waste Programs

Andrea Kock, Deputy Director

Building on Previous Success through Extensive Interaction with a Broad Range of Stakeholders

- Built on previous successes
- Solicited ideas from stakeholders
- Interacted with internal and external stakeholders

Stakeholder Input Shaped Common Themes and Recommendations



- Need for systematic and expanded use of risk and safety insights in decision-making
- Need for decision making that is not bound by current processes and focusses on timeliness as well as safety
- Need for more performance based regulations
- Need to permit licensees to make more changes to their facilities without NRC approval, while maintaining safety

The Staff's Recommendations to Achieve Modern Risk Informed Regulation

- Develop an agency-wide process, organizational tools, and endorsement to expand the systematic use of qualitative and quantitative risk and safety insights in licensing to scale the level of reviews needed to make findings of adequate protection
- Revise 10 CFR 50.59 and other similar change processes to allow additional flexibility for licensees to make changes without prior NRC approval
- Initiate an optional performance-based, technology-inclusive regulation for non-light water reactors
- Initiate rulemaking to define performance-based, technology-inclusive criteria for the licensing of I&C systems and leverage additional development standards for digital systems

Acronyms

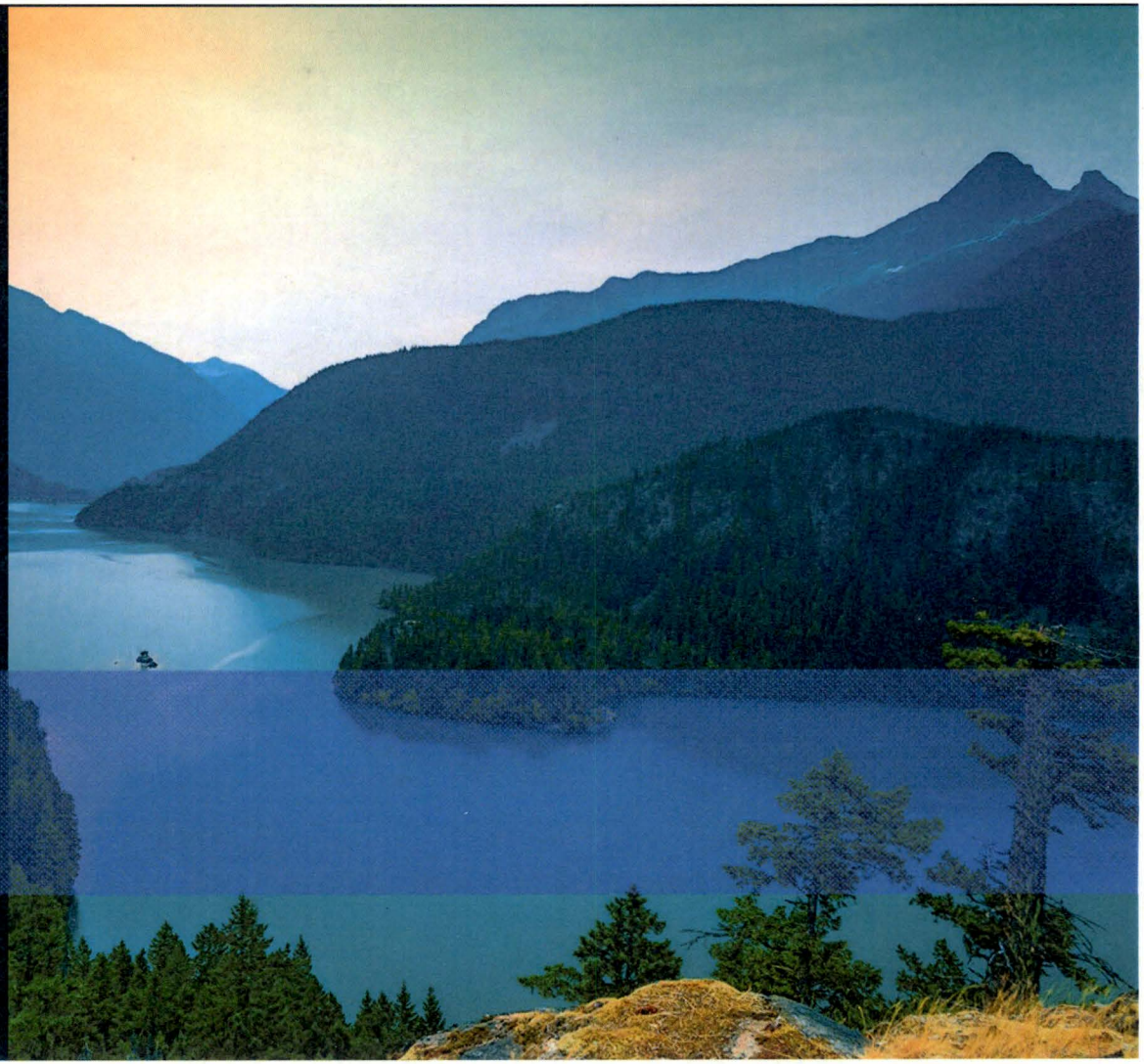
- Code of Federal Regulations (CFR)
- Instrumentation and Control (I&C)
- Nuclear Regulatory Commission (NRC)
- Regulatory Information Conference (RIC)
- Office of the Secretary (SECY)

Maria Korsnick

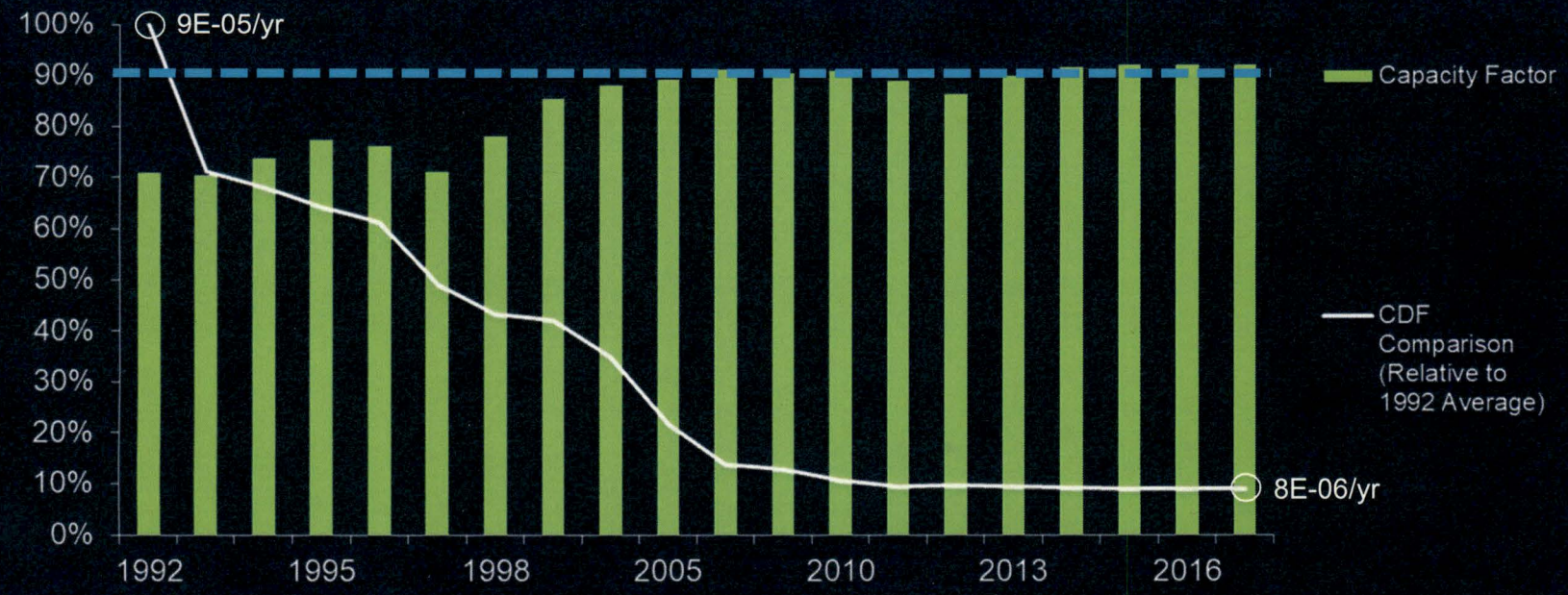
President and CEO
Nuclear Energy Institute

October 29, 2018

NEI NUCLEAR ENERGY INSTITUTE



Average US Capacity Factor and Core Damage Frequency*



*COMPARISON TO 1992

Statements by the NRC Staff

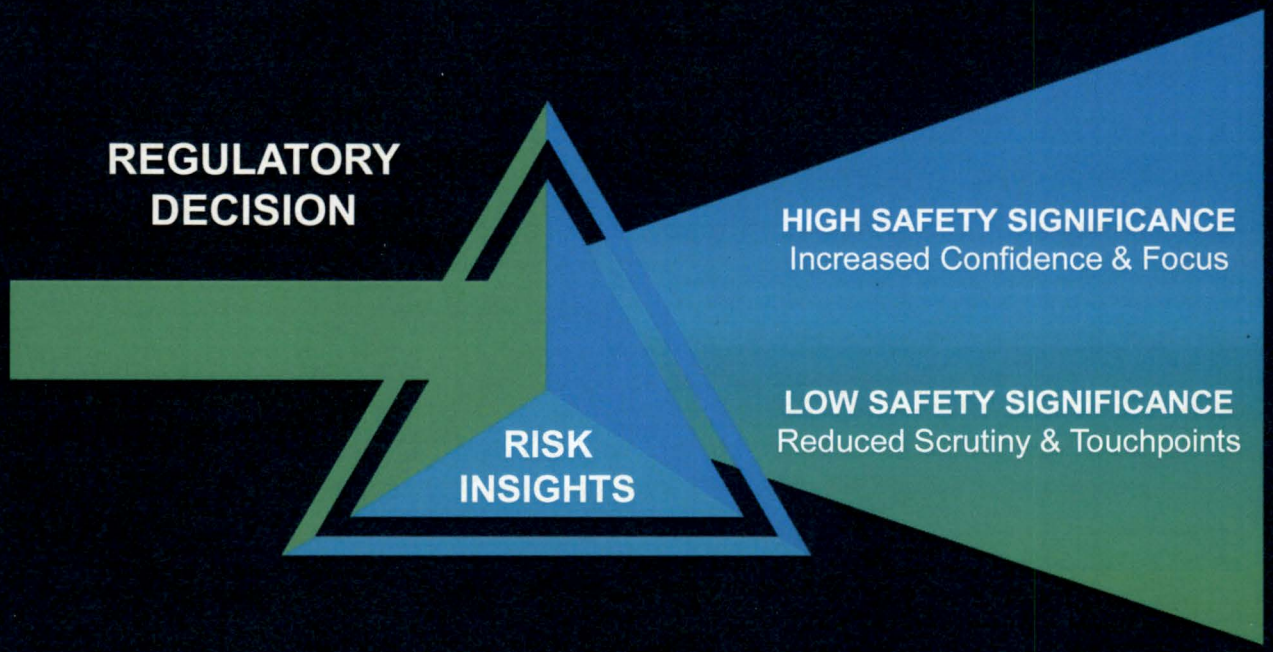
"The continued use of dated, inflexible, and inefficient regulatory approaches, [is] an unnecessary barrier to technology advances."

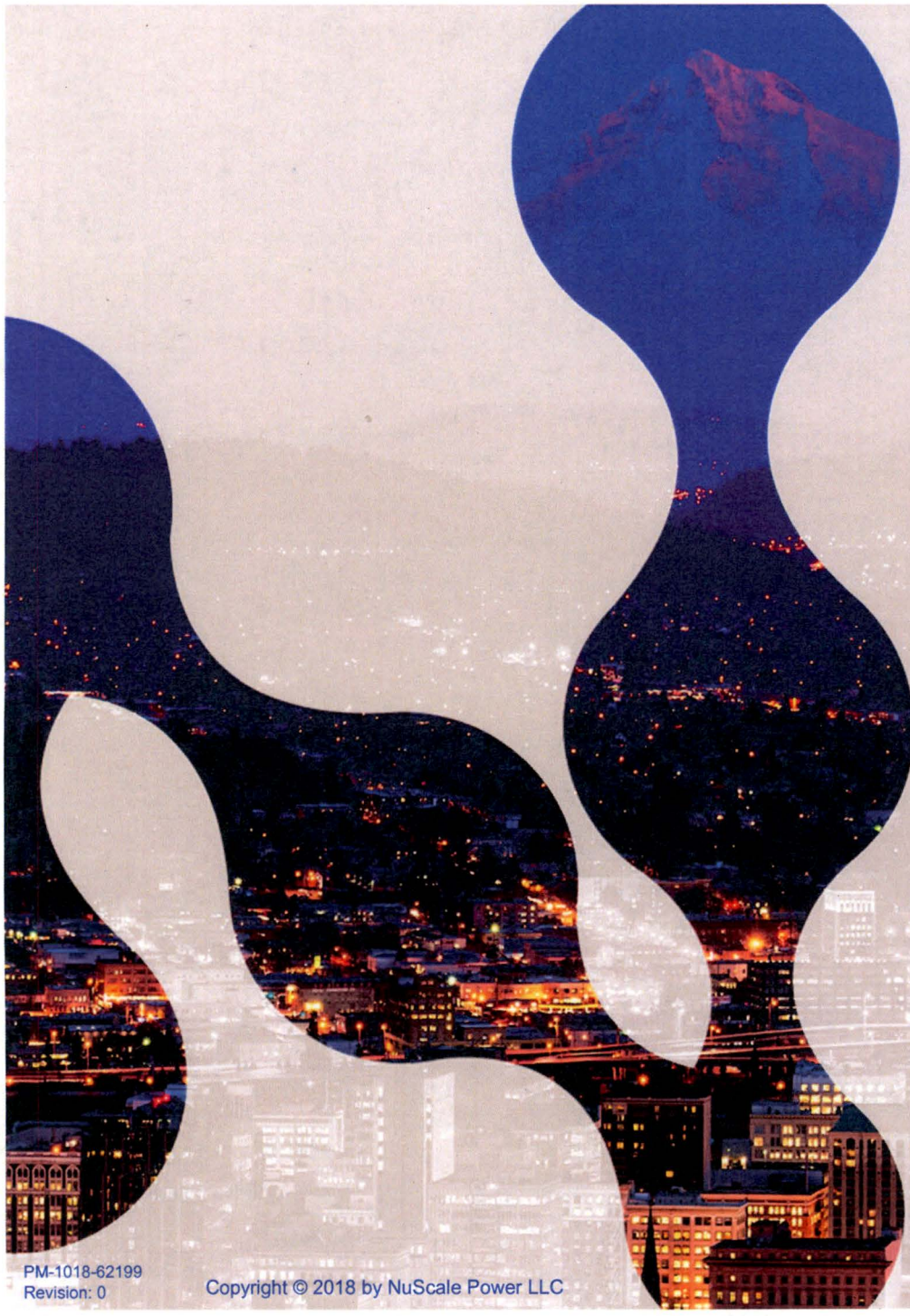
"Continued success as a safety and security regulator will be impeded by the application of existing approaches…"

"Current regulatory practices lead to unnecessary burden evidenced by the expenditure of undue efforts on matters of low safety significance…"

"[The NRC] must accept a greater degree of risk and uncertainty in areas of low safety or risk significance."

Reasonable Assurance of Adequate Protection





NUSCALE™
Power for all humankind

NuScale Perspective

October 29, 2018

Dale Atkinson
COO/CNO

PM-1018-62199
Revision: 0

Template #: 0000-20955-F01 R8

Design Certification Review—Successes

- Overall, review has progressed very well
  - maintaining schedule for the bulk of the application
  - excellent communication at all levels
- Leadership of NRO executives appreciated
  - NRO August 29, 2018 memo (ML18240A410) clarifying review expectations
  - open dialog on issues
- Key successes
  - safety classification of electrical systems design
  - control room and licensed operator staffing
  - digital instrumentation and control platform

Design Certification Review—Challenges

- Not consistently realizing benefit of design safety
  - innovative design solutions to historic safety vulnerabilities seem to 'raise the regulatory bar' in some instances
  - unreasonable level of application detail and depth of staff review, especially in areas of low safety significance
  - review framework doesn't evaluate safety holistically
  - inadequate/unclear consideration of risk in application and review processes
- Consequences
  - innovative safety enhancements harder to get approved than less-safe alternatives that better fit existing regulations and guidance
  - current review costs exceeding our estimate
  - level of detail creates lifetime significant regulatory burden to manage licensing basis

Transformation Needs

- Risk-informed regulation
  - NuScale experience illustrates how difficult this transformation will be
  - existing framework, as currently implemented, is ill-suited for designs with significant departures from past safety concepts
  - urgent need to address for new applications
- Clarify scope and level of detail required in applications/review
  - both scope and content of application and review should be risk-informed
  - "essentially complete" should be limited to the information necessary for safety finding
  - limited review of operational programs at DCA stage
  - disciplined review that considers the full regulatory framework, including downstream regulatory processes.
- NuScale provides opportunity to pilot these concepts
  - some opportunities still exist in current review
  - future applications

Dale Atkinson
COO/CNO
datkinson@nuscalepower.com

NRDC Comments on: SECY-18-0060
"ACHIEVING MODERN RISK-INFORMED REGULATION"

Geoffrey Fettus

Senior Attorney, Nuclear

Natural Resources Defense Council (NRDC)

NRDC Comments on:

- "The Need for Cultural Transformation at the NRC"
- Recommended Transformation Initiative
  "Strategy to Transform the Agency Licensing Review Process"
- Recommended Transformation Initiative
  "10 CFR 50.59 and Similar Change Processes"
- Advanced Reactors
- Digital Instrumentation and Controls

NRDC

October 29, 2018

NRDC Comments on SECY-18-0060 Recommendation 1

"Transform the agency licensing review process by development of an agencywide process and organizational tools to expand the systematic use of qualitative and quantitative risk and safety insights; thereby, enabling staff to scale the scope of review and level of detail needed to make a finding of reasonable assurance of adequate protection, beginning with the licensing reviews for reactors"

October 29, 2018

NRDC Comments on SECY-18-0060 Recommendation 2

"Revise 10 CFR 50.59 and other similar requirements to allow additional flexibility for licensees to make facility changes without prior NRC approval"

NRDC

October 29, 2018

NRDC Comments on SECY-18-0060 Recommendation 3

"Initiate an optional performance-based, technology-inclusive regulation for non-LWRs"

October 29, 2018

NRDC Comments on SECY-18-0060 Recommendation 4

"Initiate rulemaking to define high-level performance-based I&C safety design principles and develop associated regulatory guidance that documents the acceptable standards that may be used to meet these principles"

NRDC

October 29, 2018

ONE TEAM. ONE VISION. ONE GOAL.

Building the future of nuclear power in America

Transformation at the NRC

Danny Bost
Executive Vice President and CNO

October 29, 2018

Southern Nuclear

Georgia Power

Transformational Change (SECY-18-0060)

- Significant industry improvement in managing safety over last 30 years.
- Transformation opportunity in revising regulatory processes to be more efficient and effective both for the NRC and the industry.
- SECY-18-0060
  - Step the in right direction
  - Important to Part 50 and Part 52 licensees

Transformational Change (SECY-18-0060)

- Applicability to Vogtle 3 and 4
  - Improved understanding of safety margins
  - Changes in design and process possible without impacting safety
- Vogtle 3 and 4 Regulatory Construction History
  - Under construction for 6 ½ years since first safety-related rebar
  - Excellent regulatory compliance record
  - Site focus on assuring compliance
- Expand Vogtle 3 and 4 initiatives to formal pilot
  - Spotlight on risk-informed decision-making in context of reasonable assurance of adequate protection.
- Resolve Digital I&C regulatory processes

Transformational Change (SECY-18-0060)

Vogtle 3 and 4 Risk-Informing Opportunities

- NRC inspection consolidation
- License amendment level of effort
- Part 52 & AP1000 changes based on recognition of limited safety impact

Excellent Compliance History Merits Resource Reduction

NC Department of Health and Human Services

NC Perspective on NRC Transformation Recommendations

W. Lee Cox, III

Chief, Radiation Protection Section

October 29, 2018

Reflection on Transformation

- **Similarities, Comparisons, and Lessons Learned**
  - **Reinvention**
  - **Focused on Agency Success**
  - **Agency Success not a Priority for the Public or the Regulated Community**
  - **Inclusion of Value-Added Regulatory Considerations**

Transformation Recommendations

- **Define high-level performance-based I&C safety design principles and develop associated regulatory guidance**
  - **Less Prescriptive/Increased Flexibility**
  - **Leader/Champion for Change**
  - **Reliance on Familiar/Obsolete Technology and Processes**
  - **Example of State Complacency and the Transition to Drone Technology**

Transformation Recommendations

https://www.youtube.com/watch?v=MuUJCdSHLNU&feature=em-share_video_user

Transformation Recommendations

- Licensing Review Process
- Revise 10 CFR 50.59
- Performance-Based, Technology-Inclusive Regulation for Non-LWRs.

Additional Views

- Reduce the NRC Inspection Footprint When No Major Gaps are Identified
- Use of Rigorous Self-Assessments
- Incorporate More Remote Review
- Use Onsite Effort for Areas of Greater Safety Significance

Closing

- Hurricane Florence
  - Incorporation of Value-Added Oversight by Federal, State and Local Entities to Facilitate the Startup of a Reactor to Provide Needed Power.
  - No Losers = NRC Transformation Success

Perspectives on NRC Transformation

Commission Meeting

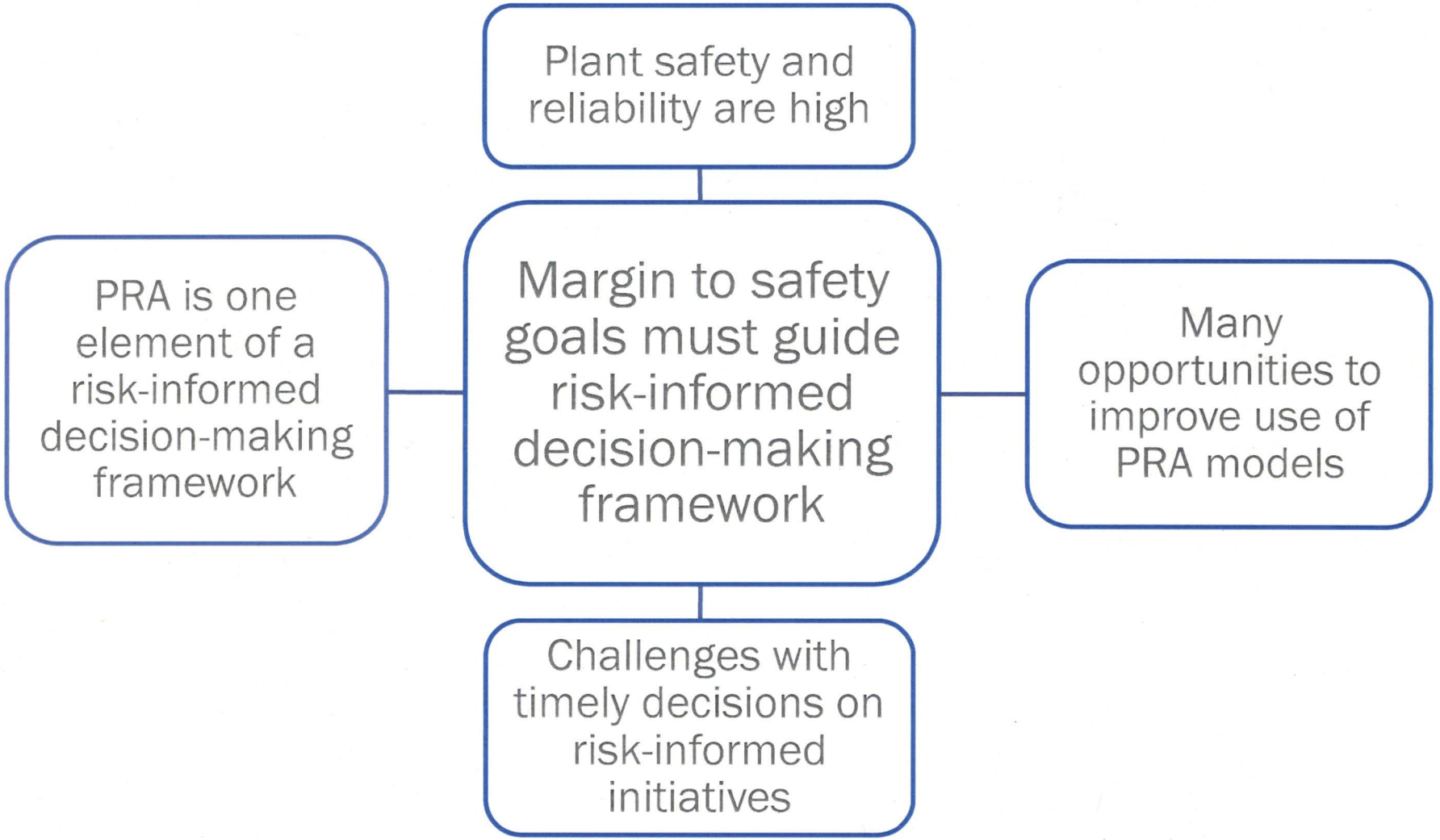
October 29, 2018

Bryan Hanson

Chief Nuclear Officer

Exelon Generation®

Risk-Informed Decision-Making



Risk-informed decision-making improves safety

Exelon Generation

Reactor Oversight Process Enhancements

Revise ROP Action matrix to reflect normal plant operations, with baseline CDF between 10^{-5} and 10^{-6}/year

Close White findings upon successful completion of follow-up actions

Results:

(1) more fidelity between risk and NRC/licensee response

(2) better public understanding of relationship between ROP findings and true risk

Reduce baseline inspections based on performance

Additional proposals are set forth in Sept. 19, 2018 NEI letter to Director of NRR, Ho Nieh

HOW DOES A 21ST CENTURY NUCLEAR ENERGY DEPLOYMENT DIFFER FROM A 20TH CENTURY DEPLOYMENT?

OCTOBER 2018, TODD ALLEN, PROFESSOR & SENIOR FELLOW

WISCONSIN
UNIVERSITY OF WISCONSIN-MADISON

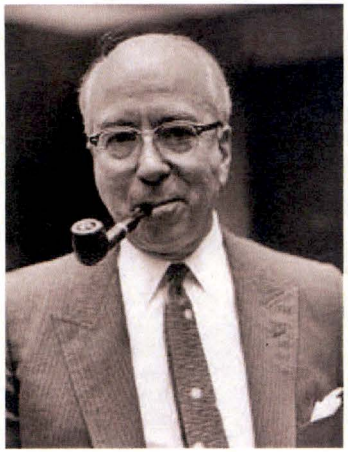
third way
fresh thinking

OPENING COMMENT

The conversation from and about the NRC has improved greatly over the past few years. The trajectory is positive.

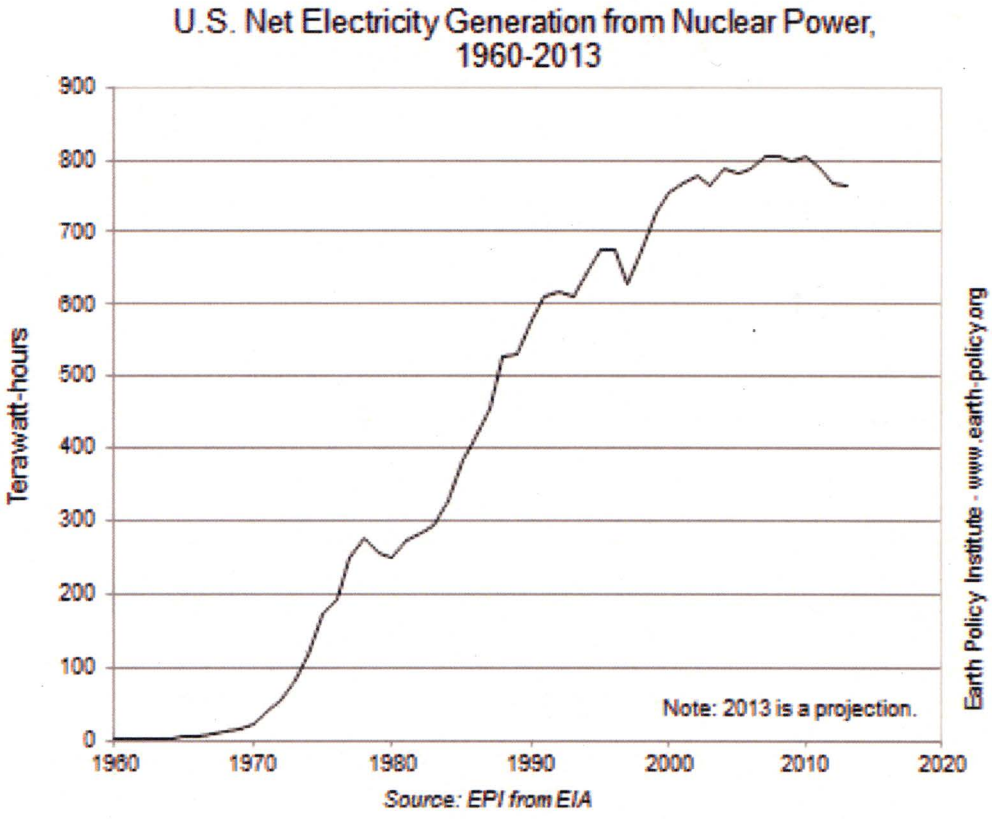
- Through its transformative efforts, the NRC has become decidedly more transparent, communicative, and flexible in its approach to the regulatory process and advanced reactor developers.
- A wide array of advanced reactor industry stakeholders are highly engaged with the Commission, and have acknowledged its willingness to adapt and innovate in its procedures.

20TH CENTURY CONFIDENT EXPERTS



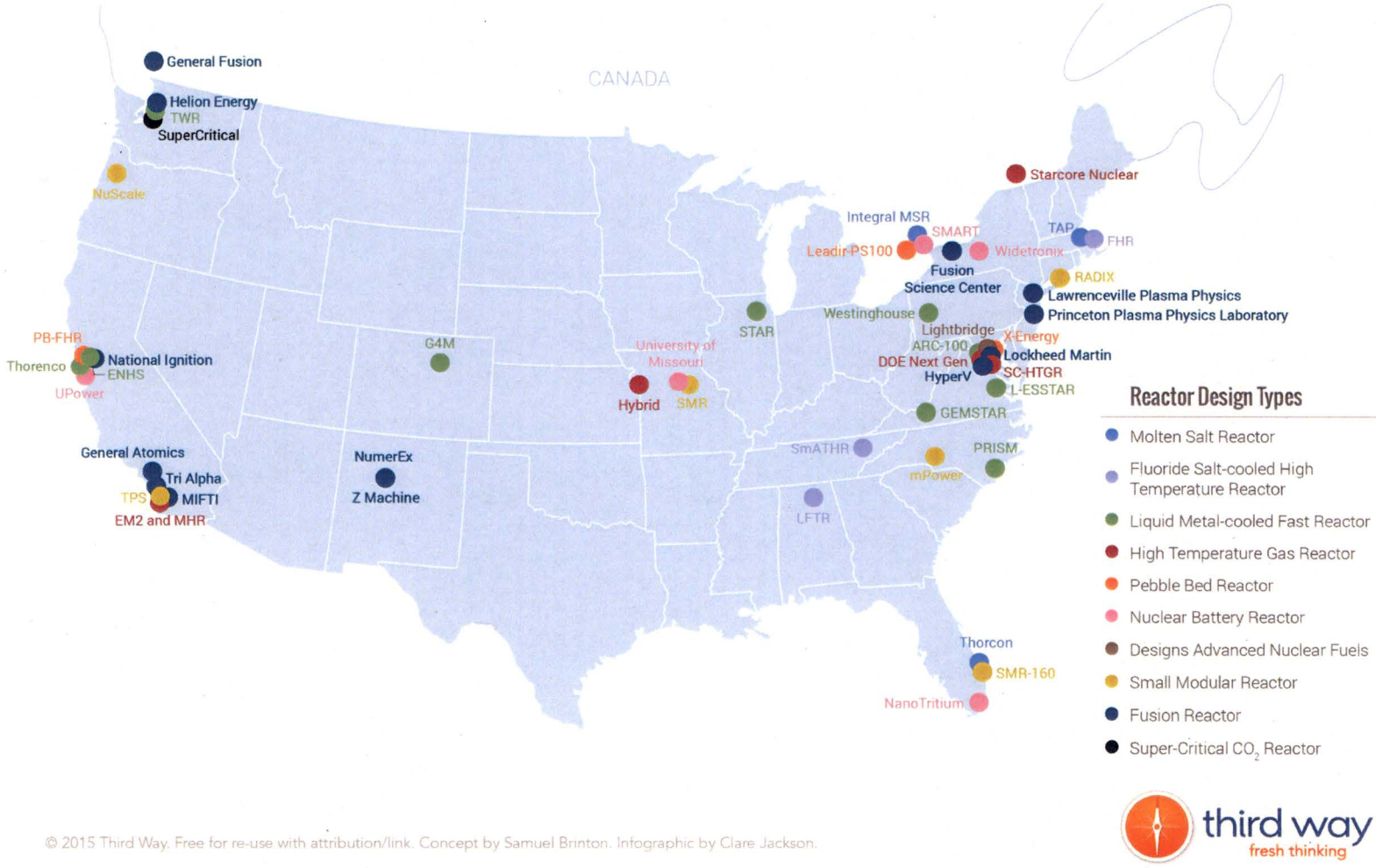
Lewis Strauss

"It is not too much to expect that our children will enjoy in their homes electrical ***energy too cheap to meter****, will know of great periodic regional famines in the world only as matters of history, will travel effortlessly over the seas and under them and through the air with a minimum of danger and at great speeds, and will experience a lifespan far longer than ours as disease yields and man comes to understand what causes him to age."*



http://www.earth-policy.org/plan_b_updates/2013/update116

THE ADVANCED NUCLEAR INDUSTRY



third way
fresh thinking

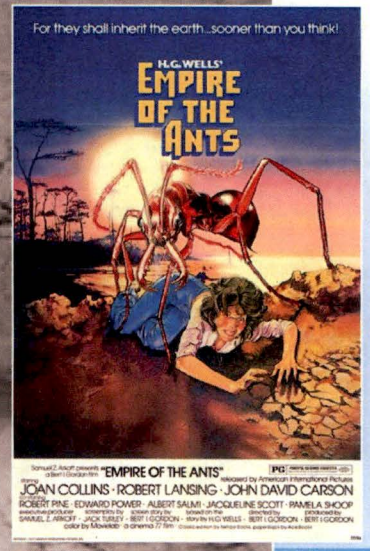
WHAT SHOULD THE REGULATOR LOOK LIKE?

COMSECY 17-0006, "Re-examination of the Need for a U.S. Nuclear Regulatory Commission Leadership Model," dated February 6, 2017

We ensure your 21st Century Nuclear is safe

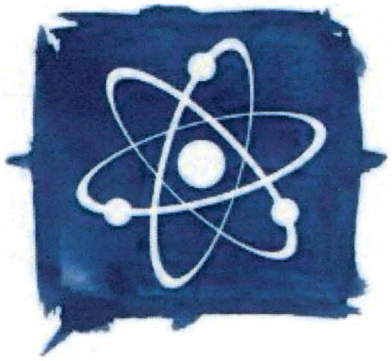
THEM: GIANT MUTANT ANTS (1950S)

A first entertainment use of radiation-induced mutant creatures



GRAND THEMES TO KEEP IN MIND

- Vendors, investors, & consumers of energy products need to believe that the NRC can regulate at the pace of commerce, while maintaining the continued protection of public health and safety, promoting the common defense and security, and protecting the environment
- Initiatives need to ensure the NRC can recruit and maintain a vibrant staff that embraces the transformation at all levels of the organization
- Changes in regulatory processes require a parallel engagement strategy that provides comfort to the public that the core mission of the NRC has not changed



ADVANCED NUCLEAR CAMPAIGN

Todd Allen

Senior Fellow, Third Way

tallen@thirdway.org

Connecticut Department of Energy and Environmental Protection

Connecticut Department of
ENERGY &
ENVIRONMENTAL
PROTECTION

Connecticut's Perspective on the NRC Staff's Recommendations and Additional Views on Transformation for the Agency

October 29, 2018

Jeff Semancik
Director, Radiation Division
Connecticut Department of Energy and Environmental Protection

Public Commission Briefing on Transformation at the NRC

Connecticut Department of Energy and Environmental Protection

Insights on Transformation

- CT applauds the NRC's Transformation Efforts
- Focus must remain on Safety
- Nuclear Safety Risk Should be Managed *not* Accepted
- Regulatory Decisions should be based on Best Science and Facts
- Engage the Communities that Bear the Risk

NRC Transformation Efforts

- We recognize reality is driving change
  - Obligation to align limited resources and available funding with the degree of safety, security, and environmental protection they achieve
  - Requires innovative solutions and cooperative actions
- We understands that there will impact.
  - Imperative that the NRC continues to work collaboratively with *all* stakeholders including states, local communities, special interest organizations, and other federal partners, as well as the regulated industry to communicate changes and minimize the adverse effects

Focus must remain on Safety

- SECY-18-0060....
  - Proposals have an implied assumption that we are being too safe (i.e. *"overly conservative"*)
  - References to *"the difficult market conditions for the nuclear industry"* (p.8)
- Nuclear safety culture principles remind us that, *"For the commercial nuclear power industry, nuclear safety remains the overriding priority"*
  - Inconsistent with, "Move fast and break things" culture associated with innovation in Silicon Valley
  - Focus must remain on improving or maintaining Public Health and Safety and minimizing environmental impact

Risk Should be *Managed* not *Accepted*

- SECY-18-0060 states, *"...the agency must accept a greater degree of risk and uncertainty..."* (p. 5) and discusses *"...increasing risk tolerance..."* (p.7)
  - Simply accepting higher risk is a "sucker's choice"
  - States and local communities *not* regulatory agencies are the ones that bear the risks and should determine if it is acceptable
  - Who is accountable when the improbable occurs?
    - Increase accountability for risk based decisions
    - For example, individual licenses held by reactor operators helps ensure individual accountability for their actions. Consider similar personal license or certification for 10 CFR 50.59 evaluators.

Risk Should be *Managed* not *Accepted*

- Risk should be *managed* vice *accepted*

$$Risk = \frac{(Probility\ of\ Occurrence) \times (Consequences)}{(Probability\ of\ Detection)}$$

  - Some consequences are unacceptable
    - Risk based decision making can become myopically focused on probability of occurrence
    - The "risk triplet" cited ignores probability of detecting events and faults
  - Consequences can vary for same decision in different locations based on surrounding population, sensitive infrastructure, etc.
  - Risk informed regulatory actions should require offsetting actions to improve or maintain risk
    - Example - triple modular redundancy vice redundant computer systems if requesting alternative to IEEE-603 for licensing

Risk Should be *Managed* not *Accepted*

- How will risk insights be used when conditions leading to *increased* risk are identified?
  - Increased failure rates, new failure modes, and undetected failures
  - Changes to offsite populations and impacts
  - Environmental changes
- Must recognize that legacy standards may no longer be useful for risk based or performance based actions
  - Example Single Failure Criterion (SFC) – risk based fault tolerance recognizes that multiple components can and do fail. Designs may need additional components to get same level of reliability assumed by single failure.

Decisions Should be Based on Science

- Assumptions in risk models should be based on the best science available
  - Example
    - NRC accepted licensee use of predicted 0.5 ft sea level based upon historical data in post-Fukushima flooding risk re-evaluation
    - National Oceanographic and Atmospheric Administration (NOAA) scientific prediction for the location is significantly higher - between 1.2 ft (Intermediate Low probability) and 4.63 ft (Extreme probability)
    - Local regulators and experts were not engaged

Engage the Communities that Bear the Risk

- All Problems are Local
- Avoid industry bias in stakeholder engagement
  - Ensure there is equal depth and breadth of engagement
- State and local experts should be engaged
  - Properly constructed citizens advisory panels can provide local, technically qualified insights
    - For example, Connecticut's Nuclear Energy Advisory Panel (NEAC) has retired Navy nuclear captains, former NRC licensed personnel, local nuclear professors
    - Example: Le Creusot Forge components. Based on NEAC insights, state worked with licensee to have them voluntarily conduct in situ non-destructive testing and sensitivity analysis which was completed in April 2017. NRC response to petition was not completed until August 2018 and never included component testing.

Connecticut Department of Energy and Environmental Protection

Questions?

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www.ct.gov/deep/radiation

Transformation Success: Narrowing the Gap Between Perception and Reality

Dave Lochbaum

Self-Unemployed

October 29, 2018

NRC has demonstrated proficiency at responding swiftly and effectively to unanticipated safety and security challenges (e.g., PWR CRDM nozzle cracking in spring 2001 and 9/11 later that year)

NRC can successfully apply that capacity to future challenges such as those listed in SECY-18-0060

BUT, and it's a big BUT:

Transformation success depends on keeping the gap between perception and reality as narrow as possible.

Year-Plus Nuclear Reactor Outages

Reactor	Date Outage Began	Date Outage Ended	Outage Length (years)
Fermi Unit 1	10/5/66	7/18/70	3.8
Palisades	8/11/73	10/1/74	1.1
Browns Ferry Unit 2	3/22/75	9/10/76	1.5
Browns Ferry Unit 1	3/22/75	9/24/76	1.5
Surry Unit 2	2/4/79	8/19/80	1.5
Three Mile Island Unit 1	2/17/79	10/9/85	6.6
Turkey Point Unit 3	2/11/81	4/11/82	1.2
San Onofre Unit 1	2/26/82	11/28/84	2.8
Nine Mile Point Unit 1	3/20/82	7/5/83	1.3
Indian Point Unit 3	3/25/82	6/8/83	1.2
Oyster Creek	2/12/83	11/1/84	1.7
St. Lucie Unit 1	2/26/83	5/16/84	1.2
Browns Ferry Unit 3	9/7/83	11/28/84	1.2
Pilgrim	12/10/83	12/30/84	1.1
Peach Bottom Unit 2	4/28/84	7/13/85	1.2
Fort St. Vrain	6/13/84	4/11/86	1.8
Browns Ferry Unit 2	9/15/84	5/24/91	6.7
Browns Ferry Unit 3	3/9/85	11/19/95	10.7
Browns Ferry Unit 1	3/19/85	6/12/07	22.2
Davis-Besse	6/9/85	12/24/86	1.5
Sequoyah Unit 2	8/22/85	5/13/88	2.7
Sequoyah Unit 1	8/22/85	11/10/88	3.2
Rancho Seco	12/26/85	4/11/88	2.3
Pilgrim	4/11/86	6/15/89	3.2
Peach Bottom Unit 2	3/31/87	5/22/89	2.1
Peach Bottom Unit 3	3/31/87	12/11/89	2.7
Nine Mile Point Unit 1	12/19/87	8/12/90	2.6

Reactor	Date Outage Began	Date Outage Ended	Outage Length (years)
Surry Unit 2	9/10/88	9/19/89	1.0
Palo Verde Unit 1	3/5/89	7/5/90	1.3
Calvert Cliffs Unit 2	3/17/89	5/4/91	2.1
Calvert Cliffs Unit 1	5/5/89	10/4/90	1.4
FitzPatrick	11/27/91	1/23/93	1.2
Brunswick Unit 2	4/21/92	5/15/93	1.1
Brunswick Unit 1	4/21/92	2/11/94	1.8
South Texas Project Unit 2	2/3/93	5/22/94	1.3
South Texas Project Unit 1	2/4/93	2/25/94	1.1
Indian Point Unit 3	2/27/93	7/2/95	2.3
Sequoyah Unit 1	3/2/93	4/20/94	1.1
Fermi Unit 2	12/25/93	1/18/95	1.1
Maine Yankee	1/14/95	1/18/96	1.0
Salem Unit 1	5/16/95	4/20/98	2.9
Salem Unit 2	6/7/95	8/30/97	2.2
Millstone Unit 2	2/20/96	5/11/99	3.2
Millstone Unit 3	3/30/96	7/1/98	2.3
Crystal River Unit 3	9/2/96	2/6/98	1.4
Clinton	9/5/96	5/27/99	2.7
LaSalle County Unit 2	9/20/96	4/11/99	2.6
LaSalle County Unit 1	9/22/96	8/13/98	1.9
D.C. Cook Unit 2	9/9/97	6/25/00	2.8
D.C. Cook Unit 1	9/9/97	12/21/00	3.3
Davis-Besse	2/16/02	3/16/04	2.1
Fort Calhoun	4/9/11	12/21/13	2.7

52 year-plus outages to restore safety levels to acceptable levels, 50 on NRC's watch

Source: UCS report No More Fort Calhouns!, February 2015. Online at http://www.ucsusa.org/sites/default/files/attach/2015/03/np-ft-calhouns-full-report.pdf?_ga=2.196753579.62578069.1538585309-730957765.1502383429

Lessons from year-plus reactor outages:

1. Owners were not knowingly operating unsafe reactors, hoping not to get caught.
2. Owners were operating what they perceived to be sufficient safe reactors, but they were not.
3. The gap between perception and reality is reflected by the time required to re-close the gap.
4. 44 year-plus outages during the SALP years (1980-1999), an average of 2.2 per year
5. 2 year-plus outages during the ROP years (2000-date), an average of less than 0.11 per year
6. ROP narrowed the gap between perception and reality, thus preventing uncorrected safety problems from growing to the point where it takes longer than a year to remedy them once detected

Lessons from ROP for transformations:

1. **Unintended consequences and initially correct deferral decisions undermined by changing landscapes need to be detected and corrected in a timely and effective manner.**

2. **Baseline gap-monitoring for non-transformation areas (aka back-burner issues) to guard against undue delays and cumulative effects of non-regulation.**

3. **To maximum extend practical, objective metrics needed to ensure desired outcomes are achieved without unintended consequences.**

4. **ROP is superior to SALP, but not infallible.**

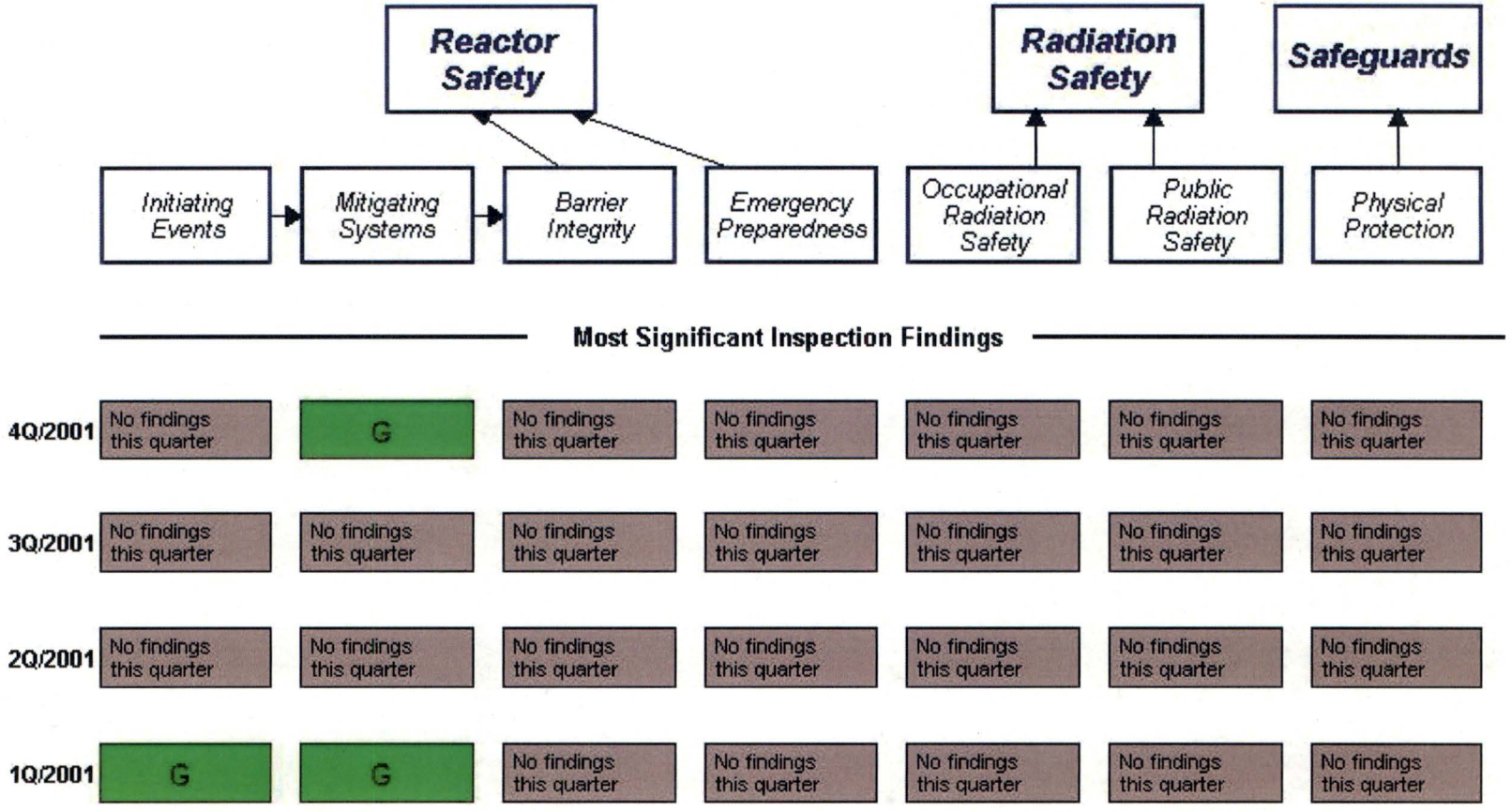
Davis-Besse Perception (SALP)

PLANT NAME: DAVIS-BESSE
REGION: 3

UNIT	RPT	ASSESSMENT PERIOD	OPS	MAINT	ENG	PS[1]
	03/95	07/01/93 - 01/21/95	1	1	1	1
	09/93	12/01/91 - 06/30/93	2	1	1	2/1/1
	04/92	07/01/90 - 11/30/91	2	1	2	2/1/1
	11/90	03/01/89 - 06/30/90	2	2	2	2/1/1
	07/89	01/01/88 - 02/28/89	2	2	2	2/1/1

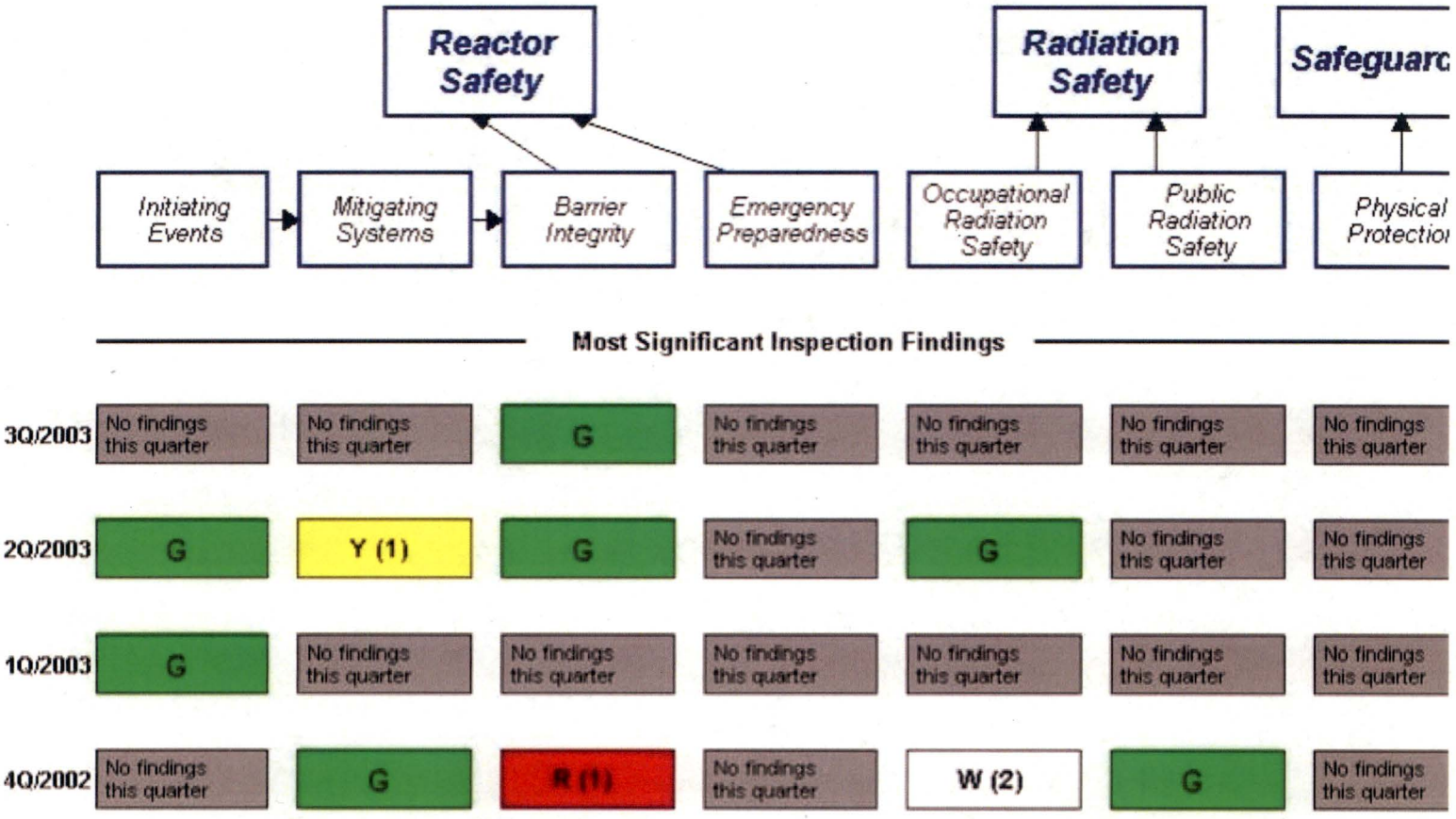
SALP perceived Davis-Besse to be a top performer

Davis-Besse Perception (ROP)



ROP also perceived Davis-Besse to be a top performer

Davis-Besse Reality



Reality showed Davis-Besse to have come closer to accident than any reactor since Three Mile Island

NRC and industry are on the same page (often the same sentence on the same page) for many risk calculations, such as:

1. **Peak cladding temperatures during postulated loss of coolant accidents**
2. **Peak containment pressures during postulated steam line break accidents**
3. **Steam generator tube wall crack growth rates**
4. **Pipe wall thinning rates due to erosion/corrosion**
5. **Safety-related component failures to start and failures to run**

Unless both are wrong, tiny gap between perception and reality

NRC and industry are not in the same book, yet alone on the same page, for high risks

Comparison Between Industry and NRC Risk Estimates				
Event	**Licensee ΔCDF**	**NRC ΔCDF**	**Risk Difference**	**Sources**
ANO flood protection yellow finding	1.44E-05	1.00E-04	594%	ML14329B209
ANO Stator Drop on Unit 1 yellow finding	4.8E-06	6.0E-05	1,150%	ML14174A832
ANO Stator Drop on Unit 2 yellow finding	1.8E-06	2.8E-05	1,456%	ML14174A832
Browns Ferry Unit 1 RHR Valve red findings	1.0E-06	1.0E-04	9,900%	ML111290482 ML111930432
Fort Calhoun flood protection yellow finding	8.4E-07	3.2E-05	3,710%	ML102800342
Fort Calhoun trip relay contactor white finding	1.0E-06	2.6E-05	2,500%	ML111660027 ML112000064
Indian Point 2 steam generator tube leak red finding	6.6E-06	2.85E-05	332%	ML003770186
Monticello flood protection yellow finding	8.92E-07	3.6E-05	3,936%	ML13233A068 ML13162A776
Oconee safe shutdown facility yellow finding	8.0E-06	1.6E-05	100%	ML102240588
Palo Verde voided ECCS suction line yellow finding	7.0E-06	4.6E-05	557%	ML051010009
Watts Bar flood protection yellow finding	8.15E-09	6.35E-06	77,814%	ML13115A020 ML13071A289

Whichever is wrong, massive gap between perception and reality

My prime concern with transformations:

Changes are not occurring in isolation, enabling progress towards desired outcome to be effectively monitored and mid-course corrections implemented, if necessary.

Instead, transformations are proposed concurrent with extensive changes to the ROP and other regulatory constructs.

Can performance shortfalls be readily and reliably detected when the yardsticks are all new without proven track records?

I know the perception is "yes, of course." But is that also the real answer?

Gap management straw-persons:

1. Annual self-evaluations by two NRC teams.

    a) One team looking for evidence that desired outcomes have been achieved or are on-target to do so.

    b) One team looking for evidence of unintended consequences from transformation initiatives and adverse consequences in non-transformation areas.

2. Commission briefing and/or ACRS meeting with presentations by both teams

List of Acronyms

ACRS – Advisory Committee on Reactor Safeguards

CDF – Core damage frequency

CFR – Code of Federal Regulations

CRDM – Control Rod Drive Mechanism

ENG - Engineering

MAINT - Maintenance

NRC – Nuclear Regulatory Commission

OPS – Operations

PS – Plant Support (e.g., training, security, etc._

PWR – Pressurized Water Reactor

ROP – Reactor Oversight Process

SALP – Systematic Assessment of Licensee Performance

Nuclear Regulatory Commission's Transformation

José Emeterio Gutiérrez
President & CEO

Westinghouse

Achieving Transformational Change

- Apply SECY-18-0600 recommendations across all NRC business lines
  - Use of risk information
  - Embrace the Staff's sense of urgency
- Westinghouse's current journey provides lessons learned
  - External help is essential
  - Operational transparency leads to efficiency in execution

Westinghouse

Licensing Considerations

- Change process (10 CFR 50.59) needs a risk-informed alternative
- License renewals and amendments
  - Greater predictability in the scope and depth of review
    - Reviews should be commensurate with safety significance
    - Use the reasonable assurance standard
- Commission policy on "forward fitting" new guidance
- Predictable advanced reactor licensing

Cross Cutting Views

- Sharing and evaluating budget execution data will promote efficiency gains
  - Confirm staff time is spent on safety significant activities
  - Analyze inspection data to drive program enhancements
  - Improve understanding with external stakeholders

The cultural discomfort that comes with change gives way to a healthier process

Westinghouse

Nuclear Regulatory Commission's Transformation

José Emeterio Gutiérrez
President & CEO

Westinghouse

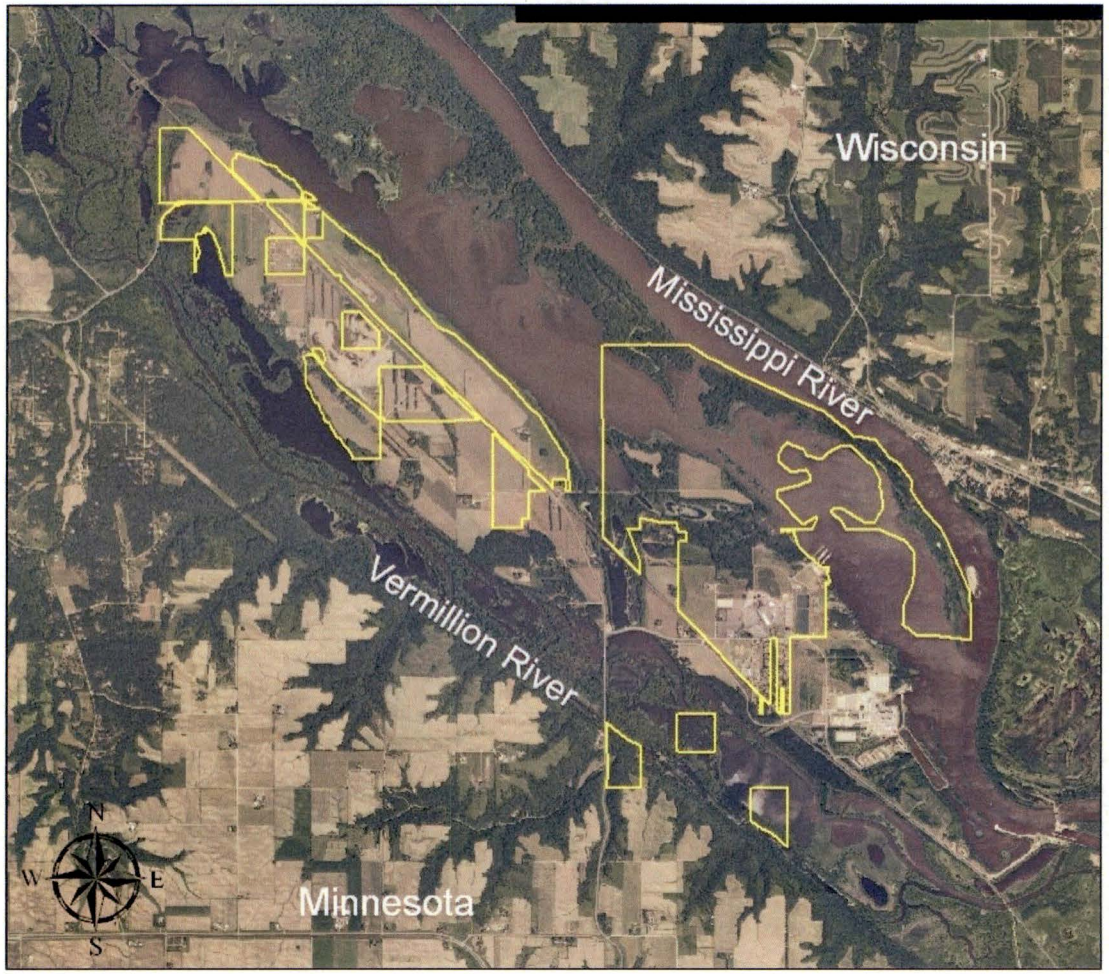
Transformation at the NRC

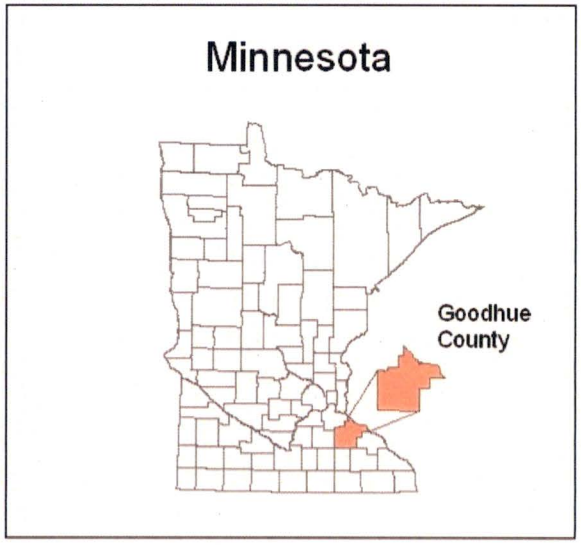
Heather Westra
Prairie Island Indian Community
Welch, Minnesota

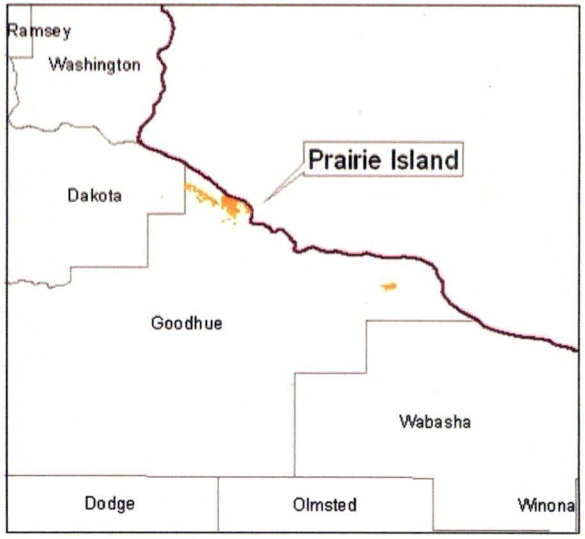
October 29, 2018

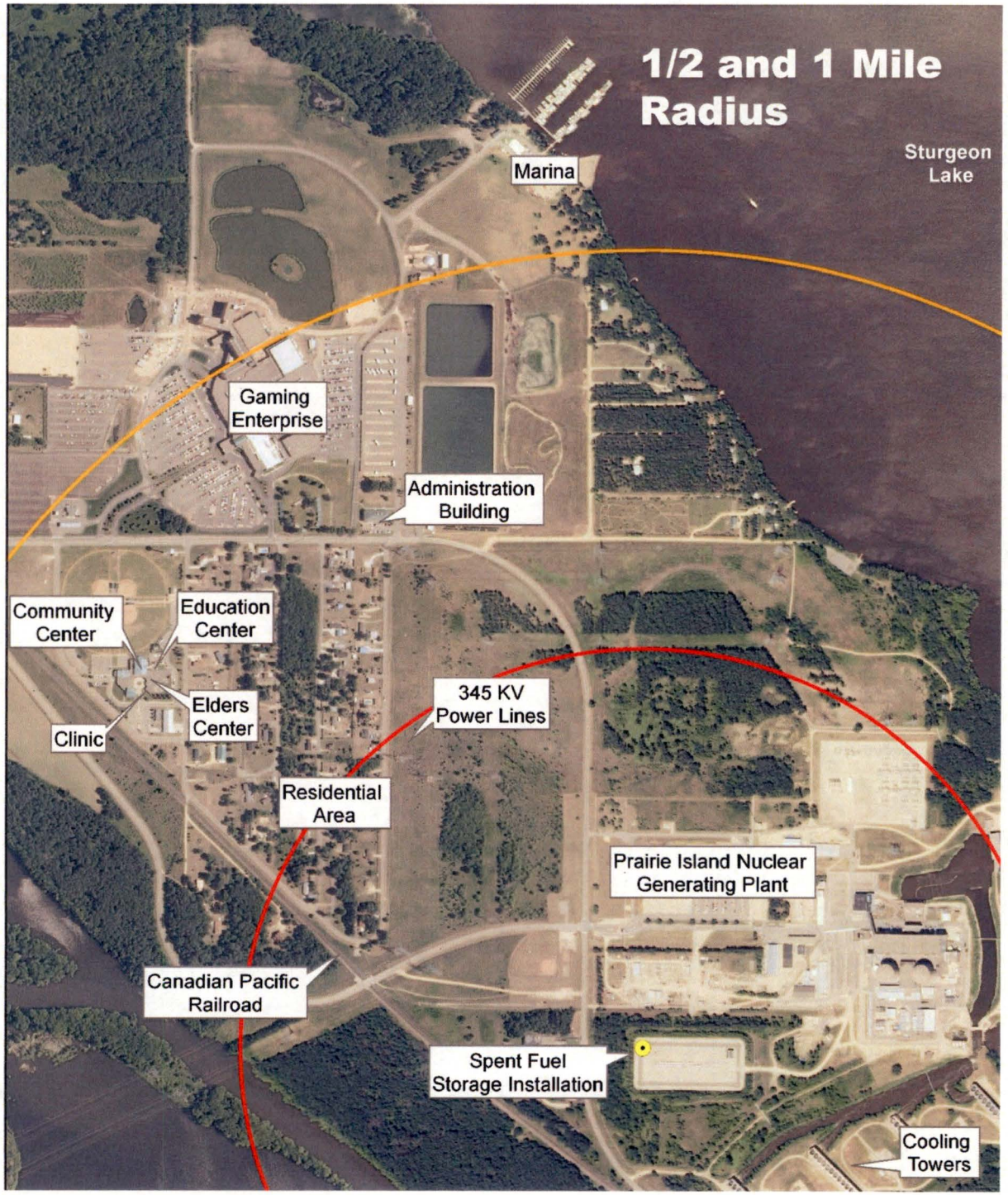
Location

Prairie Island Indian Community

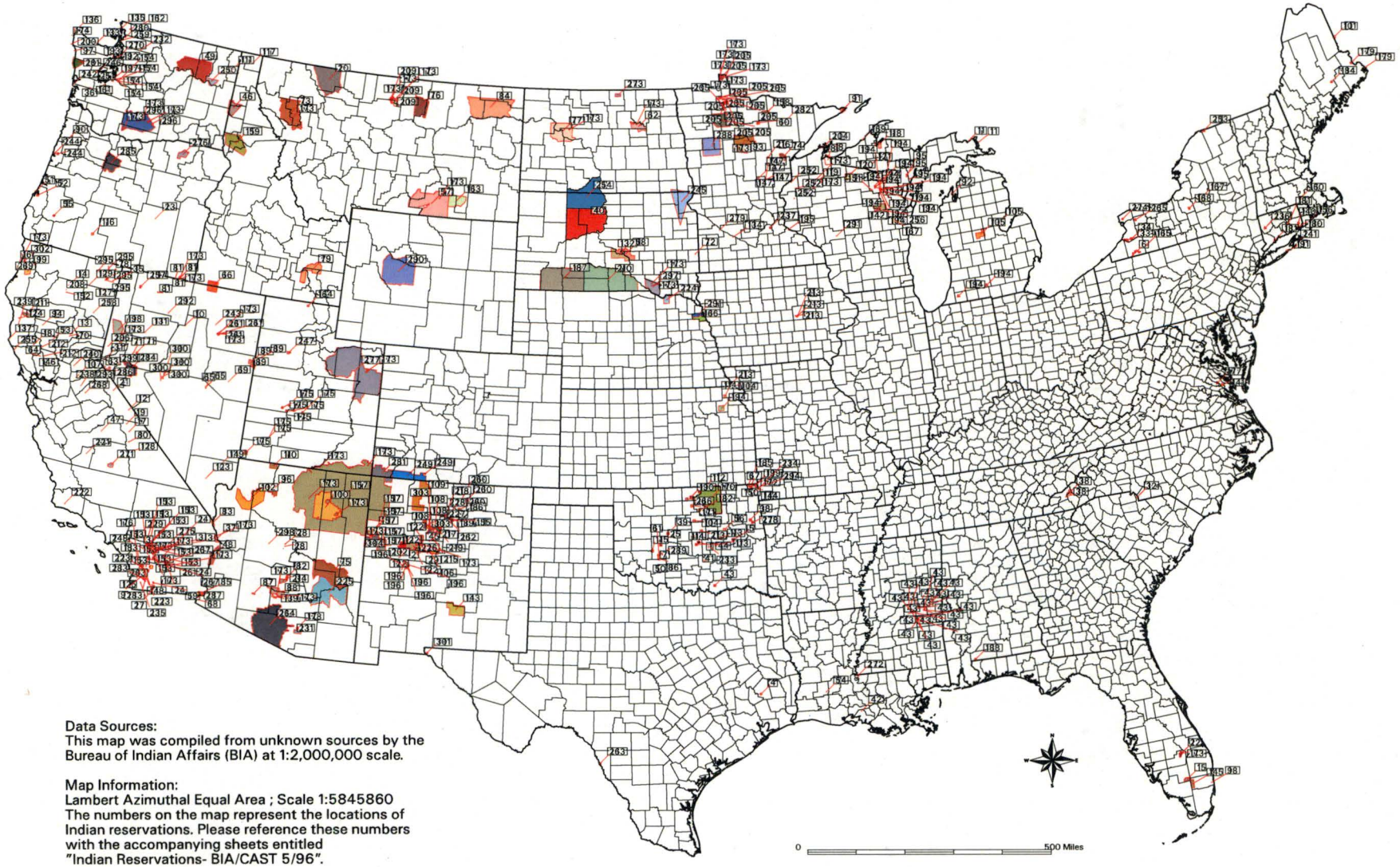







1/2 and 1 Mile Radius
Sturgeon Lake
Marina
Gaming Enterprise
Administration Building
Community Center
Education Center
Elders Center
Clinic
345 KV Power Lines
Residential Area
Prairie Island Nuclear Generating Plant
Canadian Pacific Railroad
Spent Fuel Storage Installation
Cooling Towers

Indian Reservations in the Continental United States



Data Sources:
This map was compiled from unknown sources by the Bureau of Indian Affairs (BIA) at 1:2,000,000 scale.

Map Information:
Lambert Azimuthal Equal Area ; Scale 1:5845860
The numbers on the map represent the locations of Indian reservations. Please reference these numbers with the accompanying sheets entitled "Indian Reservations- BIA/CAST 5/96".

The NRC and Federally Recognized Indian Tribes

Encourage and facilitate Tribal involvement in the areas that the NRC has jurisdiction. Tribal Policy Statement, 2017.

NRC Tribal Policy Statement—fully integrated within NRC

- **Trust Responsibility**
- **Government-to-Government Consultation**
- **Outreach to Tribes**
- **Understanding Tribal Counterparts**

Recommendations

NRC Tribal Policy Integrated Across all Program Areas

- NRC staff familiar with Tribal Policy and Protocol Manual
- Agency guidance documents includes tribes

Recognition that Tribal Interests and Rights Extend Past Reservation Boundaries

- Consultation
- Ceded lands, aboriginal lands

Include Cultural Risks in Analyses

- Recognize traditional cost-benefit models don't include potential impacts to tribal culture/traditions

NRC Encourage Licensee Outreach to Indian Tribes

- Develop working relationship