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United States Nuclear Regulatory Commission
Protecting People and the Environment

Briefing on Regulatory Approaches for Fusion Energy Systems

Opening Remarks

Cathy Haney

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

Speakers

- **Andrea Veil –** *Developing a Regulatory Framework for Fusion Energy Systems*
- **Duncan White –** *Fusion Technologies and Potential Hazards*
- **Andrew Proffitt –** *Options for Regulating Fusion Energy Systems*
- **Dr. Joseph Staudenmeier –** *Fusion Research to Support Licensing*

Developing a Regulatory Framework for Fusion Energy Systems

Andrea Veil

Director, Office of Nuclear Reactor Regulation

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NRC staff is preparing a regulatory framework for fusion energy systems

SRM-SECY-09-0064, Regulation of Fusion Based Power Generation Devices

Commission affirmed jurisdiction over fusion

Nuclear Energy Innovation and Modernization Act

Requires NRC to establish regulatory framework by 2027

SRM-SECY-20-0032 Part 53 Rulemaking Plan

Directed staff to develop options for regulating fusion

NRC staff is learning from DOE and Agreement States' experience with fusion technology

ITER

Photo Courtesy of ITER Organization

SPARC

Photo Courtesy of Commonwealth Fusion Systems

Fusion Technologies and Potential Hazards

Duncan White

Senior Health Physicist

Division of Materials Safety, Security, State and Tribal Programs

Office of Nuclear Material Safety and Safeguards

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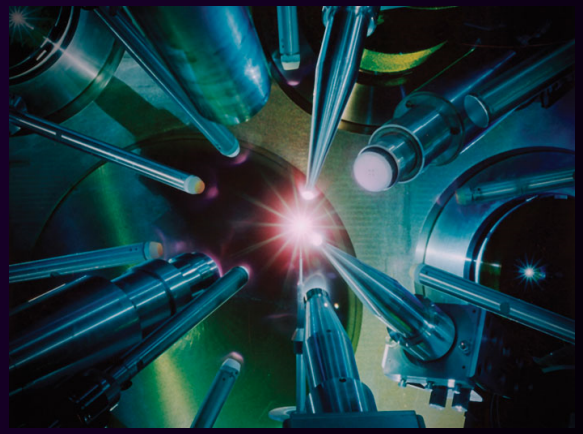
Fusion technology is progressing toward commercialization

Magnetic Confinement



Inertial Confinement

Magneto–Inertial Confinement

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The regulatory framework should be commensurate with fusion hazards

Tritium, neutrons, and operational radiation

Activated components and dust

Non-radiological hazards

NRC's byproduct material framework and fusion regulation

Strengths

- Scalable and technology neutral
- Safe regulation of current fusion activities
- Addresses radiological hazards posed by near-term fusion energy systems

Challenges

- Larger, higher hazard commercial facilities may require a different framework
- Byproduct material definition not inclusive of all fusion technologies

Options for Regulating Fusion Energy Systems

Andrew Proffitt

Senior Project Manager

Division of Advanced Reactors

Office of Nuclear Reactor Regulation

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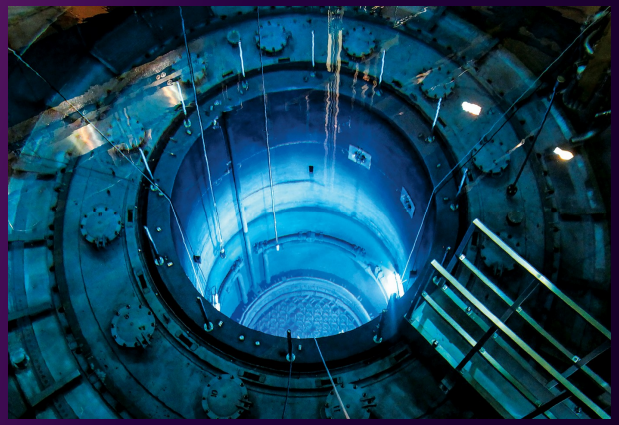
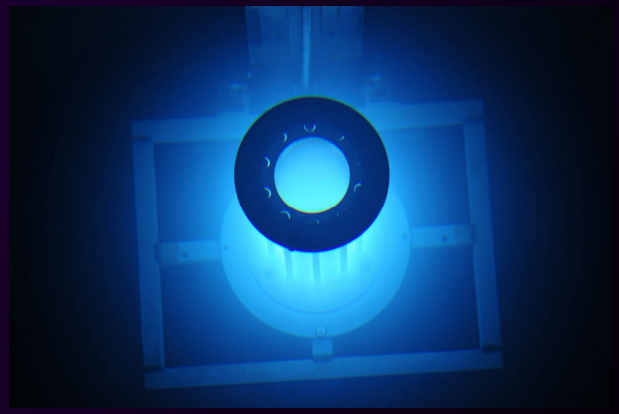
Stakeholder engagement has provided diverse perspectives on fusion regulation

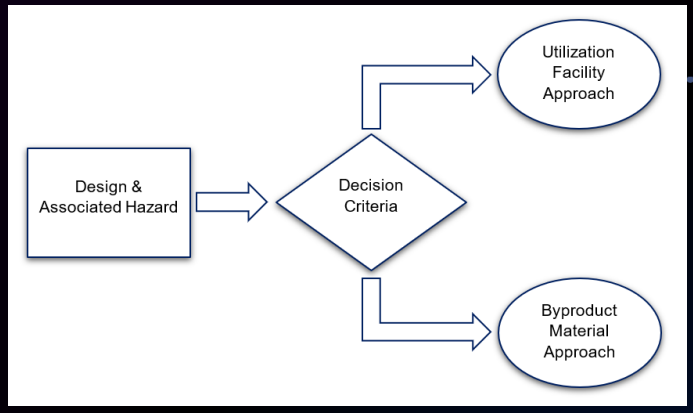
NRC staff is developing regulatory framework options



Utilization facility approach



Byproduct material approach



Hybrid approach

Fusion Research to Support Licensing

Dr. Joseph Staudenmeier

Senior Reactor Systems Engineer

Division of Systems Analysis

Office of Nuclear Regulatory Research

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Developing an agile research program to support fusion regulation

Evolving industry with diverse concepts

Planned near-term demonstration of feasibility

Facility engineering and plant design

Enhancing knowledge as the fusion industry matures

Enhance staff expertise

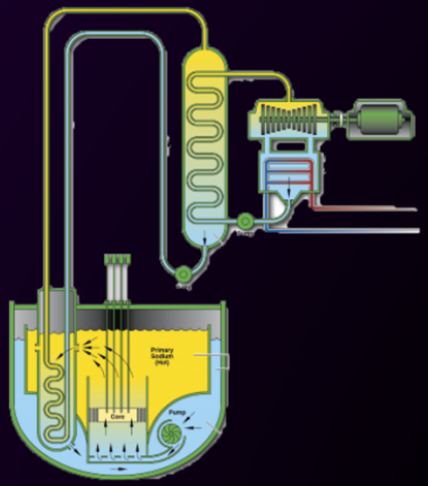

Image Courtesy of the Department of Energy

Mirror advanced reactor program training model

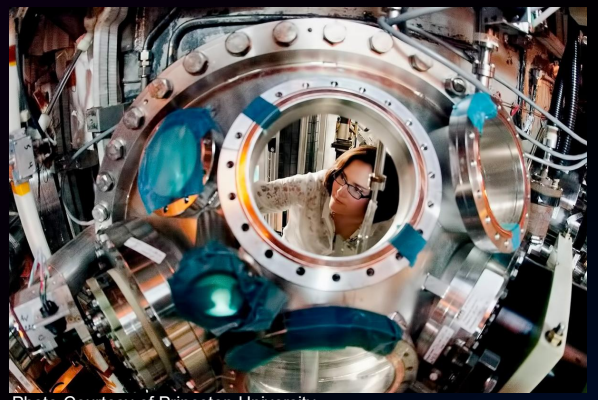

Photo Courtesy of Princeton University

Engage fusion community

Closing Remarks

Cathy Haney