



# **Briefing on RES Programs, Performance, and Plans**

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**Brian W. Sheron, Director  
Office of Nuclear Regulatory  
Research**

# Agenda

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**Overview**

**Brian Sheron**

**Programs &  
Performance**

**Mark Cunningham**

**Farouk Eltawila**

**Mabel Lee**

**Commission  
Decisions &  
Summary**

**Brian Sheron**

# **Key Messages**

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- **Develop technical bases to support regulatory decisions**
  - **Develop technical tools, data, and analytical models**
  - **Conduct confirmatory research and analyses**
- **Provide in-house technical expertise to regulatory offices and the Regions**

# Key Messages

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- **Anticipate NRC's future needs**
  - **Develop technical infrastructure for advanced reactor licensing reviews**
  - **Support new reactor licensing**
  - **Develop Regulatory Guides to provide acceptable methods for designing digital I&C systems**
  - **Develop Long-Term Research Plan**

# **DFERR Program Areas**

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- **Materials science**
- **Digital I&C and electrical engineering**
- **Nuclear fuel behavior under accident conditions**
- **Health physics**
- **Environmental transport**
- **Structural engineering**
- **Seismology**

# **Program Accomplishments**

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- **Completed research on PWR sump performance**
- **Developed technical basis for revisions to 10 CFR 50.46a fuel clad acceptance criteria for LOCA**
- **Developed technical foundation for regulatory improvements in digital I&C**

# **Program Accomplishments**

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- **Developed technical basis for guidance on the implementation of 10CFR20.1406, “Minimization of Contamination”**
- **Developed technical basis for the evaluation of materials fatigue-related operability issues**
- **Completed technical review of bio-remediation proposal at Cimarron site**

# Issues and Path Forward

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- **Proactive materials degradation assessment**
- **Integrated digital I&C and human-machine interface**
- **Reactor license renewal -- life beyond 60**



# **DRASP Program Areas**

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- **New and advanced reactors infrastructure development**
- **Thermal-hydraulics, severe accidents, reactor physics, and safety analyses**
- **Probabilistic risk assessment**
- **Human factors and reliability**
- **Fire research**
- **Accident Sequence Precursor analyses**
- **Generic Safety Issues**

# **Program Accomplishments**

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- **Supported NRO on ESBWR review**
- **Completed high-priority regulatory guides**
- **Completed Technology Neutral Framework**
- **Established an MOU with DOE to address NGNP licensing strategy**
- **Obtained French data for burnup credit**

# **Program Accomplishments**

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- **Endorsed PRA quality standards**
- **Supported safety culture inspections**
- **Improved generic safety issue program**
- **Streamlined accident sequence precursor assessments**

# **Program Accomplishments**

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- **Issued industry trend report**
- **Completed major fire research activities**

# Issues and Path Forward

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- **Improved RIRIP**
- **External events SPAR models**
- **Expanding workload regarding new and advanced reactors**
- **Monitoring DOE progress on GNEP**
- **Non-LWR PRA data and methods**

# **Program Accomplishments**

## **Human Capital**

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- **Strategic approach to critical staffing needs**
- **Recruitment**
  - **49 new employees in FY 2006**
  - **Depth of experience**
  - **Breadth of technical expertise**
- **Training**
  - **Partnering with experienced staff**
  - **Training in technical specialty and contract management**

# **Program Accomplishments**

## **Human Capital**

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- **Knowledge Management and Transfer**
  - **HTGR Community of Practice**
  - **Document capture, preservation, and sharing**
  - **Research monthly technical seminars**

# Challenges and Plans

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- **Continuing to fill critical and specialized skill gaps**
- **Knowledge management**



# Commission Decisions

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- **NAS study**
- **Technology neutral framework / Part 53 ANPR**
- **Integrated long-range research plan**
- **Expanded program on state-of-the-art reactor consequence analyses (SOARCA)**

# Summary

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- **RES is helping position the agency to address future regulatory challenges through forward-looking research.**
- **In-house expertise supports NRC's licensing and regulatory activities.**

# Acronyms

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- **ANPR**            **Advanced Notice of Proposed Rulemaking**
- **ASME**           **American Society of Mechanical Engineers**
- **ASP**             **Accident Sequence Precursor**
- **CAROLFIRE**   **Cable Response to Live Fire**
- **DFERR**         **Division of Fuel, Engineering, and Radiological Research**
- **DOE**             **Department of Energy**
- **DRASP**         **Division of Risk Assessment and Special Projects**
- **EPR**             **Evolutionary Pressurized Reactor**
- **ESBWR**         **Economic Simplified Boiling Water Reactor**
- **FY**               **Fiscal Year**
- **GNEP**           **Global Nuclear Energy Partnership**
- **HTGR**           **High-Temperature Gas-Cooled Reactor**
- **I&C**             **Instrumentation and Control**
- **IRSN**            **Institut de Radioprotection et de Sûreté Nucléaire**

# Acronyms

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- **LOCA** Loss-of-Coolant Accident
- **LWR** Light-Water Reactor
- **MOU** Memorandum of Understanding
- **NDE** Non-Destructive Examination
- **NFPA** National Fire Protection Association
- **NGNP** Next Generation Nuclear Power
- **PBMR** Pebble Bed Modular Reactor
- **PRA** Probabilistic risk assessment
- **PWR** Pressurized Water Reactor
- **RIRIP** Risk-Informed Regulation Implementation Plan
- **SOARCA** State-of-the-Art Reactor Consequence Analysis
- **SPAR** Standardized Plant Analysis Risk model
- **TRACE** TRAC/RELAP5 Advanced Computing Engine
- **V & V** Verification and Validation