



RP2020: EPRI Radiation Management Technical Objectives

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EPRI Presentation Overview

- Brief: Program Objectives and Deliverables
- Status of Current EPRI RP2020 Actions
- Looking Forward- A More Aggressive RP2020 Plan

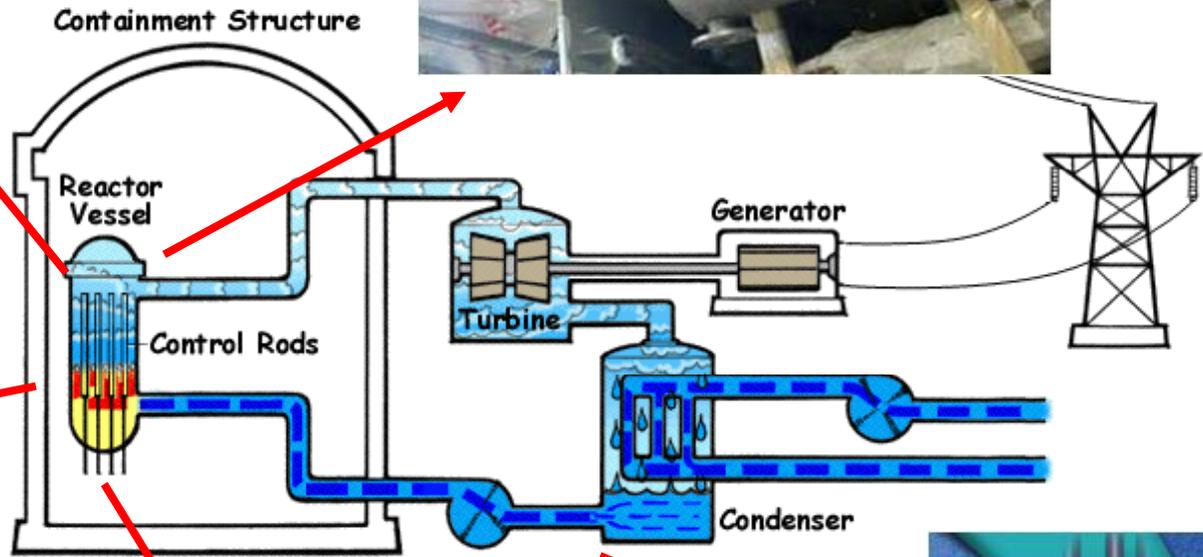
Program Impacts on Plant Operations & Key Industry Issues



**Corrosion
(Materials Issues)**



**Worker
Radiation
Exposure
(RP2020)**



**Fuel
Performance
(2010 Initiative)**

**Groundwater
Protection**

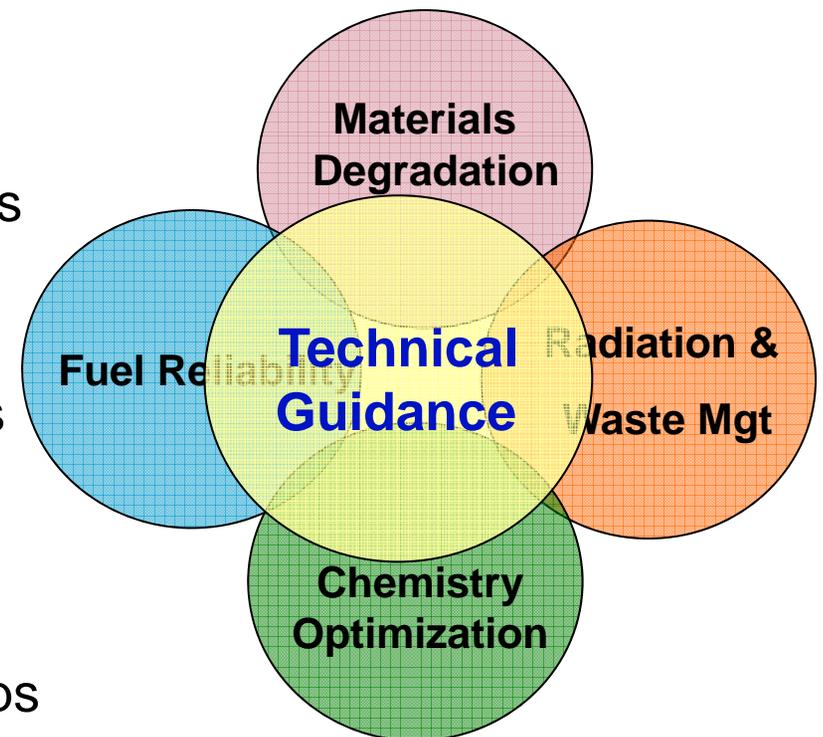


**Radioactive Waste
(Barnwell Closure)**

Program Actions and Deliverables



- Industry Strategic & Planning Roles
 - Lead cross functional collaboration (internal + external)
 - Technical basis for regulatory change
- Industry Technology Development Role
 - Innovative R&D
 - Technology demonstrations/ evaluations
- Leadership for Technical Guidance
 - Guidelines/guides and desk references
 - Application source books/decision trees
 - Benchmarking
- Unique Tech Transfer/ Application Role
 - Software/application tools
 - Communications/conferences/workshops
 - Onsite presence/assessments
 - Users groups



RP2020 Mission

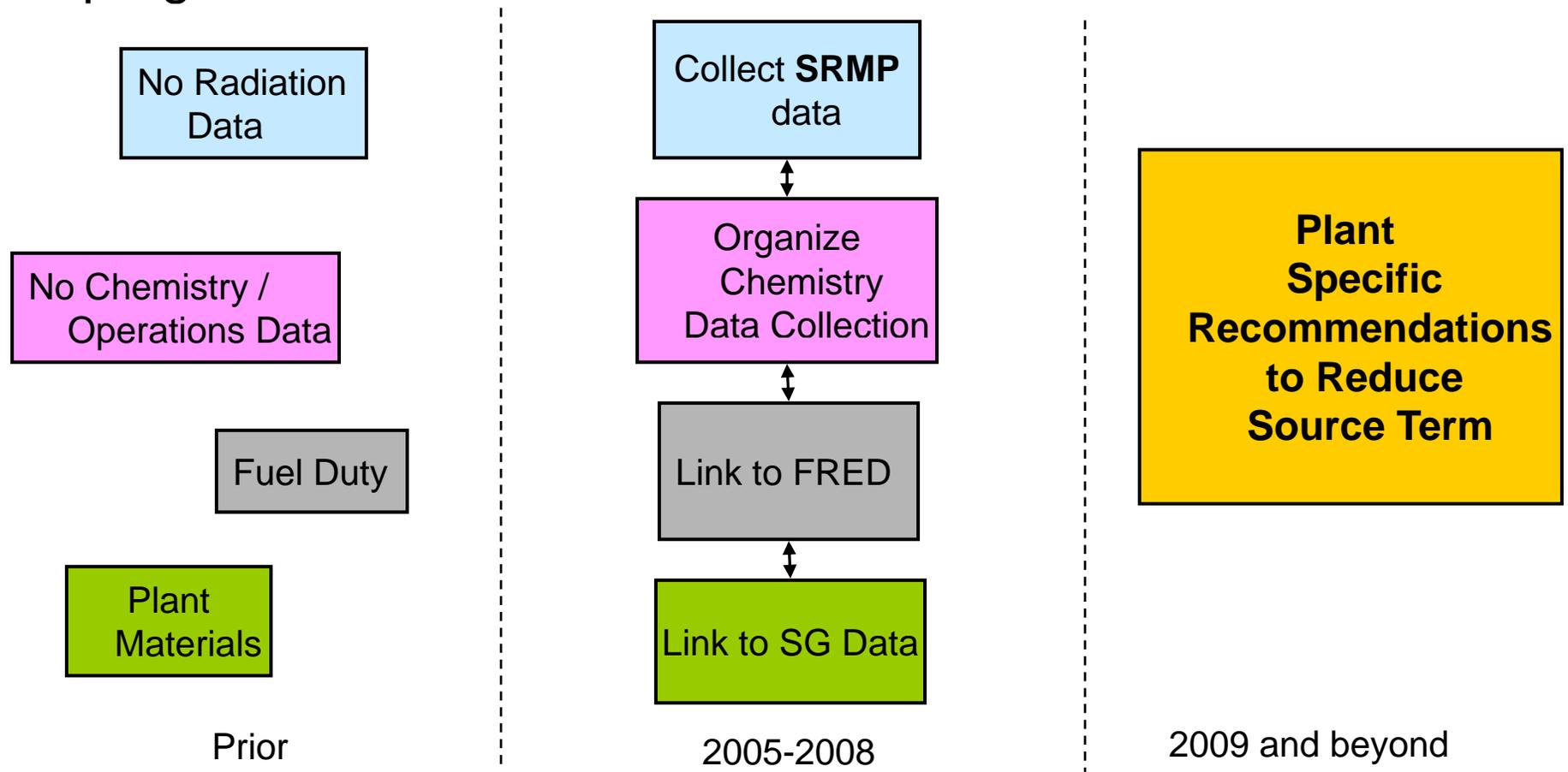
Reshape radiological protection at nuclear power plants to achieve significant improvements in safety performance and cost-effectiveness.

RP2020 Strategies and EPRI Status

- **Reduce radiation fields—EPRI**
- **Improve technologies utilization—EPRI**
- Standardize RP criteria & practices—INPO
- Redefine RP roles/responsibilities—
NEI/INPO/EPRI
- Influence RP regulations—NEI

EPRI Source Term Reduction Strategy

- EPRI Source Term Reduction Program—Results through program collaboration



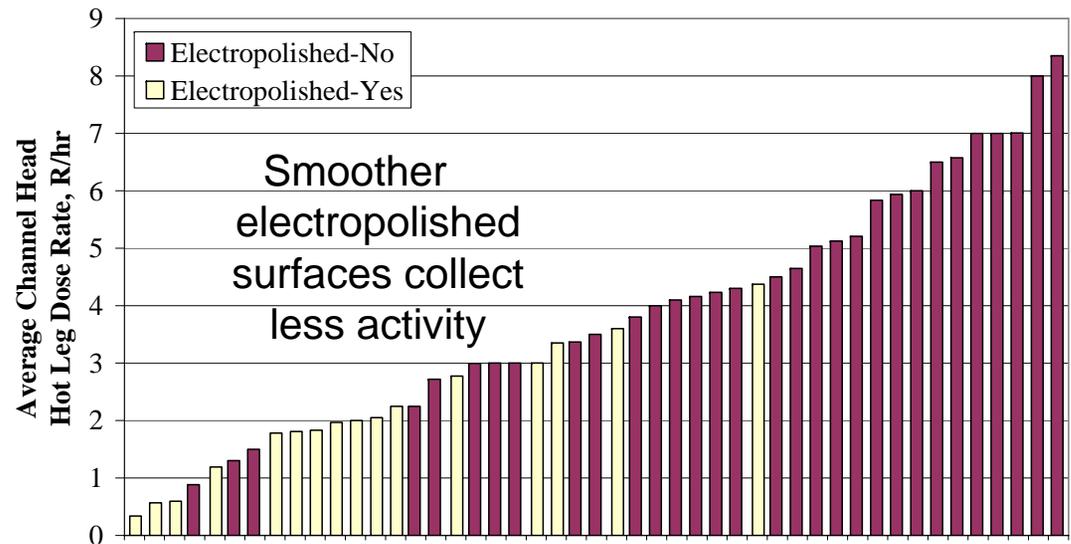
Application of the EPRI Standard Radiation Monitoring Program for PWR Radiation Field Reduction

Results

- Produced benchmarking tool to quantify benefits of source term reduction technology

Benefits

- Evaluate capital costs for radiation field reduction
 - Meet lower cumulative exposure goals



Application Development: 2008 ALARA Assessments performed at Palisades, Angra, and Koeberg

Current Source Term Reduction Deliverables

- Reports published in 2008
 - *1018371 BWR Source Term Reduction - Estimating Cobalt Transport to the Reactor*
 - *1016766 High Activity Crud Burst Impacts and Responses*
 - *1016769 Program on Technology Innovation: Feasibility Assessment of a Core Vacuum for Foreign Material and Activity Removal*
 - *1016767 Technology Evaluations and Operations Strategies for PWR Radiation Source Term Reduction (December, 2008)*

Radiation Protection: Key Lessons Learned in Dose Reduction from Emergent Inspection/Mitigation Tasks

Keys to Success (included in 2007-2008 EPRI reports):

- Early Radiation Protection involvement required
- Reduce source term
- Be aware of remote versus automatic
- Understand weld preparation techniques
- Understand inspection techniques (some are better than others)
- Accurate, scaled, detailed mock-ups required
- Shield as much as possible
- Optimize scaffolding and insulation removal times



DC Cook PZR mock-up



McGuire specialized shielding

EPRI Scaffolding Program: Mitigating Dose from PWR/BWR Materials Degradation Work

2005

2006

2007

2008

2009

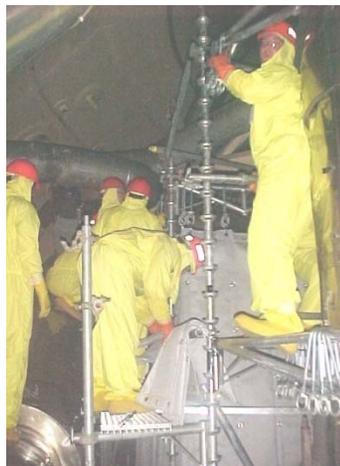
Tech Transfer (Workshops)

- 2007 Workshop Participation:
 - 80 attendees, representing 75% of the Utilities + 10 vendors
- Identified Industry deficiencies and inconsistencies

Scaffolding Guideline

Benefits:

- Provides benchmarking
- Lower overall dose
- Decrease set-up/tear-down time



EPRI Radiation Protection Deliverables

- Exposure Reduction:
 - *1016771 Dose Mitigation for Future Alloy 600 Inspections*
 - *1016770 Technology Development to Improve Radiation Shielding for Material Inspections*
- RMT Working Group Reports published to date:
 - *RMT Guidelines for Radiation Protection: Field Implementation of Remote Monitoring, 1003687, 2004 **
 - *RMT Guidelines for Radiation Protection: Training and Qualification, 1011739 , 2005.*
 - *Remote Monitoring Technology Interim Report: Industry Best Practices and Lessons Learned, 1013508, 2006.*

***2009 update: Addresses development and implementation of consistent formal processes and controls for monitoring radiological work using remote technology**

Looking Forward.....

... A more aggressive strategy

- In development with subcommittee of key utility RP experts (*Dennis Hussey, EPRI lead*)
 - Larry Haynes, Duke
 - Willie Harris, Exelon
 - Ron Thurlow, FPL
- Will be reviewed at upcoming EPRI advisory meeting- comments welcome

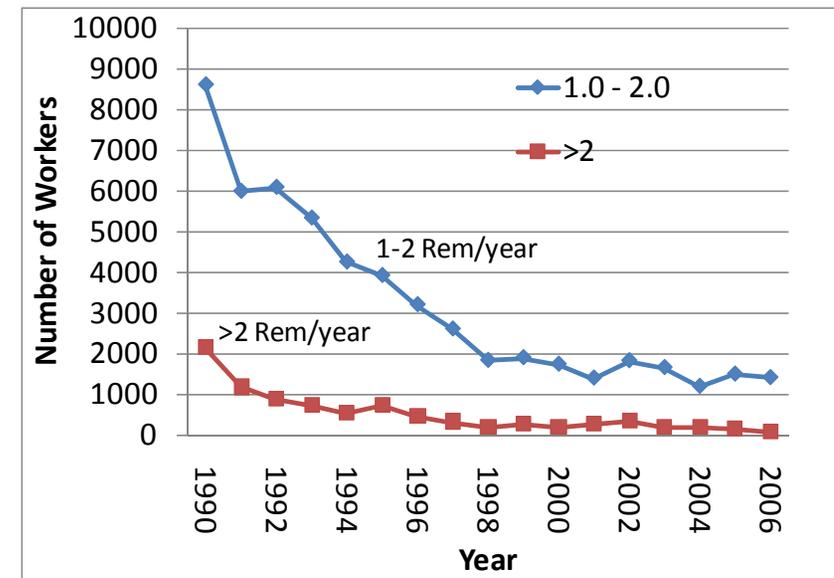
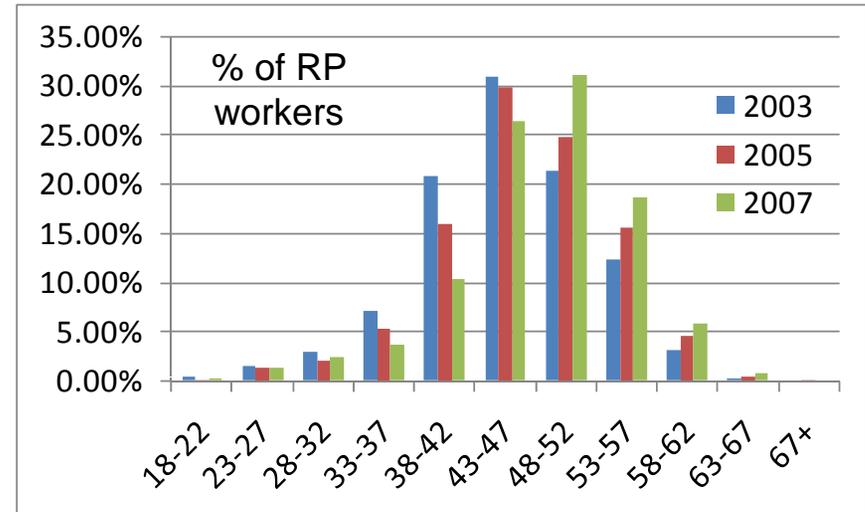
RP2020 Key Challenges

Workforce and Infrastructure

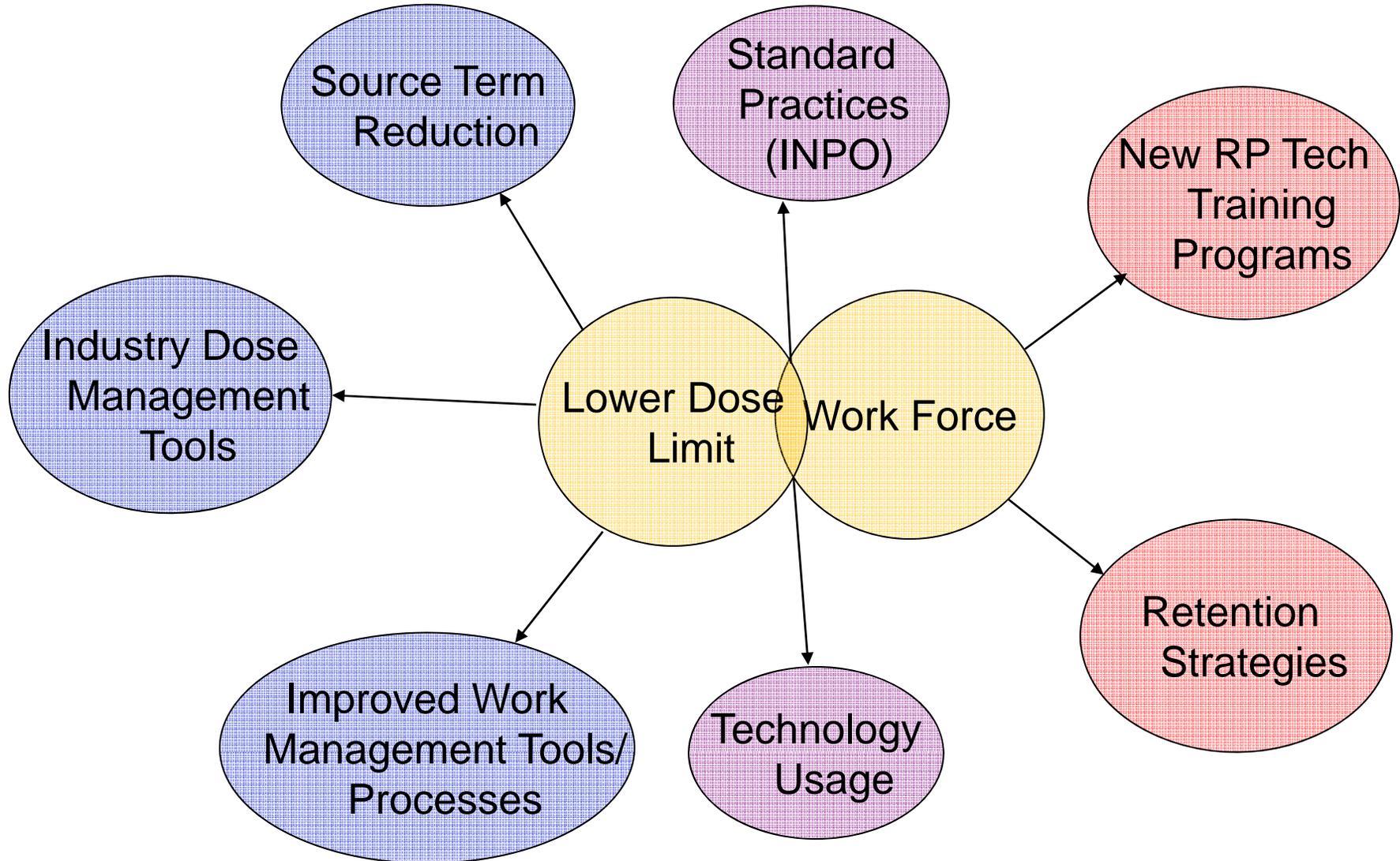
- RP Staff is getting older
- Younger staff change careers
- Technology implementation is lagging

Lower Dose Limits

- NRC adoption of ICRP 10 Rem over 5 years is expected
 - 2 Rem/year limit may be adopted
- Many workers still approach or exceed 2 Rem/year

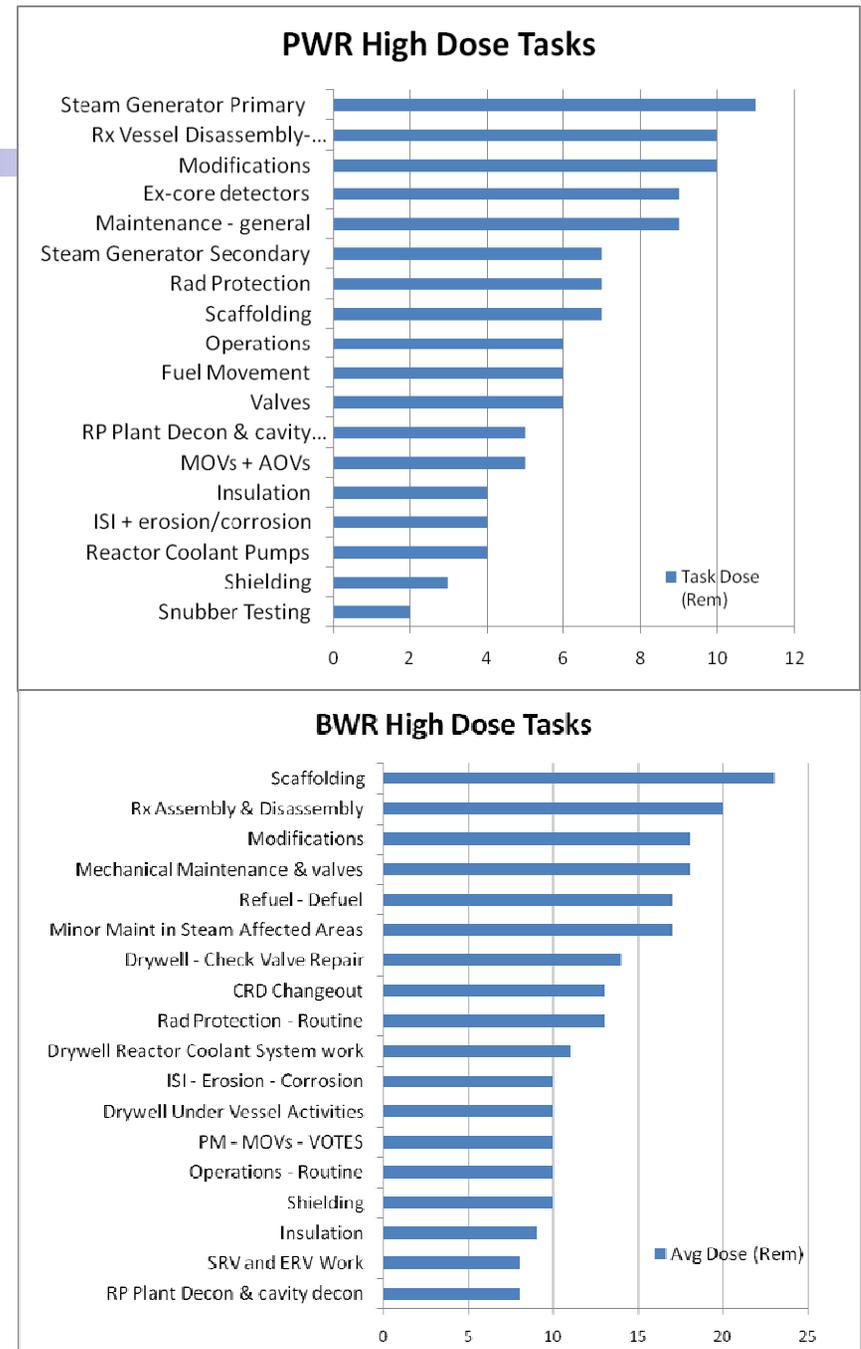


EPRI Response to RP2020 Challenges



Strategy for RP Technology Program

- Get the data
 - Early identification of high dose tasks, e.g. Alloy 600
- Determine highest dose jobs
- Target causes for high dose
 - Source term
 - Time in field
 - Distance too close
 - Not enough shielding
- Investigate/develop ways to reduce the causes of dose
- Challenge utilities to implement strategies



EPRI Support of RP2020

RP Technology Program Objectives

- While maintaining nuclear safety, challenge industry to:
 - Optimize maintenance practices
 - Reduce outage scope
 - Safely optimize job coverage
- Each objective is defined the following slides

Optimize Maintenance Practices for ALARA

- Target: How can ALARA be optimized?
 - Example: Remote UT inspections
 - Insulation removal reduction
 - Modular insulation
 - Scaffolding
 - Can inspection frequencies be safely extended with technology?
 - Alternative monitoring (temperature, vibration)
 - Thermography for valve inspection (Browns Ferry)
 - Modeling packages to simulate wear

Reduce Outage Scope

- Target: Improved equipment reliability for the high dose jobs
- Examples: Challenge vendors to improve
 - Valve packing materials
 - Updated pump designs and materials
 - Use ALARA to justify costs of a better design
 - Look at other industries to see how higher pressure valves are designed
- Other industry practices for working in radiation areas
 - Glove box work environments
 - Lessons-learned from DOE

Safely Optimize Coverage

- Target: Enhanced communication for everyone working in a radiation field
- Examples: Qualifying technologies for better communication
 - Perform engineering/risk analyses (e.g. 50.59) of technologies
 - Bluetooth communication with all workers
 - Enhanced remote monitoring
 - Heat stress prediction
 - Helmet cameras
 - Working with wireless technology
 - Improved applied visualization—Combine 3D imaging with surveys

Schedule

- Develop strategy and finalize data collection in 2009
- 2010 is start of the program
 - Analysis of high dose tasks
 - BWR/PWR ALARA groups appear to be strongest resource
 - Select candidate tasks to optimize
 - Collaborate with other EPRI Programs/Groups
 - Evaluate technologies for reducing the task doses
- 2011
 - Develop candidate technologies
 - Select pilot technologies that can be implemented at plants

Conclusions

- Significant progress has been made on EPRI RP2020 objectives to date
 - Source term reduction
 - Improved RP technology Utilization
- EPRI Radiation Management Program is planning a newly focused RP Technology Exploration
 - Any feedback is greatly appreciated
 - Industry participation is key to success

Key 2009 EPRI RM Meetings

- Conferences and Workshops
 - **2009 ISOE/EPRI ALARA Symposium and RP Technology Conference, Jan 12-14 Fort Lauderdale, FL**
- Project Meetings
 - **Scaffold Guidelines Development –**
 - **Meeting 1 - Feb 10 & 11, 2009, Charlotte, NC**
 - **Meeting 2 – TBD, June 2009**
 - **Scaffold Workshop – TBD, June, 2009**
 - **RAM Control Guidelines (3rd meeting)—TBD, April, 2009**
 - **SRMP General Area/Smear Workshop—TBD**

(watch the calendar at www.epri.com for details)