



ELECTRIC POWER
RESEARCH INSTITUTE

Scaffolding Initiatives – Building on Industry Success



**2009 ISOE North American ALARA Symposium /
EPRI Radiation Protection Conference**
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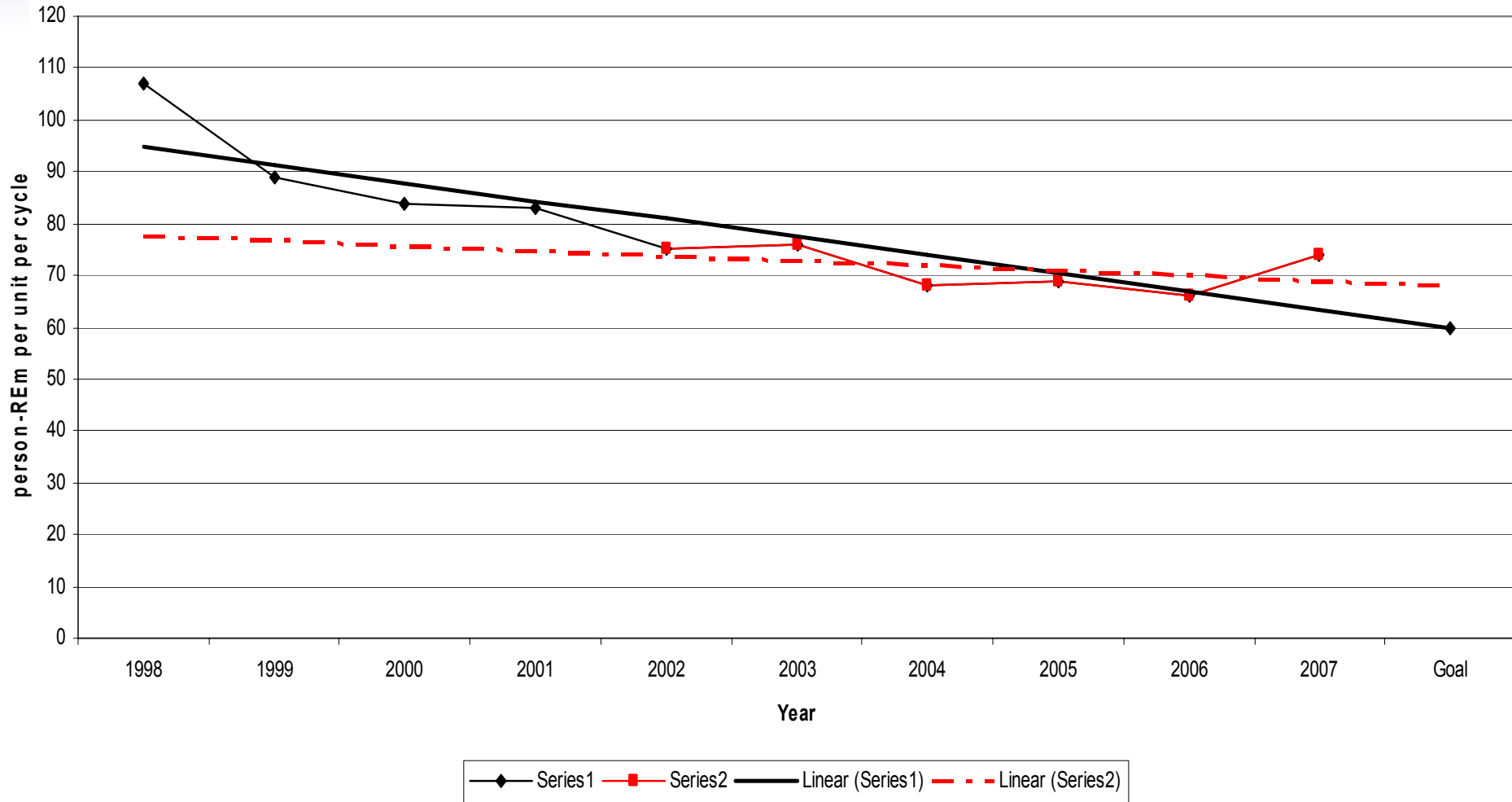
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Background

- Vertical access programs are a consistent, significant exposure contributor
- Remains the single highest exposure reduction challenge for many stations
- EPRI has conducted six Vertical Access workshops
 - Program management and related technologies
 - Process efficiency and quality improvements
 - Advanced access strategies
 - Targeting exposure reduction
 - Over 80 utility and industry experts attended in 2008
 - Extensive compilation of Lessons Learned

PWR 18-24 Month Cycle Median Values



BWR 18-24 Month Cycle Median Values



Make This a Business Case; One Station's Exposure and Cost Analysis

	Current Value	Remaining through End of Plant Life (37 years, 24.7 outages)
Number of Builds (outage)	~700	17290
Labor Cost per Tower (\$)	3,500	N/A
Outage Labor Cost (\$)	2,450,000	60,515,000
Outage Exposure (person-Rem)	~15	371
Cost per Person-Rem (\$)	30,000	N/A
Outage Exposure Cost (\$)	450,000	11,130,000
Approximate Benefits Associated with a 30% Reduction in Need		
Outage Labor Cost Savings (\$)	808,500	20,000,000
Personnel Exposure Reduction (person-Rem)	5	100 (a)
Personnel Exposure Cost Reduction (\$)	150,000	3,000,000
Total Life-of-Plant Cost Reduction Benefit (\$)	---	23,000,000

How Do We Get There – An Uplifting Experience

- Control the urge
- Alternate Options and Technology
- Database
- Permanent Installations
- Work Control
- Communication
- Radiological Controls - Exposure Management
- Staging, Erecting, and Dismantling

Control the Urge – A Scaffold Diet

- Challenge work groups to use ladders and lifts
- Scaffold crew approves, installs, tags and controls all access tools
 - Ladders are properly installed avoiding tower build
- Plant specific guidance to minimize “personal preferences”
- Common platforms, multiple use

Alternate Options and Technology

- Modular quick erect scaffolding equipment
- Laser and digitizing tool – design, interference
- Portable person-lifts



- Telescoping tower used to “pre” shield for scaffold construction
- Wireless, hands free communication system
- Step, extension and platform ladder systems
- Suspended scaffolding
- Pearl weave fabric barriers in lieu of toe boards

Database

- Access™ and Excel™ databases
 - Digital photo library
 - Inventory
 - Live status
- Link tower for repetitive work (e.g., ISI) to specific component (e.g., snubber, location, etc.)
- Master lessons learned on LAN

Permanent Installations

- Largest long term gains
- Justified using a combination of:
 - Reduced resource requirements for future installations
 - Reactor trip & plant equipment damage risk avoidance
 - Movement, installation and removal
 - Exposure reductions
 - Project schedule impact
 - Industrial safety
 - Crew constructing towers (and adjacent work areas)
 - Moving materials to and from the job site

Permanent Installations – Sample Data

Scaffolding is stored in containment. Raw scaffolding coated with Service Level 1 coating	St Lucie
Permanent scaffold storage condenser bay, drywell or containment	Plant Hatch, Brunswick, Indian Point Unit 3, many others
Permanent shielding towers in drywell or containment	Perry, Pilgrim, BFN, Limerick, numerous others
6 permanent scaffold towers, inspected on 90 day schedule	McGuire
30 permanent scaffold towers, inspected on annual schedule	Davis Besse
Permanent scaffold and shielding installations impact exposure; 6-sigma project for continued management support	Surry
External engineering analyses services reported 100% success	Several stations
Permanent installation inspection incorporated in PM/outage schedules with logic ties	Several stations

Work Control

- All scaffolds integrated into schedule
- Schedule slip used at front end of outage
 - Reduces scaffold construction immediately following shutdown
- Remote monitoring used to create/validate job history
- “Scaffold Central” strategy used for single point of contact
- Scaffold removal checklist incorporated into the work control process
- Scaffolding plans are developed for each room or area

Communication

- Post-work assessments (debriefs)
- Large, visible crew action board
 - Tracking and communication
- Central point of contact
 - 24 hours per day, 7 days per week during outages
- Infrequent use of goals (except exposure)
 - Consider:
 - Rebuild & modification percentage
 - Unplanned builds
 - Requests versus builds

Radiological Controls - Exposure Management

- ALARA coordinators included in maintenance services budget
- Contracted RP technician reports to scaffolding lead
- Multiple task and/or project specific RWPs used
 - RWP change stations (islands) used in RCA and containment
 - Requires accurate area scheduling to be effective
- Movement of large volumes of equipment in low dose areas is carefully assessed

Staging, Erecting, and Dismantling

- Innovative equipment for staging equipment
 - Custom designed, locally fabricated, narrow carts
 - Ladder elevator for moving scaffolding materials
 - Attaches to installed ladders
 - Frequently used on construction sites
- Fly-up scaffolding
 - Segmented reactor head scaffolding built
 - Significant exposure reduction
 - ~6 person-Rem to ~0.3 person-Rem per evolution

Threats to Success

- Dissimilar metal issue mitigation
 - E.g., Alloy 600
- Engineering approval for permanent installations
- Inspection requirements
 - Lack of industry consensus
- Emergent and unplanned work additions
- Perceived needs of end user
 - Ladder versus scaffolding

Industry Initiatives

- Industry Experience Documents
 - Scaffolding Program Management for Dose Reduction
 - #1003392; 2004
 - Update completed in 2008
- New comprehensive industry guidance document
 - EPRI, utility and other subject matter experts
 - Two meetings in 2009; Deliverable March 2010
- Industry database
- EPRI 7th annual Vertical Access Workshop
 - June 2 & 3, 2009
 - EPRI NDE Center, Charlotte, N.C.
 - PUT THIS ON YOUR CALENDAR