



ISOE / EPRI ALARA Symposium

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Keys to Dose Reduction:

1. Source Term Reduction.
2. Detailed Work Planning and Radiological Control of Field Activities.
3. Back-to-Basics Radiological Support of Field Work.



Source Term Reduction:

- Eliminate the Source of the Problem
 - Long Term, Intensive Strategy Involving Senior Management, Chemistry, Engineering, and Outage Management Support.
 - Develop Multi-Year (Typically 5-years), Prioritized Plan with Specific and Realistically Achievable Milestones.
 - Benefits Beyond Dose Reduction:
 - Reduced Radiological Hazards in Your Facility.



Source Term Reduction:

- Typical Strategies:
 - Chemical Decontaminations (Typically RCS and Reactor Water Clean-Up)
 - Cobalt (stellite) Component Replacement
 - Chemistry Program Optimization - HWC/Zinc Management (BWRs); Shutdown Chemistry Controls (PWRs).
 - Source Removal [Hot Spots, Crud Traps, Resistance Thermal Detectors (RTDs), etc.]
 - Condensate Pre-filter Modifications (BWRs)
 - Changes in Clean-Up System Filter Design, Loadings, System Operation Parameters, Use of Advanced Resins, etc.



Detailed Work Planning:

- Take Advantage of Work Planning to Identify Opportunities for Dose Savings.
- Clearly Identify Contingencies.
 - Evaluate Work Challenges and Potential Vulnerabilities.
 - Last Minute Planning Stresses the Organization.
- The Level of Effort Expended Developing Radiological Work Plans (RWPs and ALARA Plans) and Contingencies is Commensurate with the Radiological Risk of the Work Activity.
- Changing the Tire – NASCAR Style



Detailed Work Planning:

- **Decisions are Made in the Planning Process – Radiological Work Plans are Executed in the Field.**
- A Conceptual Model for your consideration is that Radiological Engineers are the Radiation Safety Equivalent of Maintenance Planners and that RWPs / ALARA Plans are analogous to Maintenance Work Orders.
- Radiation Protection Technicians (RPTs) are comparable to the Maintenance Mechanics and Execute the Radiological Work Plans as written.



NRC Inspection Program:

- NRC Performance Deficiencies / Findings Are Based On Actual Dose That Was Avoidable.
 - Unchanged Since ROP Inception
 - More Than Minor Threshold
 - >5 person-rem and >50% dose expansion
 - Greater Than Green Threshold
 - 135 person-rem (PWRs) or 240 person-rem (BWRs)
Three Year Rolling Average



- NRC ALARA Inspections Assess Radiological Work Planning and / or Work Execution Relative to Avoidable Dose.
 - Includes Station Response to Unanticipated Radiological Conditions (Increased Rates).
- ALARA Work Planning is a Station Responsibility.



Radiological Control of Field Activities.

- Oversight of Fast-Breaking Work activities
 - Time Dependent Dose Monitoring (Hourly / Shiftly / Daily).
 - Real Time Monitoring (Remote Monitoring Room).
- Validate dose goals early in the outage.
 - Role of Station ALARA Committee (SAC).
 - Early Assessment of Performance.
 - Respond to As Found Conditions.
 - Adjust Dose Goals as Necessary.



Radiological Control of Field Activities:

- Remote Monitoring.
 - Changing Behaviors of the radiation protection staff and the rad workers.
 - Does not provide for the full range of radiation safety support (Airborne and Contamination Control).
- Integration and Oversight of Contractors
 - Shipping of Steam Generator and / or Refuel Floor Equipment.



Back to Basics:

- Recent Issues Identified:
 - Gaps in Fundamental Job Coverage.
- Institutionalize Work Practices to Facilitate Knowledge Transfer as the Work Force Changes.