

34 Column Charts of What Utilities Consider Most Effective Processes¹

The column charts in this section summarize the results of a study carried out by the BNL ALARA Center staff to evaluate the most promising techniques and practices for dose reduction and the extent of their implementation by nuclear power plants.

The column charts are divided into three categories: Techniques and practices that were determined to have a high, medium, or low impact on dose reduction. For each category, first the techniques and then the practices are shown. The extent of implementation by plants is given by the length of the columns in the column chart.

The user can thus see at a glance which are the most effective techniques and which are least effective. He can also see the techniques that most plants have adopted and those, for one reason or another, are not as popular.

Section 39 provides background descriptions of the techniques and practices and includes references and abstracts of articles on them.

¹ Comparison of Foreign and Domestic Dose Reduction Processes and Practices at Nuclear Power Plants, results of a NRC-sponsored study by the BNL ALARA Center.

Figure 34.1 Practices With High Impact On Radiation Dose At Nuclear Power Plants

- A. Particularly effective expressions of management commitment
- B. Maintenance cleanliness
- C. Job planning and post-job reviews for high-dose jobs

**Percentage of U.S. Plants Adopting the High-Impact Practices
Responding Plants Only**

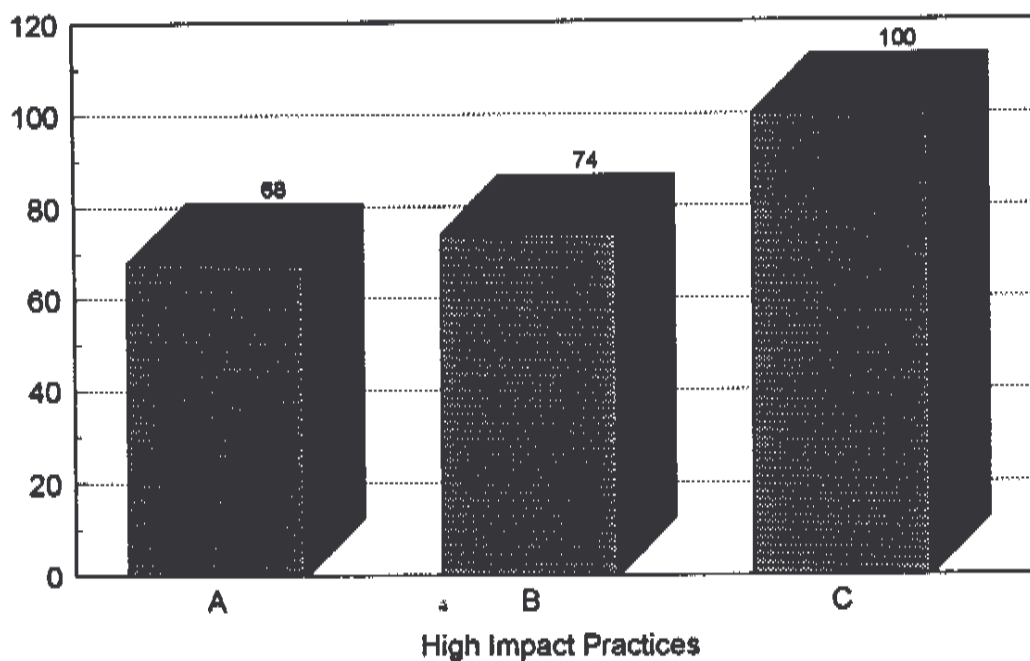


Figure 34.2 Processes With High Impact On Radiation Dose At Nuclear Plants

- A. Cobalt QA procedures on inconel fuel and grids (PWRs) and on fuel, pins, and blades (BWRs)
- B. Fuel sip for minor leaks
- C. Minimize and control crud burst during shutdown
- D. Multi-stud tensioner for RV head bolts
- E. pH control (normal value)
- F. Reactor head shield (PWRs)
- G. Remote tooling, robotics, and remote surveillance
- H. Shutdown if fuel leaks (% of fuel pins)
- I. Specification of cobalt in steam generators (PWRs)

Nineteen U.S. plants responded. Sixteen were PWRs, three were BWRs. For practices applicable to all plants, 100% = 19 plants; for PWRs, 100% = 16 plants; for BWRs, 100% = 3 plants.

**Percentage of U.S. Plants Adopting
the High-Impact Processes
Responding Plants Only**

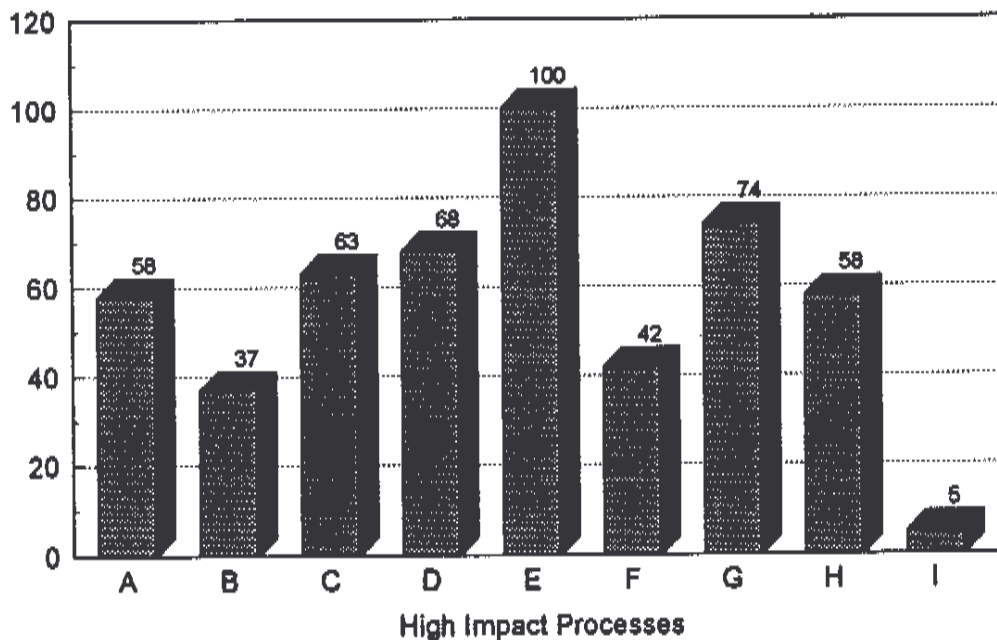


Figure 34.3 Processes With Medium Impact On Radiation Dose At Nuclear Plants

- A. Automatic control rod drive handling machines
- B. Automatic or semi-automatic ultrasonics
- C. Cavity wall and other special decontamination machines
- D. Chemical decontamination of primary systems
- E. Conoseal modifications (PWRs)
- F. Electropolished steam generator channel head
- G. Eliminate bypass manifold of reactor temperature detector
- H. Magnetic fibers
- I. O₂ control in feedwater and reactor water
- J. Passivation of new piping
- K. Permanent loop-valve pressurization system (PWRs)
- L. Permanent platforms

**Percentage of U.S. Plants
Adopting the Medium Impact Processes (1)
Responding Plants Only**

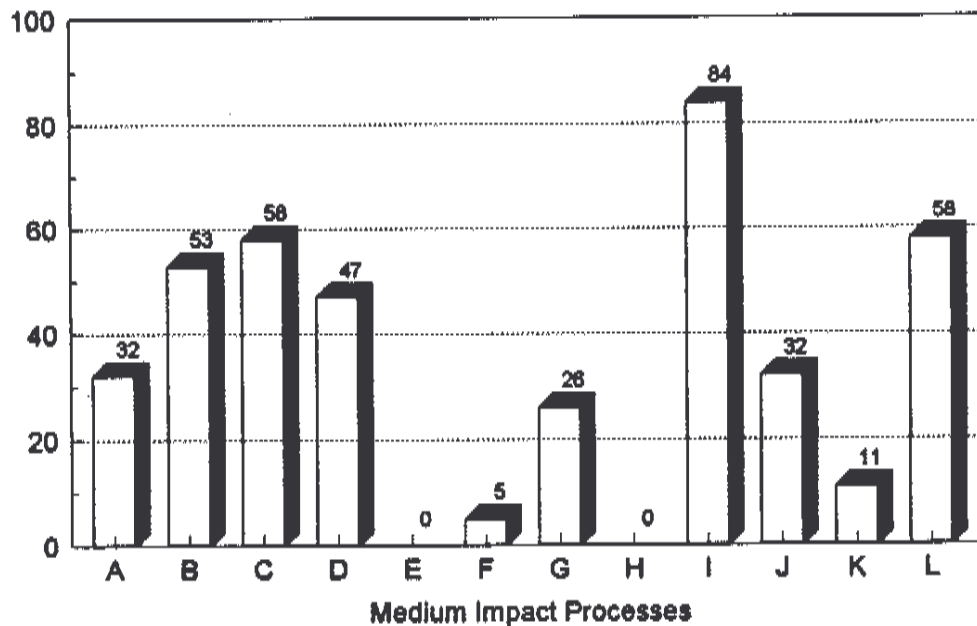


Figure 34.3 Processes With Medium Impact On Radiation Dose At Nuclear Plants (Cont.)

- M. Quick-disconnect insulation
- N. Reduced boric acid concentration or use of B-10 enrichment (PWRs)
- O. Refueling machine
- P. Refueling modifications
- Q. Replacement of worn valves or inserts with low cobalt or non-cobalt
- R. Snubber reduction
- S. Special shields (e.g., CRD, TIP detector cable, reactor head)
- T. Superheating of steam generator U-tube bends for stress relief (PWRs)
- U. Ultra-fine filters in let-down system (PWRs)
- V. Valve and valve-packing improvement
- W. Viewing windows (e.g., rad-waste and fork truck)

**Percentage of U.S. Plants Adopting
the Medium Impact Processes (2) (Cont.)
Responding Plants Only**

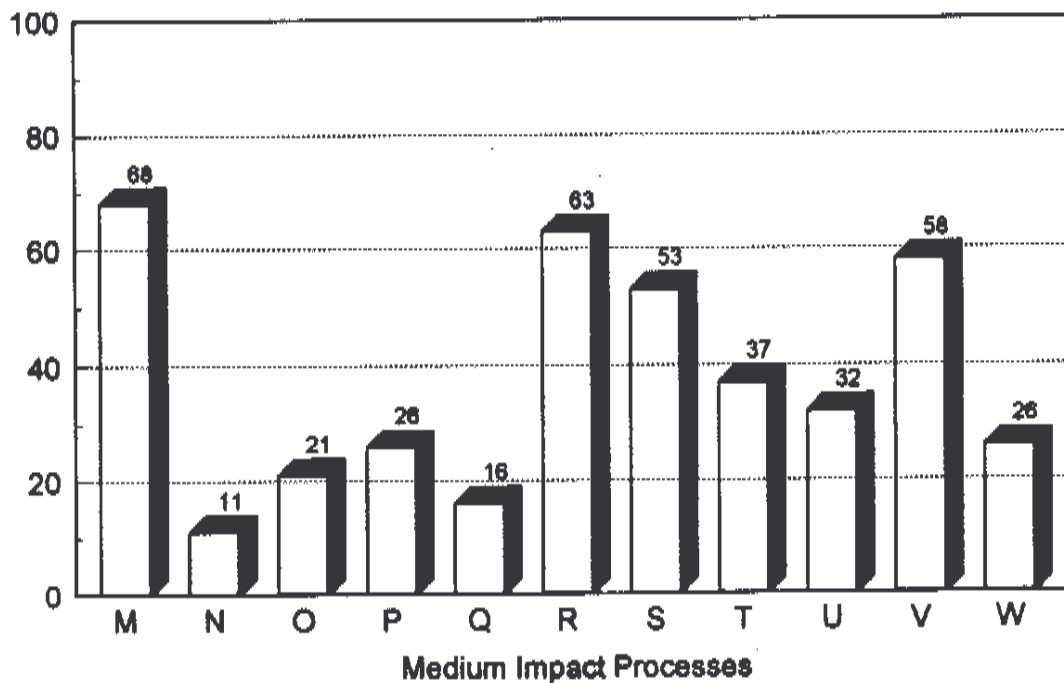


Figure 34.4 Practices With Medium Impact On Radiation Dose At Nuclear Plants

- A. ALARA campaign
- B. ALARA committees
- C. ALARA suggestion system
- D. Overall plant ALARA study and prioritization of actions
- E. Process review program
- F. Special ALARA training
- G. Dose and process trend analyses
- H. Engineering design and review for ALARA
- I. Mock-up training and dry runs
- J. Videotaping program
- K. worker training for self-monitoring
- L. Photographic records of plant areas and components
- M. Radiation maps of high-radiation areas

**Percentage of U.S. Plants Adopting
the Medium Impact Practices
Responding Plants Only**

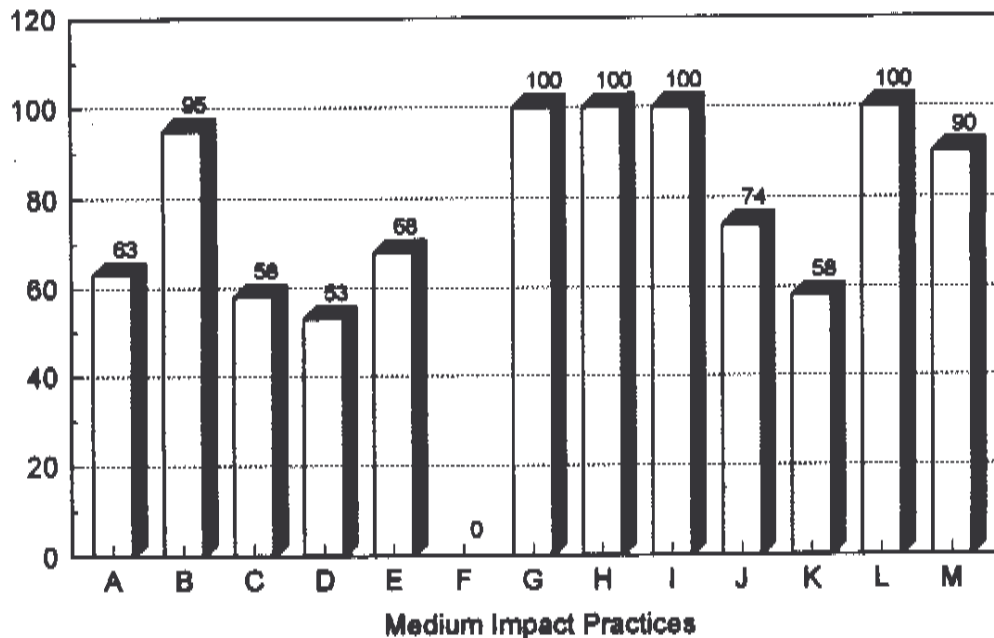


Figure 34.5 Processes With Low Impact On Radiation Dose At Nuclear Plants

- A. Clean-up procedures after valve maintenance
- B. Fuel rod cleaning
- C. Hot spot reduction program
- D. Main steam isolation valve automatic seat-lapping and handling equipment (PWR plant)
- E. Pre-coat filters on condensate demineralizers (PWRs)
- F. Quick-opening hatch for PWR fuel transfer tube
- G. Stainless steel main steam isolation valves (PWRs)
- H. Thread cleaner for reactor pressure vessel

**Percentage of U.S. Plants Adopting
the Low-Impact Processes
Responding Plants Only**

