BNL ALARA CENTER

Processes and Practices Related to Occupational Dose

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SNUBBER AND PIPE-WHIP RESTRAINT REDUCTION

Keywords: SNUBBER REDUCTION; COMPONENT RELIABILITY; EQUIPMENT MODIFICATION AND REPLACEMENT; SNUBBERS; PIPE RESTRAINTS; INSPECTION; MAINTENANCE

Description:

In order to reduce testing and maintenance requirements many plants are reducing the number of snubbers and pipe-whip restraints. A secondary benefit of these reductions is improved access for more efficient maintenance and lower exposures. Snubber and pipe-whip restraint reduction is especially important in high radiation areas. Since the average collective dose from snubber testing and repairs is about 300 person-rem per outage, and snubber maintenance costs can run in excess of $2 million per year, potential dose and cost savings from this modification are significant.

References and Selected Abstracts:

1. Bier, V.M., Sarmanian, L.G.H., and Campbell, R.D., "Assessing the Costs, Risks, and Benefits of Snubber Reduction," EPRI Report NP-5854, June 1988. (Available from Research Reports Center, Box 50490, Palo Alto, CA 94303.)

ABSTRACT: This report illustrates a simplified probabilistic analysis that quantifies and optimizes the overall safety or cost impact of changes to nuclear plant piping design regulations. The study will help analysts compare this approach with earlier methods, which trade off one deterministic part of the overall margin against another to support regulatory changes. Such methods are quantitative, rational, and able to help reduce excess conservatism, but they cannot produce an optimized set of rules.

Continuing research is leading to increasing numbers of recommended changes in regulations and design rules (for example, ASME Code Cases N-411 and N-451, the use of less-conservative methods for determining independent support motion and the use of equivalent static analysis). Therefore, regulators and utilities need tools to help determine the impact of such changes on plant operations, safety, and cost. Further rule changes will be proposed on the basis of NRC and EPRI investigations (EPRI projects RP1543 and RP2756) of sound (uncracked) pipes and degraded (precracked) pipes under dynamic overload conditions--investigations that are significantly reducing failure margin uncertainties. The present study demonstrates one way to integrate the impact of potential piping design rule changes on the safety and costs of nuclear plants while ensuring the proposed piping rule changes will not overly reduce conservatism.

Although the model used in this study is rudimentary and not yet defensible for producing future recommendations, its result point toward an optimal solution to the issue of snubber reduction--one that addresses

both safety and cost. Given these promising results, the model deserves further attention to refine its procedures, expand its scope, and incorporate state-of-the-art analysis techniques.

2. Khan T.A., Dionne, B.J., and Baum, J.W., "Data Base on Nuclear Power Plant Dose Reduction Research Projects", NUREG/CR-4409 pp. E-41 and E-59. (Available from National Technical Information Service, Springfield, VA 22161.)

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6. "New Snubber Testing Reduces Worker Exposure," Nuclear Engineering International, December 1985, p. 60.

7. Johnson, C.P., et al., "Collective Radiation Exposure Task Force Report: Hope Creek Generating Station," April 1987, p. 62.