

November 21, 2003

MEMORANDUM TO: Michael E. Mayfield, Director
Division of Engineering Technology
Office of Nuclear Regulatory Research

FROM: Farouk Eltawila, Director **/RA/** by Farouk Eltawila
Division of Systems Analysis and Regulatory Effectiveness
Office of Nuclear Regulatory Research

SUBJECT: PROPOSED RECOMMENDATIONS FOR GENERIC ISSUE (GI)-186,
"POTENTIAL RISK AND CONSEQUENCES OF HEAVY LOAD DROPS
IN NUCLEAR POWER PLANTS"

In a memorandum from Ashok Thadani to J. E. Dyer dated, November 12, 2003, RES transmitted our analysis recommendations to address GI-186 technical assessment observations in accordance with Management Directive (MD) 6.4, "Generic Issues Program." The memorandum referenced three recommendations for NRR follow-up and one recommendation for RES. These recommendations were concurred in by the ACRS in their letter to the EDO dated September 24, 2003. The RES recommendation (to establish standardized load drop calculation methodologies for heavy load drops) was based on inconsistent load drop analyses performed by licensees. The technical assessment of GI-186 documented in NUREG-1774, "A Survey of Crane Operating Experience at U.S. Nuclear Power Plants from 1968 through 2002," observed that calculational methodologies, assumptions, and predicted consequences of heavy load drops varied greatly from licensee to licensee for very similar accident scenarios. The basis for the recommendation is summarized in the Attachment. I would like to request that you (as the ASME/ASCE coordinator), contact appropriate code committees, requesting them to evaluate the need to establish standardized load drop calculation methodologies for heavy load drops at nuclear power plants. Please notify me of your actions taken in response to this recommendation.

Attachment: As stated

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(301) 415-7479

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GENERIC ISSUE 186 RECOMMENDATION FOR RES REVIEW

Evaluate the need to establish standardized load drop calculation methodologies for heavy load drops.

Basis: Computational methodologies, assumptions, and predicted consequences varied greatly from licensee to licensee for very similar accident scenarios. Accurate load drop analysis is essential, since each licensee uses load drop calculations to determine transport height restrictions which are referenced in their heavy load lift procedures. Load height restrictions contained in NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants," should also be consistent with conservative load drop analysis results. Load drop analyses also determine locations where other measures besides load height restrictions are necessary (e.g., impact limiting devices, interlocks to prevent crane motion over certain areas, or employment of single-failure-proof handling systems).

Section 4, "Licensee very heavy load drop calculations," provides examples of inconsistent load drop consequences. For example:

- (1) At the Oyster Creek facility, a calculation predicted that the maximum allowable drop height for a fuel cask weighing approximately 45 tons of a reinforced concrete slab that was 16 inches thick, was 2.77 inches,
- (2) At the Brown's Ferry facility, a calculation predicted that a load weighing 100 tons could drop on a hypothetical reinforced concrete slab that was 18 inches thick from a height of 3 feet and not penetrate the slab,
- (3) A calculation at the Limerick facility, postulating the drop of a steam dryer assembly weighing approximately 45 tons from a height of 6 feet showed that stress levels were well within the allowable range.

For additional information, please also review Appendix F, "Load Drop Calculations Involving Heavy Loads at U.S. Nuclear Power Plants," of NUREG-1774. This appendix provides in-depth details showing multiple examples of load drop calculation assumptions and results for several facilities.