January 27, 2012

MEMORANDUM TO: R. W. Borchardt
Executive Director for Operations

FROM: Eric J. Leeds, Director ***/RA/***
Office of Nuclear Reactor Regulation

SUBJECT: COMPLETION OF GENERIC ISSUE 186, "POTENTIAL RISK AND CONSEQUENCES OF HEAVY LOAD DROPS IN NUCLEAR POWER PLANTS"

The Office of Nuclear Reactor Regulation (NRR) has completed its actions supporting closure of Generic Issue (GI)-186, "Potential Risk and Consequences of Heavy Load Drops in Nuclear Power Plants." The U.S. Nuclear Regulatory Commission (NRC) opened GI-186 to address a concern related to the measures to protect against heavy load drops. The concern was based on the limited measures to protect against heavy load drops established during the resolution of Unresolved Safety Issue (USI)-A-36, "Control of Heavy Loads near Spent Fuel," and the introduction of frequent spent fuel storage cask handling activities that posed greater potential for significant plant damage. Staff activities supporting the closure include the endorsement of an industry initiative that clarifies the licensing basis for control of heavy loads, development of supplemental inspection guidance, endorsement of an industry standard for the design of highly reliable overhead cranes, and reemphasis of existing regulations and guidance related to the control of heavy loads.

The NRR staff had asked the Office of Nuclear Regulatory Research (RES) to reevaluate the resolution of USI-A-36 (Ref. 1). In accordance with Management Directive 6.4, "Generic Issues Program," RES screened the issue, classified it as GI-186, performed a technical assessment, briefed the Advisory Committee on Reactor Safeguards (ACRS), and transferred the issue to NRR for resolution. The RES staff documented the technical assessment and basis for recommendations in NUREG-1774, "A Survey of Crane Operating Experience at U.S. Nuclear Power Plants from 1968 through 2002," issued July 2003 (Ref. 2). In a memorandum transferring GI-186 to NRR for resolution (Ref. 3), the RES staff recommended the following three actions:

(1) Evaluate the capability of various rigging components and materials to withstand rigging errors (e.g., absence of corner softening material, acute angle lifts, shock from load shifts, and postulated human errors). As appropriate, issue necessary guidelines for rigging applications.

(2) Endorse American Society of Mechanical Engineers (ASME) NOG-1, "Rules for Construction of Overhead and Gantry Cranes (Top Running Bridge, Multiple Girder)," for Type I cranes as an acceptable method for qualifying new or upgraded cranes as

CONTACT: Steven R. Jones, NRR/DSS
301-415-2712

single-failure-proof. As appropriate, issue guidance endorsing the standard.

(3) Reemphasize the need to follow Phase I guidelines in NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants: Resolution of Generic Technical Activity A-36," issued July 1980, involving good practices for crane operations and load movements. Continue to assess the implementation of heavy load controls in safety-significant applications through the Reactor Oversight Process.

The NRR staff implemented these recommendations. The staff implemented the third recommendation by issuing Regulatory Issue Summary (RIS)-05-025, "Clarification of NRC Guidelines for Control of Heavy Loads," on October 31, 2005 (Ref. 4). RIS-05-025 discusses NRC heavy load handling guidelines and their relationship to the operating experience described in NUREG-1774 and related inspection findings. The staff addressed the first and second recommendations in NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," Chapter 9, "Auxiliary Systems," Section 9.1.5, "Overhead Heavy Load Handling System," Revision 1, issued March 2007 (Ref. 5). In this revision, the staff issued revised guidelines to improve the ability of slings used in single-failure-proof handling system applications to withstand rigging errors and to endorse the use of ASME NOG-1 (2004) as an acceptable method for qualifying new or upgraded cranes as single-failure-proof. On May 29, 2007, the staff issued Supplement 1 to RIS-05-025, "Clarification of NRC Guidelines for Control of Heavy Loads" (Ref. 6), to notify stakeholders of the change in guidelines. Supplement 1 to RIS-05-025 also describes previously endorsed standards applicable to heavy load drop consequence analyses and regulatory expectations on the implementation of safety analysis report change control requirements for heavy load handling activities.

Separately, during the inspection of reactor vessel head replacements in the mid-2000s, NRC inspectors identified discrepancies between constraints described in reactor vessel head lift procedures and the assumptions used in evaluations of the consequences of a postulated reactor vessel head drop. The evaluations had been submitted to the NRC. These discrepancies included nonconservative differences in the maximum lift heights, the weight of the reactor vessel head assembly, and the medium that was present above the reactor vessel flange (i.e., air instead of the assumed height of water). Resolution of these discrepancies resulted in refueling outage delays at several units caused, in part, by a lack of clarity with respect to the licensing basis related to reactor vessel head lifts. Subsequent to these outage delays and the NRC's issuance of Supplement 1 to RIS-05-025, the Nuclear Energy Institute (NEI) proposed an industrywide initiative (Ref. 7) to ensure that heavy load lifts continue to be conducted safely and that plant licensing bases accurately reflect plant practices. The staff accepted the industry proposal and held several public meetings with industry representatives to support implementation. The staff incorporated activities related to the industry initiative within the scope of GI-186.

With the benefit of public interactions with the NRC staff, industry developed NEI 08-05, "Industry Initiative on Control of Heavy Loads," Revision 0, issued July 2008 (Ref. 8). To support the initiative, NEI 08-05 includes guidelines for the following activities:

- managing the risk associated with maintenance involving the movement of heavy loads

- performing best-estimate consequence analyses for postulated reactor vessel head drops
- establishing single-failure-proof equivalence for handling systems when used for reactor vessel head lifts
- updating the description of heavy load handling programs in the safety analysis report

By letter dated September 5, 2008, the NRC staff issued its safety evaluation addressing NEI 08-05 guidelines (Ref. 9). In addition, the NRC issued RIS-08-28, "Endorsement of Nuclear Energy Institute Guidance for Reactor Vessel Head Heavy Load Lifts," dated December 1, 2008 (Ref. 10), to notify stakeholders of the safety evaluation. The industry initiative prescribed implementation of most guidelines by the first refueling outage beginning after July 1, 2008. The initiative specified that the safety analysis report be updated to include the basis for conducting safe heavy load movements in the update following that refueling outage. Thus, the staff expects that licensees for all operating reactors completed their implementation activities associated with the initiative by January 2011.

The staff determined that adequate verification activities have been completed to provide reasonable assurance of continued safe handling of heavy loads at nuclear power plants. These verification activities include the implementation of supplemental inspection guidance (Ref. 11) by region-based inspectors and the sampling of updated safety analysis reports to establish that changes consistent with the industry initiative have been completed.

The staff requested ACRS review and endorsement of the staff's technical basis for resolution of GI-186 (Ref. 12). In a memorandum to you dated October 12, 2011 (Ref. 13), the ACRS Executive Director reported that the Committee considered the proposed closeout of GI-186 during the 587th meeting of ACRS held on October 6–8, 2011, and that it had no objection to the staff's issuance of the proposed closeout.

Based on the above, the staff concludes that actions have been implemented to provide reasonable assurance of future safe handling of heavy loads. In particular, the description of the safe handling of heavy loads included in the facility safety analysis report as part of the industry initiative and the change control requirements applicable to the safety analysis report provide regulatory control over the handling of heavy loads that is equivalent to that provided for other operations of comparable safety significance. Thus, the staff concludes that the safety concerns associated with GI-186 have been adequately addressed and that the GI is closed.

References

1. Memorandum from B. Sheron to A. Thadani, “Proposed Generic Safety Issue—Potential Risk and Consequences of Heavy Load Drops in Nuclear Power Plants,” April 19, 1999. (Agencywide Documents Access and Management System (ADAMS) Accession No. ML003714155)

2. NUREG-1774, “A Survey of Crane Operating Experience at U.S. Nuclear Power Plants from 1968 through 2002,” July 31, 2003. (ADAMS Accession No. ML032060160)

3. Memorandum from A. Thadani to J. Dyer, “Proposed Recommendations for Generic Issue (GI)-186, ‘Potential Risk and Consequences of Heavy Load Drops in Nuclear Power Plants,’” November 12, 2003. (ADAMS Accession No. ML03310301)

4. RIS-05-025, “Clarification of NRC Guidelines for Control of Heavy Loads,” October 31, 2005. (ADAMS Accession No. ML052340485)

5. NUREG-0800, “Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition,” Chapter 9, “Auxiliary Systems,” Section 9.1.5, “Overhead Heavy Load Handling System,” Revision 1, March 2007. (ADAMS Accession No. ML070380201)

6. RIS-05-025, “Clarification of NRC Guidelines for Control of Heavy Loads,” Supplement 1, May 29, 2007. (ADAMS Accession No. ML071210434)

7. Letter from A.R. Pietrangelo, Vice President, Regulatory Affairs, NEI, to J.E. Dyer, Director, Office of Nuclear Reactor Regulation, NRC, “Industry Initiative on Heavy Load Lifts,” August 14, 2007. (ADAMS Accession No. ML072670127)

8. NEI 08-05, “Industry Initiative on Control of Heavy Loads,” Revision 0, July 2008. (ADAMS Accession No. ML082180684)

9. Letter from W. Ruland, Director, Division of Safety Systems, NRR, NRC, to T. Houghton, Director, Strategic Regulatory Programs, Nuclear Generation Division, NEI, “Industry Initiative on Control of Heavy Loads,” September 5, 2008. (ADAMS Accession No. ML082410532)

10. RIS-08-28, “Endorsement of Nuclear Energy Institute Guidance for Reactor Vessel Head Heavy Load Lifts,” December 1, 2008. (ADAMS Accession No. ML082460291)

11. Operating Experience Smart Sample: (OpESS) Fiscal Year 2007-03, “Crane and Heavy Lift Inspection, Supplemental Guidance for IP-71111.20,” Revision 2, September 12, 2008. (http://www.nrc.gov/reactors/operating/ops-experience/opess/2007/ss07-03r2.pdf)

12. Memorandum from W. Ruland to E. Hackett, “Proposed Closeout—Generic Issue 186, “Potential Risk and Consequences of Heavy Load Drops in Nuclear Power Plants,” September 7, 2011. (ADAMS Accession No. ML112380188)

13. Memorandum from E.M. Hackett to R. W. Borchardt, “Proposed Closeout—Generic Issue 186, ‘Potential Risk and Consequences of Heavy Load Drops in Nuclear Power Plants,’” October 12, 2011. (ADAMS Accession No. ML11284A132)

13. Memorandum from E. M. Hackett to R. W. Borchardt, “Proposed Closeout - Generic Issue 186, “Potential Risk and Consequences of Heavy Load Drops in Nuclear Power Plants”,” (ADAMS Accession No. ML11284A132), October 12, 2011.

DISTRIBUTION:

SBPB/rf	SJones	SRosenberg
RidsNrrMailCenter	JDavis	BBeasley
MReisifard	RCorreia	RidsNrrOd
GCasto	RidsNrrDss	RidsEdoMailcenter
		DDorman

ADAMS ACCESSION NO.: ML113050589 ***via email**

OFFICE	NRR/DSS/SBPB	NRR/DSS/SBPB	NRR/DSS	TECH ED*	NRR
NAME	SJones	GCasto	WRuland	JDougherty	ELeeds
DATE	12/19/11	12/20/11	01/06/12	01/09/12	01/ 7/12

OFFICIAL RECORD COPY