

XI.M23 INSPECTION OF OVERHEAD HEAVY LOAD AND LIGHT LOAD (RELATED TO REFUELING) HANDLING SYSTEMS

Program Description

Most commercial nuclear facilities have between 50 and 100 cranes. Many are industrial grade cranes, which meet the requirements of 29 CFR Volume XVII, Part 1910, and Section 1910.179. Most are not within the scope of 10 CFR 54.4 and therefore are not required to be part of the integrated plant assessment. Because only a few cranes operate over safety-related equipment, normally fewer than 10 cranes fall within the scope of 10 CFR 54.4.

Many of the systems and components of these cranes perform an intended function with moving parts or with a change in configuration or are subject to replacement based on qualified life. In these instances, these types of crane systems and components are not within the scope of this aging management program. This program is primarily concerned with structural components that make up the bridge and trolley. NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants," provides specific guidance on the control of overhead heavy load cranes. The aging management activities specified in this program utilize the guidance provided in American Society of Mechanical Engineers (ASME) Safety Standard B30.2, "Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist)."

Evaluation and Technical Basis

1. **Scope of Program:** The program manages (a) the effects of loss of material due to general corrosion on the bridge rails, bridge, and trolley structural components for those cranes that are within the scope of 10 CFR 54.4 and (b) the effects of wear on the rails in the rail system. The program also manages the effects of loss of preload of bolted connections.
2. **Preventive Actions:** This program is a condition monitoring program. No preventive actions are identified.
3. **Parameters Monitored/Inspected:** Surface condition is monitored by visual inspection to ensure that loss of material is not occurring due to corrosion or wear. Bolted connections are monitored for loose bolts, missing or loose nuts, and other conditions indicative of loss of preload.
4. **Detection of Aging Effect:** Crane rails and structural components are visually inspected at a frequency in accordance ASME B30.2, "Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist)," or other appropriate standard in the ASME B30 series. For systems that are infrequently in service, such as containment polar cranes, periodic inspections are performed once every refueling cycle just prior to use. Bolted connections are visually inspected for loose bolts or missing nuts at the same frequency as crane rails and structural components.
5. **Monitoring and Trending:** Visual inspection activities are performed by personnel qualified in accordance with controlled procedures and processes. Deficiencies are documented using applicant-approved processes and procedures, such that results can be trended; however, the program does not include formal trending.

6. **Acceptance Criteria:** Any visual indication of loss of material due to corrosion or wear and any visual sign of loss of bolting pre-load is evaluated according to ASME B30.2 or other applicable industry standard in the ASME B30 series.
7. **Corrective Actions:** Repairs are performed as specified in ASME B30.2 or other appropriate standard in the ASME B30 series. Site corrective actions program, quality assurance (QA) procedures, site review and approval process, and administrative controls are implemented in accordance with the requirements of 10 CFR Part 50, Appendix B. As discussed in the Appendix for GALL, the staff finds the requirements of 10 CFR Part 50, Appendix B, acceptable to address the corrective actions, confirmation process, and administrative controls.
8. **Confirmation Process:** Site QA procedures, review and approval processes, and administrative controls are implemented in accordance with the requirements of 10 CFR Part 50, Appendix B. As discussed in the Appendix for GALL, the staff finds the requirements of 10 CFR Part 50, Appendix B, acceptable to address the confirmation process and administrative controls.
9. **Administrative Controls:** As discussed in the Appendix for GALL, the staff finds the requirements of 10 CFR Part 50, Appendix B, acceptable to address the administrative controls.
10. **Operating Experience:** There has been no history of corrosion-related degradation that threatened the ability of a crane to perform its intended function. Likewise, because cranes have not been operated beyond their design lifetime, there have been no significant fatigue-related structural failures. Operating experience indicates that loss of bolt preload has occurred, but not to the extent that it has threatened the ability of a crane structure to perform its intended function.

References

- 10 CFR Part 50, Appendix B, *Quality Assurance Criteria for Nuclear Power Plants*, Office of the Federal Register, National Archives and Records Administration, 2009.
- 10 CFR 54.4, *Scope*, Office of the Federal Register, National Archives and Records Administration, 2009.
- ASME Safety Standard B30.2, *Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist)*, American Society of Mechanical Engineers, 2005.
- NRC Generic Letter 80-113, *Control of Heavy Loads*, U.S. Nuclear Regulatory Commission, December 22, 1980.
- NRC Generic Letter 81-07, *Control of Heavy Loads*, U.S. Nuclear Regulatory Commission, February 3, 1981.
- NRC Regulatory Guide 1.160, Rev. 2, *Monitoring the Effectiveness of Maintenance at Nuclear Power Plants*, U.S. Nuclear Regulatory Commission, March 1997.

NUREG-0612, *Control of Heavy Loads at Nuclear Power Plants*, U.S. Nuclear Regulatory Commission, 1980.