

XI.M29 ABOVEGROUND METALLIC TANKS

Program Description

The Aboveground Metallic Tanks aging management program (AMP) manages the effects of loss of material on the outer surfaces of above ground tanks constructed on concrete or soil. If the tank exterior is fully visible, the program for inspection of external surfaces may be used instead (XI.M36). This program credits the standard industry practice of coating or painting the external of steel tanks as a preventive measure to mitigate corrosion. The program relies on periodic inspections to monitor degradation of the protective paint or coating. However, for storage tanks supported on earthen or concrete foundations, corrosion may occur at inaccessible locations, such as the tank bottom. Accordingly, verification of the effectiveness of the program is performed to ensure that significant degradation in inaccessible locations is not occurring and that the component intended function is maintained during the period of extended operation. For reasons set forth below, an acceptable verification program consists of thickness measurement of the tank bottom surface.

Evaluation and Technical Basis

1. **Scope of Program:** The program consists of periodic inspections of metallic tanks (with or without coatings) to manage the effects of corrosion on the intended function of these tanks. Inspections cover the entire outer surface of the tank. Because lower portions of the tank are on concrete or soil, this program includes the bottom of the tank as well. If the tank exterior is fully visible, the program for inspection of external surfaces may be used instead (AMP XI.M36).
2. **Preventive Actions:** In accordance with industry practice, tanks may be coated with protective paint or coating to mitigate corrosion by protecting the external surface of the tank from environmental exposure. Sealant or caulking may be applied at the external interface between the tank and concrete or earthen foundation to mitigate corrosion of the bottom surface of the tank by minimizing the amount of water and moisture penetrating the interface, which would lead to corrosion of the bottom surface.
3. **Parameters Monitored/Inspected:** The AMP utilizes periodic plant inspections to monitor degradation of coatings, sealants, and caulking because it is a condition directly related to the potential loss of materials. Additionally, thickness measurements of the bottoms of the tanks are made periodically for the tanks monitored by this program as an additional measure to ensure that loss of material is not occurring at locations that are inaccessible for inspection.
4. **Detection of Aging Effects:** Degradation of an exterior metallic surface can occur in the presence of moisture; therefore, an inspection of the coating is performed to ensure that the surface is protected from moisture. Conducting periodic visual inspections at each outage to confirm that the paint, coating, sealant, and caulking are intact is an effective method to manage the effects of corrosion on the external surface of the component. Potential corrosion of tank bottoms is determined by taking ultrasonic testing (UT) thickness measurements of the tank bottoms whenever the tank is drained and at least once within 5 years of entering the period of extended operation. Measurements are taken to ensure that significant degradation is not occurring and that the component intended function is maintained during the period of extended operation.

5. **Monitoring and Trending:** The effects of corrosion of the aboveground external surface are detectable by visual techniques. Based on operating experience, plant inspections during each outage provide for timely detection of aging effects. The effects of corrosion of the inaccessible external surface are detectable by UT thickness measurement of the tank bottom and are monitored and trended if significant material loss is detected where multiple measurements are available.
6. **Acceptance Criteria:** Any degradation of paints or coatings (cracking, flaking, or peeling) is reported and requires further evaluation. Drying, cracking, or missing sealant and caulking are unacceptable and need to be evaluated using the corrective action program. The evaluation will determine the need to repair the sealant and caulking. UT thickness measurements of the tank bottom are evaluated against the design thickness and corrosion allowance.
7. **Corrective Actions:** The site corrective actions program, quality assurance procedures, site review and approval process, and administrative controls are implemented in accordance with 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. Flaws in the caulking or sealant are repaired.
8. **Confirmation Process:** 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.
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:** Coating degradation, such as flaking and peeling, has occurred in safety-related systems and structures (U.S. Nuclear Regulatory Commission [NRC] Generic Letter 98-04). Corrosion damage near the concrete-metal interface and sand-metal interface has been reported in metal containments (NRC Information Notice [IN] 89-79; IN 89-79, Supplement 1; IN 86-99; and IN 86-99, Supplement 1).

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.
- NRC Generic Letter 98-04, *Potential for Degradation of the Emergency Core Cooling System and the Containment Spray System after a Loss-of-Coolant Accident Because of Construction and Protective Coating Deficiencies and Foreign Material in Containment*, U.S. Nuclear Regulatory Commission, July 14, 1998.
- NRC Information Notice 86-99, *Degradation of Steel Containments*, U.S. Nuclear Regulatory Commission, December 8, 1986.
- NRC Information Notice 86-99, Supplement 1, *Degradation of Steel Containments*, U.S. Nuclear Regulatory Commission, February 14, 1991.

NRC Information Notice 89-79, *Degraded Coatings and Corrosion of Steel Containment Vessel*, U.S. Nuclear Regulatory Commission, December 1, 1989.

NRC Information Notice 89-79, Supplement 1, *Degraded Coatings and Corrosion of Steel Containment Vessel*, U.S. Nuclear Regulatory Commission, June 29, 1990.