Inspection Requirements Are Down the Tracks for Lined Tank Cars

Railcar regulations coming into play call for inspection of linings in tank cars and qualification of inspectors.

by Lori R. Huffman, JPCL

Increased safety in the transportation of hazardous materials is the anticipated outcome of federal regulations on continuing qualification and maintenance of railcars, which will be in force as early as 1998, according to the Federal Railroad Administration (FRA). Published as a final rule on September 21, 1995, as Subpart F, Part 180, Volume 49 of the Code of Federal Regulations (49 CFR 180), the regulations cover the maintenance and inspection of railroad tank cars. As the railcar industry gears up to comply with the regulations, some concerns have been raised by tank car owners, shippers, and lining manufacturers over the determination of inspection intervals for lined tanks, the qualification of inspection personnel, and available inspection techniques.

This article will describe the tank car regulations as they address the inspection of linings in tank cars and the qualification of inspectors. Responses from the linings and transportation industries will also be included.

Lining Inspection a First for Tank Car Regulations

The new regulations on inspecting tank cars and qualifying inspectors appear in 49 CFR 180.501-519. These regulations “reengineered the qualification and maintenance requirements for tank cars,” says James Rader, Railroad Safety Specialist—Hazardous Materials, for the FRA.

The incorporation of inspection requirements for lin-
The problem of lining failure was highlighted in a report published by the National Transportation Safety Board, entitled “Tank Car Failure and Release of Arsenic Acid in Chattanooga, Tennessee, on June 6, 1994.” The report recommended to the FRA that regulations should not only require that owners of linings determine periodic test intervals and procedures but also make this information available to inspection personnel.

Upon this recommendation, says Rader, the DOT responded by issuing a corrective document on June 26, 1996. Prior to these regulations, no federal rules were in place for inspecting linings in tank cars, says Rader.

Although the rule took effect on July 1, 1996, the phase-in periods are July 1, 1998, for tank cars that are not covered by metal jackets (used to enclose insulation or thermal protection) and July 1, 2000, for jacketed tank cars. The dates differ because procedures for inspecting non-jacketed tanks are fairly easy to develop. Special procedures must be developed for jacketed tanks to avoid complete removal of the jackets for the inspection of weld terminations and attachments, Rader says.

Like an older rule on cargo tanks (truck trailers), the tank car rule addresses condition assessment of linings in tanks carrying ladings corrosive to the materials of construction. The provisions for inspection outlined in the tank car regulation should not, however, be confused with those required by the older rule on cargo tanks, says Rader. (See sidebar on p. 56 for a discussion of this rule.) The cargo tank rule authorizes various inspection methods for non-rubber linings and spark testing of rubber linings. Conversely, the tank car regulation is performance-based, allowing the owner of the lining to determine inspection methods. The identification of spark testing was avoided in the tank car rule because of its potential for damaging linings when performed improperly, Rader says.

The owner of the lining (who may be the shipper or the tank car owner, depending on the leasing agreement) is responsible for determining periodic inspection intervals for the lining, the test procedure, and acceptance criteria. The owner must also provide this information to inspection personnel charged with qualifying the lining. Rader says that owners can use the service history of linings to determine their life expectancy or base estimates on current inspection techniques and published scientific literature.

The tank car rule includes no requirements for the certification of lining applicators and abrasive blasters. Rader notes, however, that it requires that they be trained. The rule also requires the qualification of non-destructive testing personnel (i.e., lining inspectors). In terms of quality assurance (QA) programs, the regulations...
Although they also discuss hazardous materials transport, federal regulations governing the maintenance of cargo tank motor vehicles (truck trailers) lay out different schedules and provisions for lining inspection than those for tank cars. Published on June 12, 1989 as Subpart E, Part 180, Title 49 of the Code of Federal Regulations (49 CFR 180), regulations pertaining to the inspection and maintenance of cargo tank motor vehicles (truck trailers) are laid out in 49 CFR 180.401 to 417. Before 1989, regulations on retesting and requalification of cargo tanks appeared as part of the hazardous materials regulations applying to shippers and motor carriers, according to Charles Hochman, chief of the engineering group, Office of Hazardous Materials Technology, Research and Special Programs Administration, U.S. Department of Transportation (DOT). The regulations included requirements for hydrostatic testing and visual inspection of cargo tanks, but not for lining inspection. In 1989, the DOT revised the regulations by adding requirements for lining inspection and metal thickness and grouped rules for the continuing qualification and maintenance of cargo tanks under Part 180, says Hochman.

The regulations are aimed at cargo tanks authorized by the DOT to carry hazardous materials. As they pertain to linings, however, the regulations apply only to cargo tanks carrying ladings that are corrosive to the material of construction of tanks, Hochman points out. Cargo tanks that carry materials not corrosive to the material of construction of the tank or that are lined only to ensure product purity are not subject to the requirements for lining inspection.

In addition to lining inspection, 49 CFR 180.401 to 417 covers the applicability of the rule; definitions; the qualification of cargo tanks; requirements for testing and inspection; minimum qualifications for inspectors; acceptable results of tests and inspections; repair and modification of cargo tanks; and requirements for inspection and testing, marking, reporting, and record keeping. The regulations provide a timetable of periodic test and inspection intervals for cargo tanks, including those lined for corrosion protection, which can be found in 49 CFR 180.407. Yealy inspections were mandated for lined tanks, effective September 1, 1991.

Spark Testing Mandated for Rubber Linings
Specific instructions for lining inspection are found in 49 CFR 180.407(f). Rubber linings are to be tested for holidays with properly calibrated, high voltage spark testing equipment. The regulation specifies the type of probe and steel calibration coupon that should be used. In addition, the calibration of spark testing equipment and performance of the inspection are described. If holidays are discovered, they must be repaired using materials, equipment, and procedures recommended by the
lining manufacturer or applicator, the regulation says.

Although no alternative to spark testing for rubber linings is listed in the regulations, Hochman says that cargo tank owners seeking authorization for alternative testing methods can follow an exemption procedure (see 49 CFR 107.105), building a case that another inspection method will provide an equivalent level of safety. If a cargo tank owner is granted an exemption, it is limited to a two-year period by statute, Hochman adds.

**Rule Favors Manufacturer Recommendations for Non-Rubber Lining Inspection**

49 CFR 180.407 (f) is more flexible for cargo cars lined with non-rubber materials. For these materials, the regulation requires annual inspections using equipment and procedures recommended by the lining manufacturer. Hochman says that the variety of non-rubber lining materials did not permit a consensus of opinions on appropriate test methods during the rule making process.

49 CFR 180.407 (f)(3) requires the removal of degraded areas in linings and the inspection of the substrate below the deterioration. Any corroded areas of the tank wall require thickness testing, the regulation says.

**Qualifying Inspectors for Cargo Tanks**

49 CFR 180.409 details the qualifications of persons inspecting cargo tank linings, as well as tank interiors, exteriors, and service equipment. According to the regulation, inspectors must be registered with the DOT; be familiar with cargo tanks designed for hazardous materials transport; and be knowledgeable in the use of inspection and testing equipment.

These requirements are in force for independent inspection companies, individual inspectors, and in-house inspectors employed by the cargo tank owner, says Hochman. He adds that these inspectors would also be obligated under 49 CFR 172.700 as hazardous materials employees to undergo training in hazardous materials regulations every 3 years.

**Trucking Industry Accepts Regulations on Lining Inspection**

Cargo tank owners have not objected strenuously to annual lining inspections, because they understand that lining failures can result in potentially serious problems, says Hochman. In fact, annual inspections have allowed owners to find early deterioration in tanks that otherwise could have gone undiscovered until further, serious damage had occurred, he says.

Cliff Harvison, president of the National Tank Truck Carriers, says that members of his trade organization have accepted and followed the regulations since their effective date. Although controversy lingers over the potential harmfulness of spark testing, Harvison says that he doesn’t view the inspection method as a problem, as long as it is performed by properly trained inspectors. Most carriers, he says, send their rubber-lined tanks to a qualified shop for inspection or make sure their in-house inspectors have been trained by either the manufacturer of the lining or the manufacturer of the spark testing equipment. Careful handling of lined tanks is certainly important, says Harvison, because “we’re not anxious to mess up a $40,000 lined trailer.”

Not everyone affected by the regulations is pleased with the specification of spark testing for rubber linings, however. Al Hendricks, President of Plasite, believes that spark testing can do more harm than good because it can damage linings that have already been in immersion service. An immersed lining absorbs moisture, which changes its electrical properties. When inspected with a high voltage tester, the lining can be burned by the spark, resulting in holidays, Hendricks says. He adds that NACE and ASTM have altered their standards on spark testing to reflect this information. He, like some others involved in manufacturing, applying, and inspecting linings, argues that non-destructive tests are preferable to spark testing.

Other lining types, such as high-bake phenolics, epoxies, and vinyl esters, are also used to protect cargo tanks, says Hendricks. Inspection procedures for these linings are left up to the manufacturer to recommend. Typically, says Hendricks, visual inspection is performed to evaluate the lining for discoloration, blistering, and softening.  

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Tank Car, the regulation will force lining owners to think about proper condition assessment. And proper condition assessment, which can be performed while the cars are away from the owner’s yard, will prevent shippers from having to return tank cars to authorized maintenance facilities, termed “shopping the cars,” for extensive and expensive work.

Although the regulations have been accepted by the transportation industry, certain concerns have been raised by lining manufacturers. Al Hendricks of Plasite expresses concern over the tank car regulation’s requirement that owners determine inspection intervals for their linings. To determine inspection intervals, the lining owner relies on the manufacturer to provide information about the anticipated life of the system. To date, Hendricks has already received numerous inquiries about the life expectancy of his company’s linings in various corrosivities. He fears that without standard procedures for developing these estimates, they will be used as selling tools for lining products rather than as realistic comparisons of linings.

Hendricks notes some flaws in an AAR-proposed formula for determining inspection intervals. The formula considers the film thickness of the lining and the pH of the lading to compute the intervals. One
problem, says Hendricks, is that the formula implies that “thicker is better.” He fears that owners will equate thicker lining applications with increased savings (i.e., fewer inspections) and will call for heavy applications of thin-film linings. Improperly applied thin-film linings will result in severe lining failures, he says. Another problem with the formula is its emphasis on the pH of ladings, which does not necessarily indicate a product’s potential for damaging the substrate. For example, salt is corrosive, but it does not have a low or high pH, he says. Although it is hauled in a dry state, salt is typically unloaded or “sparged” using heated water, which yields a liquid that is very corrosive to a tank car’s substrate. Molten sulfur, another example, has an unfavorable pH only when it is wet, which occurs during sparging, he adds.

Hendricks also mentions the lack of qualification requirements for inspection personnel. Without a system of certifying inspectors, he says, the quality of inspection is difficult to assure.

Industry Responds

Since the rules on tank cars were issued, industry groups have begun respond to the questions of inspection intervals and qualification of inspectors.

The AAR Revises Tank Car Manual

The AAR is revising Appendix L of its Tank Car Standard to reflect the intent of the tank car regulations, says Larry Strouse of General American Transportation Corp., chair of the T92.7 task force of the Tank Car Committee. As part of these revisions, the task group drafted the formula for determining periodic inspection intervals, based on the corrosivity of the lading and the thickness of the lining. The formula has been submitted to the Tank Car Committee for review. The standard also considers the qualifications of facilities and personnel applying and inspecting interior protective coatings and linings.

Another step in developing standards is the anticipated requirement by AAR that lining applicators notify car owners when linings are applied to their tank cars. Owners are often unaware that shippers have installed linings in leased cars, says Strouse. The requirement was created, in part, to protect tank car owners from potential liabilities if linings fail. In addition, says Strouse, “it’s just good business practice to keep the owner in the loop.”

At press time, the AAR Tank Car Committee was to meet in Colorado Springs, CO, at the end of July. The railcar industry is anticipating the meeting, in the hope that the revisions and new standards will be approved, says Strouse.

NACE Standard Addresses Regs

One task group of NACE International is drafting a consensus standard that will help owners comply with the regulations. Task group T-14 C-11 on Railcar Coatings Inspector Training Program is working on the first draft, “Training and Qualifying Personnel as Coating Inspector Specialists in the Rail Industry,” says Cynthia Greenwood, technical activities coordinator for NACE.

Finding the Regulation

The final rule for tank cars was published on September 21, 1995, and appeared in Volume 60 of the Federal Register on p. 49048 (60 FR 49048). Editorial corrections were published on June 26, 1996, in 61 FR 33250, says Rader. Subpart F can also be downloaded from the CFR Web site at http://www.access.gpo.gov/nara/cfr/index.html. This site allows users to search the CFRs by title, part, and section. Selected regulations can then be downloaded to the user’s computer. JPCL