Pipeline Companies Face Challenges in Order to Meet New DOT Breakout Tank Requirements

by

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The adoption of API Standard 653, Tank Inspection, Repair, Alteration, and Reconstruction, for tank inspection and repair was not a surprise to anyone in the pipeline industry. Several tank failures preceded it–the most notable of which was a newly reconstructed storage tank in Florefee, Pennsylvania that ruptured, January 1988, releasing approximately 93 thousand barrels of diesel oil. Although most of the product was contained in the surrounding dike, an estimated 18 thousand barrels still spilled into the Monongahela River, eventually flowing into the Ohio River.

API Standard 653 was proposed in 1989, and after receiving input from many sources, was published in 1991. Although the new criteria for aboveground storage tanks were expected, the time frame in which 13 of the industry publications, Table 1, would become part of Title 49, Part 195, was not as foreseeable. The changes to the regulations were proposed in May 1998, and published just 11 months later. As a result, pipeline companies are facing obstacles.

The most obvious hurdle is predicting the increase in maintenance budgets beyond the norm, since resulting inspections can be costly. The cost of an out-of-service examination for a tank including cleaning and loss of utilizations will run from $10,000 to $500,000. Depending upon the size, design, and condition of a tank, repair costs can exceed $100,000.

Another major challenge for some companies is the decrease in available tankage. About 5 years ago, several states began requiring reduced reed vapor pressure gasolines during the summer months to help meet federal air-quality requirements. Although overall volume requirements did not increase as a result of this regulation, they immediately contributed to additional gasoline tankage constraints by reducing operational efficiency and flexibility. To complicate matters, some tank farms began experiencing significant increases in the demand for segregated product types requiring additional limitations for segregated product tanks. This increase in demand posed significant efficiency and flexibility losses and limited maintenance opportunities.

The problem of the lack of historical information about the inspection, repair and modification of aboveground storage tanks exists for many companies. For example, if previously completed alterations were not well documented, it may be hard to determine exactly what was done. In addition, anticipating the extent of deterioration that may be found during an inspection and the amount of money to be budgeted for each tank will be difficult. For these reasons, identifying the problems that may occur while conducting inspections and preparing to address whatever is found could be challenging.

Over the next 2 to 5 years, spending will drastically increase as pipeline companies adjust to the DOT inspection and repair requirements. Once the industry adjusts to these new requirements, spending will level off considerably, and the industry's level of safety will be significantly elevated.

Some pipeline companies that did not have well-established inspection programs prior to the new DOT regulations are behind schedule. The deadlines are approaching rapidly, and noncompliance penalties will be difficult to digest considering the enormous investments companies are already making to implement system integrity programs.

Required Inspections and Their Deadlines

API Standard 653 and Part 195 highlight three types of aboveground storage tank inspections. The first is a visual survey, which normally takes less than 15 minutes per tank to complete each month. The second type is a formal in-service inspection that takes approximately 4 to 8 hours per tank. This inspection must be conducted at intervals that do not exceed the lesser of 5 years or the quarter corrosion rate life of the tank shell. In addition, the inspection must be conducted by an "Authorized Inspector" who has fulfilled the certification requirements of API Standard 653.

The third type of inspection is an out-of-service examination, which can last 1 or more days, with the average being about 3 days for a medium-sized tank. As part of this procedure, an Authorized Inspector must determine a tank's corrosion rate by measuring its remaining bottom thickness. This rate determines the interval for the next out-of-service inspection. The minimum predicted plate thickness at the time of the next inspection is specified in API Standard 653, and

some maximum intervals are given in the standard. When the corrosion rate is not known, the maximum interval is 10 years. When the corrosion rate is known, out-of-service inspections cannot exceed 20 years–even if the service interval is determined to be longer than that amount of time. During this inspection, the inspector must also assess the tank's bottom and shell thickness, analyze any bottom or foundation settlement, review non-destructive examination results, and initiate additional inspections as required.

According to the amended federal regulations, the deadline for these three types of inspections were to have begun by May 3, 1999, or the date of the last recorded inspection. From that date, pipeline companies had 1 month to implement and conduct a routine visual inspection program, 5 years to complete a formal in-service examination, and a maximum of 10 years to perform an out-of-service inspection.

All tanks built or significantly altered after October 2, 2000, must also meet requirements specified within Part 195. The regulations incorporate various tank systems and construction publicans, including API 650 for the design and construction of the tank, API 2000 for overpressure safety devices and API 2350 for overfill protection systems.

To ensure that pipeline companies are in compliance with the new standards specified in Part 195, the Office of Pipeline Safety plans to conduct audits in which they will request inspection reports, nondestructive examination reports, and other types of documentation such as tank alteration and repair plans and procedures.

How API Standard 653 and Part 195 Differ

API Standard 653 is one of several standards, recommended practices, and publications developed by the American Petroleum Institute (API). It is a living document that is constantly being reviewed and updated as technology and testing improve. There also are publications that address many other topics, such as API Standard 650, which focuses on the construction of new aboveground atmospheric tanks and API Recommended Practice 652, which deals with the lining of aboveground storage tank bottoms.

The API Pressure Vessel and Tank subcommittee is responsible for the upkeep of API Standards 620, 650, and 653. The subcommittee, in conjunction with industry, sponsors and

oversees research, investigates new technology to help refine and improve the existing standards, and answers inquiries. Based upon this information, portions of the document are sometimes modified and, when needed, new sections are added.

Title 49 of the Code of Federal Regulations, Part 195, also is an evolving document. The Research and Special Programs Administration, Department of Transportation, which falls under the Secretary of Transportation, is responsible for the upkeep of the regulations. Part 195 was first adopted in 1970 and contained federal regulations pertaining to the design, construction, and operation of interstate pipeline systems. Since that time, many new amendments have been adopted.

Inspections of Tomorrow

New technologies that may change pipeline companies' options for performing out-of-service inspections include robotic technology and improvements of scanners. Adapted from nuclear industry, robotic inspections entail lowering a robot into an in-service tank. The device then is moved through the product, measuring the tank bottom's thickness to determine how much corrosion has occurred. This technology provides a method for evaluating tanks while they are in use–saving pipeline companies anywhere from $50,000 to $500,000 per tank. This is an excellent way to help prioritize out-of-service inspections or to confirm in-service bottom corrosion that may occur. At the present time, these robotic services cannot identify all anomalies inside the tank. As robotic systems improve, they may replace out-of-service inspections.

In addition, future scanners will have increased sensitivity. These new scanners will more accurately locate and define anomalies thereby decreasing the risk of leaving a defect in the tank. Additionally, new procedures are being developed that will create scanner qualifications and scanner operator qualifications, improving the overall quality of tank bottom inspections.

Forecast for the Future

Although the standards, regulations, and guidelines set forth by API Standard 650, API Standard 653 and Part 195 present many challenges to pipeline companies throughout the United States, they will help develop more consistent methods for storage tank inspections, repairs, and construction. As companies adjust to these new tank inspection requirements, their verification of system integrity will minimize the risk of serious incidents.

Table 1. Industry Publications Reference by Part 195

Standard	*Title*	*DOT Referenced Edition*
API Standard 12F	Specification For Shop-Welded Tanks For Storage Of Production Liquids	Eleventh edition, November 1994
API Standard 510	Pressure Vessel Inspection Code: Maintenance Inspection, Rating, Repair, And Alteration	Eighth edition, June 1997
API Standard 620	Design And Construction Of Large, Welded, Low-Pressure Storage Tanks	Ninth edition, February 1996 (including Addenda 1 and 2)
API Standard 650	Welded Steel Tanks For Oil Storage	Ninth edition, July 1993 (including Addenda 1 through 4)
API Recommended Practice 651	Cathodic Protection Of Aboveground Petroleum Storage Tanks	Second edition, December 1997
API Recommended Practice 652	Lining Of Aboveground Petroleum Storage Tank Bottoms	Second edition, December 1997
API Standard 653	Tank Inspection, Repair, Alteration, And Reconstruction, Second Edition	Second edition, December 1995 (Including Addenda 1 and 2)
API Standard 2000	Venting Atmospheric And Low-Pressure Storage Tanks	Fourth edition, September 1992
API Recommended Practice 2003	Protection Against Ignitions Arising From Static, Lightning, And Stray Currents	Sixth edition, September 1998
API Publication 2026	Safe Access/Egress Involving Floating Roofs Of Storage Tanks In Petroleum Service	Second edition, April 1998
API Recommended Practice 2350	Overfill Protection For Storage Tanks In Petroleum Facilities	Second edition, January 1996
API Standard 2510	Design And Construction Of LPG Installations	Seventh edition, May 1995
NFPA 30	Flammable And Combustible Liquids Code	1996 edition