



Published as an informational service to Owners and Engineers of Steel Water Storage Tanks by
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EDITOR'S CORNER

It's almost AWWA Annual Conference and Exhibition time again, so some of you will be receiving this as our usual notice of our booth number. Look for us in Orlando at Booth 418 this year.

As we close our ninth year and prepare to enter our tenth year of TANK INDUSTRY CONSULTANTS, I want to report our latest accomplishments and introduce new personnel. Our East Coast operation is moving to larger and more centrally located quarters. As of June 6, the address is 14435 Cherry Lane Court, Suite 425, Laurel, Maryland 20707. The phone will also be changing to 301/880-4004.

New personnel include "Chip" Stein, Fred Kinsley, and Uklin Ussery. Gregory R. "Chip" Stein, E.I.T., a mechanical engineer from Rose-Hulman Institute of Technology, joined our Speedway engineering staff in April of this year. From his previous employment Chip brings experience in shop certification and design in accordance with the ASME Boiler and Pressure Vessel Code. Chip has also been involved in engineering case studies dealing with failure analysis of metal components.

Uklin Ussery and Fred Kinsley joined our field technician staff in the fall of 1987 and winter of 1988 respectively. Both gentlemen bring with them over 20 years of experience. Uklin's career as a crew foreman has included both industrial and water tower painting. Fred has held quality assurance and foreman positions in the areas of tank painting, welding and erection, and has attained a Level III rating under ASNT. We welcome these men and the expertise they add to the TIC® staff. While both technicians are relatively new to our staff, our customers they have served have already asked that they be assigned to their next projects. No greater compliment could we receive!

THE ASHLAND INCIDENT

Wherever I go, I am asked questions concerning the rupture of the Ashland Oil tank which allowed diesel fuel to flow into the Monongahela River. I learned everything I knew about it from the newspapers and magazines, until May 26, when I was privileged to be asked to testify before the

Oversight and Investigations Subcommittee of the U.S. House of Representatives Committee on Merchant Marine and Fisheries. My belief is that the present design and construction standards are sufficiently conservative. This incident served as a reminder to owners, engineers, and contractors that the requirements in the API and AWWA Standards are **minimum** requirements. The steel tank industry is a very competitive one, and the U.S. system of choosing the low bidder sometimes places members of the industry in compromising positions. It asks for the impossible, price-wise, and in some cases allows the level of acceptance to be lower than the applicable standards might permit. This practice seems to be more prevalent in the tank repair and re-erection business than in the new tank business. Although not a self-policing organization, the Steel Plate Fabricators Association is made up of members who are generally active in industry standards organizations and are aware of what it takes to build a quality tank.

TAKING THE LEAD ON LEAD

At the Steel Structures Painting Council Lead Paint Removal Symposium on February 29, 1988, I presented a paper entitled "The Specifier Looks At Environmental Regulations". I will again address this subject at the National Association of Corrosion Engineers "CORROSION/89" in New Orleans, April 17-21, 1989.

The abrasive blasting of existing structures is becoming a problem everywhere. Is the inconsistency in enforcement possibly due to the fact that the regulations may be an "overkill"?

I am not advocating breaking the law ----. I am, however, advocating that we do something to change the law. We must determine the true health risks involved. The nation cannot afford to maintain its infrastructure using the regulations now in place. Neighboring property owners must realize that they may have to suffer some inconvenience while structures are being cleaned and painted. I am not saying to ignore the true health hazards, but to approach the situation with some semblance of reality, not just reacting to the whims of every regulator and equipment supplier who happens to be put on a speaker's podium, given space in pub-

lications, or exhibiting at conferences. The regulators and equipment peddlers have a lot to gain. Will the public gain or lose?

Have we been led down the road to economic impracticality? "Get the lead out." Take a lead position in getting some practicality in the lead removal and other abrasive blasting regulations. Write your legislators -- federal, state, and local.

A WHOLE LOT OF SHAKIN' GOIN' ON

by Todd D. Moore, E.I.T.

TIC® inspected and evaluated several tanks which were near the center of the October 1987 California earthquakes. The single-shear connections on one tank had cut the cotter keys allowing the clevises to slip off the ends of pins and the diagonal braces to fall down. Several struts had buckled to varying degrees, because they were underdesigned and could not withstand the loads imposed by the diagonal braces. During the evaluation of these structures and other structures throughout the country, we have seen common failure characteristics. To date, our findings have confirmed our design theories; however, actually seeing what we have in the past only anticipated has prompted us to mention earthquake considerations here. The secret to good seismic design is to allow the "stretchy" parts (diagonal bracing) to stretch and absorb energy without having an abrupt failure due to buckling of a compression member (strut) or breaking of a connection. Most diagonal bracing on tanks has the strength and ductility to withstand a mild earthquake, however, the connections and struts do not.

Although the AWWA D100 Standard presently addresses seismic design as mandatory, it was optional at the owner's discretion until 1973, and not a requirement unless specifically addressed by the prevailing local building code up to 1979. Consequently, very few older tanks are designed for the seismic zone in which they are located. So, look out for deteriorated or underdesigned connections, weak or bowed struts, oversized diagonal bracing, abrupt discontinuities, cotter key keepers on pins, and single-shear connections.

OPERATOR INSPECTIONS

by Steven P. Roetter, E.I.T.

Many critical items concerning your water tanks can be monitored by local utility personnel. The following are some items for operators and tank owners to look for on their tanks which might indicate the need for professional inspection. These items were adapted from the *Tank Inspection Manual-NAVFAC MO-210.9* prepared by TANK INDUSTRY CONSULTANTS for the U.S. Navy.

- ▶ Differential settlement of foundations
- ▶ Deep cracks or crumbling foundations

- ▶ Metal loss on anchor bolts or nuts
- ▶ Dents or twists in columns
- ▶ Broken, bent or deteriorated rods
- ▶ Missing or loose rod pins
- ▶ Broken overflow brackets
- ▶ Tanks exhibiting large areas of rust or rust over greater than 30% of the surface area
- ▶ Any rust streaks (frequently from riser to bowl intersection) which may indicate leakage. Small leaks sometimes temporarily plug with corrosion products
- ▶ Cathodic protection meter readings outside the normal range

All tanks which are over 10 years old should be professionally inspected for structural, sanitary and safety deficiencies every one to five years. This is especially important for tanks in coastal environments where the salt laden air can deteriorate steel many times faster than a normal environment, and in earthquake and high wind regions where structural deterioration is much more critical.

Sanitary violations seem to be the problems most overlooked by tank owners. The connection of the overflow pipe directly to a drainage system without an air break should also be avoided. Damaged, missing, or improperly placed vent or overflow screens will allow birds, insects, and even squirrels to enter the tank. Manholes should be locked to deter mid-summer swimming parties. Manholes and vents on top of elevated tanks or standpipes will require an experienced climber with safety equipment to access the tanks. Professional inspection service may be required.



We have a number of papers available concerning water storage tanks. Should you like a copy of one or several, please write or call.

- ▶ An Integrated Approach to Maintaining Steel Structures
- ▶ Appurtenances for Welded Steel Water Storage Tanks
- ▶ Cathodic Protection for Water Storage Tanks
- ▶ Cold Weather Operation of Water Storage Tanks
- ▶ Designing Surface Preparation and Coating Systems for Repainting the Exterior of Existing Tanks
- ▶ Developing New Welded Steel Water Tank Specifications
- ▶ Inspecting New Tank Construction
- ▶ Maintenance Engineering for Steel Water Storage Tanks
- ▶ Steel Tank Pit Welding
- ▶ Rehabilitation and Maintenance of Steel Water Storage Tanks
- ▶ Wax-Grease Coatings in Potable Water Storage Tanks

Reprints from Journal of Protective Coatings & Linings

- ▶ Dealing with Heavy Layers of Corrosion
- ▶ Seeking an Optimum Coating System for New Welded Steel Tanks/Problem Solving Forum - Wax Grease

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