

Tank Talk

Tank Talk® 35
Winter 2001/2002

We at Tank Industry Consultants mourn with the rest of the civilized world the tragic events since September 11th. We extend our deepest condolences to all whose lives were forever changed by the unspeakable acts of cowardice. Together, "We will not tire, we will not falter, and we will not fail."



"Tonight we are a country awakened to danger and called to defend freedom. Our grief has turned to anger, and anger to resolution. Whether we bring our enemies to justice, or bring justice to our enemies, justice will be done."

President George W. Bush
Address to a Joint Session of Congress and the
American People
September 20, 2001

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Water Tank Seminar
Information Inside



Tank Talk® is published as an informational resource for the storage tank industry. To learn more about the services offered by TIC, please contact:

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Articles from previous issues of Tank Talk can be found on our web site

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President's Corner

by Steven P. Roetter, P.E., President



All of America was struck by the sheer audacity of the September 11th terrorists' attack on our country. With the threats of additional terrorist activities, our nation is on the highest level of alert.

Water systems throughout the United States have contacted us requesting help dealing with their tank security needs. To respond to those immediate needs we have put together a team of tank specialists to address your concerns and offer services to help you protect this very visible element of your water system. Starting immediately, Tank Industry Consultants will be offering **tank security evaluations** and **tank security consulting services**. We will assess the existing conditions, provide recommendations for increasing security at your tank, and utilize our extensive tank knowledge and experience in establishing priorities to help you secure your water tank against potential threats. We can advise on several levels of security to meet the needs of your systems, and provide you with a balanced perspective of your total tank security. Basically, we are here to help you in this time of trouble by whatever means possible.

Spearheading our Rapid Response Team will be John Lieb, P.E. John has more than 25 years in the tank business and has been on all types of tank sites throughout the world. Working with John will be Todd Moore, P.E., S.E. There are very few engineers in the country—if any—who have more experience in the design and rehabilitation of water storage tanks than Todd. The third member of our Rapid Response Team is Michael Doolittle. Mike has headed our field services department for the past 16 years, and brings to the team vast practical knowledge of water storage tanks of all kinds.

We are confident that this team offers the finest level of expertise available to help you in this most difficult time. If you would like to discuss your water tank security, please contact **John Lieb** at **630/226-0745**; **Lieb@TankIndustry.com**; or **800/539-7173-pager**.

A Maintenance Management Prioritization System For Water Storage Tanks

by: Gregory R. "Chip" Stein, P.E., Vice President

With today's emphasis on infrastructure maintenance, the need for a method to rate and prioritize tank maintenance requirements has become increasingly evident. This is especially critical for municipalities, utilities, and industries with multi-tank systems. A computerized management tool for comparing the relative overall condition of tanks within the same water system would simplify long-term maintenance prioritization. Such a rating and maintenance prioritization system should also include provisions for estimating the cost of the forecasted maintenance schedule. A condition rating and maintenance prioritization system has been developed which not only integrates all of the above criteria, but also includes numerous other "user-friendly" characteristics.

The database upon which the rating and prioritization system operates is established from information gathered by field technicians and engineers who assign individual numerical ratings to various aspects of the structural, seismic, sanitary, safety, coating, and corrosion condition of the tank. The numerical ratings are obtained by choosing the numbers corresponding to the most correct answer listed for a variety of questions as presented in an evaluation booklet. These numbers are then transferred to the database portion of the spread sheet template.

The rating and prioritization system program performs multiple logical and mathematical functions to determine, among other things:

- style of tank
- condition of the exterior coatings
- condition of the interior coatings
- presence of regulated heavy metals
- seismic rating
- structural rating
- safety rating
- sanitary rating
- overall comparative rating of this tank to others within the system.

The versatility and flexibility of a spread sheet allows the rating system

to accommodate a wide variety of information that is customized to meet the requirements of the individual water system, and allows the user to easily sort and prioritize the tanks. In addition to helping the tank owner evaluate the collective maintenance requirements of his tank system, the rating and prioritization system can be used to "flag" tanks that require immediate safety, seismic, sanitary, or structural attention.

The system rates and prioritizes tanks by several standardized criteria including:

- structural requirements
- seismic requirements
- sanitary requirements
- safety requirements
- painting, corrosion, and general maintenance requirements
- a weighted combination of the previous five

This variety of criteria allows the owner to base the maintenance schedule on multiple considerations such as structural stability, liability risks, corrosion prevention, aesthetic appeal, and conformance to regulatory standards.

The rating system also provides for estimated economic factors for each tank based on a recommended scope of work. The economic factors allow the owner to more confidently prepare a yearly maintenance schedule and establish budgeting requests years in advance. This forecast in turn provides valuable information utilized in establishing water rates for the forecasted period.

This type of rating and prioritization system is extremely beneficial to water systems. It consolidates and simplifies the amount of information required to more efficiently operate and maintain their tanks. Although a small water system would immediately benefit by utilizing this type of a rating system, the greater the number of tanks within a system, the more marked the ease of maintenance forecasting, scheduling, and budgeting.

Tank Security

By John M. Lieb, P.E., Chief Engineer—Industrial

As a result of the terrorists' attacks on the United States on September 11th, all of America is on heightened alert. Water utilities are no exception. Where once they sought to protect their water tanks from graffiti and vandals, they now are looking for ways to defend them from terrorist activities.

It is well understood throughout the industry that injecting a biological agent into a water storage tank is not the best or most efficient means of contaminating the water supply. However, water tanks are a highly visible symbol to the public, and as such are one of their first concerns.

While there are a number of more expensive, more involved methods to help protect your tank, we feel that your first defense should be to **protect your tank from unauthorized access.**

- **Fence the tank site** A 6 to 8-foot chain link fence with barbed wire deters unauthorized access.
- **Remove trees** and other vegetation that offer an alternate route for access to site or limit visibility on your site. In the recent past, tanks were considered eyesores to be hidden away in the trees or landscaped to make them more attractive. Just as trees and other landscaping can make a tank less conspicuous, they can also offer cover for unauthorized personnel to maneuver in.
- **Keep gates locked.** This simple, but often overlooked security measure is invaluable. Make sure that your gates operate properly and do not have gaps between the gate and fence.
- **Light your tank site.** Adequately illuminate all parts of the tank site, and regularly check to see that the lights are operating properly and that burned-out bulbs are replaced.
- **Post no trespassing signs.** Granted, the signs are not likely to prevent a trained terrorist from

accessing your site, but it may make local vandals think twice about trying.

- **Ask local law enforcement officials to drive by your tank sites regularly to check for activity on the site.** Involve your local community in your security plan by providing a phone number they can call if they notice any suspicious activity on or near the tank.
- **Install and lock vandal deterrents on ladders.** Make sure your vandal deterrents have side shields to prevent access up the sides of the ladder.
- **Use sturdy locks to lock access doors into the dry area of base cones.** Don't forget to install and maintain a light above the base cone door to help illuminate the area.
- **Lock all manholes** and verify that the manhole covers are secure. And don't forget access tube manhole covers as well. They should be locked at all times. **Make sure cathodic protection hand holes covers are in place and adequately cover the opening.**

There are some signs to look for to determine if tank site is susceptible to unauthorized access.

- Graffiti on your tank
- Foreign objects inside the tank
- Damaged fencing, gates, or locks

Do not allow anyone to access your tank unless they are trained to do so and have adequate safety gear.

John Lieb is a nationally recognized expert in the design of plate structures including specialty plate structures for petroleum, chemical, granular, and water industries throughout the world. Mr. Lieb has over twenty-six years experience as an Engineer, including twenty-four with a major tank constructor.

Industry News

NFPA

Gregory R. "Chip" Stein, P.E., Vice President of Tank Industry Consultants has been appointed as a Principal Member of the National Fire Protection Association's (NFPA) Water Tank Committee.

NFPA published two standards concerning water storage tanks—*NFPA 22: Standard for Water Tanks for Private Fire Protection*, and *NFPA 25: Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*.

SSPC: The Society for Protective Coatings

Chip has also been named Program Chair for the 2002 SSPC Annual Meeting to be held in Tampa, Florida.

NEHRP

National Earthquake Hazard Reduction Program

Steve Meier has been selected to chair Technical Subcommittee 13—Non-building Structures for the 2003 NEHRP, conducted by the Building Seismic Safety Council on behalf of FEMA (Federal Emergency Management Administration).

The Future of Tank Maintenance....Where Do We Go From Here?

by: Stephen W. Meier, P.E., S.E., Vice President—Chair of AWWA Steel Tank Committee

New regulations and advances in technology have changed the face of tank maintenance over the last ten years. Additionally, tank construction materials, new uses for tanks (such as support towers for various satellite and antenna installations), and water quality issues have affected tank design and will drastically affect future maintenance. This article will address some of the changes that have occurred in the industry and try to predict the effect these changes may have on future tank maintenance.

Lead Regulations: Changes in the regulations regarding the removal of lead-based (and other heavy metals) paint from structures have been in place for six to eight years now. What has changed dramatically is the interpretation and enforcement of these regulations. Many areas of the country now enforce a policy of no emissions into the atmosphere or past the property line. Add to this the concern for worker safety while removing the coatings, and it can easily be seen why the cost of water tank rehabilitation has doubled...even tripled over the last ten years. The largest problem has been the collection of the dust and debris generated by the coating removal while keeping worker exposure levels to heavy metals within the permissible range prescribed by OSHA 1926.62. Currently, the most widely accepted and efficient means of collection involves the shrouding of the entire structure with impervious tarps, and open blasting within this containment system. Dust collectors are used to negate the pressurization effect of the compressed air abrasive blasting and produce a negative pressure within the containment enclosure. Workers must be adequately protected in this hazardous environment. The most promising technology currently in use and undergoing further development is the "robotic" type blasting systems. These systems include a self-contained centrifugal blasting apparatus that seals against the tank surface. The unit is raised and lowered by a winch and cable-type system. There is no compressed air so there is no pressure dispersing the debris that is generated. The abrasive media is typically recyclable so the debris is minimized. Additionally, workers are outside the blasting assembly so they are not exposed to the concentrated dust.

VOC Regulations: Volatile organic compounds (VOC's), the solvents in the coating

systems that traditionally have given coatings their liquidity and workability, are being heavily regulated across the country. As the solvents within the coatings are released, the coating dries. To reduce VOC's in their product, coating manufacturers are producing more high-solids coatings and water-based coatings. These new coatings will greatly affect coating selection for coating water storage tanks.

Seismic Design Standards: AWWA D100-96 has changed the way tanks in seismic zones are designed. Additionally, the seismic zones are being modified to include the vast majority of the United States. These changes to IBC 2000 are due to a dramatic change in the way engineers view the risk of a seismic occurrence, its potential magnitude, and the affect of the event on a structure. Tanks located in the high-risk seismic zones should be evaluated to determine if they meet these new criteria. In the future, it may be prudent to re-evaluate the seismic zones and the original tank design criteria when performing any structural upgrades or modifications.

Communications Antennas: Over the past several years there has been a proliferation of cellular telephone transmission antennas and other communication devices installed on water tanks. Many times these antennas are installed with little thought for the future maintenance of the structure, and the structural integrity of the tank can also be jeopardized. Installation specifications should be designed so as not to put undue stress on structure members. The antennas, cables, conduits, and brackets should be installed so they do not contribute to the deterioration of the structure and so that the structure can be maintained in the future with minimal disruption to the communication system.

Water circulation: Short circuiting and stagnation of water within tanks has become a concern for tank owners in the last couple of years. Owners have installed baffle walls and intricate piping systems to force circulation and water turnover inside tanks. Baffle walls should be carefully designed to account for their effect on the tank structure. Additionally, these walls present challenges to the maintenance of the tank in the future.

Diving inspections: Owners across the country, especially in water-sensitive areas, have begun to rely on diving inspections to

evaluate the condition of their water storage tanks or to pinpoint leaks. Diving inspections limit the time the tank is out of service and do not require wasting water for tank draining. Care should be taken to assure the safety of the diver during diving inspections. The tank should be removed from service and valved-off. This will prevent a sudden surge in the system from drawing the diver into the piping. It will also prevent the contamination of the system in the event the diver introduces some contaminant into the water. Also, the diver should be completely disinfected prior to entering the potable water tank. The diver should be enclosed in a complete dry-suit with helmet to prevent contact with the potable water. Following the inspection, the tank should be disinfected prior to returning the tank to service.

There are a number of drawbacks to a diving inspection including the limited visibility of the diver. Prior to contracting for a diving inspection, tank owners should consider both "dry" and "wet" evaluations in order to utilize the procedure most suitable for each specific tank and set of circumstances.

Composite tanks: Over the last several years the composite-type construction of elevated tanks has become popular. This involves the construction of a concrete supporting tower and a steel container. The concrete pedestal of these tanks will require different maintenance than the steel container, thereby presenting new variations of maintenance requirements in order to realize the optimum life expectancy of each material and the tank as a whole.

A great many changes are taking place in the water storage tank construction and maintenance industry, and the future appears to hold even more advancements in technology and different challenges. Informed tank owners have the opportunity to take advantage of ever-changing construction and maintenance procedures to help maintain these valuable elements of the infrastructure for decades to come.

Steve Meier is Chair of the American Water Works Association Steel Tank Committee that oversees all steel water tank-related committees and task groups. He is a 22-year veteran of the storage tank industry.

Water Storage Tank Design, Construction, & Maintenance Seminars

Indianapolis, IN

***University Place Conference
Center & Hotel***

January 22 & 23, 2002

Phoenix, AZ

Hilton Phoenix Airport

February 19 & 20, 2002

Course Content

This two-day seminar, lead by the industry's foremost experts, will emphasize the creation and implementation of a comprehensive tank maintenance program. It will provide information about how to develop construction and maintenance programs, plan and budget for the anticipated work, implement inspection programs to gather needed information, and manage the decision-making process. Other topics covered will include special design considerations, the bidding process, contractor selection, quality control, inspection equipment, lead-paint abatement, and seismic, wind, and ice loadings.

At the seminar storage tank owners, operators, and engineers will have an opportunity to discuss common problems and concerns.

Seminar Site Information

The seminars will be held in **Indianapolis, Indiana** and **Phoenix, Arizona**. Sleeping rooms are the responsibility of the individual attendees. If you require overnight accommodations at the seminar site, lodging reservations can be made directly with the hotel.

Lunches and breaks will be furnished each day. These informal contact times will provide opportunities for personal discussion and networking with the seminar leaders and other participants.

University Place Conference Center

850 West Michigan Street
Indianapolis, IN 46202
317 / 274-3196

Hilton Phoenix Airport

2435 South 47th Street
Phoenix, AZ 85034
480 / 894-1600

Seminar Schedule

Day One

8:30 a.m. — Registration
9:00 a.m. to 4:30 p.m. — Seminar

- Tank Failure Modes
- Basics of Corrosion
- Preventing Corrosion in Storage Tanks
- Coatings and Cathodic Protection
- Specifying New Tanks

Day Two

8:30 a.m. – 4:30 p.m. — Seminar

- Developing a Tank Management Plan
- Environmental Considerations
- Developing Specifications
- Overseeing Painting and Maintenance
- Seismic Design Considerations (Phoenix)
- Tank Operation in Adverse Weather
- Tank Site Security

Who Should Attend

- Tank Owners and Operators • Consulting Engineers
- Regulatory Personnel • Plant Engineers
- Engineers and Inspection Personnel
- Government and Military Facility • Maintenance Managers

Registration Fee

The cost for the two-day seminar is **\$495**. This fee includes seminar materials and lunches and breaks both days.

Seminar Faculty

Steven P. Roetter, P.E., holds a BSCE from Rose-Hulman Institute of Technology and an MBA from Indiana University. He is a registered professional engineer and has been actively involved in chairing tutorials and presenting papers at SSPC Lead Paint Abatement Conferences and Annual Meetings, and many other industry organizations. He is a member of the Board of Governors of SSPC. Steve has authored a number of technical papers including a Manual for Steel Tank Inspection for the U.S. Navy, and a chapter on Rehabilitation and Maintenance of Steel Water Storage Tanks in ASCE's *Water Supply System Rehabilitation*. He is president of TIC and oversees all operations of the firm.

Stephen W. Meier, P.E., S.E., is Vice President Engineering & Technology at TIC. Steve is noted throughout the industry as one of the foremost structural engineers in the design, construction, and rehabilitation of concrete and steel structures, with specialized expertise in seismic design. He serves on numerous industry standards, regulatory, and design committees including NEHRP, API, ACI, and AWWA, where he is chair of the Steel Tank Committee.

Gregory R. "Chip" Stein, P.E., Vice President of Tank Industry Consultants. Chip supervises TIC's continual development and refinement of environmental and safety information, procedures, and training. Chip is actively involved in numerous industry activities and is sought after as a featured speaker at conferences and tutorials throughout the United States. The Indiana Society of Registered Professional Engineers honored him as the 1998 Young Engineer of the Year. Chip is on the Board of Directors of the Steel Plate Fabricators Association.

The seminar faculty may be assisted by members of TIC's staff of civil, structural, or mechanical engineers or NACE Certified Coating Inspectors and API 653 Inspectors.

Enrollment Policy

Enrollment is limited. This seminar is offered without discrimination on the basis of race, color, religion, sex, or national origin; however, we do reserve the right to decline the enrollment of representatives of specialized engineering and inspection firms that may be in direct competition with Tank Industry Consultants. Seminar facilities offer access for handicapped or disabled persons. Please notify the seminar coordinator in advance if these accommodations will be required.

Cancellation

Substitutions may be made up to and including the day of the seminar. Cancellations received more than 10 days prior to the seminar will receive a full refund, less a \$50 processing fee. Cancellations made in writing 10 days or less prior to the seminar will be allowed to transfer the registration fee to another seminar site.

Registration Form

Mail, fax,
or e-mail
registration
information to:

Tank Industry Consultants
7740 West New York Street * Indianapolis, IN 46214
FAX: 317 271/3300
or e-mail information to: seminars@TankIndustry.com

Name _____
 Title _____
 Organization _____
 Address _____
 City _____ State _____ Zip _____
 Phone _____ Fax _____
 e-mail _____

Seminar Site
 Indianapolis, IN
 Phoenix, AZ

Cost: \$495

Payment Options:

- Check made payable to **Tank Industry Consultants**
- **VISA** (card number) _____
- **MasterCard** (card number) _____

Expiration Date _____

Authorized Signature _____