



Published as an informational service to Owners and Engineers of Storage Tanks by TANK INDUSTRY CONSULTANTS
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Chairman's Corner

By: Crone Knoy

In 1994, TANK INDUSTRY CONSULTANTS celebrates its 15th Anniversary. Fifteen years!!! My how time flies! It seems like only yesterday that I was wondering what to do after spending 19 years in the steel tank design, construction, and maintenance business. About this same time, a number of self-improvement books hit the market. Many of them advocated the theory that we should plan on having three careers in our lives. I couldn't very well count less than a year in the motor truck engineering field as a career, nor could I count the year I spent as a part-time instructor in the Business School at Butler University. I was dabbling in real estate development and had my real estate broker's license. Did I really have two more careers to go?

Little did I know that I was destined to stay in the tank business, but in a different career mode. In the next three to four months some consulting work came my way. How could anyone support a family on this? How would we survive the winter? Should I become proficient in other fields to augment this fledgling tank consulting work? After nine months the calls kept coming in and it became obvious that there was a need for this type of specialized consulting service. My wife, Cindy, continued to help in the business. My oldest son was graduating from high school and was planning on studying engineering at college. He began assisting me. A year later I went from part-time technician assistants to a full-time employee, Joe Norvell, who to this day remains a valuable member of TIC's field services department. We added additional technicians, a secretary, and a full-time professional engineer. Our house was no longer big enough to handle this growing enterprise.

Ten years ago we took two big steps when we graduated from the office in our house to a storefront office on Main Street in Speedway, and shortly thereafter to new quarters in the United States Auto Club Building. Now we are in the throes of yet another milestone--finding more comfortable surroundings for our headquarter's operations. As we go to press, we are narrowing the alternatives down to a "short list" of potential offices.

Now back to my career. I cannot imagine doing anything other than what I am doing now! Not only is there a feeling of satisfaction in providing a service to an industry which is so vital to the basic needs of people, but my career as a consultant has given me a chance to grow as a person--and even better yet, to see the individuals who make up TIC grow personally and professionally. Instead of looking at this as being my second career (consulting instead of contracting) and looking towards the future for a third career, I view my professional life as one continuous career in the storage tank business. My career has constantly been refashioned to meet the changing needs of

society, and to make way for the professional growth of the individuals who make up TIC. I have responded personally by moving from *doing* to *managing* to *advising* to *teaching* to *mentoring*, and find that all of these aspects of my career continue in a cyclical fashion as TIC and its people grow and react to the changing needs of our clients.

TIC has responded to the need for independent opinions concerning the condition of existing tanks; monitoring the quality of workmanship being performed on tank rehabilitation projects; preparing specifications and contract documents for the rehabilitation and painting of existing tanks; evaluating the alternatives available for new tank construction; designing and specifying new tanks; monitoring the construction of new tanks; evaluating potential problems concerning lead and other hazardous materials on tanks and other existing structures; developing lead abatement, removal and disposal plans; and developing techniques to lower the operation and maintenance costs of storage tanks. As this edition of the Chairman's Corner is being written, new horizons are appearing in this industry. Is it boring having the same career for one's total existence? Not on your life!!!!

TIC Seminars -- Summer Series

TIC's two-day seminar, "Water Storage Tanks--Design, Construction and Maintenance" will be offered at three sites this summer. This is the 10th season for TIC to host this seminar which has been designed to familiarize attendees with the proper construction and maintenance of steel and concrete storage tanks and other structures. The basics of tank maintenance and construction will be discussed, as will the most current, up-to-date information on "hot topics" such as lead abatement, seismic design, and regulatory concerns. The seminars will be held on:

July 27 & 28 in Dallas, TX

August 2 & 3 in Charlotte, NC

August 10 & 11 in Ontario, CA

This winter, seminars are being planned in the Newark, NJ area; Orlando, FL; and Indianapolis, IN.

To receive a brochure outlining the specific details of the course content or for registration information, contact TIC's Seminar Coordinator, Linda Reed, at 1-800-TANKSEM (phone) or 317/486-4708 (FAX).

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Taking the Mystery out of CP

By: Bill Daugherty, P.E.

Cathodic protection for water tanks is all smoke and mirrors--right? Well...not exactly. A person must have a PhD in nuclear physics to understand cathodic protection--right? No...not necessarily. While most people may have no idea how flipping a switch on the wall causes the living room light to turn on, we don't let our lack of understanding of electrical circuits and power generation keep us from enjoying the benefits of our light switch. Instead of focusing on the "mystery" of how cathodic protection works, let's look at the benefits that can be derived from it.

Quite simply, in a water tank, cathodic protection protects bare steel below the water level from corrosion and metal loss. Cathodic protection does not protect the interior of the roof or the shell above the water level.

Why Use Cathodic Protection? - Unless your tank is located in a highly corrosive coastal or industrial environment, the interior of your tank is exposed to much more corrosive conditions than is the exterior. When coating failure occurs on the interior of your tank, the corrosion can quickly lead to measurable metal loss--or even a leak or structural failure if it is not attended to.

There are two ways to protect the interior of your tank from corrosion and metal loss--protective coatings and cathodic protection. Since it is not economically feasible to repaint the interior of your tank each time a coating failure occurs, cathodic protection in conjunction with a properly designed and applied coating system is usually the most cost effective way to protect the interior of your water storage tank.

Concerns for Above the Water Level - Many people discount the effectiveness of cathodic protection because they have experienced corrosion problems above the high water level, particularly on the underside of the roof. Properly engineered roof construction and rehabilitation can alleviate corrosion problems on this formerly difficult area to protect, making the use of cathodic protection on submerged surfaces a viable economic decision.

Maintaining a Cathodic Protection System - Without proper monitoring and maintenance, the cathodic protection system may operate at too high a voltage and cause the coating to blister, or the system may operate too low and not adequately protect the exposed steel. Strict adherence to the maintenance program outlined by your cathodic protection system manufacturer is a must. Cathodic protection, if properly designed, installed, and maintained, will help control active corrosion below the water level.

Maintenance Prioritization System

By: Michael T. Crist

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. An engineering team at TIC®, lead by Chip Stein, P.E., has developed a computerized method of comparing the relative overall condition of tanks which is being utilized by a number of TIC's multi-tank clients.

The data base upon which the rating and prioritization system operates is established from information gathered by in-

spectors who assign individual numerical ratings to various aspects of the structural, sanitary, safety, and corrosion adequacies of the tank. These numbers are then transferred to the spreadsheet data base. The rating and prioritization system program performs multiple logical and mathematical functions to determine the comparative rating of this tank to others within the same system. The spreadsheet can be 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 tanks within the system, the rating and prioritization system can be used to "flag" tanks which require immediate safety, sanitary, or structural attention. The rating system also provides estimated economic factors for each tank based on an anticipated scope of work. These estimates allow the owner to more confidently prepare a yearly maintenance schedule and establish budgeting requests years in advance. This forecast in turn provides information utilized in establishing water rates for the forecasted period.

For a demonstration of TIC's computerized maintenance prioritization system, contact Mike Crist at 410/880-4004, or Bill Daugherty at TIC Headquarters Office, 317/244-3221.

Industry Activities

The Steel Structures Painting Council (SSPC) is continuing their schedule of Lead Paint Removal and Abatement from Industrial Structures Conferences throughout the United States. At the March 1994 Conference which was held in Greenwich, Connecticut, John Poulmentis, the Regional Manager of TIC's office in Long Island, NY, presented a paper discussing how the issue of lead abatement has affected the maintenance prioritization of a large, multi-tank metropolitan utility, and Chip Stein presented his paper on "Community Acceptance of Lead Paint Removal Projects." Chip's paper was also featured in the May issue of JPCL, and another article written by Chip, "Lead Abatement Containment Systems for Elevated Steel Structures," appeared in a recent issue of Deleading.

Crone Knoy continues his service on the Board of Governors of SSPC, and as an instructor in their Coating Specifier and Manager Course. SSPC also offers lead-abatement tutorials, training sessions, and certification programs for contractors. Contact SSPC at 412/687-1113 for course and meeting schedules.

At SSPC '93 in New Orleans this past November, Steve Roetter received a plaque for his contribution as tutorials co-chair, and Crone Knoy was honored with an Editor's Award for his article, "Maintaining Aged Steel Water Tanks: What To Look For and Why" which was published in the May 1993 issue of JPCL. Chip Stein was session chair for the "Lead Paint Abatement and Removal" portion of the SSPC '93 program.

Looking ahead to 1994 and 1995, Chip Stein has been named General Session Co-Chair for SSPC '94 in Atlanta in November, and Steve Roetter will serve as Tutorials Chair. Chip will also serve as General Session Chair for SSPC '95 in Dallas. Steve Roetter will be presenting a paper on "Evaluation and Rehabilitation of Elevated Water Storage Tanks" at the AWWA Distribution System Symposium in Omaha in September.

Copies of articles and papers can be obtained by writing, calling, or faxing your request to TIC.

Professionally Speaking...

At TIC®, we are especially proud of our many staff members who actively seek a higher level of professionalism--not only in their work, but also in their education and training. In the past few months **Bill Daugherty**, **Todd Moore**, and **Jeff Marlett** have each achieved their Registered Professional Engineer designations--Bill and Todd in Indiana, and Jeff in Florida. In addition, **Steve Roetter** and **Chip Stein** have expanded the number of states in which they are registered. And last, but not least, **Crone Knoy** has successfully completed the rigorous P.E. examination process in California, and is now also licensed in New Brunswick, Canada and Washington, D.C. **Paul Troemner**, a recent addition to TIC, is a Registered P.E. in 5 states. Prior to joining TIC in 1993, Paul was a design engineer for a large tank fabricator where he was involved in the design of more than 140 tanks. Altogether, TIC engineers are registered in **35 states, Washington D.C., and one Canadian province.**

In addition to attaining his P.E. designation, **Todd Moore** has received his master's degree in Civil Engineering from Rose-Hulman Institute of Technology. **Mike Crist** will resume his master's degree studies this fall after a brief hiatus to oversee several tank projects on the East Coast. Mike has also completed courses in ultrasonic flaw detection in welds.

Another new face at TIC is **Ken Mangis**. Ken has a mechanical engineering degree from Rose-Hulman Institute of Technology and has been actively involved in engineering, inspection, and sales activities since joining TIC. Those of you on the East Coast can expect to see more of Ken as he begins helping service the expanding client base of our Laurel, MD office.

And since we're introducing new members of the TIC family, we would like to welcome **Bob Exley**. To many of you, Bob needs no introduction since he has been affiliated with the steel tank industry for more than 30 years and has served as the Chairman of the Safety and Health Committee of the Steel Plate Fabricators Association. Bob joined TIC to oversee the field services department when **Doc Reed** retired this past winter.

Tim Greene of TIC's Field Services Department and **Jeff Marlett**, TIC's regional manager based in Orlando, FL, have successfully completed the NACE Advanced Coatings Inspection program and are awaiting their Peer Review to complete the NACE Level III certification process. **Don Coffey**, a relative newcomer to TIC's Field Services Department, also has his Level III designation as do **Jeff Cannon** and **John Poulmentis**--a graduate of the New York Institute of Technology with a degree in mechanical engineering who is TIC's regional manager in Long Island, NY. The NACE Level III Certificated Coatings Inspector designation is one of the most respected in the industry. We applaud these individuals' hard work and desire to become more knowledgeable and "tops" in their field.

Thanks for Your Help....

Earlier this year, we sent out a Readership Survey to a random sampling of people on our mail list asking them their opinion of Tank Talk®. Not surprisingly, our readers continue to be most interested in topics that deal with water storage tanks, and the regulations and standards which affect the maintenance, construction, and operation of tanks.

In this and coming issues of Tank Talk you will probably see some minor changes in the newsletter. We hope to begin including photographs to "dress up" future issues of the newsletter and to help illustrate articles. We would also welcome suggestions from our readers for topics to be addressed in our new **Problem Solving Corner** where our "tank experts" respond to questions submitted by readers.

Please let us know what you think about the changes we are making, and if you have any comments or suggestions for articles, drop us a line...we'd like to hear from you.

Quieting the Quake

The day after the devastating Northridge earthquake rocked Southern California, TIC received a call from the California-American Water Company asking if we could come out to do some emergency evaluations to determine the extent of any structural damage which might have been incurred by tanks within their system. **Crone Knoy** was already in California speaking at a Steel Plate Fabricators Association seminar, so TIC engineer **Paul Troemner** and a member of TIC's Field Services Department packed their clothes and inspection gear and caught the next plane out. (They went from a frigid -27° in Indiana to a balmy 79° in Southern California in just a few short hours. But read on if you think this was any kind of vacation...) The next day they were joined by **Todd Moore** and **Mike Crist**, and in less than three days, the two 2-man crews, with Crone traveling between them, inspected 32 tanks. We are pleased to report that there was only minimal disturbance, with the worst damage found being a leaking welded repair seam on a bolted tank.

When Paul arrived at the first tank that they were scheduled to evaluate, a 100,000 gallon legged tank which had been built in 1928, they were "greeted" by a very concerned resident who was confident that the tank was going to collapse at any moment. Paul talked with the gentleman and attempted to assure him that based on his design experience, it did, in fact, appear that the tank had been upgraded to withstand seismic activity. Not very reassured, the resident challenged that no engineer would have enough confidence in the stability of the tank to spend a night in his house--right there, "under the tank."

You guessed it... At about 11:00 that same evening, Paul knocked on the concerned resident's front door and said that if the offer was still good, he was there to spend the night! No doubt that after the grueling day he had spent climbing and evaluating a number of tanks, the bed in Paul's motel room would have been a great deal more comfortable than this man's couch. But nevertheless, Paul demonstrated his confidence in the safety of not only this man and his family, but of the entire neighborhood, by spending the night sleeping "under the tank."

We'd like to report that Paul's actions totally calmed the resident and reassured him of the safety of the tank, but according to a thank you letter Paul received from a representative of the California-American Water Company, the resident was genuinely appreciative of his action, but remains "passionate" that the tank must be removed immediately.

Some people have called Paul's actions and dedication "above and beyond the call of duty." To us, it was not a surprise. That's just the way Paul is!

Penny wise...Pound foolish

When asked when their water tank was last inspected, many owners will stammer and stutter...and finally admit that they don't know. Or, they may tell you that one of their operations people climbed the tank about a year ago and looked in the man-hole, and thought it looked pretty good inside.

The American Water Works Association Standard D101 recommends that "water tanks should be thoroughly inspected at intervals of not more than five years" by an engineering organization specializing in the inspection of steel structures. Some State Departments of Health require safety, sanitary, and operational inspections even more frequently. But there are any number of reasons why tank owners put off having their tanks inspected...the cost, the inconvenience of having the tank out of service for inspection, the belief that "if it's not broke, don't fix it," the fear of how extensive the repairs required might be, or lack of understanding of the true importance of these inspections.

Some 15 years ago, Crone Knoy coined the phrase "Prebid Inspection." At TIC[®], we still use the term, but now call them "Prebid Evaluations." The basic principal is still the same--a thorough evaluation to determine the condition of the tank prior to preparing specifications for repainting and repairs. But in some ways, the label "Prebid Evaluation" may be misleading. In a large majority of cases, TIC's Prebid Evaluations result in recommendations that no work is required at this time, or minimal "housekeeping" modifications that can be performed by the owner's own personnel be made. In these cases, the bidding process and subsequent repainting and rehabilitation are delayed for a predicted period of time, or the recommendation is made to re-evaluate the tank in "X" number of years to more accurately determine when repairs or repainting will be needed. Once a thorough baseline evaluation is performed, future update evaluations are less time consuming, and therefore less expensive.

What a Prebid Evaluation does offer the tank owner is a thorough evaluation and report that can be used as a decision-making document in **planning and budgeting** funds for future maintenance. A water tank is an expensive, vital part of your water system. "Preventive maintenance" is the key to realizing the full service life of this valuable structure. But in order to be able to properly maintain your tank, you must have an accurate knowledge of the condition of the tank, and an expert prognosis of its future maintenance requirements.

Timing is important. Now that we have warmer weather in most parts of the country, it's a good time to take your tank out of service before the high-water-usage summer months. At TIC, we will help you schedule your out-of-service time so that the field evaluation of your tank will cause the least disruption possible, and the tank can be returned to service as quickly as possible. The data collected in the field will then be analyzed and organized into a certified engineering report that can be used in your decision-making process--regardless of your previous understanding of the condition of your tank, or your familiarity with engineering and tank-related terminology. The detailed observations contained in the evaluation report can also be used as a basis for preparing specifications for repainting and rehabilitation--whether required now or in the future.

Or, you could take a "wait and see" attitude. You can "wait" and "see" when your tank develops a leak from unchecked corrosion--or even more serious damage occurs--and then take it

out of service and contract for emergency repairs. But we can just about guarantee that those emergency repairs won't be required when it's convenient to have the tank out of service...and they will be more expensive.

AWWA Happenings

Several tank-related standards are in various stages of completion at the American Water Works Association. **Crone Knoy**, who serves on the AWWA Standards Committee for Steel Elevated Tanks, Standpipes and Reservoirs, the D100 and D102 Revision Task Forces, and chairs the Tank Manual Task Force, provides the following update on the Standards:

D100 - It appears likely that the revised D100 Standard which was been balloted by the Standards Committee will be published yet this year. The Standard must now be submitted for approval to the Standards Council and the AWWA Board of Directors.

D102 - Several points within the revised D102 Standard are yet to be resolved by the Standards Committee and the Task Force before the Standard can be submitted to the Standards Council and the Board of Directors. It now appears that the earliest that the D102 Standard could be reinstated would be sometime in 1995.

Tank Manual - Because the Tank Manual is not a "Standard," it does not have to be approved by the AWWA Board of Directors. The Task Force members' comments have been incorporated into a draft of the Manual which was sent to AWWA last fall. The Manual must still be submitted to the Standards Committee and the Standards Council for balloting. It is hoped that the Tank Manual could complete the approval process and be published in the fall or winter of 1995.

For those of you who do not regularly read the AWWA publications Journal and Opflow, we would like to point out a couple of tank-related articles which have been published recently which may be of interest to you.

"**Investigation of the Regent Street Water Tower Collapse**" in the May 1993 edition of AWWA Journal deals with the investigation into the collapse of a concrete and steel composite tank in New Brunswick, Canada in December of 1990. The article is of particular interest to the tank industry in as much as it was published at all. Within the cloistered environment of the US legal system, information on the causes of failure of any structure is usually privileged, and, for the most part, is not available to the industry to review and learn from. In Canada, however, the information is available to the public, and theories about the causes of this tank failure are outlined in this article.

The Effects of Tank Design and Operation on Water Quality are discussed in several articles in the July 1993 edition of AWWA Journal and the December 1993 Opflow. Increased emphasis is being placed on the sizing and piping of tanks to assure the proper balance of water turnover and detention time for improved water quality. The engineering staff at TIC is evaluating the trends and requirements in this area of tank design, and will be sharing information gathered in future issues of Tank Talk[®].

**Remember: AWWA Distribution Symposium
Omaha, Nebraska - September 11-14, 1994**