

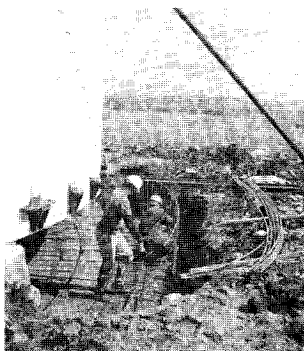
TankTalk

Upgrade of the San Diego, CA "Montgomery Tank"

by: Paul A. Troemner, P.E., Project Engineer, TIC

The California-American Water Company owns a 1,200,000 gallon steel ground storage tank, known as the "Montgomery Tank," located near San Diego, California. The tank was erected in 1960 and was approximately 60 ft in diameter and 56 ft tall. Through a detailed evaluation which included the ultrasonic testing of the tank's plate thickness and weld quality as well as a detailed seismic analysis, it was determined that this tank did not meet present seismic design requirements. In addition to the Montgomery Tank not meeting present structural standards, the tank also had AWWA, safety, and sanitary deficiencies. Lead-paint on the tank exterior and a coal-tar interior coating posed additional project challenges.

Design: TIC broke the design phase of the project into three areas: structural upgrades; operational safety, and sanitary upgrades; and the interior/exterior coating and lead-paint abatement.



Placing rebar during foundation replacement

The structural design required a new anchorage system for the tank as well as roof support structure upgrades. Inlet-outlet piping modifications and overflow pipe modifications were also required to allow the tank to operate properly during and after seismic activity.

The operational-safety-sanitary upgrades included modifications to the tank venting system, ladder, handrails, man-holes, and piping. These upgrades were designed to bring the tank into compliance with present standards. Piping modifications, and the removal and legal disposal of the existing concrete ringwall foundation were included in the seismic upgrades specified. The 1,200,000 gallon ground storage tank was braced in place while the foundation was removed and replaced in alternating 16 ft long sections.

The coating design required the safe removal, handling, and disposal of the lead-containing coatings. In addition, long-life interior and exterior coatings were specified to minimize future maintenance.

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Coming Soon... Tank Talk® on the World Wide Web

Tank Talk, and other tank-related articles, papers, and information from TANK INDUSTRY CONSULTANTS will soon be available on the Internet. Our home page is still "under construction," but grab your hard hat and visit us at

www.tankindustry.com

Comments, criticism, and suggestions for future Tank Talk articles and things you'd like to see on our web site are always welcome. E-mail us on the Internet at

info@tankindustry.com

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talk to the tank experts at
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Chairman's Corner

By E. Crone Knoy, P.E., CEO, TANK INDUSTRY CONSULTANTS

In TANK TALK 25 I discussed values as they relate to personal and business life. Steve Roetter, our president, was prompted by an article in the September-October 1996 *Harvard Business Review* called "Building Your Company's Vision" to have a group of us sit down and put TIC's core values and core purpose down on paper. The process only took about a half day. Perhaps that is because we had been walking the talk before we actually knew what the talk was. The group charged with this task consisted of Steve, Bill Daugherty, Chip Stein, Jeff Marlett, and me. The following were listed as the components of the TIC's Core Ideology:

Core Values

- Honesty and Integrity in Engineering Ethics
- Service Exceeding Customers' Expectations
- Excellence in Reputation
- Treat all People with Fairness and Respect
- Provide Opportunity for Personal Growth and Fulfillment

Core Purpose

To contribute positively to the health, safety, and economic welfare of society.

In other words, the values and purpose are the true bench mark by which we measure ourselves. The term "bench marking" is a recent buzz word in organizational management. As you might suspect, I am about to ridicule this latest buzz word. (Come to think of it, maybe a buzz word is like a buzz saw, it cuts apart what has always been and creates sawdust from which to form a "new material" that is the same old stuff, thereby selling more books which causes more trees to be cut down.)

Bench marking in today's management fad world apparently means measuring performance against goals which

have been set. Let's look at the definition of a bench mark. According to a surveying text (*Surveying Fundamentals*, Jack C. McCormack, Prentice-Hall, 1983) a bench mark is a "relatively permanent point of known elevation." To extract further from this text, "Parts of structures which must resist significant lateral forces such as retaining walls make very poor bench marks. ... Especially careful records should be made of bench marks because they may frequently be reused during the life of the job or for future work in the vicinity. They should be so completely and carefully described in the notes that another surveyor unfamiliar with the area can find them and use them, perhaps years later."

It appears to me that Core Values are the bench marks by which an organization exists. What today's management gurus call bench marks are at best TBMs (Temporary Bench Marks), as our goals must constantly be adjusted to meet the ever-changing needs of customers.

Who knows, maybe I'll write a book debunking all of these fads and create some *new* buzz words. Hopefully, it will be printed on recycled paper.



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TIC Seminars

Again this year, TIC will be offering a series of Water Storage Tank Seminars. This year's seminar series will include *one-day* seminars in Memphis, Dallas, Indianapolis, the Philadelphia area, and Raleigh, North Carolina. These seminars will address the maintenance and construction of steel storage facilities. Special emphasis on the seismic concerns will be featured in Memphis. In addition, the Indianapolis seminar will be preceded by a special one-day session on the "Basics of Corrosion & Coatings."

Memphis, TN	January 26
Dallas, TX	January 28
Indianapolis, IN	February 5 & 6
Mt. Laurel, NJ	February 25
Raleigh, NC	February 27

The cost for any of the one-day seminars is \$195, and if attendees choose to attend both days of the Indianapolis seminar, the two-day registration fee is \$375. Lunches and breaks are included in the seminar fee.

For more information or to register for any of the seminars, please contact Linda Withner, TIC's Seminar Coordinator, at

1-800-TANK SEM

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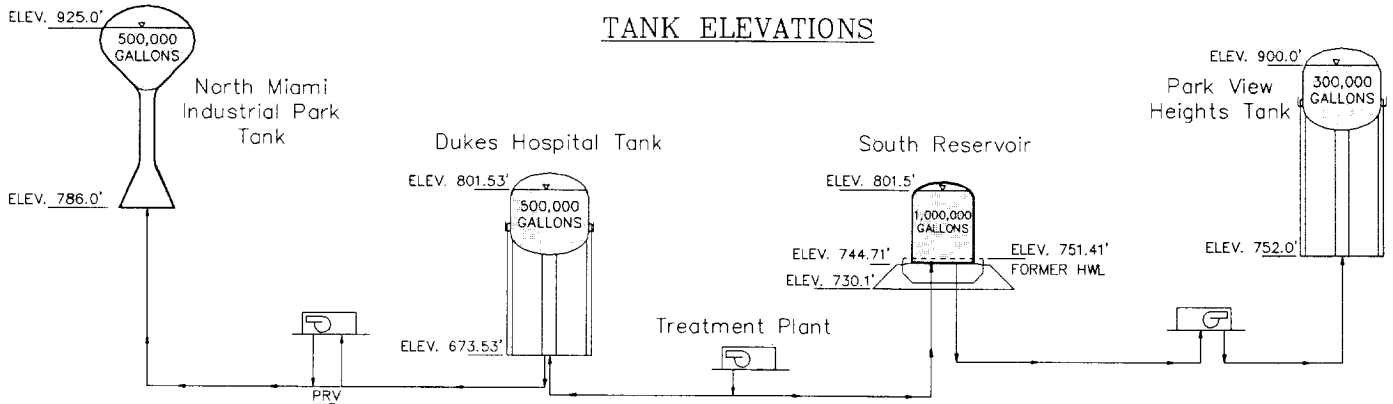
Announcing TIC's New West Coast Office
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Woody Warren has been named Project Coordinator for TIC's new West Coast Office. Prior to opening TIC's new office, Woody was Project Coordinator for client activities at TIC's East Coast Office. He has many years experience evaluating steel and concrete structures, both above ground and underwater.

California was chosen as the site for TIC's new office in order to better service California clients and more quickly respond the specialized needs of California tank owners and engineers due to the seismic activity in that area. To learn more about the specialized seismic upgrade services offered by TIC, see the cover article on this issue of Tank Talk.

Multiple Pressure Zones Present Unique Problems and Opportunities

By Todd D. Moore, P.E., Chief Engineer



Peru (IN) Utilities solved several growth-related problems with the addition of a high-pressure zone and the augmentation of another. The operation of these higher pressure zones included better utilization of system dynamics by recognizing the operating needs of the areas served including water turnover and retaining the kinetic energy of pumping. Utilizing ground storage at a higher elevation than that previously engineered into the system resulted in energy savings in booster pump operation and increased emergency storage for the commercial area.

Description of System: When TIC first started working for the City of Peru Utilities, the system consisted of two pressure zones—the primary zone serving downtown Peru and the relatively flat river basin making up the original city (static pressure gradient at 801.5 ft MSL), and the southern high-pressure zone serving the land on a plateau across the Wabash river from the main part of the City (pressure gradient of 900.0 ft MSL). Two elevated tanks served the City: one 500,000 elevated tank (the Dukes Hospital Tank) which served the main pressure zone, and the 300,000 gallon Park View Heights Tank which served the southern zone. Additionally, there was a 2,000,000 concrete underground reservoir, a 300,000 gallon clearwell, and two concrete settling basins at the City's water treatment plant.

In 1992, the Peru Utilities was given the challenge of furnishing water to a new industrial park being constructed by the Mi-

ami County Board of Commissioners north of the City. This site had a ground elevation of about 110 feet higher than the average elevation of the main part of the City. It was determined that the static pressure gradient of this pressure zone should be 925.0 ft MSL. Like most new industrial parks, a large quantity of overhead storage was required for fire protection (500,000 gallons), but there was little daily consumption. However, it was necessary to ensure the turnover of water in the Industrial Park Tank in order to maintain water quality (especially in the summer), and to prevent freezing of the water in the tank during winter months. The elevation of water in the tank (and consequently the turnover of water in the tank) would need to be controlled by operating a booster station between the tank and the main pressure zone (and water source). The booster station would raise the water level to the tank's top capacity level and a bypass would allow a prescribed amount of water to return to the main pressure zone through a pressure reducing valve if sufficient water had not been drawn from the Industrial Park Tank for consumption in the industrial park pressure zone.

In 1987 and again in 1993, TIC evaluated the City's 2,000,000 gallon underground concrete reservoir situated in the southern high pressure zone. Water entered this reservoir through piping and a throttling valve connected to the main pressure zone. Since the high operating level of the underground reservoir was ap-

proximately 50 ft lower than the static and dynamic gradient of the water source (the main pressure zone), the amount of energy used to transfer water to this reservoir was greater than actually should have been required. Since the water level in this reservoir was also approximately 150 feet lower than the static gradient of the southern high pressure zone, a booster pumping station located adjacent to the southern high-pressure zone fed the water to this pressure zone and the 300,000 gallon Park View Heights Tank serving this zone. The 1993 evaluation revealed that the reservoir had been repaired previously and equipped with a rubberized liner, but was still leaking. In addition, the reservoir was only being used at half capacity in order to assure adequate water turnover and retention for water quality. Due to the extensive costs associated with the numerous repairs required, it was determined that a new reservoir would be required at this site.

It was at this time that TIC engineers made the suggestion that instead of merely replacing the reservoir with another, the installation of a standpipe at the site with a top capacity level elevation equal to the static gradient of the main system should be considered. The standpipe would offer three operational advantages

- The energy required to deliver water to the reservoir site would not be wasted, but preserved in the standpipe.

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Upgrade of San Diego, CA Tank

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Construction: The project began with the safety, sanitary, and operations repairs, along with the seismic upgrades. The tank foundation was removed in large sections so the new foundation and anchor bolts could be installed. Special design consideration had to be given for the "cold" joints in the new foundation. Meanwhile, the interior coal-tar coating was being removed. The coal-tar coating's thickness, relative softness, and adhesion caused its removal to be difficult and time consuming.

Project specifications required that all coating removal and disposal be performed in accordance with the California Air Resources Board (CARB) and the San Diego Air Pollution Control District (SDAPCD). Rather than utilizing conventional containment methods on this tank, the contractor utilized a self-contained blast and recovery unit for the shell, and for the roof they used a floor model centrifugal blast machine. The self-contained blasting units worked well on flat, smooth surfaces. However, for areas around the ladder, handrails, and tank openings, mini-containment was utilized to contain blast debris in these areas. Use of these devices minimizes the amount of waste which must be disposed of. The entire tank exterior was coated using brush and roller techniques since there was no containment system to control overspray. Because of the project's proximity to a school yard, air monitors were installed to help assure that the health of the school children and neighboring property owners would not be adversely affected by the project. In addition, City of San Diego Structural Inspectors regularly visited the site to verify the structural integrity of the work being performed.

Results: In addition to performing the initial evaluation and designing and specifying this project, TANK INDUSTRY CONSULTANTS provided on-site observation of the work performed. This project utilized some unique construction methods that allowed the project to be completed without complaints, with a minimization of waste to be disposed of, and without the utilization of traditional methods of containment.

Paul Troemner was project engineer on the San Diego Montgomery Tank project. Paul has been with TIC since 1993. Prior to that he was a design engineer for Pitt-Des Moines, Inc. in Des Moines, Iowa for nearly 9 years. He has a bachelors in Civil Engineering from Brigham Young University, and is a registered engineer in six states, including California.

Jeff Cannon, a NACE Level III Certified Coatings Inspector, was TIC on-site representative for the Montgomery Tank project. For more than eleven years, Jeff has performed evaluations for TIC on all types of steel and concrete structures, and has been responsible for on-site evaluation on many innovative projects throughout the United States.

Multiple Pressure Zones

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- The water in the standpipe, being at the same level as the water in the main system, could "feed back" into the main system should there be extreme demands such as in case of a fire in the main (downtown) area.
- The inlet pressure at the booster station would be increased by 50 feet (21.7 psi), thus reducing the amount of energy necessary to provide water to the southern high pressure zone, and to fill the elevated tank serving that zone.

The Peru Utilities agreed with this proposal, and the old underground reservoir was demolished and the site filled in, and a new 1,000,000 gallon standpipe was erected on the site. This tank has been in operation since 1994 and has operated as anticipated.

Future Need: To accommodate the continued commercial growth in the higher area to the south of the present southern high pressure zone, Peru Utilities

is currently working with TIC Project Engineers on the design and plans for an additional booster station and a new elevated tank (anticipated to be 500,000 gallons).

A Long-Term Relationship Provides Consistency: In addition to being the consulting engineers on the new 500,000 gallon North Miami Industrial Park Tank, the new 1,000,000 gallon standpipe at the site of the old underground reservoir, and the new 300,000 gallon spheroid currently being designed; since 1986 TIC has also been the engineer on the rehabilitation of City's 300,000 gallon Park View Heights Tank, the 500,000 gallon Dukes Hospital Tank, a 120 ft x 57 ft concrete settling basin (including the addition of a roof), and 3 steel anaerobic digester covers.

The Project Engineer for the Peru projects has been Todd D. Moore, P.E. Todd has been with TIC for over 10 years and is a registered professional engineer in six states. He has a Bachelor's Degree in Civil Engineering from the University of Notre Dame, and a Masters of Science in Civil Engineering from Rose-Hulman Institute of Technology.



New 1,000,000 gallon tank
Peru Utilities

Tank Talk® is published as an informational service to Owners and Engineers of storage tanks by

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