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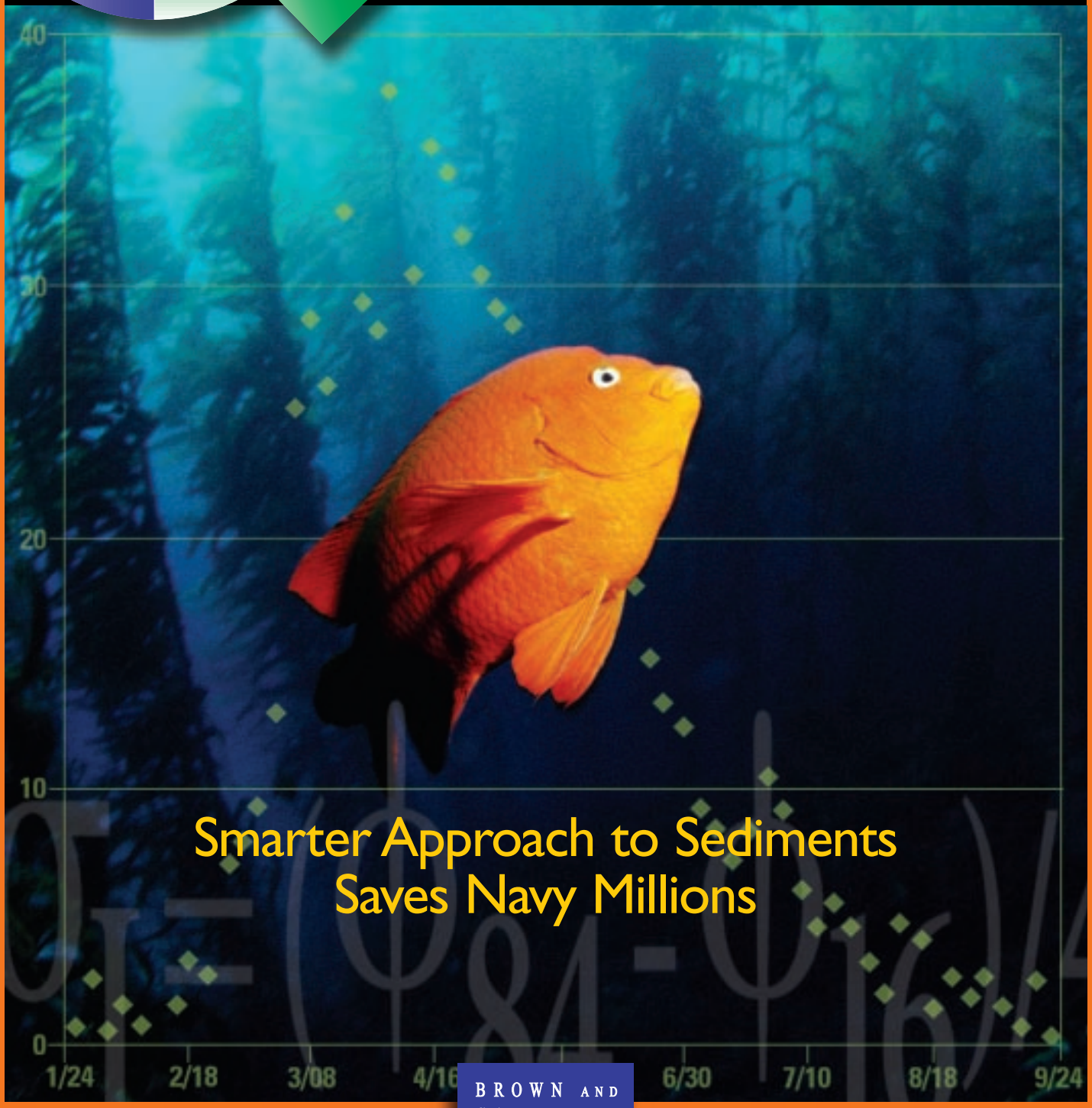
QUARTERLY



Smarter Approach to Sediments Saves Navy Millions

BROWN AND CALDWELL

QUARTERLY

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Investing in Community Outreach

By Terry Cole
Communications Manager, Atlanta

Informed, targeted programs can build public support and minimize project delays

The public can have a powerful impact on our industry. Water, wastewater, and hazardous waste cleanups are quality-of-life issues that strike emotional chords: *Is my family's health protected? Will my property values be affected? Will my local environment suffer?* Triggering these core emotions can result not only in angry confrontations but also project delays, costly analysis and even project abandonment after considerable investment of resources.

It is a daunting challenge for our industry to keep pace with growing infrastructure needs while engaging the public in partnerships that result in community acceptance. Community outreach can seem especially burdensome when added to a task list that already includes regulatory compliance, project management, long-range planning, employee relations and fiscal stewardship.

Public involvement

Still, while there are no guarantees that outreach efforts will be successful, community outreach is a reality in our industry today. Regulations frequently require public involvement, and mountains of evidence show that ignoring public input, upfront, can be disastrous.

To manage these efforts, many industry professionals turn to public relations agencies for help. The fact is, however, that few of these agencies "outside the industry" can appreciate the nuances unique to environmental projects. Flashy brochures and refrigerator magnets may establish identity, but they rarely meet the public's desire for information or help achieve community consensus. Having a public relations firm on the payroll may be difficult for utility officials to justify. Moreoever, the learning curve for these firms can be a problem—it can be costly and time-consuming to explain pump station upgrades to PR specialists who just yesterday were developing geranium giveaways for Home Depot.

Brown and Caldwell has tracked this trend toward more public involvement in environmental projects and considered the new challenges facing our clients. Over the last several years, we have added a core team of communication experts to our staff and achieved real results for a broad range of projects. We know that the key to unlocking successful public interaction is strategy: a well-conceived approach is the critical difference between a scattered, costly program and a targeted, cost-effective effort. Our communications experts sit alongside engineering staff from day one to ensure a proactive program that anticipates challenges and identifies and achieves solutions.

Successful outreach

There are a number of factors that are critical to any successful community outreach:

- **Providing information should be the primary goal.** With information, community members can develop informed opinions and make educated decisions. Without it, they are forced to rely on third-hand rumors spreading like wildfire across the neighborhood. Informed communities are our greatest allies in the struggle against public opposition to environmental projects.

Mountains of evidence show that ignoring public input, upfront, can be disastrous.

- **To manage the process, develop a plan.** Just as most utilities and companies develop a plan to guide their operations, an effective community outreach program should follow a strategic plan. Staff and communication experts should work together to define messages and determine how they should be targeted and conveyed. Budget limitations should be considered, as well as "hot button" issues that could derail the process.

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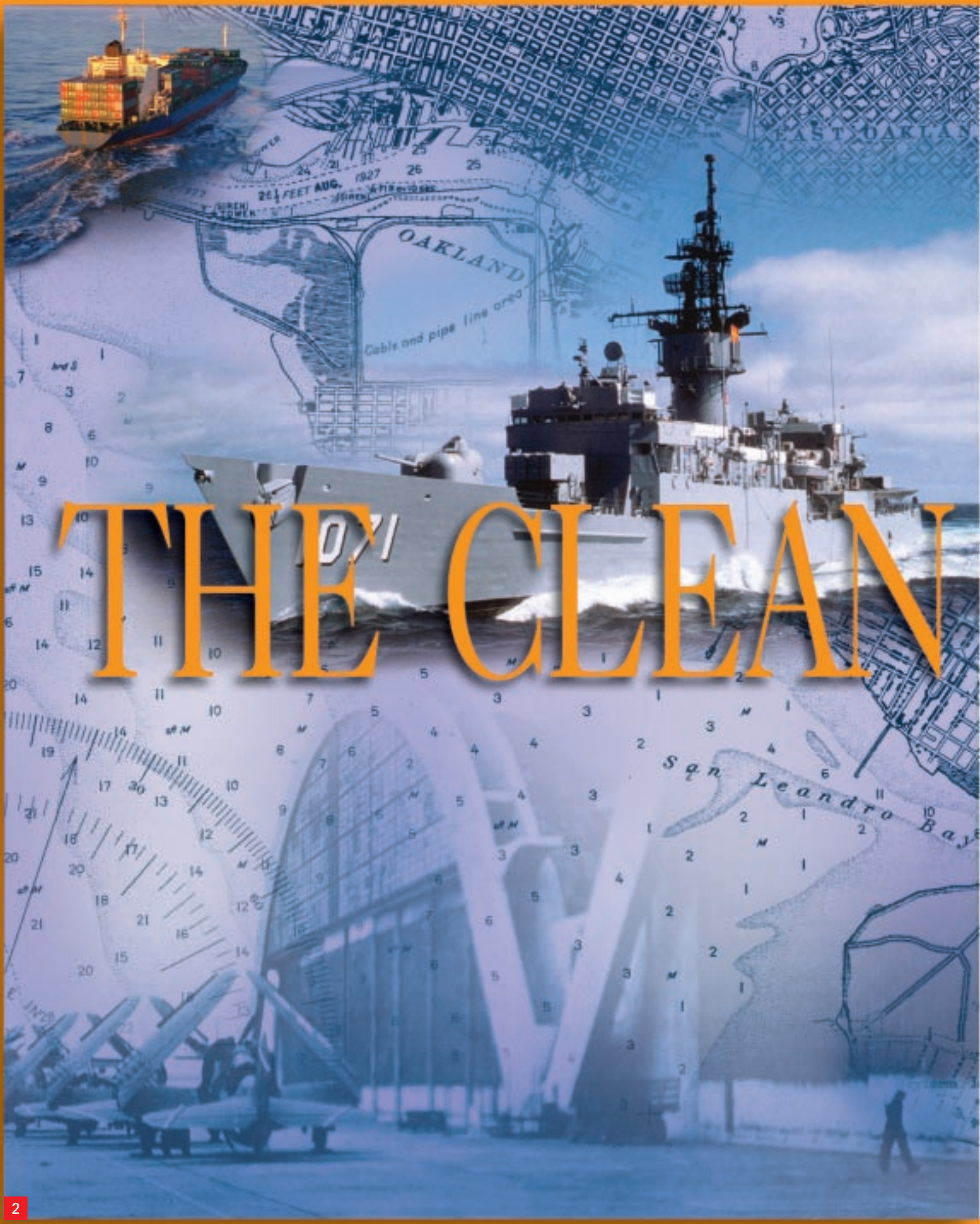
THE CLEAN
OAKLAND
San Leandro Bay

The Department of the Navy relies on technical and community relations experts for its wide-ranging CLEAN (Comprehensive Long-Term Environmental Action Navy) challenges

When the U.S. Navy launched an environmental study of its Long Beach Naval Complex in California—a 700-acre site included in Congress's Base Realignment and Closure (BRAC) program—many assumed that the study would reveal the harbor to be the most extensively contaminated of any on the West Coast.

After a six-year assessment, however, it turns out that only 60 acres of the 200-acre harbor will actually require cleanup. An innovative remedial investigation and feasibility study—conducted by Brown and Caldwell under the CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) process—determined that the rest of the harbor area presents no ecological risk, a finding that will save the Navy millions in cleanup costs.

The assessment for the Long Beach Naval Complex is just a small part of Brown and Caldwell's work for the Navy's Comprehensive Long-Term Environmental Action Navy (CLEAN) II and 3 programs. CLEAN, notes Brown and Caldwell Project Manager Vijay Bedi, is the "military version of Superfund"—an all-encompassing program to support the Navy in its hazardous waste cleanup investigation programs.

Technical and regulatory expertise

As a team subcontractor to Bechtel National, Inc., for the past eight years, Brown and Caldwell (BC) has provided technical assistance to the Southwest Division, Naval Facilities Engineering, at both active and closing Navy and Marine Corps bases in California, Arizona, New Mexico, Nevada, Washington, Oregon and Alaska. The scope of work includes numerous facilities, each with its unique requirements and dealings with varied regulatory environments, agencies and regulations.

Along with BRAC and the Navy's Installation Restoration Program (IRP), CLEAN is designed to address uncontrolled hazardous substance, pollutant and contaminant sites at closing and active bases and facilities, with the ultimate goal of site cleanup. The Navy CLEAN programs include RCRA, underground storage tanks, asbestos, spill prevention control and countermeasure plans, hazardous waste plans, PCB, UXO, air, water, hazardous materials, hazardous waste, solid waste and petroleum, oils and lubricants.

"Brown and Caldwell has been involved in various types of projects in both lead and support roles," Bedi says. To date, the team has participated in more than 200 contract task orders "with a great many successes," he adds, "including more than $3.6 million in cost savings and schedule reductions. We've gained significant expertise that we can offer other clients—from experience dealing simultaneously with the full range of federal, state, and local regulatory agencies to the use of innovative methods and technologies."

Assessing marine sediments

At the Long Beach Naval Complex harbor, for example—a site used by the Navy for 50 years—Brown and Caldwell conducted an ecological risk assessment of marine sediments and developed sediment management objectives as well as workplans for remedial investigation, sediment sampling, chemical analysis and biological assessments.

Using a unique methodology the team developed, called effects-based sediment assessment, Brown and

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The team has participated in more than 200 contract task orders, resulting in more than $3.6 million in cost savings and schedule reductions.

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Caldwell analyzed the chemistry, toxicity and biology of the Long Beach naval harbor. The study focused on the site's benthic community, small organisms that live in the top 1 to 2 cms of sediment. The multipart analysis, explains BC's Omer Kadaster, is more accurate than typical sediment assessments that exclusively measure chemistry. "Our methodology," he says, "does not focus on arbitrary chemical levels, but instead looks at whether or not those chemicals are actually affecting organisms in the harbor." The meticulous effects-based process is now being used by the Port of Long Beach as well as the Port of Los Angeles.

The task of investigating and remediating Navy CLEAN sites can be unusually complex, Bedi observes. "We're dealing with bases that have a wide variety of contaminants, some dating back to the era of World War II. Because uses of many buildings and bases have changed several times over the decades, we have to go back through records and old base drawings as part of our site inspection and preliminary assessment work."

"Our work is to get the property ready for community reuse while protecting human health and the environment."

Those steps are followed, in the CERCLA process, by environmental assessment and environmental impact statements, environmental baseline surveys, remedial investigations, feasibility studies, risk assessments and remedial design. In the case of military bases that are closing, remediation and site cleanup must reach levels compatible with future uses of the property, ranging from parks and residences to airports and light industry. "Our work," Bedi explains, "is to get the property ready for community reuse while protecting human health and the environment."

Cost and time savings

At the Marine Corps Air Station in El Toro, Calif.—a facility that was closed in 1999—the Navy wanted to complete the environmental assessment and remediation on a fast-track schedule in order to release the property as quickly as possible to the community.

In response, a team led by Brown and Caldwell's John Scholfield developed an innovative approach to expedite investigation and cleanup. Called statistically based sampling, the process analyzes random soil samplings to determine the level of human health risk at assessment sites.

"The new methodology," Scholfield explains, "enables us to calculate risk using a reduced number of samples, achieving

"Getting the public involved—early and often—is essential."

significant cost and schedule savings as a result." The process saved the Navy approximately $680,000, and the investigation and remediation process was completed only 26 months after the start of work—more than a year ahead of schedule.

Community involvement

Community relations is also a key aspect of the military environmental assessment and cleanup work, adds Brown and Caldwell's Betty Schmucker. She and BC's Robert Coleman use a variety of communication tools and media to build a rapport with communities, respecting and listening to their input and concerns and keeping affected parties up-to-date on project details.

"Communities nationwide," Schmucker explains, "naturally become concerned when major construction or remediation projects—hazardous waste cleanups, source water assessments and military base closures—land in their town. The public, stakeholders and elected officials all want to be involved in planning and to know what they can expect, including how long the project will last and exactly what work is being performed. They also want to be assured throughout the project that the work is progressing smoothly and safely."

Community relations, in fact, are a requirement of the Department of Defense. Its Installation Restoration Program (IRP) directs the military to keep citizens informed of project progress and to seek citizen input on environmental investigations as well as proposed cleanup alternatives.

Since 1994, community relations services have been a key element of Brown and Caldwell's support of the Navy CLEAN work at at least 14 closing and active Navy and Marine Corps bases in California and Arizona. "The primary goal of community relations," Coleman explains, "is to involve citizens as participants in the decision-making process on the environmental cleanup of these bases. The key is providing opportunities for productive two-way communication between lead and support agency representatives and citizens of communities affected by the base cleanups."

Successful community relations, he adds, depends on research, planning, implementation and evaluation. In the case of Navy CLEAN, essential steps include establishing and supporting community-based Restoration Advisory Boards (RABs); developing and disseminating fact sheets and proposed plans; coordinating all aspects of public meetings and open houses and establishing and maintaining information repositories where community members can access project documents, reports and other data.

Productive dialogue

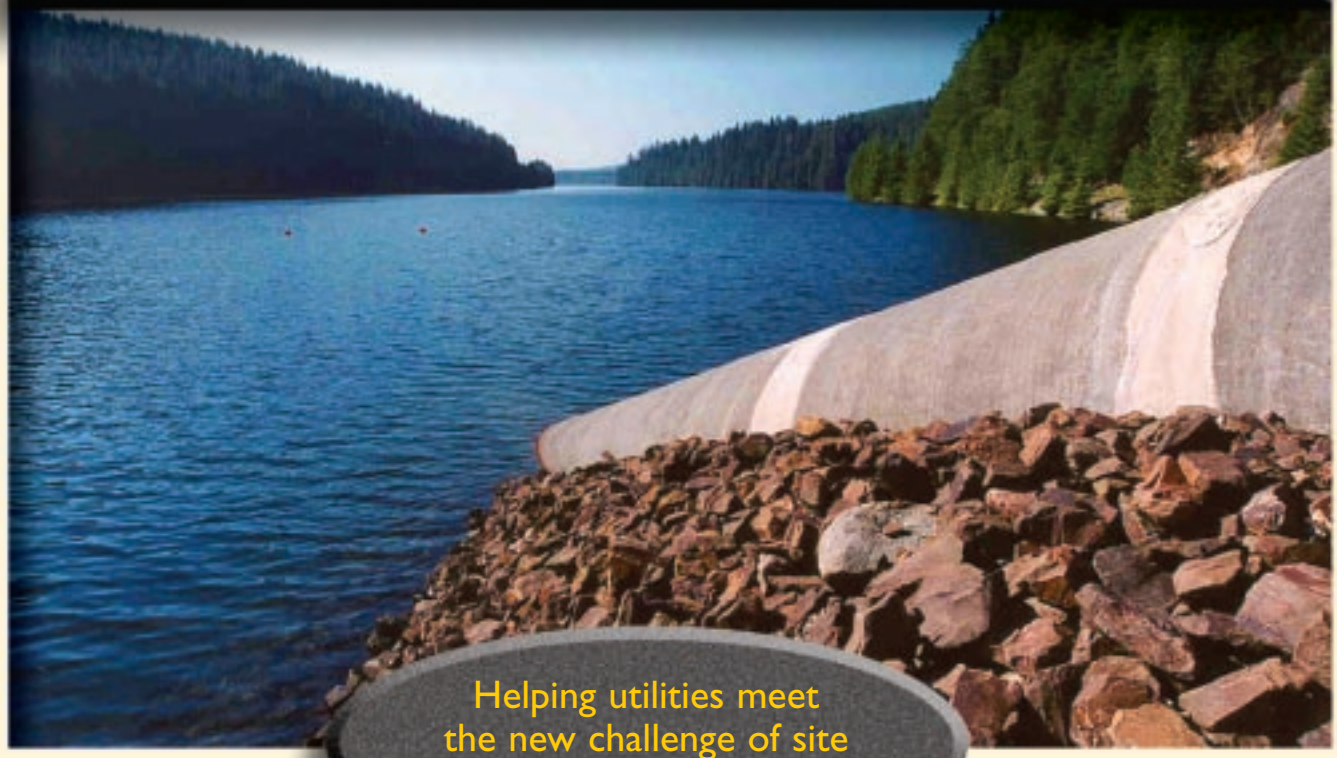
"The Navy listens to what the public has to say," Schmucker says, "and we use a variety of media tools to facilitate open, meaningful and productive dialogue among the military, regulatory agencies and affected communities." RABs, in particular, she notes, give communities a chance to speak directly to the Navy and regulators in a two-way communication format.

"The bottom line is that the community has the power to stop a project," Coleman adds. "The important lesson for any project of this kind is that getting the public involved—early and often—is essential."

For more information on Navy CLEAN projects, contact Vijay Bedi at (858) 571-6714 or vbedi@brwncald.com.

Southern California's Long Beach Naval Complex (indicated by dotted lines) is one of many Navy and Marine Corps bases that BC has helped assess as part of the Navy CLEAN program.

ON HIGH ALERT



Helping utilities meet the new challenge of site and system security

For every public water system in the United States, the terrorist attacks of September 11, 2001, brought new awareness of potential threats and vulnerabilities. While there is no record that any utility has yet experienced an attack, it has become clear that drinking water systems — especially treatment, distribution and storage facilities — may present targets of opportunities for acts of terrorism, sabotage or vandalism, including physical destruction and intentional contamination.

To respond effectively to these new challenges, the City of Atlanta Department of Water rapidly commissioned and completed a vulnerability needs assessment to identify and correct critical security gaps. Performed by Brown and Caldwell in partnership with Versar, Inc.— a firm specializing in homeland security — the analysis revealed the strengths and weaknesses of more than a dozen of the utility's water system facilities and recommended a range of measures to lower risk exposure.

"Many of the security improvements we proposed were no- or low-cost solutions," says Brown and Caldwell's John McLaughlin, who participated in the assessment. "By focusing on low-hanging fruit — including training, policies and standard operating procedures — the utility was able to significantly reduce its vulnerability."

Experts in water system security

McLaughlin has been working to improve the security of water systems since long before the events of September 11. As chairman of the Disaster Preparedness Committee of the North Carolina Section of the American Water Works Association and Water Environment Association (NC AWWA / WEA), he has been focusing on issues of utility terrorism, sabotage and

vandalism since early 2001.

At Brown and Caldwell, he heads Project SAFE — Secure Assets, Facilities and Environment — a new program that quickly and cost-effectively identifies system vulnerabilities, prioritizes security needs and structures realistic implementation plans.

Analyzing plants, pumping stations, disinfection facilities, storage tanks, distribution networks and collection systems, the team identifies the organizational and physical security controls needed for each site, then works with utility staff to address those needs with fast, efficient strategies.

National priority

Security, McLaughlin adds, will be a key issue facing virtually every water system in the years ahead. "Even the most prepared and aware utilities have vulnerabilities," he says. "While the professionals who run the systems take very seriously their responsibility to protect public health and safety, they are not all equally equipped to anticipate, plan for and react to terrorist or other threats, ranging from potential water supply contamination to truck bombings and everything in between."

Vulnerability assessments

This issue is now a national priority, since the US House of Representatives and US Senate passed House Bill 3448. The legislation requires every utility serving more than 3,300 people to complete a Vulnerability Assessment (VA) and an Emergency Response Plan (ERP) to address the findings of the Vulnerability Assessment. The US Environmental Protection Agency (EPA) has already allocated $90 million in funding for VAs and ERPs, providing grants of up to $115,000 for water systems that regularly serve a population of 100,000 or more. Additional money for utility security, McLaughlin says, will likely be available through HR 3448 and the public health and bioterrorism acitivities of the US Centers for Disease Control.

"Funding is no longer an obstacle for many utilities that are planning vulnerability assessments," McLaughlin notes. Although the government grants are noncompetitive, they do, however, require that the assessments employ specialized methodology developed by the Sandia National Laboratory, or an equivalent process. Seventeen consulting firms, including Brown and Caldwell and Versar, have been trained and licensed to instruct water utility staff members in the Sandia method, which was developed prior to the September 11 attacks and fully unveiled in November 2001.

Powerful partnership

With nearly 70 years of combined experience in water treatment, wastewater systems and industrial security, Brown and Caldwell and Versar are teaming exclusively to provide clients nationwide with system and infrastructure security services.

"Our knowledge of infrastructure and the water and wastewater utility process, paired with Versar's specialized security expertise, offers our utility customers a real advantage," McLaughlin explains.

Versar is the organization that

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Atlanta's Department of Water commissioned a vulnerability needs assessment to lower risk exposure.

"By focusing on low-hanging fruit — including training, policies and standard operating procedures — the utility was able to significantly reduce its vulnerability."

ON HIGH ALERT

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coined the term "homeland defense." For more than 15 years, the firm has been a leader in homeland security services, including physical inspection of facilities, operations and equipment to assess risk to heath and safety, property, data and communications. Headed by Dr. Ted Prociv, former Deputy Assistant to the Secretary of Defense for Chemical and Biological Affairs, Versar recently provided emergency response services, anthrax testing, remediation and risk mitigation consulting for more than 200 government and industry clients. Its laboratory is one of the few on the planet that can not only test for but also produce virtually all chemical and biological agents.

Brown and Caldwell and Versar have already partnered on five major vulnerability assessments, including one of the first, post-September 11, to analyze security at a key military educational asset, the United States Air Force Academy. From October 2001 to March 2002, the team performed a campus-wide vulnerability assessment, focusing on utility infrastructure.

"The US Air Force Academy is a unique, high-profile site and potential target, home to many of the future fliers for the United States Air Force," explains Dan Clayton, who headed the assessment team for Brown and Caldwell. "Potential security breaches and contamination issues are taken very seriously there, since they affect a population that is vital for national security."

During the vulnerability assessment, Versar and Brown and Caldwell reviewed the entire security of the base, including its water and wastewaster infrastructure. Examining its water treatment plant (operated by the Colorado Springs Utilities) as well as reservoirs, fences, chemical and electrical systems, telemetry, pump stations, backup systems and emergency fuel supplies, the team identified and prioritized points where contaminants could be introduced and critical components that could be subject to tampering and destruction. They then developed threat scenarios, recommended capital investment priorities and proposed a range of prevention and response strategies to protect drinking water storage and distribution facilities, sanitary sewers, wastewater treatment and related reuse pumping and storage systems, and water treatment plants owned by the Colorado Springs Utilities.

"Our task," Clayton says, "was to examine what could happen if there was a serious breach, think through threat scenarios, and create strategies for counteracting those threats."

> "Our task was to examine what could happen if there was a serious breach...and create strategies for counteracting those threats."

Excellent results

The results were excellent, according to the detachment commander of the Office of Special Investigation. Brown and Caldwell and Versar, he reported, "did an outstanding job and provided a superb and professional product."

Lessons learned

The knowledge gained by the assessment team, Clayton adds, are widely applicable to other clients, especially large civilian water and wastewater facilities. Especially helpful, he says, was the ability of Brown and Caldwell and Versar to analyze threat scenarios in partnership with base military experts, an experience that provided an unusual depth of insight.

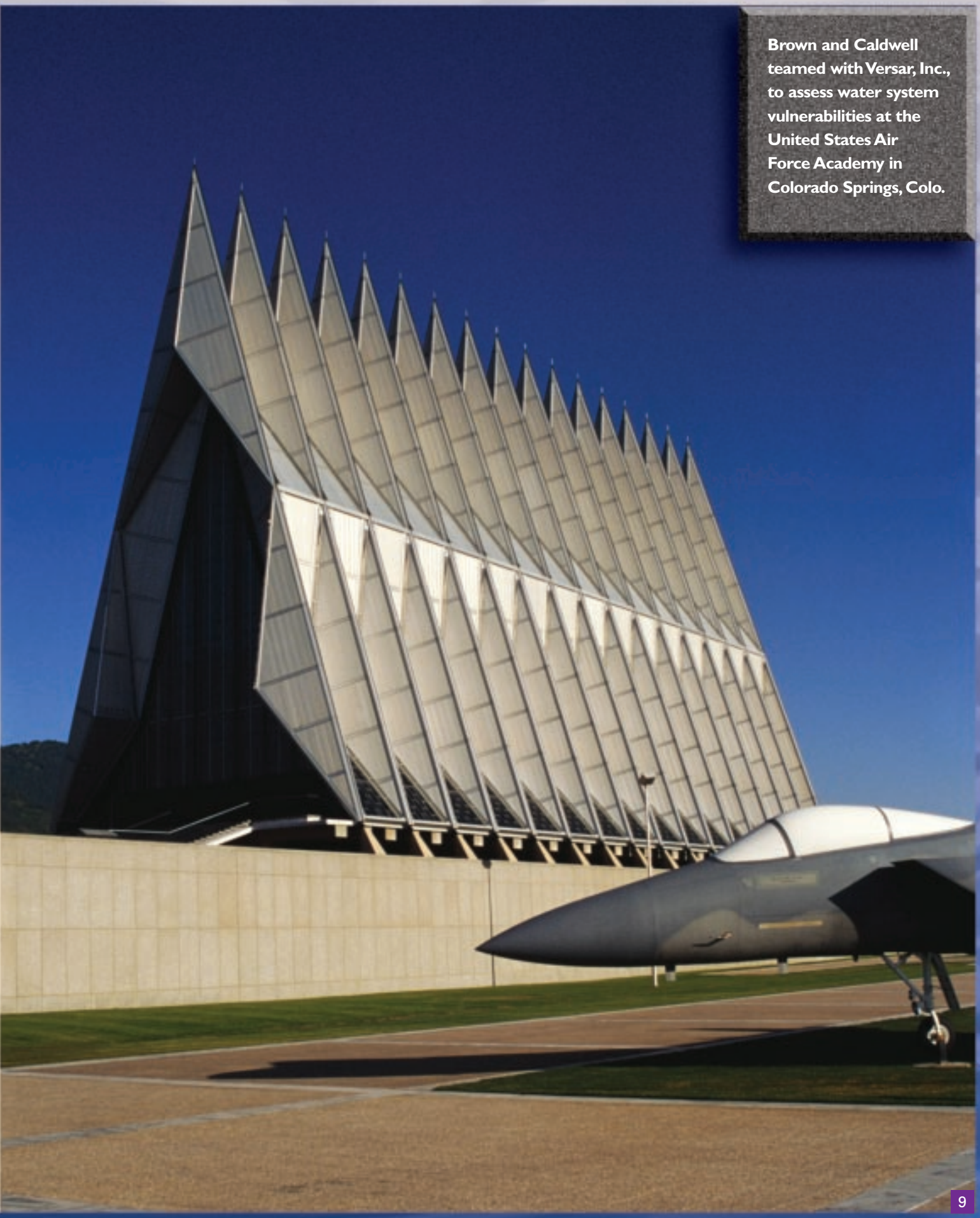
For every water utility, McLaughlin says, there are some fundamental, cost-effective steps that can reduce the risk of terrorist attack. "The most beneficial steps," he explains, "are those that involve policies and procedures. These measures will generally cost less over time and greatly increase the ability of utilities to prevent and respond to attack."

Water systems, for example, can enhance their security by eliminating unauthorized access to critical facilities, ensuring physical protection, increasing patrols, and training staff to note and report abnormal conditions during their duties.

"Utilities," he says, "should use the same screening measures for anyone who comes through the gate, whether they are employees, consultants or contractors. They should monitor vehicles on the plant site, especially large tankers, and put standard operating procedures in place for daily issues and disasters. Local law enforcement as well as site security personnel should do walk-around site assessments, and local and regional emergency management staff should be familiar with the facilities and what each one means to the water system."

The key point, he stresses, is that "the effectiveness of your emergency response plan depends on the care with which it has been prepared."

For more information on Project SAFE, contact John McLaughlin at 309 East Morehead Street, Suite 160, Charlotte, NC 28292; (704) 358-7204; jmclaughlin@brwncald.com.



Brown and Caldwell teamed with Versar, Inc., to assess water system vulnerabilities at the United States Air Force Academy in Colorado Springs, Colo.

QUARTERNOTES

Everglades Construction Program Reaps Civil Engineering Awards

With its massive pump stations and constructed wetlands, the South Florida Water Management District's Everglades Construction Program (ECP) is winning numerous awards for excellence in civil engineering.

The pump stations alone—the largest formed suction inlet pumps in the world—have won an Honor Award from the Florida Institute of Consulting Engineers and the 2001 Best Civil Construction Project Award from F.W. Dodge *Southeast Construction* magazine. Each station can pump almost 2 billion gallons per day in winds reaching 155 miles per hour.

The pump stations' joint venture design team—Prescott Follett & Associates and Brown and Caldwell—have also been honored for the design of the stations and their elements, helping the district to procure pumps, gears and engines and providing full-time engineering support and coordination during construction.

Team effort

In addition, the entire project, including Stormwater Treatment Area 2—primarily designed by Brown and Caldwell—has earned a 2002 ASCE National Outstanding Civil Engineering Achievement Award of Merit and was named the 2001 American Society of Civil Engineers Palm Beach Branch Project of the Year.

"This was an extremely visible, one-of-a-kind project, on a very large scale," explains Brown and Caldwell project manager Angela Berry. "It's been a tremendous team effort that has laid the foundation for the next phase of Everglades restoration." With ECP change orders totaling less than 5 percent overall, she adds, the success of the project resulted from solid construction management and the team's nonadversarial, partnering approach.

Largest constructed wetlands

Brown and Caldwell has worked with the District on its Everglades Construction Program since 1994. Central to the state's effort to restore the Everglades, the project includes six large constructed wetlands, known as storm-water treatment areas, or STAs. The largest constructed wetlands in the world, these STAs cover more than 44,000 acres and represent a total capital cost of approximately $700 million.

Designed and operated for nutrient removal, the STAs reduce phosphorus to less than 50 parts per billion (ppb), 20 times lower than the levels achieved by advanced water treatment plants. STA 2 encompasses some 6,500 acres of remnant Everglades habitat and former agricultural fields. It will treat an estimated 175,000 acres-ft per year of storm water from upstream basins, with an estimated phosphorus load of 35 tons. Together, the six constructed wetlands will remove more than 160 metric tons of phosphorus per year.

Upstream of the Everglades' massive pump stations, intakes screen out floating debris, weeds and alligators.

Prize-Winning Project

Viva Las Vegas

BC Opens New Southwest Office

Brown and Caldwell recently opened a new office in the Southwest, bringing its nationwide network of engineering and environmental expertise to Las Vegas. Municipalities, private companies and government agencies in southern Nevada now have access to a local staff with a national reputation and more than 50 years' professional experience.

Seasoned team

Managing the Las Vegas office is Mark O. Briggs, PE, who specializes in water distribution and wastewater conveyance systems evaluation, improvement and design. Briggs has completed projects for several municipal agencies in southern Nevada, including the Las Vegas Valley Water District, Southern Nevada Water Authority and Clark County Sanitation District. He has also managed the planning, design and construction support for numerous water, reclaimed water and wastewater projects in the southwestern United States.

Heading the environmental services practice is Supervising Geologist Robert N. Thompson, CEM, who has experience in surface and subsurface contamination investigations and design and implementation of corrective action plans. Thompson has completed projects for the Nevada Division of Environmental Protection and private sector industrial clients, as well as several Phase I and II brownfields site investigations for the City of Las Vegas.

Also on staff are Christopher D. Lucie, PE—an expert in the design and construction of water distribution systems, pumping stations and wastewater conveyance systems—and Andrew E. Rausch, who has nearly 10 years' experience with both private and municipal clients. Rausch's work has included design and implementation of corrective actions for underground storage tank releases, Phase I ESAs, soil and groundwater remediation and regulatory compliance.

BC's new Southwest office is located at 4425 W. Spring Mountain Road, Suite 225, Las Vegas, NV 89102. For more information, call (702) 938-4080.

San Diego Utilities Focus on Asset Management

The City of San Diego is one of the first major cities in the country to focus on improving asset management practices and gain better control over life-cycle costs of asset ownership. Its Water and Wastewater departments are jointly launching development of a capital asset management system to improve their asset planning and decisions and to support bond ratings for large, upcoming capital improvement programs.

"As we upgrade our water and wastewater infrastructure," explains Marsi Steirer, Water Department deputy director, "the new system will support our financing programs and help us improve the effectiveness of our decision making and asset management."

Maintaining service, reducing costs

Asset management minimizes the costs of asset ownership while sustaining infrastructure and meeting required service levels. True asset management is a structured program that monitors conditions, resources, and results for key assets—preparing life-cycle asset plans with all ownership costs, measuring actual vs. planned costs while monitoring condition trends, and tracking and projecting overall capital improvement needs. Better asset management can save at least 20 percent of total asset ownership costs, according to estimates by the U.S. Environmental Protection Agency.

To spearhead the development of a new capital asset management system for its utilities, the city of San Diego selected Brown and Caldwell in a nationwide competition involving seven firms. Brown and Caldwell won the contract based on its previous work developing asset management systems for large and small clients, including the Metropolitan Water District of Southern California and Kansas City's water, wastewater and storm-water utilities.

The most assets for the money

"Utility managers across the country are realizing that better asset management means real cost savings," explains Ken Harlow, project manager for Brown and Caldwell. During asset acquisition, he says, "the process ensures that utilities get the most asset for their money. By preparing life-cycle plans for new assets, utilities can plan for and manage all ownership costs, including initial expenditures, ongoing asset maintenance, capital refurbishments and ultimate asset replacement."

In addition, asset management can improve reliability. An effective asset management program minimizes unexpected failures, such as pipe collapses and pump station outages, that can result in damage claims, expensive emergency work, environmental penalties and political fallout.

Like many cities, Harlow notes, San Diego faces the challenge of interfacing or integrating a great number of separate, asset-based information systems. To accomplish this, Brown and Caldwell will employ special methodology—its Asset Management Program Evaluation tool—to investigate and document current asset management practices and systems in both departments, assessing needs in 80 subject areas. The project team will then work with the city to design an effective asset management system that can serve the growing needs of both departments.

> Better asset management can save at least 20 pecent of total asset ownership costs.

Paying dividends

The city expects that improving its capital asset management will pay dividends. "This is an important initiative," explains Joe Harris, deputy director in the city's Metropolitan Wastewater Department. "It will enable us to appropriately manage our critical infrastructure, help safeguard our environment and provide our ratepayers with the best value for their money."

For more information, contact Ken Harlow at kharlow@brwncald.com or (949) 260-6152.

Trenchless Repair Wins No-Dig Award

Northern California's EBMUD Honored for Excellence in Trenchless Technology

For cost-effective sewer repair, with minimal disruption to the public, Northern California's East Bay Municipal Utility District (EBMUD) has won the 2001 No-Dig Award from the International Association of Trenchless Technology (IATT). Presented annually for the most notable advance or achievement in trenchless technology, the award honored the district's Wood Street Interceptor project for the rapid, innovative rehabilitation of a badly corroded, large-diameter sewer while it remained in service.

Complex challenge

"This was a complex project that went very smoothly," explains Project Manager Peter Bellows, who led Brown and Caldwell's design of the rehabilitation work. The project renovated 2,350 feet of EBMUD's 9,000-foot, 105-inch-diameter Wood Street Interceptor—part of a wastewater interceptor system, owned and operated by the district, that includes 30 miles of gravity pipelines, 7 miles of force mains, 14 pump stations, and 4 wet-weather treatment and storage facilities. Most of the system was constructed in the early 1950s of unlined reinforced concrete; since then, several portions of the gravity pipelines have experienced severe corrosion.

Made of cast-in-place, reinforced concrete, the Wood Street Interceptor is typically used to equalize wastewater flow into the district's treatment plant—backing up the flow of wastewater each day and pumping it out at night. These operations result in high wastewater sulfide concentrations, as well as sediment in the invert of the interceptor and severe corrosion at the crown of the pipe.

Corrosion-resistant liners

To rehabilitate the pipeline, the contractor installed a corrosion-resistant liner—consisting of a spray-applied, high-strength polymer that adhered to the concrete pipeline, forming a section of corrosion-proof, cellular plastic. The contractor then placed a thin, flexible PVC sheet over the polymer to create an impermeable barrier protecting the concrete from corrosion.

The trenchless construction method is projected to extend the useful life of the pipeline by 50 years. It also minimized construction time, enabling the project to be completed in only one dry season instead of two, as originally estimated. In addition, the process permitted the interceptor to remain in operation throughout the project, saving the district the cost and risk of bypassing flows.

Work was performed during a six-hour window at night, when flows were at their lowest. Rigorous safety measures protected personnel in the pipeline, and close coordination with district operations staff at the influent pump station ensured that flow levels remained low enough to permit the rehabilitation work.

Trenchless technologies are often cost-effective methods for districts and municipalities to repair or renovate their underground pipelines, with minimal disruptions to the public.

No delays or community complaints

As a result of effective coordination, the project was completed with an excellent safety record, no lost construction days and no community complaints. It was honored with the No-Dig Award at a ceremony in September 2001 in Prague, Czech Republic, recognizing its new material technology, speed of installation, cost effectiveness and safety record.

"This award," Bellows says, "helps highlight the continuing advances in trenchless technologies. These are often very cost-effective methods for districts and municipalities to repair or renovate their underground pipelines, with minimal disruptions to the public."

For more information, contact Project Manager Peter Bellows at (925) 210-2386, pbellows@brwncald.com or Project Engineer Eric Petrel at (925) 210-2471, epetrel@brwncald.com.

A new plastic liner protects a 105-inch, thumbnail-shaped interceptor. Wastewater flows beneath a temporary wooden platform, removed at the end of the project.

Demonstrating New Digestion Process

Columbus Water Works Explores Efficient New Process to Produce Class A Biosolids

The Columbus Water Works utility in Columbus, Ga., is developing much-needed design information for a cost-effective new thermophilic plug-flow process for producing Class A biosolids.

The demonstration project, conducted by Brown and Caldwell, answers questions related to reactor configuration, hydraulics and pathogen destruction in an efficient, easy-to-operate, flow-through system.

"Until now," explains Project Manager John Willis, "no one has researched and developed this thermophilic plug-flow digestion process. With its continuous sludge flow and relatively small number of valves, it represents a simpler operation, with fewer costs and headaches."

Federal funding

Columbus Water Works (CWW) is researching the process as a way to use its existing plant to produce pathogen-free, Class A biosolids for agricultural use. An evaluation by Brown and Caldwell indicated that high-temperature digestion would be the best approach, using the efficient new plug-flow arrangement.

To demonstrate how the new system would function, CWW, under the leadership of its president, Billy Turner, secured a $1.5 million federal appropriation, which CWW is matching. Turner and his organization, Willis says, have already shown their aptitude for innovation by demonstrating groundbreaking combined sewer overflow (CSO) treatment and watershed management technologies.

Defining design details

Although anaerobic digestion, Willis notes, has been performed in cylindrical or egg-shaped vessels for many years, it is possible, he explains, to achieve Class A pathogen destruction at considerably lower plug-flow detention times when the process is used in conjunction with an upstream, complete-mix thermophilic digester. The particulars of such a process, however, remain undefined today.

To arrive at the design specifications, a Brown and Caldwell team—including Willis, Project Engineer Ted Hull and Project Advisor Perry Schafer—is investigating a process that consists of a complete mix, continuous feed thermophilic anaerobic digester followed by a narrow plug-flow reactor, sized to allow the required detention times at specific design temperatures.

The first phase of the project includes a literature review, development of a testing protocol and Quality Assurance Project Plan (QAPP) and the formation of a peer review committee of industry experts, provided through a contract with the Water Environment Research Foundation.

In the second phase, the project team—in association with Dr. Mike Aitken and Dr. Mark Sobsey at the University of North Carolina, Chapel Hill—will conduct pilot-scale pathogen-destruction tests using a complete mix thermophilic reactor followed by a batch reactor. The sludge feedstock will be seeded with high concentrations of poliovirus as well as helminth ova parasites, then fed nearly continuously into the complete mix reactor.

Attractive alternative

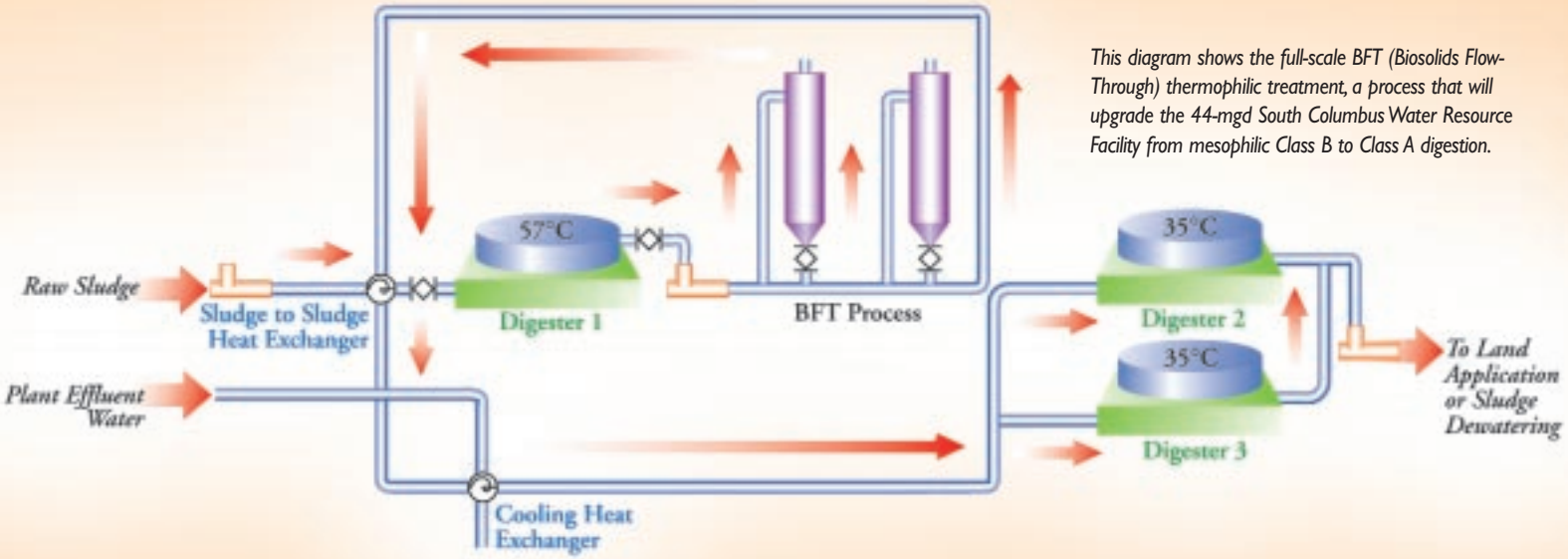
The batch reactor will be used downstream of the complete mix reactor to simulate destruction in the full-scale plug-flow reactor. Samples will then be taken intermittently to test for the pathogens. A full-scale plug-flow reactor prototype will also be constructed and tested hydraulically, using lithium tracers to determine its plug-flow effectiveness.

Following these investigations, Brown and Caldwell will design, supervise construction of and test full-scale, full plant-flow demonstration upgrades at the South Columbus Water Resource Facility and produce a report summarizing the findings of the investigation.

"The results of the proposed project," Turner notes, "will have widespread use at wastewater plants that use anaerobic digestion and should be attractive for treating other residuals such as livestock wastes." Additional federal funding is expected for the project in the next two years.

For more information, contact John Willis at (770) 673-3643 or jwillis@brwncald.com.

With its continuous sludge flow and relatively small number of valves, thermophilic plug-flow digestion represents a simpler operation, with fewer costs and headaches.



This diagram shows the full-scale BFT (Biosolids Flow-Through) thermophilic treatment, a process that will upgrade the 44-mgd South Columbus Water Resource Facility from mesophilic Class B to Class A digestion.

Investing in Community Outreach

CONTINUED FROM PAGE 1

■ **Think like the public.** It can be difficult to anticipate public concerns when you're in the midst of a major project — managing contractors, schedules, budget concerns, public officials and high-pressure project decisions. One of the most important roles of our communication experts, therefore, is to provide an objective perspective for our clients. We listen with the ears of the public, offer insights and suggest solutions for negotiating sensitive issues.

■ **Managing your credibility is as important as managing the project.** As Abraham Lincoln remarked, "Public image in this country is everything." Once damaged, the credibility of a utility or company will haunt every subsequent project, making it an uphill battle to convince public officials, boards of directors and others to support future efforts. Not only are agency reputations damaged, but individual reputations and job stature can also be injured in the process. A successful community outreach effort protects and manages a client's credibility.

■ **It's not enough just to provide the facts.** We have to anticipate the public's concerns, tailor our messages to meet their needs, and manage how we communicate. Just as it takes an expert in the technical field to design a technologically sound process, it takes an expert in the art of communication to design an effective outreach campaign. Information that is overly technical, not relevant and misses the bottom-line for concerned citizens clouds issues instead of illuminating them.

Today, community involvement in our industry is a fact of life. Still, while we can't operate in a vacuum, we can avoid having projects halted or delayed because of negative public opinion. Managed properly, community outreach can be a healthy, productive part of environmental design and infrastructure development—supporting our industry's efforts while giving citizens a voice in their quality of life.

Terry Cole is Communications Manager for Brown and Caldwell in its Atlanta office. She develops strategic communication solutions and provides training for clients throughout the Southeast and other regions. A former reporter, she also spent 10 years managing communications for a water/wastewater agency.

A Reference for Regulators

Brown and Caldwell To Write EPA Guide on Land Treatment of Municipal Wastewater

When the US Environmental Protection Agency (USEPA) recently decided to update its 21-year-old *Process Design Manual for Land Treatment of Municipal and Industrial Wastewater*—the primary reference book for regulators — it turned to a team of experts with nearly a century of combined experience in land treatment of waste.

Led by Ron Crites, Natural Systems Service Leader for Brown and Caldwell, the project team includes industry specialists who have completed hundreds of projects, presentations and publications involving all aspects of land treatment technology, including municipal wastewater, food processing wastewater, and animal waste.

"Because of our nationally recognized expertise," Crites explained, "the EPA's National Risk Management Research Laboratory in Cincinnati selected Brown and Caldwell—after a competitive procurement process—as the sole source to update and revise the publication."

Crites has served as principal author of the USEPA land treatment guides for the past 25 years. His most recent book, *Land Treatment Systems for Municipal and Industrial Wastes*, features the latest EPA guidance on land application of biosolids and phytoremediation. The Brown and Caldwell team also includes Robert Rubin, a visiting scientist with the USEPA Office of Wastewater Management (OWM) who has contributed to the *USEPA OWM Guidelines for Onsite and Decentralized Wastewater Treatment Systems*; Sherwood Reed, who directed preparation of the current *EPA Process Design Manual for Land Treatment of Municipal Wastewater*; and Jordan Smith, an engineer who has recently completed more than 10 projects involving land treatment of wastewater.

"Brown and Caldwell, in effect, will be writing the manual that the EPA relies on for its own decisions," Crites says. The team will update the book with the latest knowledge on design and operation of land treatment systems, including phytoremediation of soils using trees and other plants; phosphorus removal/prediction and testing; nitrogen removal mechanisms for slow rate systems with high C:N wastewaters; results of the SAT research project findings; and current overland flow design practice.

> "Brown and Caldwell, in effect, will be writing the manual that the EPA relies on for its own decisions."

"In the course of the project," he adds, "we'll be reviewing all the information published over the past 20 years. We'll update this widely circulated guide with new case studies, examples, research findings and a clearer, more straightforward presentation." The revised manual is scheduled to be published in October 2002.

For more information about this project, contact Ron Crites at (916) 444-0123 or rcrites@brwncald.com.

Meeting New Sediment Standards

On a barge fitted with a drill rig, the Brown and Caldwell team samples dredged sediment to perform the modified elutriate procedure for ChevronTexaco.

ChevronTexaco Refinery Is First in Mississippi to Meet Strict Federal Dredging Rules

In Bayou Casotte, on the Gulf Coast of Mississippi, ChevronTexaco's Pascagoula Refinery is the first facility in the state to meet new environmental guidelines for dredging, issued in 1998 as part of the Clean Water Act regulations.

The federal Inland Testing Manual (ITM) rules cover Tier I and Tier II sediment and water quality evaluations for placing dredged sediment in upland, confined disposal facilities. All dredging permit applicants, nationwide, must now comply with these new federal requirements.

Thorough evaluation

The refinery began the 14-month ITM evaluation process when its five-year dredging permit was expiring. The facility sought to renew the permit in order to perform maintenance dredging and deepen tanker berths—new work that would enable it to receive deeper-draft vessels at its docks and save approximately $1 million a year in shipping costs.

Successful assessment

To conduct the environmental assessment, a project team headed by Brown and Caldwell's Vic Vickery developed sampling, analysis and quality assurance plans and coordinated with regulatory agencies, including the Mississippi Department of Environmental Quality, the Mississippi Department of Marine Resources and the U.S. Army Corp of Engineers, Mobile District.

"Our task," Vickery explains, "was to conduct a thorough chemical and physical evaluation of the sediments. In addition, through the modified elutriate procedure, we assessed the effluent water quality that would be discharged during the placement of dredged sediment in the confined disposal facility. This procedure is required to ensure that the effluent would meet surface water quality standards."

Because Brown and Caldwell had extensive prior knowledge of the refinery's sediments and water quality, he adds, the team was able to reduce the the number of constituents requiring evaluation by 20 percent.

The refinery received a new 10-year dredging permit, instead of the standard 5-year license, because of the thoroughness and quality of the evaluation.

The assessment was completed successfully and on schedule; in fact, Vickery says, the refinery received a new 10-year dredging permit, instead of the standard 5-year license, because of the thoroughness and quality of the evaluation.

As other companies seek to renew their dredging permits, they too will have to comply with the detailed new ITM guidelines—a complex task, Vickery advises, that can add substantially to the time and cost involved in obtaining permits.

For more information on the ITM guidelines, contact Vic Vickery at (225) 295-3700 or vwickery@brwncald.com

The Next Front: Contaminated Sediments

BC's strategic alliance with HydroQual delivers expert, practical solutions

Contaminated sediments are rapidly supplanting soil and groundwater as the next front on the Superfund battlefield. EPA has already identified 96 watersheds—with more sure to follow—encompassing an estimated 1.2 billion cubic yards of contaminated sediment. Fish consumption advisories are in place on two-thirds of these water ways. Remediation costs could approach a trillion dollars over the next 20 years.

Brown and Caldwell is squarely in the forefront of this technically challenging and politically charged area, working with the Navy (see cover article), industries and PRP groups throughout the country on contaminated sediment Superfund and other sites. Our work has included innovative risk-based solutions, capping and, when warranted, sediment dredging (see the Spring 2002 *Quarterly*, p.13, for details on a BC dredging project on New York State's Hudson River).

The technology of sediments remediation is rapidly advancing. Better science is improving decision-making, and new techniques for sediments removal are reducing the potential for contaminates to be released into the environment.

Multidisciplinary challenge

Contaminated sediment issues are invariably multidisciplinary. In order to offer the full range of technical resources needed to properly manage contaminated sediment sites—from initial investigation and modeling through implementation—we have formed a strategic alliance with HydroQual, one of the premiere firms in the world in numerical modeling of surface water systems. HydroQual's expertise in hydrodynamic sediment transport and chemical transport modeling perfectly complements Brown and Caldwell's capabilities in risk assessment, sediment investigation and remediation engineering.

Remediation costs could approach a trillion dollars over the next 20 years

As always, our objective is to bring the highest level of technical resources to the challenges faced by our clients in order to develop optimal, practical solutions. We believe that the strategic alliance with HydroQual is in keeping with that long-held philosophy. We hope you will agree.

Robert D. Mutch, Jr.
Senior Vice President

When it Comes to Security

The Low-hanging Fruit Delivers the Sweetest Gains

Tackling your system's vulnerabilities is no longer an option. How you go about it is.

Last year, Brown and Caldwell teamed with Versar, the nation's most respected homeland defense provider, to help utilities assess–and correct–system weaknesses. From coast-to-coast, and in Hawaii, we're working with leading utilities to identify risks and develop practical, affordable solutions.

Go for the sweetest gains

State-of-the-art monitoring and surveillance equipment is a reasonable expectation. But know that your biggest, fastest security gains are almost always achieved through improvements to training, policies and standard operating procedures. That's where we focus first.

Security solutions vs. integrated solutions

Security solutions may meet the need, but integrated solutions leverage your investment by offering greater protection. That's because system integrity and system vulnerability are connected. Our security experts work with you to create solutions that act in concert with programs like asset management and O&M.

Be practical. Be powerful.

If you're looking for security assessment services that produce reality-based solutions, we deliver. Let us show you how we've helped utilities like yours make system security a lot less daunting.

Contact John McLaughlin of Brown and Caldwell's Business Consulting Practice at (704) 358-7204 or jmclaughlin@brwncald.com

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