



Statement of Qualifications

Independent Assessment
for West Point Wastewater
Treatment Plant



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Treatment Plant



King County Department
of Natural Resources and
Parks
March 6, 2017



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Ms. Christie True, Director
King County Department of Natural Resources and Parks
King Street Center
201 South Jackson Street
Seattle, Washington 98104-3855

Re: Statement of Qualifications for West Point Independent Expert Review Panel

Dear Christie,

As requested, Woodard & Curran is pleased to present the following Statement of Qualifications for providing an independent assessment of the flooding situation at the West Point Wastewater Treatment Plant on February 9th. Based on our conversations last week, it is our understanding that you are looking for an independent panel of experts to review the events leading up to the flooding of the plant to determine what went wrong and what can be learned moving forward. We assume that this will also be a forensic review of the operations, design, construction, maintenance, and asset management aspects of the plant that might have contributed to the flooding.

Our size and organization allow us to respond quickly to this request while also bringing extensive resources in all facets of utility review. We have assembled a team of experts for this work who all have wide-ranging experience with large wastewater treatment plants. We have not included experts from the Seattle area or companies with a long history at the West Point site in order to maintain an independent view of the situation. We can add relevant experts as we learn more, and are open to any suggestions that King County or other stakeholders have regarding additional expertise that would be beneficial to the panel. We thought it best to start with a smaller, more focused team to get a better understanding and bring in additional resources as needed.

I will lead the project as the Principal-in-Charge. Woodard & Curran will be the prime consultant in the lead, with specific technical experts working under our direction. Our staff have process, operations, planning, design, construction, and asset management experience at large wastewater facilities around the country. We have also engaged experts that represent electrical, process automation, structural, and reliability centered maintenance (RCM) specialties from other companies. We have excellent project management leadership and will orchestrate the work out of our Walnut Creek, California office.

This project will also benefit from our expert liability consulting and expert witness work. We have worked with many clients on sensitive matters, analyzing the technical and scientific basis of legal claims to determine the root causes of a range of issues. While there is no legal claim at issue in the West Point flooding, the forensic, analytical approach we use in legal matters will benefit King County.

Woodard & Curran is an *Engineering News-Record* Top 80 multi-disciplinary consulting firm with broad experience in the design, instrumentation/controls, operations, and construction management of water utility systems. The firm has expanded steadily to serve clients on a national scale. Today, it represents almost a thousand engineers, scientists, planners, and O&M personnel serving clients from 27 offices and 45 O&M project locations. Woodard & Curran's combination of skills and expertise will provide King County a seamless team of professionals, fully integrated to assess all aspects of utility design and operations. We will augment our team as needed with other experts to ensure that all critical aspects of the assessment are covered.



TJC and Associates, Inc. (TJC) has extensive and varied experience in providing structural, electrical, and I&C designs for wastewater facilities. With expertise in public and private sector construction, infrastructure requirements, treatment processes, it works collaboratively with design teams for nearly every type of water treatment design project. TJC has applied traditional and innovative approaches to a variety of design challenges for plants and facilities with capacities ranging from less than 1 to in excess of 500 million gallons per day.

The following team is proposed to begin the review effort. Additional experts will be added if the need arises. We will also engage several mid-level staff who will assist with interviews and data collection while we are gathering information in the up-front phases. Resumes for all staff are included in the attached package.

- *Phyllis Brunner, Principal-in-Charge, Woodard & Curran
- *Mike Matson, Project Manager, Woodard & Curran
- *Rawle (Chibby) Alloway, Operations Specialist, Woodard & Curran
- *Stephen Clary, Senior Environmental Engineer, Woodard & Curran
- *Edward Melanson, Process Automation, Independent Consultant
- *Marius Basson, Reliability Centered Maintenance, Aladon
- Randolph Jones, Operations Specialist, Woodard & Curran
- Paul Dombrowski, Senior Process Engineer, Woodard & Curran
- Marilyn Bailey, Senior Environmental Engineer, Woodard & Curran
- Paul Giorsetto, Electrical Power, TJC and Associates
- Michael Erwin, Electrical Power, TJC and Associates
- Terence Cavanagh, Structural Design, TJC and Associates

*core team

The team we have assembled will conduct the work with the utmost independence and bring all of their expertise to this assignment. They are some of the most experienced individuals in the industry who have planned, designed, constructed and operated some of the most challenging wastewater treatment systems.

As a resident of Seattle and the Magnolia neighborhood, I am especially committed to understanding what led to such a serious flooding event at the West Point facility. I have personally spent many hours in Discovery Park over the years with family and friends. It would be a privilege to work with this expert panel to understand and learn from this and to prevent similar events in the future.

Thank you for the consideration and please call me (207) 558-4260 with any questions.

Sincerely,

WOODARD & CURRAN

Phyllis A. Brunner, P.E.
President of Consulting

Enclosure(s)

cc: Alyson Watson, Woodard & Curran
Mike Matson, Woodard & Curran

Chibby Alloway, Woodard & Curran
Tiffany Knapp, King County Project Manager



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Blank pages within this document are for double-sided printing purposes.



Firm Profile

Woodard & Curran is an integrated engineering, science, and operations company. Privately held and steadily growing, we serve public and private clients locally and nationwide.

From our environmental roots to the range of consulting, engineering, and operations expertise we provide today, we work for a diverse clientele - including municipalities, the energy industry, food & beverage manufacturers, colleges and universities, and the real estate community.

Talented people are at the heart of our firm. Our company was founded in 1979 on a simple business concept: provide an enjoyable place to work with opportunity, integrity, and commitment, and we will attract talented people. It happened. At the heart of our company are people who are experts in their fields and passionate about what they do, showing a level of commitment and integrity that drive results for our clients. You experience this power every day in our actions, our solutions, and our promises kept.

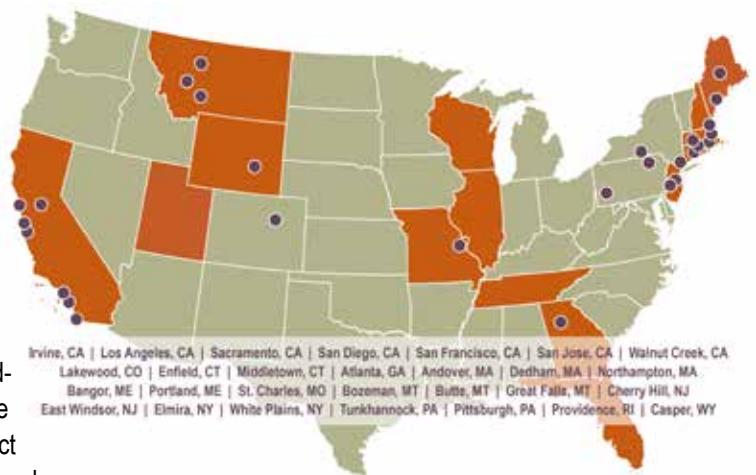
Commitment evident in personal approach

Our commitment is reflected in the personal attention, collaborative resources, and dedication to results that we devote to each project. We assign the right people with the right expertise to the job, and provide clients with easy accessibility to senior experts.

Our work is characterized by responsiveness, resourcefulness, and willingness to do what it takes to get the job done properly. Examples range from helping communities garner state and federal funding for wastewater treatment system improvement to managing a multi-vendor manufacturing project through a major snowstorm and getting production lines up and running. We are experts at navigating the complexities of environmental regulations and have been involved in transforming many brownfields sites into marketable properties. In defining moments like these, it is commitment that brings our clients results.

Operating with integrity

Our integrity impacts our decision-making at all junctures of our work — from the openness of our communication to the fairness of our prices to placing your interests above our pocketbook. We hire people who share our values of honesty, respect, and fairness and who want to do the right thing. They, in turn, treat everyone — our people, our clients, regulators, and stakeholders — respectfully and honestly.



Woodard & Curran serves clients locally and nationwide from offices throughout the U.S. The firm operates offices in the locations noted above, as well as treatment facilities in the states that appear in orange.

Full-service firm with multidisciplined staff

Our integrity and commitment are matched only by the depth of our expertise. Our staff are specialists in their fields, offering in-depth understanding of cutting-edge technology, astute problem-solving, multidisciplinary engineering, and expert regulatory guidance. The firm has received numerous honors and awards, and we have ranked among *Engineering News-Record's* top 100 environmental firms every year since 2000.

Services to the public sector

We have been serving cities, towns, and state governments for over 35 years. Today, we offer services beginning with studies, concept, and design on through construction and operations to address our clients' solid waste, wastewater, water, stormwater, and civil engineering needs.

These projects often incorporate hydrogeology, Geographic Information Systems (GIS), and instrumentation and controls. We also offer strong capabilities in health, safety, and security, including vulnerability assessments of public water supplies, emergency planning, and environmental sustainability.

Services to the private sector

Woodard & Curran provides a range of environmental engineering, science, and operations support to companies in the real estate, bottled water, pulp and paper, automotive, food processing, pharmaceuticals, electronics, oil and gas, mining, processing, and metals forging industries, as well as to hospitals, colleges and universities, and law firms.

While the range of clients we serve has grown, our work has always been characterized by long-term relationships. Typical projects include compliance and permitting; process and infrastructure improvements; corrective and remedial action; expert witness/litigation support; air quality; environmental information management, mining and process plant design; hazard resiliency planning; and engineering, procurement, and construction management. Our private-sector clients also benefit from our services in health, safety, and security, and environmental sustainability.

Operations and Management

Woodard & Curran operates nearly 50 water, wastewater, and groundwater treatment facilities across the U.S. Our operations and management specialists focus on contract operations and other operations and management assignments for water, wastewater, groundwater, and solid waste facilities.

We design flexible, expandable solutions that keep operations efficient, maximize existing assets, and conserve costs. Our projects have ranged from quick, hard-hitting operational and training assignments to comprehensive plant evaluations and process control improvements to full contract operations.

WOODARD & CURRAN'S SERVICES OFFERED

Civil and environmental engineering

- wastewater engineering
- civil engineering
- water supply and treatment
- solid waste management
- design-build contracting

Operations and management

- contract operations
- utility and asset management
- organizational development
- water & wastewater treatment
- water reclamation
- groundwater remediation
- training services
- health and safety

Corrective action and real estate

- due diligence
- site investigation and remediation
- risk assessment
- real estate development
- environmental ecology
- civil/site engineering and permitting
- natural gas services

Industrial engineering

- food and beverage manufacturing and source infrastructure
- electrical instrumentation and controls
- industrial wastewater
- process engineering
- power engineering

Environmental management consulting

- hazard mitigation planning
 - climate change
 - emergency preparedness
 - expert witness
 - environmental information systems
 - compliance
 - health, safety, and security
 - sustainability
-



Sanitary

WASTEWATER SERVICES

PROCESS DESIGN, OPERATIONS EXPERTISE, FUNDING SOLUTIONS AND SERVICE: A POWERFUL COMBINATION

The nation's wastewater infrastructure is aging and environmental regulations are increasingly stringent. To protect public health and the environment, facilities and infrastructure require upgrades, repairs, or replacement. Woodard & Curran teams with our clients to develop tailored solutions: few firms offer our unique combination of process design, operations expertise, and funding solutions. Whatever the concern – regulatory compliance, efficiency, cost-effective operations, or aesthetics – we will develop the best strategy to meet your needs.

Our experience in the contract operations industry, which demands compliance at the lowest possible cost, gives us a unique understanding in both the science and business of wastewater treatment. Our approach to wastewater solutions is based upon a combination of advanced technology and traditional know-how, tailoring solutions to meet each clients' individual needs. Some problems are solved through the introduction of cutting edge treatment systems while others are solved by tapping unrealized capacity through optimization of existing processes.

Municipalities must balance community growth and development with environmental, regulatory, and public health concerns—all within tight budget constraints.

It takes vision to meet the future demands of population increases and economic development while maintaining community values. Since 1979, we have partnered with municipalities of all sizes—from metropolitan cities to small communities and with other private operators—to meet their sanitary wastewater engineering needs with tailored, cost-effective, and practical solutions. We are committed to doing what it takes to make each project a success, whether it's using new technology to optimize operations and reduce costs or leveraging funding sources to help municipalities achieve compliance.

Planning. Utility owners and managers are frequently faced with a number of conflicting economic, environmental and political drivers. The solutions to these complex issues must be effective, flexible and reliable. At Woodard & Curran, we will work with you to craft a solution to meet your needs by combining our understanding of physical, chemical, and biological processes, regulatory requirements and state of the art technology together with our proven experience. Effective planning requires a team effort and we will work with you to develop a solid, meaningful solution.

Studies indicate that a growing number of U.S. waterways do not meet their water quality goals—all indicators point to performance demands increasing. Based upon our understanding of chemical and biological processes, regulatory requirements and the latest in



Woodard & Curran recently ranked #80 (#19 ENR's Top Sewer & Waste Firms) on Engineering News-Record's list of top 500 design firms in the nation.

technological advances, Woodard & Curran will develop cost-effective plans to allow you to meet your needs: both now and in years to come.

Infiltration & Inflow (I/I). Our services include evaluating and rehabilitating sewer systems, including numerous I/I studies on large and small collection systems, the evaluation of corrosion and odor within those systems, and design and construction services for effective rehabilitation. Every project is different and we work closely with our clients to identify and implement the appropriate study and design approach, whether it is traditional or innovative. In addition to providing our technical expertise, we help clients communicate components and goals of I/I services to key stakeholders.

Combined Sewer Overflow (CSO) Services. Existing CSO infrastructure is aging, systems are failing, and regulatory agencies are increasingly focused on abatement. With increasing flows and decreasing budgets, eliminating CSOs in surface water has become an enormous challenge. Woodard & Curran has both the in-depth regulatory knowledge and the highly qualified technical staff needed to successfully deliver a CSO project, whether it be long-term control planning, or implementation of engineering design.

Asset Management. Woodard & Curran's organizational assessment and improvement methodology puts municipalities on a path to success. We seamlessly combine consulting, finance, operations, and planning services to form a complementary approach that takes advantage of our municipal knowledge to form customized, results-driven solutions. Our staff includes former municipal and utility managers, planners, and finance experts, in addition to engineers, operators, and technical experts that truly understand the municipal business. As contract operators of over 50 utility and municipal operations, and consultant to hundreds of municipalities in the Northeast, Woodard & Curran understands that managing municipal resources requires devoting significant attention to people and management, as well as physical infrastructure. Woodard & Curran has helped create positive change at numerous municipal organizations, leading to more effective and efficient entities. Our team of experts evaluates every situation from multiple perspectives, applying proven approaches to identify areas for improvement and suggesting a path to better performance.

Treatment Facility Design & Upgrades. Wastewater treatment facilities are major infrastructure assets. Inadequate service can block development and pose a significant risk to public health and the environment. Woodard & Curran specializes in wastewater process design and operations, which has led us to unique applications of technologies typically not associated with a non-industrial setting. Our clients benefit from the investments we make in both state of the art wastewater treatment technology and in our experienced professionals who can provide full design services.

Environmental Information Systems. Woodard & Curran can build a GIS-based information management tool with a blend of consulting, programming, database, administration and GIS skills that will meet a project's goals, objectives and asset management needs. By applying a thoughtful and intelligent use of this technology, we are able to provide clients with an existing infrastructure condition assessment and enhanced detail and accuracy in growth and development projections, or example, defining wastewater needs areas in unsewered areas.



Efficiency & Operations Consulting. Our operations group is composed of highly trained, experienced industry professionals who work together to optimize plant operations. Our troubleshooting teams are available to our self operated clients, where they apply their broad-based experience to quickly identify and solve operational issues. The key to successful facility operations is compliance delivered on budget and addressing issues quickly when they arise. Woodard & Curran's approach is a Management and Technical Assessment and Action Plan (MTAAP) which can be built into a facility plan to cost-effectively and thoroughly complete facility planning for long-term needs.

SCADA Implementation and Service. Woodard & Curran's extensive electrical, instrumentation, and control services expertise Woodard & Curran's extensive electrical, instrumentation, and control services expertise encompasses engineering and implementing controls, instrumentation, and information systems into water, wastewater, and industrial facilities. We combine the engineering functions of a multidisciplinary consulting engineering firm with the implementation expertise of control systems integrators. Implementation assistance is provided with minimal, if any, operational downtime. Our typical services include SCADA systems, control and information technology planning, engineering design and specifications, hardware selection and configuration, control panel design and fabrication, programming, system simulation and testing, installation supervision and start-up, and documentation and training.

Electrical Instrumentation and Control (EIC) Systems. An efficient controls system can reduce energy and operations costs and enhance facility performance. Our EIC group implements turnkey instrumentation and control systems for clients in the public and private sectors. We combine the power of a multidisciplinary environmental consulting firm with the implementation expertise of control systems integrators. Implementation assistance is provided with minimal, if any, downtime. Our SCADAServ range of support services can also help clients maximize the investment they've made in a SCADA system and maintain reliable operations.

Contract Operations & O&M Services. We use our operations and engineering expertise to provide balanced solutions and improve operational performance. Our operations plans are developed to meet facility demands and business objectives. Woodard & Curran currently operates nearly 50 wastewater, drinking water, groundwater remediation, industrial wastewater, and solid waste facilities. Our approach is to keep successful operations and maintenance systems and procedures while restructuring and improving with new elements for greater control and responsiveness to client needs.

Funding Assistance Services. Securing funding for infrastructure projects is an area where our proven track record has helped clients move forward with their projects. Woodard & Curran has experienced professionals who research, track and resolve local, state and federal funding opportunities. We have the expertise available to explain funding initiatives, assist in the application process, and then design and implement funded projects. We are committed to staying informed regarding funding opportunities and then translating that knowledge to our clients so that we can help develop appropriate funding strategies.



Woodard & Curran takes advantage of innovative technologies to provide clients with sustainable cost-effective, high-performance systems that will meet their municipal engineering needs for years to come.



TREATMENT FACILITY DESIGN & UPGRADE

ENVIRONMENTAL LEADERSHIP: A CULTURE OF LEARNING BRINGS NEW TECHNOLOGIES TO OUR CLIENTS

A wastewater treatment facility is a major infrastructure asset. Inadequate service can block development and pose a significant risk to public health and the environment. Since 1979, Woodard & Curran has assisted communities and utilities with the design of wastewater treatment facilities that are cost-effective, apply state-of-the-art technology, and meet regulatory requirements.

Process design and operations expertise: a rare combination

Very few environmental consulting firms specialize in wastewater process design and operations, and even fewer firms exist that have in-depth experience in both. This is one of Woodard & Curran's primary strengths and services. Our breadth of expertise has led to unique applications of technologies typically not associated with a nonindustrial setting. For example, using Snowfluent technology for a sanitary district that had run out of lagoon disposal space, and membrane reactor technology at an extremely small site where treatment capacity needed to be expanded.

Implementing the state-of-the-art

Woodard & Curran has a long history of investing to advance the state-of-the art in wastewater treatment. We have helped many clients become the first on the block to implement the latest advances in treatment technology, which have since become commonplace such as sequencing batch reactors and membrane bioreactors.

Most of our process engineers have advanced degrees and several are adjunct professors or teach college level classes in wastewater treatment.

Full-service design: from upgrade to new facilities

Our experience encompasses project implementation of all types, including:

- investigating & improving system energy efficiency;
- assessing whether to design new facilities or upgrade existing ones;
- designing to maintain service during construction;
- phasing or staging implementation;
- maximizing financial assistance from State and Federal agencies;
- optimizing systems through SCADA and information technology; and
- addressing "payback": determining the period of time it will take for project savings to pay for improvement costs.

Public interest programs: a key to success

In addition to our technical expertise, we focus on communicating to build long-lasting alliances—an important element that when neglected can grind a project to a halt. We focus on maintaining client relationships for the long term and provide the level of commitment and continuity necessary to accomplish that goal.





EFFICIENCY & OPERATIONS CONSULTING

MAKING THE MOST OF WHAT YOU HAVE

Today's economic climate forces utility managers to get the most from each dollar: no one appreciates this more than we do. The key to successful facility operations is compliance delivered on budget. We understand this better than most because we provide operation and maintenance services at more than 40 project locations nationwide. In order to thrive in this ultra-competitive market, we need to operate each facility at its peak efficiency.

Our operations background brings value to our self-operated clients. Woodard & Curran's operations group is composed of highly trained, experienced industry professionals who work together to make sure each plant is run at its best. When issues surface, a team is quickly dispatched to address them.

Troubleshooting teams are ready to solve operational issues

Our troubleshooting teams have broad-based experience solving operational issues. Combined with the client teams' deep experience and insight, problems are quickly identified and solved.

Operational consulting brings a wealth of experience to all

Clients that operate their own treatment facilities can reap the benefit of our operations experience through operational consulting. Services include:

- staffing evaluations and operator training programs,
- parameter-specific operational control strategies and
- Comprehensive Plant Evaluations (CPEs).

Plant assessments: experience yields an enlightened approach to CPEs

Woodard & Curran's approach is a Management and Technical Assessment and Action Plan (MTAAP). An MTAAP generates the holistic design, operating, maintenance, and management perspectives that assures non-capital alternatives are tackled first — before turning to the more costly approach of process upgrades and expansions. We also can help to fund genuine capital needs.

The original concept of a CPE was developed in the 1980s as a compliance tool for regulators. Woodard & Curran has enhanced the tool to provide managers with an across-the-board understanding of both the as is situation and a prioritized listing of improvement opportunities by identifying the root causes of any compliance problems, as well as opportunities for improving performance and reducing costs.

A Woodard & Curran MTAAP can be built into a facility plan to more cost-effectively and thoroughly complete facility planning for long-term needs. Alternatively, it can be focused on identifying innovative approaches to reduce operating costs or for developing a strategic plan for management and staff. MTAAPs can even redefine and re-engineer utility operations from the ground up, leading to dramatic performance improvements and cost savings.



Our operations group is composed of highly trained, experienced industry professionals who work together to ensure each plant is run at its best. Our troubleshooting teams are available to our self-operated clients, where they apply their broad-based experience to quickly identify and solve operational issues.



ELECTRICAL INSTRUMENTATION & CONTROLS SYSTEMS

An efficient controls system can reduce energy and operations costs and ensure your facility is operating at peak performance. Our EIC group implements turnkey instrumentation and control systems for clients in the public and private sectors.

Our SCADA Serv range of support services can also help you maximize the investment you've made in your SCADA system and maintain reliable operations.

We combine the power of a multidisciplinary environmental consulting firm with the implementation expertise of control systems integrators. Implementation assistance is provided with minimal, if any, downtime.

How we deliver results:

- **Technology planning to evaluate your business and strategic goals.** We'll identify the appropriate hardware/software needed to achieve your business goals. We interview your staff to understand the existing level of technology utilized in daily operations. We develop a report to establish hardware/software platforms, projects and costs, and an implementation schedule.
- **Detailed guidance throughout the project.** Our Preliminary Engineering Basis of Design Report (BODR) becomes the guide for all subsequent design activities.
- **Bid-phase and construction services based in responsiveness.** We'll pre-qualify vendors, respond to questions, and provide implementation and installation support through pilot testing, start up, and training.
- **Long-term support keeps you up to date and well informed.** Service contracts provide system updates and enhancements to ensure that the strategic goals identified at the beginning of the process are kept in focus.



SERVICES

- Supervisory control and data acquisition (SCADA) systems
- Control and information technology planning
- Engineering design and specifications
- Hardware selection and configuration
- Control panel design and fabrication
- Programming
- System simulation and testing
- Installation supervision and start-up
- Documentation and training



CONTRACT OPERATION & O&M SERVICES

COMBINING OPERATIONS AND ENGINEERING EXPERTISE FOR MEASURABLE RESULTS

Woodard & Curran's training, operations assistance and full contract operations have one common focus: improving operational performance. Merging our operations and engineering expertise to provide balanced solutions, our capabilities range from small, quick-hitting operational and training assignments, to comprehensive, multi-year, full-contract operations arrangements.

Woodard & Curran understands the need to remain competitive in today's business environment. Our operations plan aligns with the unique production schedule and demands of your facility to insure that your business objectives can be met.

Training reinforces excellence in daily performance

Training programs take into account client operational objectives, trainee need-to-know criteria, and relationships between staff performance and operational objectives. They are at the core of operational excellence and employee morale.

Operations assistance to optimize your assets

Operations assistance often begins with a MTAAP. An MTAAP identifies how to maintain compliance and get the most out of your facility by optimizing existing assets before considering costly capital investments. In addition to full-service O&M, our staff performs benchmarking studies to improve performance and increase competitiveness. Our energy evaluations are still another means of identifying significant energy savings.

Emphasizing greater control and responsiveness

Woodard & Curran currently contract operates over 50 wastewater, drinking water, groundwater remediation, industrial wastewater, and solid waste facilities ranging in size from 10,000 gallons per day (GPD) to 320-million gallons per day (MGD). Our approach is to keep successful operations and maintenance systems and procedures while restructuring and improving with new elements for greater control and responsiveness to your needs.



SERVICES

- Full Contract Operations
- Operations and Management Assistance
- Facility Evaluations
- Troubleshooting
- Process Control Improvements
- Energy and Chemical Optimization
- Innovative Sludge Management
- Preventive and Predictive Maintenance
- Training



ASSET MANAGEMENT

EFFECTIVE ASSET MANAGEMENT: IT IS MORE THAN JUST A BUNCH OF TOOLS & TECHNIQUES

Organizations have invested trillions of dollars in infrastructure to improve lives and create healthy environments. Many of these investments have not been supported by adequate maintenance, sustainable practices, and sound long-term capital planning. Numerous assets have degraded unnecessarily or operate inefficiently, while others are replaced before the end of their useful lives, costing communities untold millions in lost value.

Organizations have struggled with how to approach asset management. Where should they focus their efforts? What data should be collected? How do they balance maintenance with rehabilitation and replacement work? What technologies are needed and how should they be implemented?

People – The Keys to Success

How employees collect, use, and communicate information about assets is critical. It is impossible to implement effective asset management without a well-developed plan for incorporating employees and understanding an organization's culture.

Money – A Driving Force

Funding is precious and budgets are tight. Organizations must be prepared to defend expenditures with an objective and understandable methodology. Effective asset management helps prioritize investments and provides a defensible framework for capital and maintenance decisions.

Practices – The Playbook for Doing Business

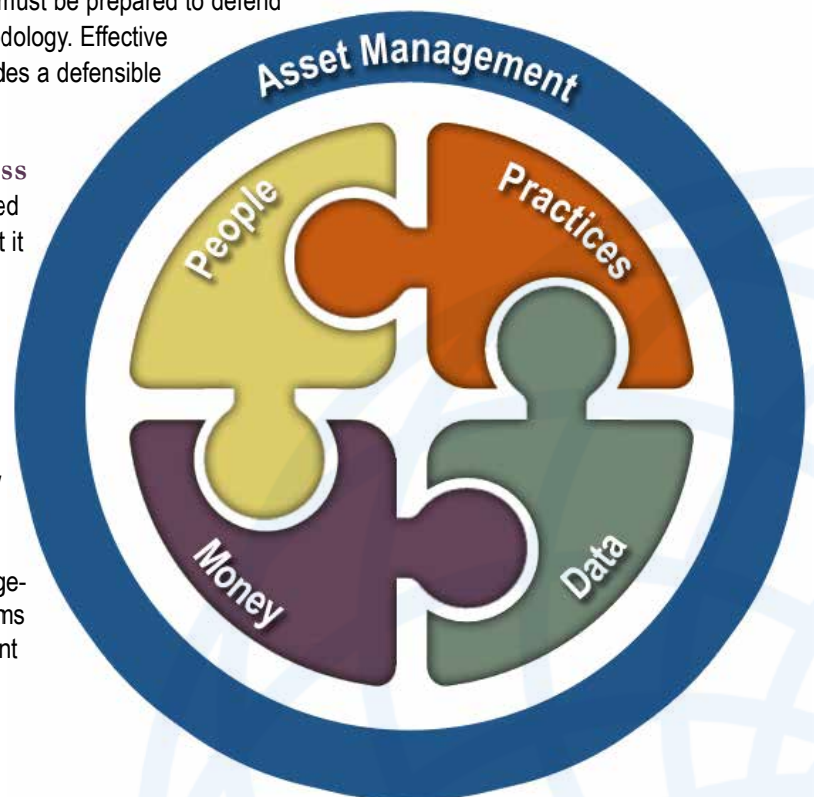
Streamlining day-to-day O&M practices is often a neglected or undervalued aspect of effective asset management, but it can be one of the most important. Organizations with efficient practices have lower lifecycle asset costs and lower O&M expenditures for the same activities, compared with their peers.

Data – Information is Power

Turning data into useful information involves knowing how to effectively collect, store, and manage it. It also requires knowing how to select and use the vast array of information technologies that are available. Effective asset management controls information, preventing the common problems of excess data collection, redundant storage, and inefficient access.

SERVICES

- Asset Management Strategy and Program Development
- O&M Services
- Business Process Evaluation and Design
- Change Management, Organizational Development, and Training
- Asset Inventory and Condition Assessments
- Information Utilization
- Web-Based Hosting
- Capital Planning





Selected Projects

Since Woodard & Curran was founded in 1979, we have assisted communities with the design of wastewater treatment and collection systems that are cost-effective, apply state-of-the-art technology, and meet regulatory requirements. Our in-depth experience includes enhanced nutrient removal, management and disposal of residuals, alternative discharge scenarios, permitting, evaluations, pilot programs, O&M training, and operations improvement programs.

Tapping our pool of experts

Our project teams do what it takes to make each project a success, whether it's using new technology to optimize operations and reduce costs or leveraging funding sources to help municipalities achieve compliance. We have the expertise and flexibility to meet the changing needs of clients and of ever-increasing regulations. Because we have access to a diverse group of in-house engineers, scientists, and operations professionals, we can match the right people and skills to the job.

We take advantage of innovative technologies to provide clients with cost-effective, high-performance systems that will meet their municipal engineering needs for years to come. We are one of the few environmental consulting firms that specialize in wastewater process design, operations, automation, and information management — four key ingredients for efficient, well-managed utilities.

Wastewater treatment facility and collection system design

A wastewater collection system and treatment plant is a major infrastructure asset for a city or town. Inadequate service can block commercial, school, and residential development and pose a significant risk to public health and the environment.

Our history of innovation includes developing projects and applying membrane bioreactor technology for a plant upgrade to meet the restrictions of a very small site at a Massachusetts private school, and developing a water reuse facility for a Massachusetts high-tech company to ease growing pressure on its local water supply.

Demonstrated Experience

On the following pages, we have included a small portfolio of representative projects that demonstrates our extensive experience.

We supply process design, operations expertise and control systems design and service: a powerful combination.



Clients also benefit from Woodard & Curran's experience with funding strategies, grant/loan administration, and access to short- and long-term financing sources. We leverage lesser-known sources to develop creative and tailored funding packages.





BOSTON WATER & SEWER COMMISSION MASSACHUSETTS

UPGRADES AT 320-MGD PUMPING STATION

The Boston Water & Sewer Commission (BWSC) maintains and protects the long-term quality and reliability of water and sewer services in the City of Boston. Since 2000, Woodard & Curran has provided operations and maintenance services related to the management, operation, and maintenance of the BWSC's 320-MGD Union Park Pumping Station, nine sanitary and stormwater pumping stations ranging from 1.5-6.5 MGD, and one water booster pumping facility. The Commission retains ownership of the wastewater collection and stormwater drainage system and the water distribution system. When upgrades were required, the Commission turned to Woodard & Curran.

Turbine upgrades include noise and emissions control

Woodard & Curran worked with BWSC to upgrade the mechanical systems associated with three existing combustion turbines and one new gas turbine at the Union Park Pumping Station, including installing new emissions controls. State-of-the-art noise and emissions control devices, including turbine exhaust piping, thermal expansion joints, noise control silencers, and carbon monoxide catalytic oxidation units were selected and specified. Woodard & Curran provided detailed engineering, equipment procurement support, and construction support services. After installation, commissioning and stack testing were completed.

CSO facility protects water quality in Boston Harbor

The \$40 million Union Park Pumping Station facility is a joint effort between the Boston Water and Sewer Commission, which operates the facility, and the Massachusetts Water Resource Authority, which is funding the expansion. It includes 2.2 million gallons of underground storage, screening, disinfection, and dechlorination facilities.

Woodard & Curran staff coordinate pumping activities with both the Boston Water and Sewer Commission and Massachusetts Water Resource Authority staff. The firm works closely with the Commission on community relations issues and coordinates as needed with the Boston Fire, Police, Public Safety, and Emergency Management departments.

As part of efforts to restore Boston Harbor into a clean and accessible body of water, the Commission is working jointly with the Massachusetts Water Resource Authority to reduce the impacts of combined sewer overflow (CSO) by investing in the CSO control facility in Boston's South End. Woodard & Curran supports this effort, as well as other BWSC projects, by providing O&M and engineering services to keep facilities and infrastructure operating smoothly and efficiently.

The Boston Water & Sewer Commission is working jointly with the Massachusetts Water Resource Authority to reduce the impacts of combined sewer overflow (CSO) by investing in the CSO control facility in Boston's South End. Woodard & Curran supports this effort, as well as other BWSC projects, by providing O&M and engineering services to keep facilities and infrastructure operating smoothly and efficiently.





METROPOLITAN DISTRICT COMMISSION

HARTFORD, CONNECTICUT

WATER POLLUTION CONTROL FACILITY MASTER PLAN

Woodard & Curran assembled and led a team including CH2M HILL, Savin Engineers and other consultants to prepare a Master Plan for the upgrade of the 80-MGD Hartford Metropolitan District Commission (MDC) Water Pollution Control Facility (HWPCF). The upgrade was part of the MDC's \$1.8 billion Clean Water Project to address a federal consent decree and a Connecticut Department of Environmental Protection consent order to achieve federal Clean Water Act goals.

The Master Plan included comprehensive improvements to increase overall plant peak flow capacity to 200 MGD and upgrade systems. The overall planning efforts involved evaluating a range of topics and unit processes to achieve these improvements, such as influent and effluent pumping, plant capacity, fast-track projects, biological nutrient removal (BNR) using step feed activated sludge, solids management, and odor control systems.

The Master Plan phased the \$500 million in HWPCF improvements over a 6-year implementation schedule. A number of aspects of the Master Plan are either currently underway or have already been completed. Some of these include:

- Upgrades to the BNR system through optimizing and expanding the existing system. The existing 3-pass step feed activated sludge BNR system was modified into a 4-pass arrangement, resulting in an increase of 40% of BNR capacity. Anoxic mixers used for each pass were platform mounted with a hyperbolic impeller and upgraded aeration consisted of fine-bubble diffused aeration with new Turblex high efficiency blowers.
- Construction of a dry weather ultraviolet (UV) system to provide disinfection for flow receiving biological treatment. This system utilized a vertical lamp UV configuration to treat an design average flow of 80 MGD and a peak hourly flow of 120 MGD. The UV system is housed in a new structure to house the UV channels and supporting electrical systems.

The conveyance of sewage to the HWPCF, particularly combined sewage, will also be enhanced. During and following storm events, the HWPCF will treat wet weather-related flows in accordance with the treatment plant site's effective capacity as evaluated and recommended by the HWPCF Master Plan; the tributary sewer system's conveyance, storage, and controls infrastructure; and outlined improvements to include biological nutrient removal for nitrogen control.

Woodard & Curran worked with the MDC to develop a master plan as part of an expansive project to achieve Clean Water Act standards. \$500 million of improvements to increase overall plant capacity at the Water Pollution Control Facility are being phased over six years.





CITY OF ST. CHARLES MISSOURI

WASTEWATER SYSTEM CONTRACT OPERATIONS AND ENGINEERING SERVICES

In January of 2014, Woodard & Curran took over operations of the City of St. Charles' two wastewater Treatment Facilities. Woodard & Curran was chosen for a ten year operating contract of these facilities after responding to a RFP, which garnered responses from 10 firms. Since taking over operations, Woodard & Curran has not had any effluent violations, nor any safety incidents. In addition, we have been able to conclude union negotiations and transition the full staff.

Wastewater treatment and collection

Woodard & Curran operates and maintains the City's wastewater treatment systems, which include the Missouri River Plant and the Mississippi River Plant. The Mississippi River Wastewater Treatment Facility is an activated sludge facility with a daily average design capacity of 9.6 MGD. The Mississippi River Wastewater Treatment Facility serves the North and Western portions of the City. The Missouri River Wastewater Treatment Facility is a three-cell oxidation ditch activated sludge facility with a daily average design capacity of 7.5 MGD. The Missouri River Wastewater Treatment Facility serves the South and Eastern portions of the City. Both facilities were originally built in 1968 but have since experienced many modifications, some as recent as 2013.

Woodard & Curran is also responsible for oversight of the City's Industrial Pretreatment Program (IPP) and Fats, Oils and Grease (FOG) Program.

Engineering support

In conjunction with taking on the wastewater operations contract with the City, Woodard & Curran has also assisted with the following items:

- Completion of a post-construction SCADA audit of the wastewater treatment facilities;
- Completion of a technical opinion and recommendations for the New Town vacuum system;
- Presentation of SCADA recommendations at the water Plant;
- Design and Construction Engineering Services for a 2 million gallon elevated storage tank (currently in final design)
- Lift station low-flow operational evaluation;
- Lift station odor evaluation and odor control system solution development; and
- Lift station safety upgrades, including fall protection addition.





CITY OF YUBA CITY CALIFORNIA

WASTEWATER TREATMENT FACILITY EXPANSION

In order to address Yuba City's aging infrastructure, meet regulatory requirements, and provide capacity for the projected build-out of the service area in accordance with the City's adopted General Plan, Woodard & Curran completed a capacity analysis of all processes within the plant and designed improvements to the highest priority facilities, including a new solids thickening facility, repair and upgrade of the aeration tanks, and improvements to the plant electrical system. The improvements were prioritized to meet the City's CIP constraints and regulatory requirements. The selected technology was rotary drum thickeners, which were integrated into the existing process at the plant and included the installation of two new rotary drum thickeners, thickened waste activated sludge pumping, polymer make-up units, sludge drying improvements, and centrifuges to replace the existing dissolved air flotation system. Woodard & Curran recently assisted the City in replacing 12 mechanical aerators including gearboxes and motors, for the biological treatment process at the WWTF. Woodard & Curran also included an alternatives analysis technical report on oxygen supply - making recommendations that will increase the reliability and lower maintenance costs of the oxygen supply while minimizing the capital cost of achieving these goals. The facility improvements include upgrades to the City's existing anaerobic digesters, evaluation of cogeneration technologies, dewatering upgrades, and overall biosolids disposal.

Highlights:

- **Process Improvements** – Woodard & Curran helped the City implement and prioritize process improvements and capacity expansion projects within an operating plant to meet the City's CIP constraints and regulatory requirements.
- **Treatment Capacity Expansion** – Projects included aeration and solids handling processes and clearing hydraulic bottlenecks in the system to achieve a 12.6-mgd treatment capacity.
- **Predesigned Process Upgrades** – The project included the pre-design of several treatment process upgrades and the design of a new solids thickening facility.

Woodard & Curran helped the City implement and prioritize process improvements and capacity expansion projects within an operating plant to meet the City's CIP constraints and regulatory requirements.





ENCINA WASTEWATER AUTHORITY

ENCINA, CALIFORNIA

ENGINEERING SERVICES

Woodard & Curran has been providing a suite of services for Encina Wastewater Authority (EWA) since 1999 that has included extension of engineering staff, providing as-needed engineering services, comprehensive asset management planning, engineering design, bid administration, and construction management services for rehabilitation and maintenance projects. Woodard & Curran's services have included planning, engineering, bid administration, and construction management for numerous rehabilitation and maintenance projects at the Encina Water Pollution Control Facility (EWPCF), a 36-MGD facility which provides wastewater treatment service for six member agencies in northern San Diego County, as well as the Carlsbad Water Recycling Facility and four remote lift stations.

The Woodard & Curran team acted as the program manager for EWA for the expansion of the Phase V expansion of the EWPCF to the capacity needed by 2025. Woodard & Curran is providing technical assistance to EWA staff on ongoing projects including: implementation of primary enhancement (chemical addition), technology upgrade for process control and monitoring, installation of secondary effluent flow equalization facilities for peak flow management, addition of a triple pass heat dryer to produce Class A biosolids, and replacement of cogeneration facilities with new engine-generator sets. In Addition, we provided assistance with allocation of costs for Phase V, as well as amending the Revised Basic Agreement between the member agencies.

Woodard & Curran has been providing a suite of services for EWA since 1999 that has included extension of engineering staff, providing as-needed engineering services, comprehensive asset management planning, engineering design, bid administration, and construction management services for rehabilitation and maintenance projects.





ENCINA WASTEWATER AUTHORITY

ENCINA, CALIFORNIA

PHASE V EXPANSION AND PEAK FLOW MANAGEMENT

The Encina Wastewater Authority (EWA) operates and administers the Encina Water Pollution Control Facility (EWPCF), which provides wastewater treatment service for six member agencies in northern San Diego County. The member agencies are: the City of Carlsbad, the City of Vista, the Buena Sanitation District, the Leucadia County Water District, the Vallecitos Water District, and the City of Encinitas. The EWPCF's existing influent flow is approximately 21 mgd. The design capacity of the facility is 40.5 mgd liquid and 43.3 mgd solids average dry weather flow. The last major expansion was completed in 1992.

The Woodard & Curran team is acting as Program Manager for EWA for the expansion of the EWPCF to the ultimate capacity needed by 2025, which is projected to be about 49.8 mgd liquid and 51.8 mgd solids. Included in the role as Program Manager, our staff is providing technical assistance to EWA staff on other ongoing projects. These projects include:

- Implementation of primary enhancement (chemical addition)
- Technology upgrade for process control and monitoring
- Installation of secondary effluent flow equalization facilities for peak flow management

EWA completed a Peak Flow Management Plan in October 1999. This study investigated alternatives for managing peak flows to avoid expansion of the existing Ocean Outfall. A risk-based approach performed by another consultant was used to analyze alternatives, which included options for both primary and secondary effluent storage. The near-term project recommendation involves construction of 7.5 mg of secondary effluent flow equalization to be integrated with the new Water Reclamation Plant (WRP) being constructed by the Carlsbad Municipal Water District. Our team assisted EWA staff with the Peak Flow Management Plan, reviewing the design of the flow equalization facilities by others, and coordinated the equalization basin design with the WPCF Phase V expansion and Carlsbad WRP.

Woodard & Curran has also provided engineering design, bid administration, and construction management for several rehabilitation and maintenance projects which include:

- Aeration basin improvements – air piping investigation and replacement, diffuser replacement, MCC/VFD replacement
- Digester improvements – coating, mix system improvements, soil settlement evaluation
- Odor reduction facility rehabilitation and media replacement
- Buena Vista Pump Station VFD replacement
- Grit drain piping reconfiguration and rerouting
- Bar screen replacement

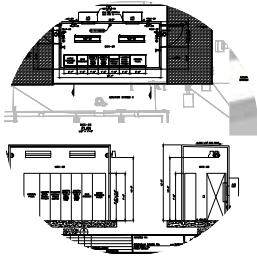
The Woodard & Curran team is acting as Program Manager for EWA for the expansion of the EWPCF to the ultimate capacity needed by 2025. Woodard & Curran also provided engineering design, bid administration, and construction management for several rehabilitation and maintenance projects.



- Flare replacement of candlestick type with new enclosed flare type
- Outfall location verification and protection
- Spiral Heat exchanger and associated equipment replacement analysis

The EWA utilizes a multi-year Master Plan for Rehabilitation and Major Improvements (Master Plan) to the EWPCF in order to schedule rehabilitation/major improvements projects in a way that allows orderly accomplishment of work consistent with the treatment needs of the EWPCF, and provides a relatively constant annual spending level (\$500,000 per year). Woodard & Curran prepared annual updates to the Master Plan for fiscal years 1997/98, and 1998/99. Woodard & Curran has also been awarded the contract for Major Improvements for the last 4 consecutive years. Recent projects include Digester Nos. 5 and 6 Cleaning which had been in service since 1992 and had not been cleaned. These two digesters were showing signs of grit accumulation and EWA had been experiencing problems such as plugged sludge pump suction lines. Aeration Basin Nos. 1 and 2 Air Piping Replacement project is currently in construction phase. This involved a 16-inch and 30-inch steel aeration air header, which had a severe air leak. Air had been escaping from the relief valves, expansion joints and construction joints of the aeration basins. In addition, when it rains air could be seen bubbling out of the ground.





INLAND EMPIRE UTILITIES AGENCY

CHINO, CALIFORNIA

RP-2/RP-5 PUMP STATION OVERFLOW DESIGN

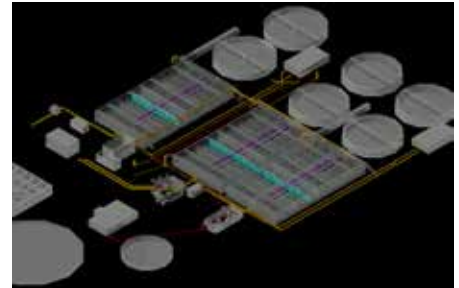
As part of Phase I site investigation and evaluation of IEUA's sewer system, Woodard & Curran examined the Los Serranos trunk sewer, the Chino Interceptor, the Emergency lagoon at RP-2, and interconnecting piping. We then performed a hydraulic evaluation and modeling of existing sewer system design and layout, and identified problem and deficiencies of the system. Woodard & Curran made recommendations to improve the flow capacity and operations of the system. The current stop-log structure (ST-1) was redesigned with a permanent weir structure. The evaluation work of Phase I was used for the design of improvements under Phase II of the project.

During Phase II, we prepared design documents based on the hydraulic analysis, as well as assisting with bidding and construction. The project improvements are comprised of various components, including structural modifications to two existing structures in the trunk system, new piping at the WWTP to route flows to existing Overflow Prevention Basins, and new piping at the WWTP.

The project was a fast-track assignment, with Woodard & Curran responding with modeling and 30% design within 30 days of NTP. The original project called for an overflow protection system for RP-5 pump station. Early on, Woodard & Curran identified an opportunity to provide equal protection for RP-2 pump station with minimal additional piping. By examining 22 sets of plant and pipeline as-builts and working directly with IEUA engineering, operations and construction staff, Woodard & Curran was able to provide a design to protect both pump stations for a construction cost of \$295,000, a fraction of the original budget. Once the final design concept was agreed upon, Woodard & Curran completed final design within five months.

Project Highlights:

- **Site Investigation, Hydraulic Evaluation, and Design** – Woodard & Curran conducted investigation and designed improvements to RP-2 headworks, emergency lagoon, PS-1, and piping and accessories, PS-2, and interconnecting sewer system, a new sewer segment, and a new manhole structure.
- **Fast-Track Work** – Woodard & Curran conducted modeling and 30% design within 30 days of NTP; completed final design within five months of design NTP.
- **Cost-Saving Ideas** – Woodard & Curran identified a way to provide equal protection for the RP-2 pump station with minimal additional piping; by closely examining plant and pipeline as-builts and working with IEUA staff, Woodard & Curran designed to protect both pump stations for a fraction of the original construction budget.





CITY OF BRENTWOOD CALIFORNIA

WASTEWATER TREATMENT PLANT PHASE 1

Woodard & Curran worked with the City of Brentwood to assist in solving their Delta wastewater discharge issues. As part of the Wastewater Facilities Plant effort, regionalization of a number of east Contra Costa communities was considered. Interim improvements to the existing WWTP were designed to allow continued operation until a long-term solution was implemented.

Woodard & Curran then managed the design of the new \$39 million, 5 mgd wastewater treatment plant for the City of Brentwood, which includes:

- Influent pump station and metering
- Screenings
- Grit removal
- Denitrification basins
- Oxidation ditches
- Secondary clarifiers
- RAS pump station
- Filter pump station
- Tertiary filters
- Chlorination/dechlorination facilities
- Utility and reclaimed water pump stations
- Effluent metering
- Cascade aerator
- Outfall structure
- Gaging station

The plant was designed to meet Title 22 requirements for unrestricted reuse of the treated effluent. Effluent is discharged to off-site reclamation users (golf courses and parks), on-site land disposal ponds, and Marsh Creek.

As part of this project, SRF funding was obtained, assistance in EIR preparation was completed, and NPDES permit negotiations with the Central Valley Regional Water Quality Control Board were successfully performed to obtain a new NPDES permit.

Project Highlights:

- **Solved Delta Wastewater Discharge Issues** – Woodard & Curran worked with the City of Brentwood to assist in solving their Delta wastewater discharge issues.
- **Designed Interim Improvements** – Woodard & Curran designed improvements to the existing WWTP to meet regulations until the long-term solution was implemented.
- **Designed of New Wastewater Treatment Plant** – Woodard & Curran then designed the new \$39 million, 5 mgd wastewater treatment plant to meet Title 22 requirements.

Woodard & Curran managed the design of the new \$39 million, 5 mgd wastewater treatment plant for the City of Brentwood.





CITY OF BRENTWOOD CALIFORNIA

WASTEWATER TREATMENT PLANT PHASE II

Woodard & Curran recently completed a predesign to expand the capacity of the Brentwood WWTP from 5.0 MGD to 6.4 MGD (planned buildout) to meet near-term needs, while optimizing new facilities to meet long-term goals, as well as making the facility as energy efficient as practical. Services consist of recalibrating buildout flows and load criteria based on newer data and the City's population projects; reassessing current and future required process capacity based on revised flow and load projects; transitioning to diffused air for process flexibility, increased capacity, and energy efficiency; re-rating the existing filters to eliminate the need for additional units; and using technical experts to provide direction for disinfection and biosolids dryer process upgrades..



Project Highlights:

- Reviewed and updated flow load projections, which established the baseline for process sizing to meet buildout conditions
- Upgrades were identified to minimize operational and capital costs
- Held workshops with the City to evaluate biosolids dryer equipment options based on: product quality, ease of operation, lifecycle cost, footprint, safety





ORANGE COUNTY SANITATION DIST.

ORANGE COUNTY, CALIFORNIA

CENGEN STRAINER DRAIN AND SUMP PUMP DISCHARGE PIPING MODIFICATIONS, TRICKLING FILTER REHABILITATION AND NEW CLARIFIER DESIGN, PEAK FLOW MANAGEMENT PROJECTS

Woodard & Curran has managed and designed numerous treatment plant improvement projects for Orange County Sanitation District:

- The CenGen Strainer Drain project includes predesign, design, bid and construction services to improve drainage by rerouting drain piping. Sump pump discharge drains are rerouted for operational flexibility.
- For the trickling filters and clarifiers replacement project, the Woodard & Curran team was responsible for design of clarifiers (30 mgd capacity), sludge/scum pump station, effluent junction box for flow control, effluent disposal conveyance options, hydraulic modeling and evaluation of pipe routing alternatives. Rehabilitation project was coordinated closely with several ongoing improvement projects for the District and included numerous workshops, preparation of design memoranda and drawings as well as construction phase services.
- Peak flow management efforts have included identification of suitable facilities and design through construction of modifications including effluent weir automation, primary and secondary clarifier modifications, rehabilitation of structures, and dewatering pump installation. This effort included a feasibility analysis of flow equalization basin construction, use of standby process basins for peak flow storage, retrofit of gates and weirs to allow remote adjustment and automated control, installation of basin dewatering pump, and evaluation of on-site stormwater generation.





INLAND EMPIRE UTILITIES AGENCY

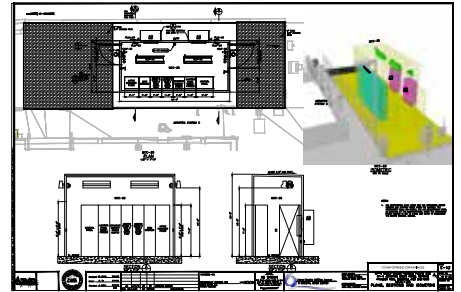
CHINO, CALIFORNIA

RP-1 MIXED LIQUOR RETURN PUMPS

IEUA retained Woodard & Curran to provide engineering services to design a Mixed Liquor Return (MLR) Pumps system at Regional Water Recycling Plant No. 1 (RP-1) to reduce effluent Total Inorganic Nitrogen (TIN) to comply with NPDES and groundwater recharge program permit conditions. IEUA's NPDES permit has limits for TIN concentration of 8 mg/L and mass emission rate of 5,338 lbs/day based on a 12-month flow-weighted running average. NPDES compliance is determined on an agency-wide basis using the flow-weighted average of discharges from RP-1, RP-4, RP- 5 and Carbon Canyon Water Recycling Facility (CCWRF). IEUA's groundwater recharge program permit requires a maximum total nitrogen (TN) concentration in recharged recycled water or a combination of recycled water and diluent blend water not to exceed 5 mg/L prior to reaching the groundwater table. Compliance with groundwater recharge permit conditions is based on lysimeter readings near each basin.

As part of the IEUA Wastewater Facilities Master Plan, process modeling was performed to evaluate existing RP-1 liquid treatment capacity to meet both 5 mg/L and 8 mg/L effluent TIN under average and maximum month flow and load conditions. The process modeling showed that the overall liquid treatment capacity with a mixed liquor return system installed could meet 8 mg/L TIN at a 32 MGD flow rate, and could meet 5 mg/L at a 28 MGD flow rate. Current average influent flow is approximately 28 MGD and flows are predicted to increase to 33 MGD by 2035. Implementation of an MLR pumps system at RP-1 will help IEUA optimize its treatment capacity while meeting NPDES and groundwater recharge permit requirements with a modest capital investment until the next major plant capacity expansion, expected to occur in 2035.

Water 3 Engineering/Woodard & Curran Water and Environment (Woodard & Curran) completed an evaluation of alternatives and final design of an RP-1 MLR pumps system in 2007, but the project was shelved before construction. Since 2007, existing conditions and the goals for the project appear to remain the same. The previously designed MLR pumps system would improve TIN removal at RP-1 with an investment of approximately \$6m (in 2007 dollars). This project will revisit the assumptions used for the original to confirm it is the best solution that balances the anticipated reductions in TIN with cost and provides revised design documents that reflect changes at RP-1 since 2007.







Key Staff

Woodard & Curran offers King County Department of Natural Resources and Parks leading wastewater engineering experts who have helped numerous clients with upgrading their aging infrastructure. To ensure successful and timely completion of all engineering tasks, we have assembled an experienced and dedicated project team with a proven record in providing quality service while meeting aggressive deadlines and minimizing costs. Woodard & Curran offers in-depth experience which includes enhanced nutrient removal, management and disposal of residuals, alternative discharge scenarios, permitting, evaluations, pilot programs, O&M training, and operations improvement programs.

Our project team will do what it takes to make each project a success, whether it's using new technology to optimize operations and reduce costs or leveraging funding sources to help municipalities achieve compliance. We have the expertise and flexibility to meet the changing needs of clients and of ever-increasing regulations. Because we have access to a diverse group of in-house engineers, scientists, and operations professionals, we can match the right people and skills to the job.

Phyllis Brunner, PE

Phyllis has over 40 years of experience in civil and environmental engineering. Her civil background includes projects ranging from planning-level studies to design and construction of large municipal/industrial facilities. She has served as senior principal-in-charge, project manager or engineer for numerous wastewater, civil, remediation, and water projects for many public agencies in the Pacific Northwest, Colorado, Alaska and in New England. Phyllis has an extensive infrastructure rehabilitation background in the utilities area that encompasses water reservoirs, pipelines, dams and large-diameter brick sewers. She has managed numerous large teams of professionals on multidisciplinary projects for local agencies and is known for her excellent organization and communication skills. Proven client service and project/program manager, ensuring on-time, on-budget completion, quality control and assurance, health and safety, resource commitment, and risk mitigation on some of the largest and most innovative environmental programs and infrastructure rehabilitation projects in the U.S. Brings proven success in bridging diverse teams across geographies using an engaging leadership style, cultivated over the years, to deliver sustainable results. She received the Engineering Award of Excellence in 1998 in recognition for her outstanding service to the profession, ASCE, and the Pipeline Division.

Mike Matson, PE

Mike specializes in the planning, design and construction of water infrastructure projects, including hydraulic evaluations, design and construction of water and recycled water systems, as well as facilities planning for water, wastewater and recycled water systems. He has participated in the design of approximately 150 miles of up to 96-inch diameter



Phyllis Brunner, PE
Principal in Charge



Mike Matson, PE
Project Manager

water and recycled water pipelines, approximately 12 miles of up to 36-inch diameter sanitary/storm sewer pipelines, six pump stations up to 160 MGD, and six reservoirs up to 10 MG.

Edward J. Melanson, PE

Edward has over 35 years of experience working with control systems for municipal, private and federal clients across North America. His specialty is process automation for water and wastewater treatment, collection, and distribution facilities, and his experience includes project management, value engineering, planning, forensic analysis, condition assessment, design, programming, construction supervision, and startup on projects ranging from small (less than 1 MGD) to large (greater than 200 MGD) facilities. Edward's experience includes working with most current technologies such as distributed control systems (DCS), programmable logic controllers (PLCs), human-machine interface (HMI) systems, and supervisory control and data acquisition (SCADA) systems.

Stephen Clary

Steve brings a diverse understanding of water and wastewater issues developed during his experience on projects in California and around the world. Previously, Steve was program director for Sydney's \$3 billion Clean Waterways Program where he managed significant cost reductions while still meeting the environmental and customer service goals. In California, he has experience in nearly all aspects of water and wastewater projects including community outreach, regulatory agency negotiations, stakeholder consensus building, planning, design, and construction management. Steve has also been project manager or project engineer for the planning and detailed design of secondary and tertiary treatment facilities for various agencies in California. These projects include phosphorous removal and nitrogen removal treatment plants, as well as biosolids treatment and effluent reuse facilities.

Marius Basson

Marius is an experienced engineering professional with more than 20 years experience in leading and implementing business improvement and reliability programs. He specialized in the application of Reliability centered Maintenance (RCM2) for many years and adopted a methodical way of thinking. He has a strong track record of successful engagements with asset intensive industries including manufacturing, chemical, oil and gas, mining, electric utilities, water and wastewater utilities, chemical, nuclear waste processing and other process industries. He has extensive experience as a dynamic manager with a proven track record in large capital project management.

Chibby Alloway

Chibby has over 40 years of general management, technology evaluations, design, build and operational experiences in the water and wastewater utility industry. He has had a varied employment career with regulators – U.S.E.P.A., public sector – Ventura Sanitation District in Ventura, California, consulting engineering – Metcalf and Eddy, and the private sector with several design and operations based companies have provided Chibby with a comprehensive prospective for management of water and wastewater technology companies. His technical expertise's includes applied water and wastewater research and development; engineering and design of capital improvement plan development and execution, process engineering and modeling, facility and network asset management programs, and in situ reductions of volatile and semi-volatile organics.



Stephen Clary
Senior Environmental Engineer



Chibby Alloway
Operations Specialist



Randy Jones
Operations Specialist

Managerial he began as a manager of a small municipal wastewater project early in his career to managing a larger water and wastewater engineering and operations business unit which was based in the Western United States principally in California, Washington, Oregon, Arizona, and Hawaii and represented over 70 municipal and industrial clients.

Randy Jones

Randy Jones has 37 years of experience in the water, wastewater, and industrial wastewater fields. He specializes in the management of daily operations, operator training, treatment facility start-up, troubleshooting, construction and compliance. In the past 15 years, he has received 40-hour MSHA training and holds a current 40-hour OSHA certificate, as well as 8-hour OSHA supervisor training. Over the course of his career, Randy has overseen 175 contract operations company acquisitions and has considerable experience with budgetary processes and wastewater and water treatment plant expansions. Today, he works to identify cost reduction and efficiencies at Woodard & Curran's facilities in the western states.

Paul Dombrowski, PE, PLS, BCEE

Paul has over 30 years of experience providing civil and environmental consulting services to municipalities and clients in the private sector. He focuses on the evaluation, design, construction, and operation of wastewater treatment facilities. He has completed more than 30 facilities plans and plant evaluations. He has served as the technical lead on the evaluation, design, construction administration and/or startup of numerous upgrade projects that cumulatively exceed \$750 million dollars. Paul is well recognized for his practical treatment process expertise and has contributed to many of the current design and operations Manuals of Practice (MOP) published by the Water Environment Federation (WEF) (MOP-8, 29, 31, 34 & 35) and the New England Interstate Water Pollution Control Commission (the 2011 edition of TR-16 and subsequent revisions related to flood resiliency). Paul also serves on the Editorial Advisory Committee of the Operations Forum section of the WEF magazine Water Environment and Technology. He regularly lectures on wastewater design and operation at both the University of Massachusetts, Worcester Polytechnic Institute and for many of the state operator associations throughout New England. Paul is currently participating on the Water Environment Research Foundation (WERF) work group investigating Sidestream Enhanced Biological Phosphorus Removal with numerous industry leaders and an academic team from Northeastern University.

Marilyn Bailey, PE

Marilyn specializes in the planning, design, and construction of water, wastewater treatment and water recycling systems. She has worked on regional multi-agency master plans utilizing innovative engineering and institutional solutions to maximize water recycling. She has also been involved with design and construction of water recycling and wastewater treatment facilities throughout the Bay Area with capacities up to 160 MGD.

Paul Giorsetto, PE, LEED AP, BD+C

Paul has more than 25 years of design experience in the areas of electrical power distribution, electrical industrial applications, control systems, and instrumentation. His specific experience includes electrical system modeling and planning; medium and low-voltage electrical distribution designs of water, wastewater and industrial waste treatment facilities; plant instrumentation; and SCADA systems for in-plant and telemetry-based systems. He also has significant experience in construction services, as a resident engineer and inspector, and during facility startup.



Paul Dombrowski, PE, PLS, BCEE
Senior Process Engineer



Marilyn Bailey, PE
Senior Environmental Engineer



Paul Giorsetto, PE, LEED AP, BD+C
Electrical Power
TJC and Associates, Inc.

Paul has been the electrical and/or discipline lead on numerous large water and wastewater design projects, and has been a project manager on stand-alone control system and electrical design projects having construction costs in excess of \$3 million. He has acted as project manager on several standalone electrical and instrumentation and controls (I&C) design-build projects.

Michael J. Erwin, PE

Michael heads up TJCAA's Control Systems Programming group, has been building valuable experience since 1986 in the design, implementation, and management of electrical power, control, automation, and instrumentation systems. He performs electrical design engineering for water and wastewater treatment facilities, collection and distribution systems, and industrial facilities, focusing on instrumentation and control system design and programming. His specific experience includes development of power calculations, protective device coordination, equipment specification, instrument selection, and control panel fabrication design; design of SCADA systems for in-plant and telemetry-based systems; and programmable logic controller (PLC) programming.

Michael has hands-on familiarity with a wide variety of PLC and SCADA hardware and software platforms, including Rockwell Automation, Schneider Electric, and GE Intelligent Platforms. He gained his extensive experience not only as a consultant, but also as chief engineer and project manager for a Northern California systems integrator. With this understanding of the water/wastewater, control system, and construction industries, he emphasizes constructability and focuses on systems that feature maximum operator usability and efficiency.

Terence J. Cavanagh, SE

Terence, a licensed engineer since 1985, is an expert in the design of water and wastewater treatment plant structures. He specializes in the structural design and seismic evaluation of facilities including water and wastewater treatment plants, reservoirs and storage tanks, pump stations, ozone treatment facilities, chemical storage and containment facilities, and operations centers/laboratories. He provides significant design expertise with all conventional building materials used for water and wastewater treatment facilities.



Michael J. Erwin, PE
Control Systems Programming
TJC and Associates, Inc.



Terence J. Cavanagh, SE
Structural Design
TJC and Associates, Inc.



PHYLLIS BRUNNER, PE

PRINCIPAL-IN-CHARGE

Professional Profile

Phyllis has over 40 years of experience in civil and environmental engineering. Her civil background includes projects ranging from planning-level studies to design and construction of large municipal/industrial facilities. She has served as senior principal-in-charge, project manager or engineer for numerous wastewater, civil, remediation, and water projects for many public agencies in the Pacific Northwest, Colorado, Alaska and in New England. Phyllis has an extensive infrastructure rehabilitation background in the utilities area that encompasses water reservoirs, pipelines, dams and large-diameter brick sewers. She has managed numerous large teams of professionals on multidisciplinary projects for local agencies and is known for her excellent organization and communication skills. Proven client service and project/program manager, ensuring on-time, on-budget completion, quality control and assurance, health and safety, resource commitment, and risk mitigation on some of the largest and most innovative environmental programs and infrastructure rehabilitation projects in the U.S. Brings proven success in bridging diverse teams across geographies using an engaging leadership style, cultivated over the years, to deliver sustainable results.

She received the Engineering Award of Excellence in 1998 in recognition for her outstanding service to the profession, ASCE, and the Pipeline Division.

Related Experience

Metro Vancouver, British Columbia – Annacis Island Wastewater Treatment Plant (AIWWTP) Stage 5 Expansion, Pre-design, Detailed Design and Construction Management Services. Senior Principal Oversight for the planning, design and construction of AIWWTP's Stage 5 expansion to meet a projected 2024 flow of 170 MGD (ADWF). The pre-design included extensive wastewater characterization, process and hydraulic modeling, existing capacity and facility condition assessment, sustainability, redundancy, and post disaster evaluations. A plan was developed after alternatives and costs were determined and presented to the client. The pre-design effort envisioned the project to the 10% conceptual level. The final design is now underway and includes civil and landscape, architectural, structural, mechanical, HVAC, process, and EIC design as well as provision of tendering, pre-purchasing, and related services. Initial design packages for ground improvements have tendered and are under construction. The project is being conducted in two phases and started with the BC team awarded the work in 2007 and the stage 5 start-up anticipated in 2020. Capital cost is \$500 Million.

King County, WA – Brightwater Wastewater Treatment Plant (WWTP). Senior Principal Oversight for the BC led pre-design and final design for half of the major treatment facility designs for the Brightwater Treatment Plant. The project included planning and development of one of the nation's largest Greenfield wastewater treatment plants, designed for an ultimate average wet weather flow of 54 MGD and peak flow of 170 MGD. BC led the detailed designs for the new plant headworks, chemically enhanced primary treatment (CEPT), innovative submerged fixed-cover digesters, and new energy

Education

- Bachelors, Civil Engineering, University of Colorado - Boulder
- Bachelors, Geology, University of Vermont
- Advanced Management Program AMP 165, Harvard Business School

Registrations

- Registered Professional Engineer: Washington, Alaska, Maine

Associations

- American Society of Civil Engineers (ASCE)
 - Water Environment Federation (WEF)
 - Pacific Northwest Clean Water Association (PNCWA)
-

building. The new plant incorporates one of the highest levels of odor treatment in the nation, stringent sustainability criteria, and innovative landscape and architectural designs. The project was completed five years ago and is a major showcase of innovation, learning and successful operation for King County.

City of Lake Oswego, Oregon – Lake Oswego Interceptor Sewer. Senior Principal Oversight for the BC led pre-design, final design, and construction management efforts over 9 years to deliver this innovative, six-project, \$90 Million program. The pipeline is a submerged, buoyant gravity line that is secured to the bottom of the lake. All manholes and structural support is highly engineered and designed for underwater. The end result is a new and upgraded interceptor and trunk sewer system in and around Oswego Lake. The program was completed in 2011 on schedule and 10 percent under budget despite a wide variety of daunting technical, permitting, and public-relations challenges. The project has received numerous awards and recognition by the engineering profession for innovation and risk mitigation.

Pierce County Department of Public Works and Utilities, Pierce County, WA – Chambers Creek Regional WWTP Pre-design, Design and Construction Management Services. Senior Principal Oversight for the BC provided pre-design, design and construction services for the Chambers Creek Regional WWTP to enhance the level of treatment, provide additional treatment capacity, and rehabilitate the facilities, many of which are more than 25 years old. Planned upgrades, renovations, and expansions included odor and solids stream improvements; liquid stream improvements; plant laboratory, maintenance, and administration buildings; odor control and primary sedimentation tank rehabilitation; and biosolids and energy recovery. The construction phase is currently under way. The capital cost is \$400

million with project start-up in early 2017. The project site was home to the 2015 US Open Chambers Bay Golf Tournament which provided unique challenges to the design and construction team regarding phasing and delivery of construction services. Timing milestones and damages were factored into the delivery contracts and no claims were filed as the event and the construction did not impact each other.

City of Portland, ME – Ocean Gateway Cruise Ship and International Ferry Terminal. Program Manager led the master planning and preliminary design of the Ocean Gateway Cruise Ship and International Ferry Terminal located in Portland Harbor. The project involved redevelopment of a 24-acre site strategically situated at the entrance to Portland Harbor that had been the Bath Ironworks Ship Repair Facility for many years. The purpose of the project was to redevelop the site as a multi-use waterfront transportation facility for marine passenger operations serving the state of Maine and the region. The project involved a master planning effort that required an extensive inventory of the existing facilities both on land and in adjoining waters. The project has since been constructed and promoted redevelopment and economic investment into the entire adjacent area on the city's waterfront. The program overall has received industry recognition and several engineering awards.

Boston Water and Sewer Commission, Boston, MA – Flow Monitoring Evaluation. Project Manager and Senior Technical Advisor for installation, data collection, analyses, and reporting from 25 flow meters and five rain gauges located throughout the entire local Boston collection system over a 3-year duration. Purpose was to evaluate overall system capacity, identify I/I issues, locate areas of tidal influence, and recommend improvements.

King County, WA – West Point Wastewater Treatment Plant Biosolids Dryer Facility Evaluation. Project Manager and third-party engineer evaluating alternative options benefit/cost to an indirect dryer facility operated by a private contractor at the plant. Work was conducted under an emergency ordinance by King County. Directed all technical work, third party evaluation, and reporting. Extensive public process with local citizens, County Council, and County Executive. Follow-on work included design and construction support of recommended improvements to biosolids handling practices at the West Point Plant.

King County Metro, Seattle, WA – On-Call Environmental Services. Contract manager to provide on-call environmental services over a 3-year period from 1992-1995. Work orders included a remedial investigation/feasibility study (RI/FS) for a sewage treatment plant, underground and aboveground storage tank (UST/AST) designs, environmental assessment, development of a hazardous materials management plan, sensitive areas studies, and construction management services. Managed over 30 work orders with a total consulting contract value of \$3 million.

Port of Seattle, Seattle, WA – Environmental Clean-up and Redevelopment Duwamish Waterway Terminal 5 Container Facility. Principal-in-Charge and Senior Civil Engineer for the remediation of Area #3 approximately 30 acres adjacent to Harbor Avenue, which was a former landfill and scrap yard. Scope included an environmental RI/FS Remedial Action Plan, permit support, regulatory negotiations, cleanup design services, preparation of plans/specifications, bid support, and construction oversight for a landfill closure gas and collection systems. Scope also included final design of site/civil improvements for parking, public access, landscape, and container storage. Project was conducted with ultimate use

as the American President's Line (APL) container facility that is the current tenant.

Municipality of Metropolitan Seattle, WA – Brick Sewer Rehabilitation Program.

Project Manager for project intended to evaluate and rehabilitate 11 miles of 36-inch to 144-inch brick sewers built at the turn of the century. The program consisted of a \$72 million budget spread over six phases. The scope of work included surveying, field inspection, engineering evaluation, rehabilitation recommendations, preparation of contract documents, and construction management. Repair work included internal and external grouting, manhole rehabilitation, sediment removal, construction of a 130-foot deep, 20-foot-diameter access shaft, and installation of numerous permanent monitoring stations for future inspections.

Employment History

Woodard & Curran

www.woodardcurran.com

Woodard & Curran is a 1000-person privately held firm providing integrated engineering, science, and operations to a diverse clientele including municipalities, industry, colleges and universities, the real estate community, and food and beverage manufacturers.

President of Consulting

Sept. 2016 – Present, Portland, Maine

Responsible for the strategic leadership of the organization to ensure its future relevance, credibility and viability. Responsible for establishing organizational objectives and priorities, providing hands-on leadership toward market growth and business planning goals, and actively working towards developing business for the organization while focusing attention on the internal operations and opportunities for improvement, team building, increased efficiencies and innovation.

Brown and Caldwell

brownandcaldwell.com

Brown and Caldwell (BC) is one of the largest employee-owned engineering consulting firms in the U.S. The firm has 50 offices and approximately 1500 employees providing consulting services to municipal and private sector clients.

Brown and Caldwell, West Region

Management, Senior Vice President

2001 – Sept. 2016, Seattle, Washington

Led average annual business of \$150M for 600+ person professional environmental engineer, scientific, construction management, information technology, business consulting and marketing team. Responsible for managing and growing the region's business, including 12 offices, while ensuring high standards for quality, client service, safety and communications.

Woodard & Curran

www.woodardcurran.com

Woodard & Curran is a 1000-person privately held firm providing integrated engineering, science, and operations to a diverse clientele including municipalities, industry, colleges and universities, the real estate community, and food and beverage manufacturers.

Municipal Business Practice Leader,

Northeast Region

1998 – 2001, Portland, Maine

Responsible for municipal sales, marketing, contracting, project execution, delivery, and customer service. Supervised staff of 20 and business revenues of \$10 million. Clients included the Maine Department of Transportation, City of Portland, and Boston Water and Sewer Commission.

Woodward-Clyde Consulting Engineers

Woodward-Clyde Consulting Engineers with annual revenues of \$400M was acquired by URS in 1997. The 3,000 person company was a privately held

engineering firm providing full-service environmental engineering service to federal, state and local government as well as private sector clients. The firm provided planning, design and construction services in water, wastewater, waste remediation, and solid waste. The company was regularly recognized for geotechnical services, dams, tunnels, and international seismic expertise.

Vice President, Seattle Operations

Manager

1991 – 1998, Seattle, Washington

Responsible for growth of Seattle office, expanding client base and tripling number of professionals serving Pacific Northwest clients. Projects ranged in size from small investigations to design-builds of multi-million dollar complex landfill closure programs. As Operations Manager, responsible for strategic vision, operations plans, business development priorities, and assuring technical quality of deliverables and products and outstanding client service was provided by office of nearly 100 professionals. Managed large complex projects and contributed as senior advisor to company directors.

Brown and Caldwell

brownandcaldwell.com

Brown and Caldwell (BC) is one of the largest employee-owned engineering consulting firms in the U.S. The firm has 50 offices and approximately 1500 employees providing consulting services to municipal and private sector clients.

Senior Project Manager/Engineer

1985 – 1991, Seattle, Washington

Hired as project engineer and promoted to senior manager responsible for one third of the office revenues in wastewater engineering. Led large condition assessment programs for the City of Seattle and King County. Applied technical expertise in collection systems for municipal agencies and clients.

City of Boulder, Colorado

Engineer and Project Manager

1983 - 1985, Boulder, Colorado

One of three Utilities Department project managers responsible for all City projects associated with water, sewer, and flood control for the city of 80,000 people.

Responsibilities included project planning, design, construction, contract administration, and public contact related to capital improvement projects. Typical projects had a 1-year implementation deadline in order to comply with City budgeting requirements. Completed approximately 30 projects annually, working with in-house engineering staff and outside consultants.

Other

Project engineer, technician and surveyor with Scott, Cox & Associates and Brokaw Eng. Associates, 1976 – 1982



MICHAEL H. MATSON, PE

PROJECT MANAGER

Professional Profile

Mike specializes in the planning, design and construction of water infrastructure projects, including hydraulic evaluations, design and construction of water and recycled water systems, as well as facilities planning for water, wastewater and recycled water systems. He has participated in the design of approximately 150 miles of up to 96-inch diameter water and recycled water pipelines, approximately 12 miles of up to 36-inch diameter sanitary/storm sewer pipelines, six pump stations up to 160 MGD, and six reservoirs up to 10 MG.

Related Experience

Contra Costa Water District – Los Vaqueros Project. Project Engineer responsible for the overall design of the Old River Facility, a 10,500 hp, 250 cfs raw water intake and pumping facility. He also had civil and mechanical design responsibilities for the facility, including a 1,500-foot-long flood control levee; extensive subgrade soil improvements to mitigate for the soft, weak native soils; surge facilities; pile supported 78-inch pipeline; flow metering and isolation valve facilities; fish screen intake; and a pumping plant consisting of five 2,100 hp vertical turbine pumps. Also supervised the structural, electrical and instrumentation and control design work.

Delta Diablo Sanitation District – Bridgehead Pump Station and Bridgehead Conveyance System Phases 1 and 2. Project Manager for the comprehensive facilities master plan for the Delta Diablo Sanitation District (DDSD) for the Bridgehead Pump Station and Conveyance System, then managed design of Phase 1 and 2 facilities. The facilities master plan was performed to identify the facilities and the schedule for implementing capacity increases associated with wastewater flow from developing southeast Antioch. Designed of the initial capacity expansion project, a parallel 24-inch force main to augment the conveyance capacity of an existing 14-inch PVC force main that runs approximately 11,600 lineal feet. Managed the design of Phase 2 facilities, including a new pump station, emergency storage basin, and refurbishments to convert the existing pump station into an emergency diversion pump station. Facilities included an 11.75 MGD wet/dry pit pump station and 900 kW standby diesel generator; a 1.3-mg circular concrete emergency storage basin tank; and the appurtenant facilities for the pump station and force main.

City of Santa Clara, CA – Trimble Road Trunk Sewer. Responsible for quality assurance during the first phase of the trunk sewer design and evaluated six alternative alignments. All alternatives were 48-inches in diameter and the length varied from 1,400 to 4,900 feet long. Criteria used to rank the alternatives included operations and maintenance, constructability risk, impact to adjacent property/odors/noise, environmental impact mitigation, hydraulic capacity, schedule, traffic impact, permitting/easement acquisition, and capital cost. Each criterion was given a weighting (1 to 4) and each alternative was scored for each criterion (1 to 10). Designed the improvements, which included open cut and trenchless pipeline installation and cured-in-place pipe (CIPP) rehabilitation

Education

- B.S., Civil Engineering, University of California, Berkeley, 1984

Registration

- Professional Civil Engineer, California, #042546, 1987

Affiliations

- American Water Works Association
 - American Society of Civil Engineers
 - Water Environment Federation
 - Bay Area Water Works Association
 - California Water Environment Association
-

of a 48-inch trunk sewer. One of the challenges on this project was crossing under a high pressure gas transmission main, which involved working closely with PG&E.

Dublin San Ramon Services District (DSRSD) – Alamo Creek Trunk Sewer Relocation. Responsible for quality assurance for the preliminary design evaluation, an alignment alternatives analysis to determine the most feasible and cost-effective project, and final design to replace an existing creek crossing for the District's 36-inch diameter trunk sewer. Project features included completing environmental documentation, obtaining permits for the creek crossing, and construction near Caltrans overpass foundations.

City of Brentwood, CA – Wastewater Treatment Plant. Principal-in-Charge oversaw work with the City of Brentwood to assist in solving its Delta wastewater discharge issues. As part of the Wastewater Facilities Plant effort, regionalization of a number of east Contra Costa communities was considered. Interim improvements to the existing WWTP were designed to allow continued operation until a long-term solution was implemented. Assisted with the design of the new \$39 million, 5 MGD wastewater treatment plant for the City of Brentwood. The plant was designed to meet Title 22 requirements for unrestricted reuse of the treated effluent. Effluent is discharged to off-site reclamation users (golf courses and parks), onsite land disposal ponds, and Marsh Creek. As part of this project, State Revolving Funds funding was obtained, assistance in EIR preparation was completed, and NPDES permit negotiations with the Central Valley Regional Water Quality Control Board were successfully performed to obtain a new NPDES permit.

El Dorado Irrigation District – Deer Creek Wastewater Treatment Plant Improvement. Project Manager assisted in preparing a Basis of Design Report to establish design criteria and refine preliminary project requirements for the

Deer Creek Wastewater Treatment Plant upgrades to meet new NPDES requirements. The WWTP upgrades were designed for an average dry weather flow of 3.6 MGD and a peak wet weather flow of 10.3 MGD. The project involved preparing a detailed set of drawings and specifications based on information contained in the Basis of Design Report. The Deer Creek Wastewater Treatment Plant is designed to meet Title 22 requirements for unrestricted reuse of the treated effluent. Effluent is discharged to off-site reclamation users and to Deer Creek.

City of Winters, CA – Sanitary Sewer System Master Plan. Principal-in-Charge sewer system master planning services for the City of Winters. Although only recent additions to the City had record drawings, a computer model was developed of the existing trunk system and future improvements necessary to meet the General Plan for a population of 14,000. Evaluated various alternatives for dividing the main sewer-shed in town to optimize the money spent on improvements. To address the challenges posed by older sewers in the downtown area, steps were clearly identified for achieving cost-effective improvements that fit within the City's budget.

Los Osos Community Services District – Los Osos Wastewater Project. Project Manager responsible for the preliminary and final design of a portion of the wastewater collection system to serve the unsewered community of Los Osos in San Luis Obispo County. The design responsibilities for this project encompassed the southerly portion of Los Osos, consisting of northerly sloping hillsides. The collection system design for this area consisted of approximately 10 miles of gravity sewer, from 8-inch to 24-inch sewer trunks, including manholes and service laterals to the edge of the public road right-of-way. The project required significant coordination with adjacent collection system areas and effluent disposal and wastewater force main facilities being designed by

other consultant teams. Responsible for performing existing utility research and documentation, and for coordinating the siting of over 1,200 service laterals with property owners. A design analysis model was developed to determine the most efficient way to site sewers and sewer laterals in hilly areas.

Fairfield-Suisun Sewer District – Sewer System Management Plan. Principal-in-Charge oversaw preparation of a Sewer System Management Plan (SSMP) for the Fairfield-Suisun Sewer District to reflect current practices, as well as goals and objectives for effective planning and management of the District's collection system. The SSMP met the sewer system management plan requirements of the San Francisco Bay Regional Water Quality Control Board, as well as anticipated State Water Resource Control Board waste discharge requirements for sewage collection system agencies.

San Luis Obispo County – Design of Collection System Improvements. Project Manager for the design of collection system improvements for the County of San Luis Obispo County Service Area No. 1. These improvements were required under a RWQCB order to eliminate septic tank disposal of domestic wastewater. New lateral connections were designed for properties not connected to the collection system, as well as a new bypass to connect properties previously served by a community leach field with the Nipomo wastewater treatment facility.

Livermore-Amador Valley Water Management Agency - Export Pipeline Program. Program Manager responsible for technical reviews, costs estimates, and development of rehabilitation concepts for the existing force main. This program involved the design and construction of 16 miles of pipeline, a 41.2 MGD pump station, and approximately six miles of relining the existing pipeline.

Edward J. Melanson, PE

Process Automation

Education

University of Phoenix, BS
Information Systems, 1997

Professional Registrations / Affiliations

Licensed Professional
Engineer in Massachusetts,
North Carolina, California,
Washington, Maine,
Connecticut, New
Hampshire

Risk Assessment
Methodology Water
Certified, (RAM-W), 2002

American Water Works
Association (AWWA),
Member, M-33 Committee
Author

New England Water Works
Association (NEWWA),
Member

Board of Public Works
Chairman (2006-2008),
DPW Formation Committee
Chair, Capital Outlay
Committee, Norfolk, MA

Years in the Industry

35+

Areas of Technical Expertise

Forensic Analysis, Condition
Assessment, Retrofit Design
for Existing Facilities,
Project Management,
Control System Design,
SCADA Design,
Application Programming,
Construction Services

Summary of Qualifications

Mr. Melanson has over 35 years of experience working with control systems for municipal, private and federal clients across North America. His specialty is process automation for water and wastewater treatment, collection, and distribution facilities, and his experience includes project management, value engineering, planning, forensic analysis, condition assessment, design, programming, construction supervision, and startup on projects ranging from small (less than 1 MGD) to large (greater than 200 MGD) facilities. Mr. Melanson's experience includes working with most current technologies such as distributed control systems (DCS), programmable logic controllers (PLCs), human-machine interface (HMI) systems, and supervisory control and data acquisition (SCADA) systems.

Pocono Township, PA – Emergency Sewer System Repairs. The Township contracted with another engineer and publicly bid the installation of a new sewer system that included 5 pumping stations and approximately 8 miles of sewer throughout the mountain region. The system was placed into operations and began to immediately fail. Mr. Melanson was part of a team that performed a forensic assessment on the system. The assessment concluded the overall system had many critical issues that were leading to the multiple failures. As part of corrective action, Mr. Melanson redesigned the control system to improve responsiveness and overall control, worked directly with the new systems integrator to implement the emergency fixes in the field, and performed a startup/commissioning process of the emergency repairs. Additionally, Mr. Melanson redesigned the entire control system at all facilities and their SCADA to meet industry standards, to eliminate faulty and equipment, and to simplify the overall operations to meet the Township's requirements.

Greenville Utilities Commission, NC - WWTP and Remote PS Electrical and SCADA Upgrades Project (SRF Project). This project focused on resolving issues and omissions remaining after substantial completion by the General Contractor under the oversight of another consultant. The work included multiple phases associated with debugging and repairing software controls, replacing defective equipment, redesign and installation of a plant-wide wireless network, developing staffing plans for the new facility, and producing automation design standards. Mr. Melanson was responsible for all tasks related to design, equipment selection, documentation of existing systems, preparing staffing responsibility plans, and developing design standards for both regional and duplex pump stations. Mr. Melanson assisted with troubleshooting and repair of various instrumentation and SCADA issues.

Randolph Park Water Reclamation Facility – Pima County, AZ. Randolph Park experienced a failure that led to flooding of the plant and destruction of most equipment. Mr. Melanson was brought in to assist the legal team in determining the root-cause that led to the catastrophic failure. The project centered on a failure of the monitoring and control system, proper design of fail-safe components, and the human element of responding to alarms when the system reported an anomaly. The work included review of design documents, as-builts, site visits, review of testimony, and interaction with the various stakeholders. The project completed with a settlement.

SCADA System, Cambridge Water Department, Cambridge, MA. This multi-discipline design project included a task to design and then implement SCADA at their 24 MGD Sullivan Water Treatment Plant. Mr. Melanson's responsibilities included supervising staff; assisting with the development of PLC programs, HMI graphics, and databases; field engineering; coordinating the development of an information system master plan; coordinating development and construction activities with the client, the contractor, and several subcontractors; and providing technical assistance on PLC and HMI issues. During field installation, Mr. Melanson was responsible for overseeing all field testing, checkout, startup, and training activities for the PLC and HMI systems. Prior to project completion, the plant experienced a catastrophic failure after a power outage of the surge control system. The failure led to the flooding of all areas located below grade, resulting in the destruction of most equipment. Mr. Melanson was part of the team that assisted the Contractor in assessing damage, and in re-testing the replacement equipment.

Southerly WWTP Renewable Energy Project SCADA System Value Engineering Study, NEORS, Cleveland, OH. Mr. Melanson served on a value engineering team to perform a detailed analysis of the proposed control system and contracting means for the Southerly Renewable Energy Project. This study, which was primarily a risk assessment, included review of all Contract 80 and 80B documents, discussions with the primary consultant and their lead subconsultants, identification of risk elements and high level mitigation actions, and a prioritization of recommendations. Key recommendations are being incorporated by the District at Southerly and other facilities in the NEORS system.

Water System Energy Efficiency Improvements Project, Cleveland, OH. Mr. Melanson was responsible for working with a diverse team to analyze energy usage and make recommendations for improvements for the Cleveland Division of Water. The work included analysis at all major facilities including pump stations and treatment plants. The analysis looked at equipment, day-to-day operations, pumping strategies, energy suppliers and their rate structures, and potential vendors. Mr. Melanson was responsible for guiding the team on automation systems and concepts for energy optimization, and leading negotiations with various vendors on potential solutions.

SCADA System Design, Western Wake Partners, Town of Cary, NC. Mr. Melanson was responsible for overseeing the technical aspects of the conceptual design for the SCADA system for a new wastewater treatment plant and seven remote pumping stations. The work included an evaluation of various remote site communications systems for the WWP and the Town of Cary; evaluation of other business systems and their integration into a comprehensive enterprise level system; evaluation and recommendations for specific hardware and software products including PLC's, network equipment, computer hardware, and SCADA software; and standards development for setting direction by other engineering consultants on facility designs that integrate to the overall SCADA system. This work included interface with other engineering consultants, representing the Partners, to help achieve the goal of a single, integrated system.

SCADA System, Walnut Hill Water Treatment Plant, Massachusetts Water Resources Authority, Marlborough, MA. For this multi-phase project, Mr. Melanson served as the project manager overseeing the instrumentation design and application engineering tasks. For the design, Mr. Melanson was responsible for supervising staff; overseeing development of all design documents including loop diagrams, wiring and panel details, and specifications. The design includes incorporation of many vendor packages into the overall SCADA including site security/intrusion monitoring, ozone sub-process packages, residuals, and HVAC controls. During the construction phase, Mr. Melanson's responsibilities included coordinating the development and construction activities with the client, the contractor, and several subcontractors; and overseeing all field testing, checkout, startup, and training activities for the I&C system.

Design-Build-Operate Project, Seattle Public Utilities, Seattle, WA. This design-build-operate project provided SPU's first water treatment plant, sized at 120 MGD. Mr. Melanson was responsible for all instrumentation aspects of the design, including supervising design staff; developing complete process and instrumentation diagrams (P&IDs) for all processes, detailed control panel layouts and instrumentation installation details, and the control system architecture diagram; preparing detailed control logic descriptions and specifications, and incorporating elements of the site security into the SCADA system.

Professional Experience

Vice President, Electrical and Automation, Practice Leader

T & M Associates, Dedham, MA

3/2014 – 10/2016

Regional municipal engineering company headquartered in New Jersey. The primary focus was the water/wastewater market, followed by the private sector environmental and biotechnology markets.

- Supported the company vision for expansion by growing the automation and electrical service lines
- Served as the Massachusetts office leader during expansion into New England
- Recruited staff, conducted BD and marketing, and created a design process with standards specific to automation.
- Secured multiple electrical and automation design contracts for new clients in OH, NJ, PA, and MA, which resulted in the Electrical and Automation group expanding with new staff in OH and MA to supplement staff in NJ.

President

AES, North Carolina / Massachusetts

1/2012 – 2/2014

Startup partnership venture, offered traditional consulting services with a cloud-based subscription software.

Municipal water/wastewater and DPW markets, some fortune 500 companies, in southeast Massachusetts and North Carolina.

- Grew company from two business partners to 12 employees and FT consultants
- Grew revenue from zero to approximately \$1.2M in 2014
- Led business development, marketing, contract negotiations, project management, technical support, invoicing
- Responsible for staff management, HR management, and P&L for the company.
- Performed technical consulting services including automation evaluations, SCADA upgrades, master planning, WIFI system design, cloud-based product setup and configuration, client management, and training.

Senior Vice President, Design Management Office

2009-2011

Brown and Caldwell, Middleboro, MA / US-based environmental engineering firm headquartered in Walnut Creek, CA.

- Served as technical leader of firm-wide design functions, termed designated design groups (DDG).
- Implemented plan to transition all technical staff into the DDG.
- Managed 185 staff in 6 key locations and 26 secondary locations.
- Achieved KPIs including staff billability, project breakage, overall technical quality, and contribution to firm profit.

Vice President, Electrical and Process Automation Services

2006-2009

Brown and Caldwell, Middleboro, MA

- Organized and unified the Electrical and Process Automation Service groups across the US into a single group, EPAS, and then transitioned EPAS from an in-house-only support function to a standalone service provider for the water, wastewater, and private sector industries. Grew EPAS from approximately \$5M to \$17.9M annually
- Developed restructuring plan for transitioning all engineering support services into a single group to increase design efficiency and service delivery in response to market changes identified in 2009

Vice President, Automation Services

2004-2006

CDM-Smith, Cambridge, MA

International environmental engineering company headquartered in Cambridge, MA.

- Managed automation practice firm wide as 2nd in command. Accountable for marketing, business development, staff growth, talent development, and business operations for 15 automation groups nationwide.
- Served as I & C Discipline Leader (e.g., Chief Engineer) firm wide from 2001 until 2006.

Vice President, Automation Area Manager

2000-2004

CDM-Smith, Cambridge, MA

Instrumentation Group Leader

1998-2000

CDM-Smith, Cambridge, MA

Papers, Presentations, Publications

Approximately fifteen papers and presentations delivered for industry organizations including AWWA, CA-NV Section AWWA, New England AWWA, New England WEA, North Carolina AWWA-WEA, Virginia AWWA-WEA, Maine Water Utilities, and the New Hampshire Department of Environmental Services.

Publications include articles in **Control Magazine**, and authorship for the AWWA **M33 Flowmeter standard**, 3rd Edition under final review and should be released early 2017.



STEPHEN CLARY, PE

SENIOR ENVIRONMENTAL ENGINEER

Professional Profile

Steve brings a diverse understanding of water and wastewater issues developed during his experience on projects in California and around the world. Previously, Steve was program director for Sydney's \$3 billion Clean Waterways Program where he managed significant cost reductions while still meeting the environmental and customer service goals. In California, he has experience in nearly all aspects of water and wastewater projects including community outreach, regulatory agency negotiations, stakeholder consensus building, planning, design, and construction management. Steve has also been project manager or project engineer for the planning and detailed design of secondary and tertiary treatment facilities for various agencies in California. These projects include phosphorous removal and nitrogen removal treatment plants, as well as biosolids treatment and effluent reuse facilities.

Related Experience

Novato Sanitary District – Wastewater Treatment Facility Upgrade. Project Manager leading the construction of a new 7 MGD treatment plant consisting of flow equalization facilities, influent pump station and headworks including screening and grit removal, primary sedimentation, secondary treatment using activated sludge process, UV disinfection, solids thickening using gravity belt thickeners, anaerobic digestion, co-generation facilities, and odor control. Assisted the District in obtaining a CWSRF loan to finance construction of the project. Prepared and submitted the application and coordinated with State Water Resources Control Board during and after the application process.

Yuba City, CA – Wastewater Treatment Facility Expansion. Project Manager responsible for managing the wastewater treatment facility expansion project to address aging infrastructure, meet regulatory requirements, and provide capacity for the projected build-out of the service area in accordance with the City's adopted General Plan. Assisting the City in implementing process improvements and capacity expansion projects to increase the firm average dry weather capacity of the wastewater treatment facility to 12.6 MGD. The project includes the predesign of treatment process upgrades to every process within the treatment plant, and final design of a new solids thickening facility.

City of Malibu, CA – Civic Center Wastewater Treatment Facility. Project Manager leading the design of a centralized wastewater collection and treatment system and recycled water distribution system for the City of Malibu in response to several regulatory orders that will ultimately ban the use of onsite wastewater treatment systems in the Civic Center Area. Also assisting the City with the preparation of a Clean Water State Revolving Fund (CWSRF) application to finance project construction.

Delta Diablo Sanitation District (DDSD) – Headworks Improvements Predesign. Project Manager, DDSD's wastewater treatment plant master plan had identified the need for upgrades to the headworks area of the plant. The District selected Woodard & Curran to proceed with a predesign to further evaluate two basic alternatives devel-

Education

- M.S. Civil/Environmental Engineering, University of California, Davis, 1978
- B.S. Civil Engineering, University of California, Davis, 1974

Registrations

- Professional Civil Engineer, California, #30318, 1979
-

oped in the treatment plant master plan, and another proposed by the Woodard & Curran team. The basic components of the headworks include: an existing 48-inch CIPP lined/RCP gravity influent pipe; two existing 24-inch CCP pressure forcemains; screening facilities; grit removal facilities; and influent flow metering. Worked closely with DDSD staff to: optimize and evaluate headworks layout alternatives and process equipment options; resolve headworks/conveyance system hydraulic constraints; select a preferred alternative project with key input from District staff; and estimate the cost of construction and implementation for the preferred alternative.

Sausalito-Marín City Sanitary District (SMCSD) – Headworks, Primary and Secondary Treatment Predesign. Project Manager conducted predesign of new headworks, compact primary clarifiers and other improvements to the District's existing wastewater treatment plant, which sits on a highly constrained site leased from the National Park Service on San Francisco Bay. Successful completion of the headworks project will improve treatment plant performance, provide additional redundancy, and decrease maintenance and operator attention. These improvements need to allow maximum flexibility in meeting long-term changes that may occur to the secondary treatment and disinfection processes.

Sausalito-Marín City Sanitary District (SMCSD) – Wet Weather Conveyance and Treatment Plant Evaluation.

Principal-in-Charge provided a study to develop a plan to provide needed peak wet weather flow capacity for the SMCSD conveyance system and treatment plant. The work included continuous simulation of wet weather flows to determine the expected frequency, duration, and volume of peak flow events; hydraulic modeling of the conveyance system, which includes a gravity interceptor, several major pump stations and force mains, and a wet

weather diversion pump station; and analysis of treatment options to minimize or eliminate blending during peak flow events. Solutions focused on infiltration/inflow reduction, upstream storage, and consolidation of pump stations to reduce peak flows reaching the treatment plant.

Sewerage Agency of Southern Marin (SASM) and Sausalito-Marín City Sanitary District (SCMSD) – Sewage Spill Reduction Action Plans. Principal-in-Charge provided services in the preparation of comprehensive sewage spill reduction action plans (SSRAPs) for these two regional sewer agencies in southern Marin County. The SSRAPs were mandated by compliance orders issued to the agencies by U.S. EPA as a result of large sewer overflows that occurred in early 2008. Three major submittals, consisting of 11 plans and reports, were required to be submitted over a two-year period. Preparation of these submittals required extensive coordination with the six sewer agencies that comprise SASM, and the three agencies tributary to SMCSD.

Sausalito-Marín City Sanitary District – Treatment and Wet Weather Flow Upgrade Final Design. Project Manager, as follow-up to planning and predesign work, Steve led the design phase of the project which will add a headworks (screening and grit), primary clarifier, fixed film reactor upgrades, equalization and tertiary filter improvements to the existing wastewater treatment plant. The project aims to improve treatment plant performance, provide additional redundancy, and decrease maintenance and operator labor requirements.

Delta Diablo Sanitation District – Fueling Station Facility Replacement Design. Project Manager, after evaluating several alternatives, DDSD determined that designing a new facility replacement equipped with a split-wall aboveground storage tank on site would provide the most benefits as well as cost-savings to

the District. Prepared detailed plans and specs suitable for public bidding, and coordinated permit and regulatory requirements for the installation of the new facility and removal of the old facility.

Delta Diablo Sanitation District – Conveyance System Master Plan

Update. Project Manager responsible for evaluating changes to the service area, updating flow projections to establish firm recycled water supplies and confirm facility sizing for recommended improvements, InfoWorks hydraulic modeling, and development and evaluation of alternatives to address capacity/condition improvement needs. The project also included “Model for the Optimization of Storage and Treatment” (MOST Model) so the District can optimize the use of its equalization storage basins to minimize needed conveyance and treatment improvements.

City of Pacifica, CA – Wet Weather Equalization Basin Site Feasibility

Evaluation Project. Project Manager, the City of Pacifica Wet Weather Equalization Basin Site Feasibility Evaluation Project follows from Woodard & Curran's Collection System Master Plan update for the City. After conducting feasibility studies and identifying permitting requirements for three alternative sites for the EQ basin, the team made the recommendation for the EQ basin location near the most critical remote pump station in the vicinity of the Linda Mar Park and Ride Lot. Under this alternative, capacity improvements within the gravity collection system would be implemented, and a flow equalization facility would be constructed. The Linda Mar EQ basin would include a 2.1 MG underground concrete basin with pipes to divert flow to the basin during high wet weather conditions.

Marius Basson President

Summary/Profile

EDUCATION

- M.S., Mechanical Engineering, Pretoria, South Africa
- Mechanical Engineering Degree, Pretoria, South Africa

CERTIFICATIONS

- Certified Reliability Professional, Society of Maintenance and Reliability Professionals (SMRP)
- Aladon Network - Certified Practitioner

LANGUAGES

- Afrikaans and English

Mr. Basson is an experienced engineering professional with more than 20 years' experience in leading and implementing business improvement and reliability programs. He specialized in the application of Reliability-centered Maintenance (RCM2) for many years and adopted a methodical way of thinking. He has a strong track record of successful engagements with asset-intensive industries including manufacturing, chemical, oil and gas, mining, electric utilities, water and wastewater utilities, chemical, nuclear waste processing and other process industries. He has extensive experience as a dynamic manager with a proven track record in large capital project management.

Mr. Basson offers a hands-on management style and detailed knowledge of underlying technologies with proven ability for meeting large scale project deadlines and budgets. He is a good communicator and presenter and a qualified and experienced mechanical engineer. Mr. Basson has excellent networking capabilities and is well respected and recognized in the risk and reliability community.

Experience

Aladon

President since May 2013

Marius Basson, a long-time Reliability-centered Maintenance (RCM2) practitioner and Aladon member, has acquired the Aladon business from Bentley Systems, a US based software company, in May 2013.

The Aladon Network, which became part of Bentley through the company's acquisition of Ivvara in 2012, is a global community of reliability professionals whose members are certified by Aladon as "practitioners" and "facilitators" in the delivery of risk and reliability services (such as RCM2 and RCM3) for physical assets. Marius leads the Aladon Network to further advance the discipline of RCM and, in doing so, help make industrial operations safer and more productive.

Marius is responsible for certifying the global Network of practitioners and for developing leading methodologies used in industry for reducing risk and increasing reliability. Aladon is the Global Network for Risk and Reliability services. The Aladon methodologies focus on whole-life asset management through delivering value starting at conceptual phase through applying Reliability-centered Design™. During the operating phase, methodologies such as RCM2™ and RCM3™, RBI3™, FMEA, RCFA, Condition Assessment are used to ensure assets continue to deliver their intended functions and Asset Life Information Management™ is used for assets that are reaching their end of life.

The Aladon methodologies are aligned with and underpin the ISO standards for Asset Management and Risk Management.

Marius continues to work with large international companies and Utilities to apply the Aladon methodologies for improving reliability of physical assets and reducing business risks, both physical (safety and environmental) and economic (operational).

Vice President, Head of Global Reliability ***CH2M HILL Strategic Consulting***

Marius worked at CH2M HILL from April 2012 until June 2014 as the Head of Global Reliability responsible for growing the capabilities of Strategic Consulting Group at CH2M HILL. Marius was a member of the CH2M HILL Global Asset Management Team and responsible for developing market strategies and procedures.

Marius was further responsible for coaching and mentoring of the RCM Practitioners and reliability engineers at CH2M HILL. He played a major role in winning and delivering the following projects at CH2M HILL (of which he managed the projects also):

- **Metro Vancouver, BC Canada**

The training and development program for Metro Vancouver to assist them with developing its O&M Training and Procedures Program. Mr. Basson led the “Reliability Track” and the objective was two-fold: capture the knowledge of the current staff before they retire and provide a robust foundation for their Learning Management system to facilitate sustainable, forward-looking training development and implementation for its O&M professionals. These services include a completing a bottom up assessment of current operations and training; identifying competencies, training gaps, and operator requirements for each O&M task; and developing a plan and implementation process for building the required training. The desired outcome of this program review is for Metro Vancouver to have a completely self-sustaining O&M technical training program, incorporating staff development, future planning, and change management. The scope for the project includes the following tasks:

- Maintenance task development, critical task analyses, and equipment list verification for the critical assets of Metro Vancouver
- Develop a competency model to address the required competencies for work tasks in each position for all divisions
- Develop training curricula for each division and identify the most efficient types of training for each area, including eLearning, field and walkthrough guides, standard operating procedures, and knowledge assessments
- Develop gap analyses to match existing training materials to the curricula and identify the gaps where additional materials need to be developed
- Prioritize the training curricula based on the Department’s critical needs and the gaps identified

- **Confidential Automobile Manufacturer**

Mr. Basson worked together with the client to identify and solve problems with a critical area of the manufacturing line. The client experienced unplanned downtime and extended repair times. The recommendations from Mr. Basson resulted in increased production and less downtime.

Mr. Basson and the team identified the problem, developed a strategy to solve the problem and implemented the solution that helped to solve the problem. The recommendations included recommendations from a detail RCM review of the equipment in the weld area as well as recommendations from a review of the work processes that were followed (work identification, maintenance planning and scheduling, work execution and continuous improvement).

- International Chemical Producing Company

Mr. Basson was leading a team to streamline the design review process for a new chemical process facility using a reliability thinking approach that verifies design, identifies modifications at the design stage; develops failure management policies (maintenance tasks) and operating strategies early in design cycle by encouraging multiple disciplines to participate in the design review process.

Through applying the reliability principals early on, the company could verify the design integrity, recommend modifications to design and develop failure management policies based on user-defined functions. The systematic approach follows the following steps:

- To identify risks early in the project
- Define business goals and perform a criticality analysis on the proposed facility (baseline design) to determine the critical equipment and the impact on business goals if the equipment fails
- Perform the RCM analyses on the critical systems and subsystems
- Identify critical spares (to support maintenance and operations at all levels)
- Determine the stocking policy (and logistics) for critical spares (as determined by RCM)
- Simulate real life scenario and optimize baseline design – provide recommendations to engineering
- Consider alternative design options and perform sensitivity testing

Other projects Marius worked on include winning and leading the reliability portion of a multi-year, multi-million Asset Management Program for DC Water, Reliability Centered Design projects for Seattle Public Utilities, Reliability Program for City of Columbus Ohio, and Lockheed Martin's reliability improvement program at their Atlanta based facility.

General Manager, Asset Management Walter Energy and Western Coal

Mr. Basson joined Western Coal in January 2011 as the General Manager responsible for Asset Management and was part of the integration team after the acquisition by Walter Energy in April 2011. Marius was a member of the due diligence team that made recommendations to the board on assets (properties and equipment) and asset management practices.

Mr. Basson was responsible for developing management strategies for all the legacy Western Coal properties in NEBC, West Virginia, and Wales (UK) and worked closely with Walter Energy staff on standardization and integration of the two companies. He served on the Steering Committee for the Wales Project and was a senior member on the project team for the new properties under development in NEBC. He headed up the Crisis Management and Business Continuation Project which was part an

integration project between the two companies. Mr. Basson also served on the Steering Committee for Large Capital Projects and Capital Acquisitions for projects less than \$100M. His responsibilities included:

- Developing overarching asset management and process safety strategies (based on PAS55)
- Steering site specific (tactical) strategies and working flow (business process development)
- Organizational development and role development (for recruiting purposes)
- Evaluating and selecting asset performance tracking technology and software
- Selecting Fleet Management System (FMS) and managing integration into asset performance tracking software
- Managing a continuous improvement program – 6 Sigma and RCM
- Developing performance standards and metrics for mobile fleet and fixed plant assets
- Directing and implementing maintenance strategy for critical assets and a Work Management System (CMMS)
- Serving on the steering committee for capital projects and acquisitions
- Serving on the steering committee for the ERP system upgrade (Ellipse renewal)
- Serving on the steering committee for new mine projects in NEBC and Wales
- Developing and implement asset refurbishment and replacement strategies
- Developing standards and policies across multiple mine sites in various disciplines
- Managing asset management and continuous improvement groups
- Budgeting and forecasting for operational and capital programs (individual budgets and steering committees)

Vice President, RCM Consulting

PricewaterhouseCoopers/New Dimension Solution

- The Massachusetts Water Resources Authority—Award winning work in asset management and RCM2, RCM2 facilitator training and mentoring, RCM facilitation on clarifiers, centrifuges, chlorine contact tanks, digesters, and chemical plants. Developed failure management strategies for critical assets. The program resulted in savings of approximately \$618,000 per year.
- Seattle Public Utilities—RCM2 training, RCM2 facilitator training and mentoring, System criticality assessment, RCM facilitation of pump stations and storm water systems. Developed failure management strategies for critical assets. The RCM program on the waste water pumping stations resulted in savings of approximately \$500,000/year.
- Denver Water Board—RCM2 training, RCM2 facilitator training and mentoring, System criticality assessment, RCM facilitation of Hydro-electric generator, reservoirs, generators water treatment facilities, pump stations, HVAC systems, and boilers. Developed failure management strategies for critical assets. The RCM2 program was part of a research project conducted for AwwaRF.
- Sacramento Regional County Sanitation District—RCM2 training, RCM2 facilitator training and mentoring, System criticality assessment, RCM facilitation on main inlet pumps and storm water pump station, RCD of new proposed storm water pumping station. The pilot projects were executed to prove the concepts of RCM and RCD and the recommendation was to continue the processes for critical assets.

- Orange County Sanitation District—RCM2 training, RCM2 facilitator training and mentoring, RCM facilitation of digesters, circulation pumps, raw water pumping station, Development of failure management strategies for critical assets and RCD on a new raw water pumping station. The RCM recommendations led to substantial savings in long term water treatment through improved grit removal and sludge handling. The RCD project was successful and the results were presented at a SMRP conference. OCSD adopted the RCD philosophy for new capital projects.
- Las Vegas Valley Water District—RCD project on new fresh water reservoir and pumping station. The RCD recommendations provided LVVWD the opportunity to save approximately \$1,3 Mil based on the original base design.
- Washington Suburban Sanitary Commission—RCM2 training and Pilot projects on wastewater pumping stations, centrifuges and thickeners. The recommendations lead to increased efficiency and improved operating conditions. Mr. Basson played a leading role in the development of the Reliability and Maintenance Strategy for the WSSC.
- Since the acquisition of New Dimension Solutions by PricewaterhouseCoopers, the City of Boca Raton contracted PwC to provide RCM training and RCM Facilitator development for their staff. The project also includes three pilot projects.
- Other utility organizations I worked with include ESCOM (Koeberg Nuclear Power, Peak Power Stations and Phossil Power Stations), Umgeni Water, Rand Water, Bergen County Utilities Authority, Indianapolis Water, Veolia Water, East Bay Municipal Utilities District and Narragansett Bay Clean Water Commission.

Publications and Presentations

- AwwaRF - Applicability of Reliability Centered Maintenance in the Water Industry
- Maintenance and Reliability Technology Summit 2004 - The RCM2 Methodology
- Society for Maintenance and Reliability Professionals (SMRP) 2005 - RCM in Asset Design Phase
- AWWARF Technology Transfer Summit 2006 - Applicability of Reliability Centered Maintenance in the Water Industry
- SAP EAM Conference 2006 - Reliability Centered Spares Workshop
- NEWEA 2006 - Failure Characteristics and New Maintenance Techniques
- WEFTECH 2007 - Reliability Best Practices
- NEWEA 2007 - Reliability Centered Maintenance Case Study
- Maximo Conference 2007 - Reliability 101 Fundamentals with MWRA Deer Island Case Study
- WEFTECH 2008 - Failure Patterns and New Maintenance Techniques
- IMC 2008 - Reliability Improvement for Mining Mobile Equipment
- WEFTECH 2009 - Sustainability of Reliability Centered Maintenance Projects
- Blue Ribbon Panel Expert 2010 – Seattle City Light
- CIM 2013 – Failure Patterns and early detection driving better Maintenance
- Bentley the Year of Infrastructure London UK 2013 – Technical Judge for Best Global Asset Management Program
- IPAMC 2015 (Teheran) Iran – Key Note Speaker
- IMC 2015 – Risk-based Reliability Centered Maintenance (RCM3) and Panel Discussion Expert
- Maintenance 2000 (Las Vegas) 2016 – Reliability Centered Maintenance
- Meridium User Conference (Vienna, Austria) – Fourth Generation Maintenance



Aladon

The Risk & Reliability

GLOBAL NETWORK

WATER AND WASTEWATER

RELIABILITY CENTERED MAINTENANCE

World-Class RCM Training and
Consulting Services for Water
and Wastewater Industry

Best Practices and
Templated Solutions

www.aladon.com

WATER-CENTRIC RELIABILITY CENTERED MAINTENANCE

Aladon and the Aladon Network have been assisting customers improving reliability of their physical assets for more than 30 years. The Aladon Network has implemented RCM2™ on all continents in every endeavor known to mankind and are now using that experience to offer industry-centric solutions. The Aladon industry-centric RCM solutions are based on years of experience implementing RCM and reliability improvement programs in specific industries. The Aladon track record in the Water and Wastewater Industry speaks volumes and includes references from utilities around the globe. Aladon understands the Water and Wastewater Industry and the challenges faced by modern Facilities and Utilities and our new Water-centric RCM offers a comprehensive experienced-based solution which includes templates and information to expedite the implementation of an RCM-based reliability program.

THE ALADON WATER-CENTRIC RCM PROGRAM OFFERS THE FOLLOWING:

- *Standard Operating Philosophy Templates* that covers all aspects of water and wastewater collection, treatment and distribution
- *Equipment Reliability Templates* for all types of physical assets used in water and wastewater
- *Best Practice Maintenance and Operating Strategies* based on multiple utility industry experiences
- *Implementation and Sustaining Results*

THE STANDARD OPERATING PHILOSOPHY TEMPLATES contains information used to develop the Customer-specific Operating Context, thus saving time and money. The Operating Context is an essential and very important part of the RCM process and the template provides the basic information required to develop the Operating Context. The templates are developed for specific processes in source, collection, treatment and distribution and based on generic water and wastewater process design and regulatory standards. It includes generic equipment (screens, pumps, centrifuges, digesters, clarifiers, filters, etc.) and process (screening, filtration, clarifying, dewatering, disinfection, etc.) information.

Our experience has shown that regardless where we implement RCM in water and wastewater, our customers all use the same or similar equipment to do the same or similar job. We have collected information on these assets over many years and used it to develop the **EQUIPMENT RELIABILITY TEMPLATES**. The templates do not replace our “zero-base” approach for doing RCM but it is valuable for ensuring equipment reliability programs are derived from not only the experience of the people who know the equipment best (operators and maintainers), but also the experience from peers in the same and like type industries. Our comprehensive template library includes the majority (if not all) the equipment used in the water and wastewater industry. The templates are grouped by different processes for source, collection, treatment and distribution. The templates are comprehensive and includes multiple and different types of assets.

The **BEST PRACTICE MAINTENANCE AND OPERATING STRATEGIES** are based on the experience we gained working with the many Facilities and Utilities around the world, our global Network of Practitioners who work in all industries and specifically from a research program for the “Applicability of Reliability Centered Maintenance in the Water Industry”. The research program was led by Marius Basson from Aladon and was a program jointly funded by the Water Research Foundation. The strategies are based on specific operating context and equipment specific information and must not be implemented without proper review. The templates are continuously updated and provide our customers a technical base for verification and making sound decisions. The templates include the newest technology information and are especially useful for developing **OPERATOR DRIVEN RELIABILITY PROGRAMS**.

IMPLEMENTATION AND SUSTAINING RESULTS are probably the largest challenge faced by any organization embarking on a reliability improvement program. The biggest downfalls are the lack of executive sponsorship and proper change management. The Aladon methodology is focused not only on changing the way maintenance is being done, but also changing the minds of the people involved.

Our award-winning approach starts by introducing the concept of Reliability Centered Maintenance to the executives and senior managers to obtain the necessary support and sponsorship. Our systematic approach continues by involving engineers, maintainers and operators (and anybody else who is involved in the process) who ultimately will be responsible for the implementation and sustaining of the results.

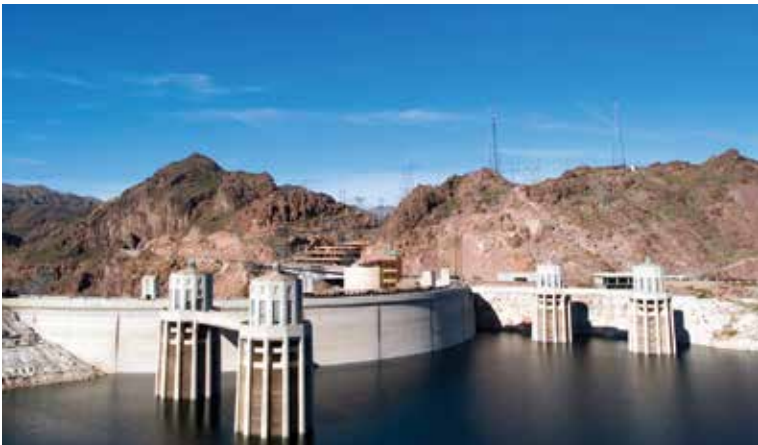
Our training programs provide the necessary change management to develop a reliability culture within the organization while our world class RCM software provides the platform and framework for sustainable results.

THE ALADON WATER-CENTRIC RCM PROGRAM PROVIDES:

- Water and/or Wastewater specific overview and training sessions
- Water and/or Wastewater specific Operating Philosophy and Equipment Reliability Templates
- Water and/or Wastewater specific RCM training material and worked case studies
- RCM manual (in book format soon) specific to the Water and/or Wastewater Industry
- World class consulting services from experienced Network members
- Advanced software for effective and efficient RCM facilitation and sustainable implementation of the results

THE ALADON WATER-CENTRIC RCM PROGRAM PROVIDES:

- Extensive experience in implementation of reliability improvement programs with specific industry focus and content
- A well-documented methodology for improving maintenance and operations with proven results
- Sharing in the experience of others in the Water and Wastewater Industry around the world
- A pragmatic approach to ensure effective use of resources
- Software to capture institutional knowledge and ensure sustainable results
- Template library for verification and guidance



Our clients who have adopted a reliability culture, will have access to the templates of hundreds of pieces of equipment. The templates assist our clients in accelerating the implementation of an RCM-based reliability program and further provide them with the information for verification and guidance to ensure failure modes, effects and failure management best practices are consistent with the industry.

Standby Generator Set Protective Devices, Alarms and Status Displays

Note: All Status lamp and display indicators, as well as horn annunciations, occur only at the standby generator and are not evident at the Operations Control Center (OCC)

Row	Protective Device Name	Status Lamps			Horn	Trip level Descriptions	Warnings	Shutdowns	Check		Notes
		Warning Only	Shutdown Only	Warning then Shutdown			Yellow Light Local Display	Red Light Local Display	S	U	
1	AC Sensing Loss				No	Warning when controller does not detect nominal generator set AC output voltage after crank disconnect	AC sensing loss				
2	Air Damper Indicator				Yes	Shuts down when signaled by a closed air damper circuit		air damper indicator			No pre-warning, just shuts down (NPPA 110 fault)
3	Alternator Protection				Yes	Shuts down when alternator overloads or there is a short circuit		alternator protect sdwn			No pre-warning, just shuts down
4	Battery Charger Fault				No	Warning when battery malfunctions	chgr fault				Requires optional battery charger with a malfunction output (NPPA110 fault)
5	Common Paralleling Relay Output				Yes	Warning when there is a relay fault	common pr output				
6	Critical Overvoltage				Yes	Shuts down when voltage exceeds 275 volts		critical overvoltage			No pre-warning, just shuts down. Monitors nominal voltage with a step-down transformer in the 208-240 range
7	Customer Auxiliary (Warning)				Yes	Warning or shuts down when an auxiliary digital or analog input signals the controller (User defined)	Digital input DO1-D21 or analog input AO1-AO7	Digital input DO1-D21 or analog input AO1-AO7			Using the remote communications package, user can label auxiliary functions to display selected name instead of digital or analog input. Note: User can define inputs as warnings or shutdowns
8	ECM Red alarm				Yes	Shuts down when controller receives a signal from the engine		ECM red alarm			No pre-warning, just shuts down. Only on DDC/MTU engines with MDEC/ADEC. User can navigate the menus to access the fault code. Engine operation manual provides fault code descriptions
9	ECM Yellow Alarm				Yes	Warning when yellow alarm signals the controller	ECM yellow alarm				This fault only relates to the DDC/MTU engine with MDEC/ADEC. User can navigate the menus to access the fault coder
10	EEPROM Write Failure				Yes	Shuts down when control logic detects a data save error		EEPROM write failure			No pre-warning, just shuts down
11	Emergency Power System (EPS) supplying the load				No	Warning when the generator set supplies more than 1% of the rated standby output current	EPS supplying load				(NPPA 110 fault)
12	Emergency Stop				Yes	Shuts down when local or optional remote emergency stop switch activates		emergency stop			No pre-warning, just shuts down
13	Field Overvoltage				Yes	Shuts down when the controller detects field overvoltage		field over volts			No pre-warning, just shuts down
14	Generator Switch Not in Auto				Yes	Warning when generator set master switch is in the RUN or OFF/RESET position	master not in auto				
15	Ground Fault Detected				Yes	Warning when user supplied ground fault detector signals the controller	ground fault				

The above example is a partial template for Standby or backup generator maintenance and functional testing. Our comprehensive approach has been developed over 30-years of industry experience working with companies in all industries. The templates is available in our software for use by qualifying customers.



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CHIBBY ALLOWAY

OPERATIONS SPECIALIST

Professional Profile

Chibby has over 40 years of general management, technology evaluations, design, build and operational experiences in the water and wastewater utility industry. He has had a varied employment career with regulators – U.S.E.P.A., public sector – Ventura Sanitation District in Ventura, California, consulting engineering – Metcalf and Eddy, and the private sector with several design and operations based companies have provided Chibby with a comprehensive prospective for management of water and wastewater technology companies. His technical expertise's includes applied water and wastewater research and development; engineering and design of capital improvement plan development and execution, process engineering and modeling, facility and network asset management programs, and in situ reductions of volatile and semi-volatile organics. Managerial he began as a manager of a small municipal wastewater project early in his career to managing a larger water and wastewater engineering and operations business unit which was based in the Western United States principally in California, Washington, Oregon, Arizona, and Hawaii and represented over 70 municipal and industrial clients.

General Manager

In his working career Chibby has served as a General Manager for Wastewater and Water business units in the western portion of the United States – principally in California for over 20 years. In this capacity, he directed the growth and execution of a water and wastewater – design, build, and operations business unit. He has implement innovative solutions for hazardous groundwater treatment, industrial waste source treatments, such as perchlorate, municipal wastewater treatment conveyance and treatment, and water reuse and brackish water reuse treatment facilities. Chibby has managed business unit with over 700 employees and annual revenues exceeding \$175 million.

Engineering Manager

Chibby has served several roles at the Vice President level. In these roles, he has directed and managed process and facility designs & permitting, development of project bid cost, and lead negotiations of contractual and commercial commitments for all types of project execution – 1) Design, Bid Build, 2) Design, Build, 3) Design, Build, & Operate (DB) and 4) Design, Build, Operate, and Own (DBOO) water and wastewater facilities. He has executed engineering projects, which ranged from small facility plant upgrades (\$500-\$750K) to Greenfield treatment facilities and pipeline installations (\$5-\$100M).

Chief Technical Officer

Primary responsibilities included identifying new technologies which the service and equipment based companies he worked with utilized in providing an expanded scope of services to its current client base or utilize new technology to deliver and innovative solution to an expanded set of clients. In new technology review he developed modified stage sate type processes to evaluate, validate, and integrate new technologies. The

Education

- Masters, Environmental Engineering, Stanford University
- Attended Colorado State University

Registrations

- Wastewater Operator License - Grade V - CA
- Water Operator License - Grade III - CA

Professional Associations

- Water Environment Federation

Publications and Presentations

- Co-authored: Removing Organically Bound Phosphorus to Below 50 ug/L from a High Color Pulp and Paper Wastewater Using a 3-Stage Clarifier/ Filtration System.

Education/Certificates

Chibby attended Colorado State University and Stanford University. At Stanford, he graduated with a Master of Science in Environmental Engineering.

While academics are important for his knowledge of facility design – his facility management pedigree is validated with his operational experience which is belayed as he holds the highest wastewater operator license - Grade V as issued by the State of California. A Grade III water operator license (IV being highest) as also issued by the State of California.

program provided three of the companies he has worked with significant growth and profit opportunities with the selection of integration of new technologies into their business offerings. In respect to R&D, Chibby has developed and managed basic life & physical science research both with in-house skills, coordination with several nationally known academic researchers and their institutions, and also developed research with water and wastewater NGO's (WRF and WERF).

The following is an overview the important process and practices that he has developed and refined during his extensive operational based career.

Process & Practices Developed

Facility Design and Process Selection (FDPS)

- Review environmental permit requirements to establish baseline flow, organic loads, nutrient and organic removal
- Review Stakeholder – municipal or industrial client – quantitative and qualitative treatment works requirements such as odor control, bio solid management, and industrial source controls parameters
- Work with process modeling (such as Bio Win) to confirm unit process selection assures the numerical balances for all air, water, nutrient, chemical and solid balances
- Confirm unit process selection with unit process performance standards
- Operational and maintenance review of each unit process to confirm cost and ease of operation is integrated into the final design
- Facility Construction (FC)

Developed comprehensive project delivery plan with contractors, vendors, and operational staff

- Establish formal Partnering Program

with contractor to promote on-time and on-budget facility completion. Program modeled on U.S. C.O.E program.

- Develop formal communication program for all facility stakeholders. Use of weekly and monthly dashboard
- Develop and implement Work Safe Program for all Facility participants

Facility & Unit Process Start-ups and Performance Validation (FUSU)

- Develop separate unit process(s) and facility startup schedule which coordinates activities with; Vendors, Contractors, & Operational staffs
- Develop unit process checklist for Operational staffs and train & review during Vendor training
- Formalize Standard Operating Procedures (SOP's) which are reviewed during Vendor training – This will include safety review of equipment and procedures.
- Define and validate unit process operations with on-line instrumentation & process control computerization
- Design and implementation of maintenance management and asset management systems

On-Going Facility and Personnel Management (OGFM)

- Development of job descriptions and skill inventory requirements for operations, maintenance, and supervisory
- Develop and implement required safety program
- Develop operations and maintenance budgets to track actual vs. benchmark values for; Labor, Overtime, chemicals, utilities (electrical, natural gas, fuels), maintenance – capital and corrective
- Integrate maintenance management (computerized) and asset management into the operational tasks and annual budgeting processes

- Completed Reliability Centered Maintenance evaluations of water and wastewater treatment assets

Work History

2015 - Present

Woodard & Curran, Senior Client Manager/Senior Consulting, Walnut Creek, CA

2012-2014

BCR Environmental, Chief Technology Officer, Jacksonville, FL

2010-2012

Synagro Technologies, Inc., Vice President, Engineering and Technology, Baltimore, MD

2007-2010

Veolia Water North America Operating Services, Executive Vice President & Chief Technical Officer, Pleasant Hill, CA

1997-2007

U.S. Filter Corporation, President and General Manager, West LLC, Pleasant Hill, CA

1995-1997

Wheelabrator, Regional and General Manager, West Region, Pleasant Hill, CA

1992-1995

General Manager of Triunfo Sanitation District and Director, Water and Wastewater, Ventura County, CA

1989-1992

Metcalf and Eddy Services, Vice President and Western Region Manager, Redwood City, CA

1978-1989

E.O.S., Western Region Operations Manager, San Mateo, CA

1976-1979

Research Assistance, U.S.E.P.A., Estes Park, CO

ABBREVIATED FACILITY SUMMARY

Facility Name	Location	Facility Size	Treatment Processes	Services Provided
Indianapolis Water Company	Indianapolis, IN	3 Plants Total Capacity 250 MGD	Chem. Coag, Filtration, Carbon, Disinfection, Dewatering	FUSU, OGFM
Lynn Wastewater Treatment	Lynn, MA	65 MGD	Prim., Second w/ TN, Thickening, FBI Incineration	FUSU, OGFM
Burlingame Wastewater Treatment	Burlingame, CA	15 MGD	Prim., Secondary, Thickening, BP Dewatering	FDPS, FC, FUSU, OGFM
Fairfield-Suisun Sanitation District Facility	Fairfield, CA	35MGD	Prim, Chem. Coag., TN, Filtration, UV Disinfection, Dewatering	FUSU, OGFM
HBWS - Recycle Treatment Facility	Honolulu, HA	15 MGD	TN, Filtration, Microfiltration, R.O., UV	FDPS, FC, FUSU, OGFM
Gainey Ranch Water Reclamation	Scottsdale, AZ	3.5 MGD	Prim, Chem. Coag., TN, Filtration, UV Disinfection	FDPS, FC, FUSU, OGFM
Superstition Sanitation District	Apache Junction, AZ	10 MGD	Prim, Chem. Coag., TN, Filtration, UV Disinfection	FDPS, FC, FUSU, OGFM
San Jose – Santa Clara WPCF	San Jose, CA	140 MGD	Prim., Secondary TN and TP, Filtration, AD, Co-Gen, FBI Incineration	FUSU, OGFM
Sand Island WWTP	Honolulu, HA	15 Dry Ton Pellets/ Day (75 MGD)	Primary, AD, Dewatering, Pelletizer	FDPS, FC, FUSU, OGFM
Oklahoma City Utilities	Oklahoma, OK	120 MGD (Five Plants)	Prim., Secondary, Thickening, BP Dewatering	FUSU, OGFM
City of Rodgers WWTP	Rodgers, AR	15 MGD	BNR, Filtration, UV, Dewatering	FUSU, OGFM
City of Springdale WWTP	Springdale, AR	20 MGD	BNR, Filtration, UV, Dewatering	FUSU, OGFM
Chevron Water Production Facility	San Ardo, CA	3 MGD	Chemical Coag., Microfiltration, RO, Wetlands	FDPS, FC, FUSU, OGFM
Kerr-McGee Perchlorate Remediation Facility	Henderson, NV	2.5 MGD Biological Perchlorate Removal	TN System, H2O2, Filtration, Dewater	FDPS, FC, FUSU, OGFM
Philadelphia Bio-Solids Facility	Philadelphia, PA	225 Ton/Day Pellet Production	Dewatering, Andritz In-Direct Pelletizer, Storage, Rail Shipment	FDPS, FC, FUSU, OGFM
Central Arizona Project Facility	Scottsdale, AZ	75 MGD Water	Sedimentation, Chemical Coag, Filtration, UV Disinfection	FDPS, FC, FUSU, OGFM
Caldwell WWTP	Caldwell, Idaho	15 MGD	BNR, Filtration, UV Disinfection	FUSU, OGFM
Palm Springs WWTP	Palm Springs, CA	25 MGD	Prim., Secondary TN, Filtration, UV, Percolation Basins, Dewatering	FDPS, FC, FUSU, OGFM
Milwaukee Sanitation District	Milwaukee, WI	130 MGD (3 Plants)	Prim., Secondary TN, Dewater, Pelletizer	FUSU, OGFM
South Kern Compost Facility	Taft, CA	650 Ton/Day	Prim and Sec Negative Pile Compost with Bio-Filter Scrubbing	FDPS, FC, FUSU, OGFM

Work Scope Key:

- Facility Design and Process Selection (FDPS)
- Facility Construction (FC)
- Facility & Unit Process Start-ups and Performance Validation (FUSU)
- On-Going Facility and Personnel Management (OGFM)



RANDOLPH JONES

OPERATIONS SPECIALIST

Professional Profile

Randy has 37 years of experience in the water, wastewater, and industrial wastewater fields. He specializes in the management of daily operations, operator training, treatment facility start-up, troubleshooting, construction and compliance. In the past 15 years, he has received 40-hour MSHA training and holds a current 40-hour OSHA certificate, as well as 8-hour OSHA supervisor training. Over the course of his career, Randy has overseen 175 contract operations company acquisitions and has considerable experience with budgetary processes and wastewater and water treatment plant expansions. Today, he works to identify cost reduction and efficiencies at Woodard & Curran's facilities in the western states.

Related Experience

Confidential Client, CA – Industrial Waste Treatment Plant. Provided permitting, design, development and implementation coordination for a \$1.5 million industrial wastewater treatment construction project in California for Woodard & Curran. He also gave construction supervision and engineering support for the project.

American Water Enterprises – Regional Vice President of Operations. Managed the operations and maintenance, business development, capital investment design and construction for clients in the western United States and oversaw 75 employees implementing water and wastewater O&M services. He managed the build, construction, and operations of water and wastewater treatment facilities for both commercial and municipal clients. The projects he managed ranged from \$100,000 to \$7,500,000.

ECO Resources – Rocky Mountain Regional Manager. Supervised 35 employees and all of ECO Resources' services in a three state area. He oversaw 154 operation and maintenance service contracts that grossed an annual revenue of approximately \$12 million. He managed budget profitability, staff organization, enhanced business development, environmental compliance, direct invoicing and customer services on a daily basis.

ECO Resources – Business Development Manager. Maintained \$6 million in active work load and increased sales 15% annually for ECO Resources. He managed the acquisition of two small contract operation companies and one commercial filter distribution company, played a key role in other large acquisitions and wrote several RFP's for large communities and military bases.

AquaSource Services – Contract Operations. Executive Vice President who oversaw 486 employees, 145 contract operations and 44 investor owned utilities across a large geographic area. The region had an annual operating budget of approximately \$26 million. Randy was responsible for budgets, business development, profitability, operations, maintenance and compliance. He achieved an EBITDA change from negative \$2.2 million to positive \$10.2 million by obtaining a 20 percent growth in new contracts and acquisitions.

Registrations

- A Water, 10934
 - Industrial Wastewater A, 1085
 - Wastewater A, 807
 - Wastewater Collection 4, 66393
 - Wastewater 4, 66394
 - Water 4, 66396
 - Water Distribution 4, 66395
-

AquaSource Services – Colorado/Missouri Regional Manager. Supervised 77 employees and all of AquaSource's services rendered in Colorado, Missouri, Wyoming and South Dakota—encompassing 128 contract water and wastewater operations and 12 regulated utility systems which grossed \$6.5 million. Randy helped to plan for expansion; oversaw budgetary monitoring, staff organization and leadership of staff; and helped to improve revenue, environmental compliance and customer service.

AquaSource Services – National Startup and Due Diligence Manager. Evaluated the operational due diligence of companies being considered for acquisition by AquaSource and led the integration of those companies that AquaSource ended up purchasing. Led a 15 member cross-functional team to re-engineer the processes associated with startup and due diligence. The changes he implemented included: the standardization of information collected, single source information call center, computerized project management and digital photography (e.g. providing local management a view of the facilities before purchase).

AquaSource Services – Colorado Industrial Operations Manager. Performed laboratory analysis and managed the operations for water, wastewater and industrial mining treatment plants. He was responsible for all federal, state and local compliance issues. 19 plants, including employees, were under his direct supervision.

Town of Dyer, IN – Superintendent of Water and Wastewater. Ran a 7.5 MGD wastewater treatment plant and a 1.2 MGD water treatment plant, supervised 20 personnel related to the systems and oversaw public relations and all communications between state and local officials. As a liaison for the Town of Dyer, researched, co-developed and wrote federal grants for the wastewater treatment expansion; prepared bid packages for the construction; and supervised the design and construction of a \$5-million-dollar wastewater plant expansion to modify activated sludge to oxidation ditch extended aeration plant which included a \$2.5-million-dollar wastewater collection rehabilitation.



PAUL DOMBROWSKI, PE, BCEE

SENIOR PROCESS ENGINEER

Professional Profile

Paul has over 30 years of experience providing civil and environmental consulting services to municipalities and clients in the private sector. He focuses on the evaluation, design, construction, and operation of wastewater treatment facilities. He has completed more than 30 facilities plans and plant evaluations. He has served as the technical lead on the evaluation, design, construction administration and/or startup of numerous upgrade projects that cumulatively exceed \$750 million dollars. Paul is well recognized for his practical treatment process expertise and has contributed to many of the current design and operations Manuals of Practice (MOP) published by the Water Environment Federation (WEF) (MOP-8, 29, 31, 34 & 35) and the New England Interstate Water Pollution Control Commission (the 2011 edition of TR-16 and subsequent revisions related to flood resiliency). Paul also serves on the Editorial Advisory Committee of the Operations Forum section of the WEF magazine Water Environment and Technology. He regularly lectures on wastewater design and operation at both the University of Massachusetts, Worcester Polytechnic Institute and for many of the state operator associations throughout New England. Paul is currently participating on the Water Environment Research Foundation (WERF) work group investigating Sidestream Enhanced Biological Phosphorus Removal with numerous industry leaders and an academic team from Northeastern University.

In addition to his contributions to industry-wide reference documents, Paul is an active participant in a number of professional associations; previously serving as a Director as well as the chair of both the Plant Operations and Awards Committees of the New England Water Environment Association (NEWEA). Paul currently serves the Process Control Event Coordinator for the NEWEA Operations Challenge Committee and on the WEF Operations Challenge Committee.

Paul has a particular focus on the operational aspects of treatment plants and upgrades and currently holds a Massachusetts Grade VI operators license. Over the last 20 years, he has developed and conducted dozens of operator training programs with particular focus on nutrient removal, filament control and secondary clarifier operation. Recently, Paul worked with the Maine DEP, the Maine Joint Environmental Training Coordinating Committee (JETCC) and NEIWPCC staff to develop and deliver a hands-on secondary clarifier training and optimization class at the Portland, ME and Springfield, MA treatment plants. In recognition to his many contributions to wastewater operations, Paul has received both the Alfred E. Peloquin Award from NEWEA and the Morgan Operational Solutions Medal from the WEF.

Related Experience

The Metropolitan District, Hartford, CT – Master Planning. Technical Lead for preparation of the Master Plan for the Hartford Water Pollution Control Facility (WPCF). Major aspects of the planning effort focused on developing recommended plan for dry weather (90 MGD) BNR and UV disinfection improvements as well as providing for a substantial

Education

- Masters, Environmental Engineering, Worcester Polytechnic Institute
- Bachelors, Civil Engineering, Worcester Polytechnic Institute

Registrations

- Registered Professional Engineer - CT, PEN.0025323
- Board Certified Environmental Engineer - AAES, 99-100799
- Wastewater Operator Grade 6C - MA

Professional Associations

- American Academy of Environmental Engineers, Board Certified Environmental Engineer
- Chi Epsilon - Honor Society of Civil Engineers
- Connecticut Water Pollution Abatement Association
- Massachusetts Water Pollution Control Association
- New England Water Environment Association, Plant Operations Committee Chair, 2001-2005, Executive Committee and Director-at-Large, 2008-2011, Awards Committee Chair, 2011-present
- Tau Beta Pi National Engineering Honor Society
- Water Environment Federation, Technical Practice Committees for various manuals of practice
- Water Environment Federation, Operations Forum Editorial Advisory Committee, 2007-present

Technical Expertise

- Activated sludge wastewater treatment
- Nutrient removal from wastewater
- Wastewater clarification processes

increase in wet weather (200 MGD) treatment capacity at the WPCF.

Town of Enfield, CT – Facilities Plan and WWTP Upgrade Design. Technical Lead for the preparation of a comprehensive facilities plan and \$36M plant upgrade design. The evaluation of this 10 MGD plant included particular focus on biological nitrogen removal and sludge processing alternatives as well as the rehabilitation of an aging WPCF.

Upper Montgomery Joint Authority, Pennsburg, PA – Facilities Plan and WWTP Upgrade Design. Technical Lead for the evaluation of preparation of a comprehensive facilities plan and \$25M plant upgrade design to expand the plant to 2.5 MGD and meet stringent nitrogen (5 mg/L) and phosphorus (0.1 mg/l) limits while also providing a peak wet weather treatment capacity of 11.5 MGD.

Town of Billerica, MA – WWTF Tertiary System Upgrades. Technical Lead responsible for the \$12.3 million SRF funded upgrades to the 5.4MGD Letchworth Avenue WWTF to meet lower effluent phosphorus and aluminum limits. The upgrades included comprehensive planning, permitting, funding, detailed design, construction administration and startup of the proprietary CoMag process, an intermediate pump station capable of pumping the 16.5 MGD peak flow, gravity thickeners, dedicated waste activated sludge pumps, chemical storage and feed systems, and a plant wide SCADA system.

Town of Nantucket, MA – WWTP Design. Technical Lead for the expansion and upgrade of this 4.0 MGD membrane bioreactor treatment facility serving the year-round and seasonal residents. Upgrade of these treatment facilities require flexibility to accommodate significant variations in flow and pollutant loading, particularly in the biological nitrogen removal and sludge processing systems.

Town of Windsor Locks, CT – On-Call Wastewater Engineering. Project Manager and Technical Lead for a variety of on-call assignments for the Windsor Locks Water Pollution Control Authority (WPCA). Tasks included development of a capital improvements plan, evaluation of sewer use rates, pump stations upgrades and assistance with various WPCF system upgrades.

Portland Water District, Portland, ME – East End WWTF Aeration Upgrade. Process Technical Lead for the East End Wastewater Treatment Facility Aeration Upgrade preliminary design effort. Worked closely with the lead process engineering firm to provide input on aeration upgrade options at the project initiation and throughout the design effort, provided senior process engineering expertise, oversight and input for QA/QC on options development and viability determination.

Canton, CT WPCF – Treatment Process Evaluation & Upgrade. Project Manager and Technical Lead for evaluation of alternatives to renovate the existing trickling filter (TF)/ RBC process. Alternatives considered included combinations of structural and process modifications to rehabilitate the system and improve plant performance. Final design and construction of improvements included rehabilitation of the existing TF drive, replacement of the broken RBC shaft and conversion of the RBC process to the hybrid activated sludge-RBC process. The hybrid RBC process improvements included a return activated sludge system and new blowers/diffusers to control RBC biofilm thickness and aerate the suspended growth portion of the system.

New England Interstate Water Pollution Control Commission (NEIWPC) – Nitrogen Optimization and Training Program. Lead for operations evaluation and training program conducted by the New England Water Pollution

Control Commission for the Connecticut Department of Environmental Protection. Program involved evaluation of various WPCF's in Connecticut to evaluation of current operating practices, identification of potential improvements to operating procedures and incorporating site specific training and workshops to assist operations staff improve nitrogen removal performance.

Woodridge Lake Sewer District, Goshen, CT – Facilities Planning. Project Manager for completion of comprehensive facilities plan that evaluated local treatment and disposal versus a regional solution with an adjacent community. Effort included a comprehensive infiltration/inflow investigation, evaluation of the existing groundwater disposal system, upgrade of the treatment facility, evaluation of a regional solution with an adjacent community, SCADA improvements and a detailed financial evaluation of alternatives.

Town of Beacon Falls, CT WPCF – On Call Wastewater Engineering. Project Manager for a variety of on-call assignments for the Beacon Falls WPCA. Recent tasks include review of proposed industrial wastewater connections and evaluation of upgrade of treatment process systems.

Town of Billerica, MA – Energy Efficiency Improvements. Technical Lead for evaluation and design of replacement of aeration blowers and plant water system to both reduce energy consumption and improve the control as well as the performance of this 5.4 MGD advanced WWTF.

Town of West Haven, CT – Evaluation of Operations and Process Assessment. Technical Lead on evaluation of process control measures used by contract operator at a 12.5 MGD BNR facility. Developed report that documented process limiting factors and identified operational and modest plant modifications to improve plant performance and enhance liquid treatment capacity.



MARILYN BAILEY, PE

SENIOR ENVIRONMENTAL ENGINEER

Professional Profile

Marilyn Bailey specializes in the planning, design, and construction of water, wastewater treatment and water recycling systems. She has worked on regional multi-agency master plans utilizing innovative engineering and institutional solutions to maximize water recycling. She has also been involved with design and construction of water recycling and wastewater treatment facilities throughout the Bay Area with capacities up to 160 MGD.

Related Experience

Novato Sanitary District – Wastewater Treatment Facility Master Plan and Final Design. Process Leader, the Novato Sanitary District upgraded its wastewater treatment facilities to increase treatment reliability, improve compliance with regulations, replace aging infrastructure at the treatment plants, and accommodate planned growth as defined in the City of Novato General Plan. Woodard & Curran was hired by the district to prepare a wastewater treatment facility master plan to define and evaluate alternative treatment concepts that would address issues of growth and NPDES permit compliance, while accommodating future recycled water. The Master Plan includes a condition assessment and an evaluation of future flows and loadings. Prepared construction bid documents for the plant upgrade which included consolidation of two separate treatment facilities into a single plant by converting the smaller Ignacio plant into a transfer pump station, and constructing a new 7 MGD treatment plant at the Novato site. Phased construction of the \$84 million project kept the existing plant operational during construction of new facilities on same site.

City and County of San Francisco, CA – Oceanside Water Pollution Control Plant.

Project Manager for the design of the pretreatment and solids-handling portions of a \$220-million, 43 MGD Oceanside Water Pollution Control Plant. The facilities under Marilyn's direction included raw sewage screening, grit removal, gravity belt thickeners, belt filter presses, dewatered cake storage, dual polymer systems, odor control, egg-shaped digesters, a gas storage tank, waste gas incineration, and an energy recovery building with gas-fired engines and boilers. As part of the environmental mitigation measures for project approval, 70 percent of the overall project was built underground. The design included stringent odor and noise control limits.

Yuba City, CA – Wastewater Treatment Facility Expansion. Process Lead managing wastewater treatment facility expansion project to address aging infrastructure, to meet regulatory requirements, and to provide capacity for the projected buildout of the service area in accordance with the City's adopted General Plan. Assisting the City in implementing process improvements and capacity expansion projects to increase the firm average dry weather capacity of the wastewater treatment facility to 12.6 MGD. The project includes the pre-design of treatment process upgrades to every process within the treatment plant, and final design of a new solids thickening facility.

Education

- M.S., Environmental Engineering, Stanford University, 1978
- B.S., Civil Engineering, Kansas State University, 1977

Registrations

- Professional Civil Engineer, California, #31428, 1980
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San Jose/Santa Clara WPCP – Treatment Plant Upgrades. Served as Project Engineer and onsite resident engineer during construction of \$38 million in improvements to the 167 MGD San Jose/Santa Clara WPCP. Following a total process failure at the plant that led to a cease and desist order, oversaw a process by process capacity analysis to determine the reason for the failure. She identified hydraulic and process bottlenecks and contributed to the design and construction of the upgrades to every process in the plant. Major components of the project included replacement of the existing raw sewage pumps, new primary effluent pump station and flow equalization facilities, new secondary clarifiers, new nitrification aeration basins and clarifiers, and a new disinfection facility. Following facility upgrades, the plant has maintained compliance with NPDES permit requirements.

City of Benicia, CA – Benicia Wastewater Treatment Plant Expansion Project. Project Manager for the expansion and upgrade of the Benicia Wastewater Treatment Plant to 4.5 MGD in response to compliance issues related to secondary treatment system solids handling. The \$4 million project included evaluating all plant processes and designing upgrades that included modifying the headworks, expanding the rotating biological contactor secondary treatment system, adding a secondary clarifier, adding a new gravity sludge thickener, expanding the belt press solids dewatering facility, and improving the anaerobic digesters.

South Placer Wastewater Authority – Regional Wastewater System and Recycled Water System Evaluation. Task Leader evaluated the wastewater collection, treatment, recycling and disposal system that serves the South Placer Region. Led the effort to evaluate the capacities of two treatment plants that serve the area. Aggressive water conservation in the service area had resulted in lower flows and more concentrated organic

loadings to the plants. The capacity evaluation indicated that both plants were nearing their organic treatment capacity to handle organic loading even though there was adequate hydraulic capacity due to water conservation. As part of the study, the team developed treatment alternatives and a phased implementation plan for both plants to quickly restore the organic treatment capacity and subsequently to expand the overall treatment capacity to meet buildout in the service area.

City of Santa Rosa Laguna Water Pollution Control Plan – Ultraviolet Disinfection Project. Project Manager for a medium pressure, ultraviolet (UV) disinfection facility for the City of Santa Rosa Laguna Water Pollution Control Plant. Most of the effluent from the Laguna Plant is reused for irrigation on surrounding farms and vineyards. The remainder is seasonally discharged to the Russian River, which serves as a drinking water source for downstream communities. The disinfection system must therefore meet the most stringent requirements of Title 22 for unrestricted reuse. The stringent effluent coliform requirements of 2.2 MPN/100 ml and a peak flow of 67 MGD combined to make this one of the largest medium pressure UV facility in North America. The project included pilot testing and an extensive predesign that served as the Engineer's Report to RWQCB and Department of Health Services for providing Title 22 compliance. The \$10-million project also includes sodium hypochlorite facilities for miscellaneous in-plant uses.

Novato Sanitary District – Sodium Bisulfite Design. Project Manager for facility planning, final design, and engineering services during construction for a remote sodium bisulfite dechlorination facility for the Novato Sanitary District. The district operates two treatment plants that share a joint outfall to the Bay. The district's dechlorination facility was located approximately five miles from the plants in a marsh targeted for habitat restora-

tion by the Coastal Conservancy, thus requiring relocation and replacement of the dechlorination facility. The new sodium bisulfite system was located on the outfall pipe, approximately one-half mile from the closest treatment plant. Design included a storage tank, chemical metering pumps inside a secondary containment area, a remote sampling facility, a chemical induction unit for mixing the sodium bisulfite within the outfall, a control system to calculate dosage based on the combined flow from both plants, remote sampling facility, modifications to the plant's bioassay system, and over one half mile of heat-traced chemical piping. The sodium bisulfite system is sized for 50 MGD, which is the combined peak flow from the two plants.

East Bay Municipal Utility District – Sodium Hypochlorite Design. Design Manager for the design of converting the disinfection system for the wastewater treatment plant from gaseous chlorine and sulfur dioxide to sodium hypochlorite/sodium bisulfite. To meet the client's schedule requirements, the design, consisting of 131 drawings, was accelerated and completed in only 10 weeks. The construction cost of the modifications is \$4.8-million. The conversion required new storage tanks, piping, control systems, pumps, mixers, and flow control loops. The new hypochlorite/bisulfite facilities, designed to meet peak flows of 340 MGD, were constructed while maintaining uninterrupted service and minimizing risk to existing facilities.

City of Santa Rosa, CA – Biosolids Beneficial Reuse Program Phase II. Project Manager for the expansion of the 18 MGD Laguna Wastewater Treatment Plant. The \$7 million project included new primary sedimentation facilities; replacement of the secondary aeration system with fine bubble diffusers; and a new solids dewatering facility with belt filter presses, odor control, conveyor systems, a truck-loading station; and provisions to dewater digested sludge and stored lagoon sludge.



Education

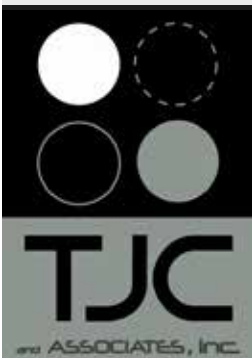
MBA, University of CA, Berkeley, 1988
 MS, Electrical Engineering and Computer Science; University of CA, Berkeley; 1980
 BS, Electrical Engineering and Computer Science; University of CA, Berkeley; 1978

Professional Registrations

Electrical: CA, WA, NV, HI, WY, CO, OR, AZ, ID, AK
 PE: UT, NM, WI, OH
 Control Systems: CA
 LEED Accredited Professional

Professional Memberships

Institute of Electrical and Electronics Engineers
 Instrumentation, Systems, and Automation Society



Paul Giorsetto, P.E., LEED AP, BD+C QA/QC

Experience

Paul Giorsetto has more than 25 years of design experience in the areas of electrical power distribution, electrical industrial applications, control systems, and instrumentation. His specific experience includes electrical system modeling and planning; medium and low-voltage electrical distribution designs of water, wastewater and industrial waste treatment facilities; plant instrumentation; and SCADA systems for in-plant and telemetry-based systems. He also has significant experience in construction services, as a resident engineer and inspector, and during facility startup.

Mr. Giorsetto has been the electrical and/or discipline lead on numerous large water and wastewater design projects, and has been a project manager on stand-alone control system and electrical design projects having construction costs in excess of \$3 million. He has acted as project manager on several standalone electrical and instrumentation and controls (I&C) design-build projects.

- Pressure Zones 2 and 3 Pump Station Improvements; Dublin San Ramon Services District, Pleasanton, CA; Project Engineer and TJCAA Project Manager.** Project Lead electrical and I&C engineer for preliminary design, final design, and construction services for electrical and mechanical renovations at four drinking water pump stations. Work included field inspections, conceptual approaches, use of reduced voltage starters for hydraulic surge control, replacement of all electrical equipment, and interfacing to the District's radio based SCADA system. Project also resulted in relocating several PG&E service points at each pump station and developing bid documents to incorporate a sole sourced District programmer for performing SCADA system upgrades.
- Cogeneration Electrical Improvements and Service Relocation Project; Dublin San Ramon Services District, Pleasanton CA; Project Engineer and TJCAA Project Manager.** Performed preliminary and final design services for improvements to and expansion of the WWTP electrical distribution and cogeneration facility. This project includes relocation of the WWTP existing 21 kV PG&E service, replacing existing cogeneration control/switchgear, and adding a third cogeneration unit resulting in a total internal generation capacity in excess of 2 MW. Work includes coordinating necessary facility improvements for power export capability to PG&E, new PG&E primary service, new networked engine-generator controls, and upgrades to several 480 V and 21 kV switchgear. TJCAA is assisting the District with engineering services during construction, with Project completion scheduled to occur in 2012.
- 1630 Pump Station Project; Cucamonga Valley Water District, Rancho Cucamonga, CA; TJCAA Project Manager.** New pump station executed as a joint effort between CVWD and the Inland Empire Utilities District. Project management tasks included prime consultant responsibilities for all support disciplines: structural architectural, building mechanical, electrical, and I&C. New pump station included new building structure, building mechanical systems,

new electrical (SCE) service, and control system coordination for secure extra-agency data exchange. Project requirements included prepurchase process to expedite procurement and ensure commonality of provided equipment. Project finished on time and on budget.

- **Graham Hill Water Treatment Plant Electrical Improvements Project; City of Santa Cruz Water Department, Santa Cruz, CA; Project Engineer and TJCAA Project Manager.** Renovation, expansion, and improvements to the electrical distribution system at the City's main Graham Hill WTP. Project included verification and design validation to establish the conceptual approach. Final design for upgrades to the electrical system include a new utility 21 kV primary service, 480 Volt main-tie-main switchgear with source transfer logic, remote switchgear console for arc-flash considerations, 1,500 kW engine-generator set, and a dedicated electrical building.
- **Arc Flash Implementation; Central Contra Costa Sanitation District, Martinez, CA; Project Manager.** Prepared an arc flash implementation strategy for the District that included reviews of previous arc flash and electrical improvement studies, field verification of hazard mitigation techniques, development of standard criteria for arc flash hazard identification and field labelling, and preparation of a standardized facility graphic for communication of arc flash conditions to District electricians.
- **SCADA Telemetry Upgrade Project; Contra Costa Water District, Concord, CA Project Manager.** Prepared comprehensive predesign analyses and report for development of alternatives for remote site radio and PLC equipment, new multiple address system radios, new point-to-point and high bandwidth backbone communication links, and secure MPLS strategy as a standby strategy for routing telemetry SCADA data to District servers. This project also included development of RFQ and RFP documents for execution of a design/build procurement strategy by the District for both the telemetry equipment and new server equipment being installed at the Randall-Bold WTP.
- **Diemer WTP, Electrical System Reliability Analysis (Electrical Master Plan); Yorba Linda, CA.** Performed reliability analysis of the existing 40 year old electrical system at the Diemer WTP in Yorba Linda. Project included field investigations, review of existing documentation, and application of client's reliability criteria as it related to the electrical distribution system. Developed final report with recommendations for system improvements and for integrating the work with ongoing District planning and design projects.
- **Pacheco Pumping Plant ASD Replacement Project; Santa Clara Valley Water District, Santa Clara, CA; Lead Instrumentation Engineer, Project QA/QC, and TJCAA Project Manager.** Project included replacement of 12 existing 2000 hp, 5 kV, wound rotor motor speed control with new PWM Adjustable Speed Drives. Work includes analysis of drive technologies, review of prequalification and procurement delivery methods, control system interfaces to large drives, and modifications to the existing controls to support interim operation of parallel control systems for the multi-year construction cycle.

Publications and Presentations

"Electrical Fundamentals for Water Distribution and Treatment Facilities", presented at Contra Costa Water District, June 23, 2011.

"Wireless Applications in the Water and Wastewater Industries", presented at the American Water Works Association, Fall 2007 Conference,



Terence J. Cavanagh, S.E.
Vice President

Experience

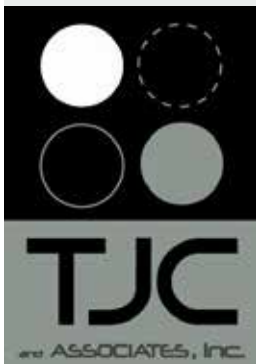
Mr. Cavanagh, a licensed engineer since 1985, is an expert in the design of water and wastewater treatment plant structures. He specializes in the structural design and seismic evaluation of facilities including water and wastewater treatment plants, reservoirs and storage tanks, pump stations, ozone treatment facilities, chemical storage and containment facilities, and operations centers/laboratories. He provides significant design expertise with all conventional building materials used for water and wastewater treatment facilities. Mr. Cavanagh's specific project experience includes the following:

Education

MS, Structural Engineering/
 Structural Mechanics;
 University of CA, Berkeley; 1984
 BS, Civil Engineering;
 University of CA, Berkeley; 1982

Professional Registrations

Structural: CA, HI, ID, IL, KY, NH, OR, UT, WA, WY
 Civil: AL, AZ, AR, CA, CO, CT, DE, FL, GA, HI, IA, ID, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, MT, ND, NE, NV, NH, NJ, NM, NY, NC, OH, OK, OR, PA, RI, SC, SD, TN, TX, UT, VA, VT, WA, WI, WV, WY



- **Bridge Condition Assessment and Temporary Structure Design; Pasadena Water and Power; Pasadena, CA; Project Manager/Principal in Charge.** Performed structural evaluations of three existing bridges and designed temporary structures to support movement of heavy construction equipment during the City of Pasadena's Arroyo Seco Canyon Project.
- **Pasadena Recycled Water Project-Phase I; Pasadena Water and Power; Pasadena, CA; Project Manager/Principal in Charge.** Provided structural design for an 11,000-square-foot CMU pump station with a concrete roof and two monorails for equipment movement. The design also included a 0.5-MG, rectangular, buried concrete reservoir; a horizontal, hydro-pneumatic tank; and a concrete foundation for a prefabricated FRP building that will provide shelter and secondary containment for stored chemicals.
- **Murray Reservoir Demolition and Murray Hydro-Pneumatic Zone Upgrades; Pasadena Water and Power; Pasadena, CA; Project Manager/Principal in Charge.** Provided a structural design for a CMU pump station and hydro-pneumatic tank to be located over a demolished in-ground reservoir.
- **Rinconada Water Treatment Plant (WTP) Reliability Improvement Project; Santa Clara Valley Water District; Los Gatos, CA; Project Manager/Principal in Charge.** Structural design for a new ozone generation building, LOX facility, flocculation/sedimentation basins, filters, washwater recovery facility, chlorine contact basin, and an elevated concrete platform to support electrical equipment. The structures are part of this major project to improve reliability at the Rinconada WTP, which is the main water treatment plant serving the western service area for the District.
- **Rinconada WTP Residuals Management Project; Santa Clara Valley Water District; Los Gatos, CA; Principal in Charge.** Responsible for the structural design of new gravity thickeners, a two-story concrete building housing new centrifuges and electrical equipment, and a steel-frame load-out structure.
- **Ironhouse Wastewater Treatment Plant (WWTP) Expansion; Oakley, CA; Structural Engineer of Record.** Responsible for the structural design of a 9-mgd expansion, including an influent pump station, headworks, anoxic/aeration basins, membrane bioreactors, backpulse tank, blower/electrical/generator/chemical building, UV/Effluent pump station, and a solids handling building.
- **Napa MST Recycled Water Project; Napa Sanitation District; Napa, CA; Principal in Charge.** Structural design of a 40 x 60-foot concrete masonry pump station and electrical equipment room, as

well as four pipe crossings over existing creeks.

- **Headworks Project; Sausalito-Marin City Sanitary District; Sausalito, CA; Project Manager.** Structural design for facility improvements as part of a WWTP expansion design on a highly constrained site adjacent to San Francisco Bay.
- **WWTP Expansion; Delta Diablo Sanitation District; Structural Engineer of Record.** Designed structural elements for a 12.2-mgd WWTP expansion to include a recycled water facility to service two power generation facilities. Design of this multimillion-dollar facility, which was completed within 6 months, included a 1.8-MG welded steel tank for recycled water storage. Mr. Cavanagh provided engineering services during construction.
- **C Street Pump Station; City of Petaluma, CA; Project Manager.** Performed a seismic assessment and refurbishment design for a 1960s pump station to accommodate new pumps, improve Code compliance, and address aesthetics.
- **Bridgehead Emergency Storage Basin and Pump Station; Delta Diablo Sanitation District; Oakley, CA; Structural Engineer of Record.** Structural design of a sewage pumping station and a 1-MG cast-in-place emergency storage basin. Design included a concrete building 26 feet below grade and a two-story, 1,720-square-foot masonry block building with a metal truss built-up roof.
- **Vineyard Avenue Pump Station; City of Pleasanton, CA; Principal Engineer.** Provided engineering and construction services for the design of a 2,176-square-foot concrete masonry unit pump station/electrical building on a constricted site with strict architectural/aesthetic requirements.
- **Surface Water Treatment Facility, Phase I; City of Brentwood, CA; Principal Engineer.** Provided engineering for the design of a WTP expansion. Specific elements of the project included a 30 x 35-foot, 35-foot-deep wet well and concrete masonry block electrical building.
- **Domestic Water Connection and Distribution System Piping Project; Sacramento County Airport System; Project Manager.** Provided engineering for the design of prestressed concrete pile foundation system supporting two 1.5-MG prestressed concrete potable water storage reservoirs.
- **WWTP Expansion; City of Brentwood; Structural Engineer of Record.** Design of a 10-mgd WWTP expansion. This substantially new, \$40 million facility included all elements of the process train and required consideration for mitigation of highly liquefiable soils. The selected mitigation measure included a combination of stone piles and dynamic compaction. Provided engineering services during construction.
- **Coral Street and Fountain Avenue Pump Station Upgrades; Monterey Regional Water Pollution Control Agency, Monterey, CA; Principal in Charge.** Directed the seismic analysis and design for refurbishment of oceanside pump stations.
- **Storm Water Pump Station Refurbishment; Central Sanitation District; Orinda CA; Project Manager.** Prepared seismic evaluations and retrofit designs for the upgrade of the Lower Orinda Pump Station. Expansion of this circa 1950 pump station increased its capacity from 14 mgd up to 21 mgd—the estimated capacity required through 2035.
- **Ridgemark WWTP Expansion; Sunnyslope County Water District; Ridgemark, CA; Project Manager.** Lead and provided quality assurance/quality control reviews for the design of modification and expansion of the headworks, membrane bioreactors, blower building and solids handling storage tank on a fault rupture site.
- **Drinking Water Improvement Project; City of Folsom, CA; Project Manager.** Provided engineering for the design of a 10-mgd WTP expansion. Specific elements included Actiflo pretreatment structure, filters, and partially buried prestressed concrete chlorine contact tank. Provided engineering services during construction.



Michael J. Erwin, P.E.

Principal

Experience

Michael Erwin, who heads up TJCAA's Control Systems Programming group, has been building valuable experience since 1986 in the design, implementation, and management of electrical power, control, automation, and instrumentation systems. He performs electrical design engineering for water and wastewater treatment facilities, collection and distribution systems, and industrial facilities, focusing on instrumentation and control system design and programming. His specific experience includes development of power calculations, protective device coordination, equipment specification, instrument selection, and control panel fabrication design; design of SCADA systems for in-plant and telemetry-based systems; and programmable logic controller (PLC) programming.

Mr. Erwin has hands-on familiarity with a wide variety of PLC and SCADA hardware and software platforms, including Rockwell Automation, Schneider Electric, and GE Intelligent Platforms. He gained his extensive experience not only as a consultant, but also as chief engineer and project manager for a Northern California systems integrator. With this understanding of the water/wastewater, control system, and construction industries, he emphasizes constructability and focuses on systems that feature maximum operator usability and efficiency. His experience includes the following:

- **Treatment Plant 2 PLC Upgrade Project; Alameda County Water District; Project Manager/Lead Programmer.** Treatment Plant 2 was built in 1993 and included four Modicon 984-785 PLC systems, three of which were hot-standby PLCs. Michael Erwin was one of the PLC programmers on the original 1993 project. The PLC upgrade project involved converting the original Modicon 984 PLC programs to the latest version of Schneider Electric's Unity software and testing and commissioning new Quantum Unity PLC systems to replace the existing PLCs. The programming work included development of new ACWD-defined function blocks, conversion of the LL984 ladder for plant control functions, and thoroughly bench-testing all aspects of the new program before installation and testing in the field.
- **Oro Loma Effluent Pump Station Control System Upgrade Project; East Bay Dischargers Authority, San Lorenzo, CA; Project Manager/Programmer.** The Oro Loma Effluent Pump Station collects treated wastewater from Hayward, San Leandro, San Lorenzo, Castro Valley, and Union City and pumps the treated water through a dechlorination station and into San Francisco Bay. The pump station consists of two 350-hp electric pumps on variable frequency drives (VFDs) and two 1,200-hp diesel driven pumps, and has a pumping capacity of over 200 mgd. The first phase of the project involved development of a control system design package to replace three existing Automation Direct PLCs and two Woodward engine controllers with two Quantum Unity PLCs that provided parallel control to two pumps each. In the second phase of the project TJCAA developed the new Unity PLC control programs and

Education

BS, Electrical Engineering; San Diego State University; 1986

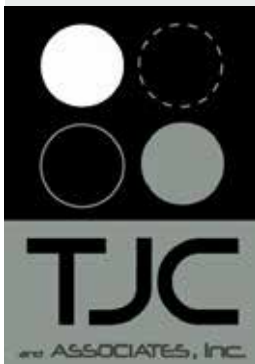
Professional Registration

Electrical: CA

Professional Memberships

Instrumentation, Systems, and Automation Society

American Water Works Association



configured the plant's existing Wonderware system to monitor the control of the pump station.

- **Water Treatment Plant (WTP) PLC Upgrade Project; City of Benicia, CA; Project Manager/Programmer.** The Main PLC at the City's WTP had become obsolete and difficult to maintain. In addition, multiple undocumented changes had been made over the past 15 years while the City's maintenance staff was keeping the system operating reliably. The project included field verifying and "as-building" the existing PLC control panel, developing a bid set of documents for replacement of the PLC control panel, and programming the new GE RX3i PLC to improve performance of some treatment processes and a fully documented PLC control program. Because the plant was in operation, the installation team had only 24 hours to remove the existing PLC panel, install the new panel, and bring the plant's primary processes back into operation. Not only was the installation completed on time, the plant was back in full automated operation within 32 hours of the initial plant shutdown.
- **Rinconada WTP Reliability Improvement Project; Santa Clara Valley Water District; Los Gatos, CA; Lead I&C Engineer.** Oversaw the electrical engineering and control systems design work for the \$180 million WTP modernization. This project incorporates capacity increases to raise plant output to 100 mgd and incorporates new ozone treatment trains, multiple new and retrofitted chemical systems, filters, and floc-sed basins. The design was developed to maintain the plant in operation throughout the estimated 5-year construction period. Design included new 12-kV distribution, arc flash protection strategies, a new 3-MW diesel standby generator, and new distributed motor control centers with smart motor starters and VFD equipment. I&C design incorporated a new distributed PLC architecture coordinated with construction phasing and new processes. Final design included over 400 electrical, instrumentation, and controls design drawings.
- **Wastewater Treatment Plant (WWTP); City of Malibu, CA; I&C and Electrical Discipline Lead.** Lead I&C and electrical engineer for new greenfield WWTP and collection system pump stations for City of Malibu. This project included new SCE service, secondary selective 480-V distribution for reliability, standby generation, and local motor controls. The I&C design incorporated distributed controls based on PLCs and integration of control platforms provided by process package suppliers.
- **Montclair Lift Station; Inland Empire Utilities Agency, Chino Hills, CA; Lead I&C and Electrical Engineer.** Design of an electrical system replacement, including distribution equipment, VFDs, and PLC control panel, with a new system using redundant ControlLogix PLCs. The project design required a phased installation sequence to maintain continuous operation during construction.
- **SCADA System Integrator Projects FY2013-14 and FY 2014-2016; Contra Costa Water District, Concord, CA; Project Manager.** Acting as system integrator for CCWD SCADA projects. Provided assistance with development of panel I/O requirements, system PLC programming (Modicon Unity), human-machine interface graphic preparation (Telvent and Wonderware), coordination with construction contractors, and development of as-built documentation. This work included SCADA-related tasks on a variety of CCWD capital improvement projects including new chlorination boosters, storage tank upgrades, a new wireless I/O installation at the sludge drying beds at CCWD's Randall-Bold WTP, a new control system interface to replacement ozone destruct equipment, and a new control system interface to the UPS system installed at the CCWD Bisso Lane Engineering Headquarters and other capital improvement projects.

- **Well 2 PLC Program Upgrade; Bella Vista Water District, Redding, CA; Lead Programmer.** Performed an update of the well site PLC program to meet BVWD programming standards and organization, add residual chlorine monitoring, and improve the automated backwash sequence.
- **Lincoln Pump Station; City of Stockton, CA; Project Manager and Lead Programmer.** Control system design for a new pump station with three lift pumps, VFDs, PLC controls, and integration into the city's existing telemetry/SCADA system.
- **Water Distribution System SCADA Upgrade; San Juan Water District, Granite Bay, CA; Project Engineer.** Hardware and software upgrades from an existing proprietary control system to a new Allen-Bradley PLC and Wonderware-based SCADA system. Eight major PLC panels were replaced at the WTP using AB CompactLogix PLCs on a fiber optic Ethernet network. A combination of 900-MHz and 2,400-MHz spread spectrum Ethernet radio networks was used for control and monitoring of 6 pump stations, 3 tank sites, and 17 flow metering sites. An Intouch SCADA application was deployed on redundant virtual servers and redundant historian servers with thin-clients distributed throughout the treatment plant and the major pump stations. Execution of this project had to be performed with minimal plant shutdowns, and installation had to be performed using existing field wiring—the design included provisions for complete panel replacement and termination in less than 24 hours.
- **WWTP Expansion with New Control System; City of Delano, CA; Project Manager/Lead Programmer.** Control system design, PLC program development, and SCADA programming for the expansion. The project included selection and integration of new instrumentation throughout the facility, seven new PLC control panels with Rockwell Automation ControlLogix controllers, a managed fiber optic Ethernet network, and a Wonderware Archestra SCADA system with an Intouch HMI, SCADAalarm alarm dialer package, and reporting software.
- **WTP Expansion; Bella Vista Water District, Redding, CA; Project Manager/Lead Programmer.** Upgrades to the raw water pump station, WTP, and 10 remote pump stations and well sites. Worked directly with the District to design and implement new control strategies and update the process to meet all California drinking water standards. Upgrades included new PLC programs for the raw water, filter plant, and telemetry GE Fanuc 90-30 PLC systems and a new Intellution iFix SCADA system with redundant SCADA servers and two remote view nodes.

Publications and Presentations

"Planning for the Replacement of Your Obsolete PLC System," American Water Works Association Water Education Seminar, August 2015.

"Diplomacy – Dealing with Customers, Owners, Engineers, and Vendors," presented quarterly at MCC Control Systems, 2004–2010.

"The Specifics – Reading, Understanding, and Implementing Specifications," presented quarterly at MCC Control Systems, 2004–2010.



NATHAN CHASE, PE, LEED AP ND, ENV SP, QSD/P WASTEWATER ENGINEER

Professional Profile

Nathan specializes in water and wastewater with nine years of experience on projects from master plans to final engineering design through to construction support services. He has delivered sustainable and resilient solutions on a wide range of projects throughout California and around the globe, including water/wastewater treatment design and plant retrofits, integrated water resources planning, pump station design, decentralized graywater and blackwater treatment, green infrastructure and stormwater best management practices (BMPs) for construction and permanent development/redevelopment, bridge/highway/rail/site drainage, hydrologic & hydraulic modeling, LEED® and Envision certification, and climate change adaptation planning. He is proficient in using specialized software applications and models, including Autodesk AutoCAD and Civil 3D, Bentley MicroStation, Esri ArcGIS, and various hydrology and hydraulics (H&H) models (e.g., HEC-RAS, HEC-HMS, Storm and Sanitary Analysis, AES, WSPG).

Related Experience

Inland Empire Utilities Agency – RP-1 Mixed Liquor Return Pumps. Project Engineer responsible for preliminary design, final design, and engineering services during construction of a mixed liquor return pump system to enhance total inorganic nitrogen removal within the Regional Plant No. 1 (RP-1) secondary treatment system. Improvements include installation of six mixed liquor return pumps and associated variable frequency drives, mixers, flowmeters, piping and controls; and both the modification of existing baffles and construction of new baffles.

Yucaipa Valley Water District – Digester Cover and Gas System Rehabilitation.

Project Engineer responsible for bid support services and engineering services during construction for a digester cover replacement project at the 8 MGD Henry N. Wochholz Regional Water Reclamation Facility. The project includes replacement of all four fixed digester covers, condition assessment and rehabilitation of the digesters and appurtenances, and upgrades to the digester gas piping to replace existing buried pipe with aboveground stainless steel pipe.

Yucaipa Valley Water District – Dewatering System Field Evaluations.

Project Engineer responsible for vendor coordination and pilot test assistance for field trialing of five different dewatering systems to potentially replace aging belt filter presses at the 8 MGD Henry N. Wochholz Regional Water Reclamation Facility. Prepared a technical report to compare performance, cost, and return on investment of the newer technologies versus rehabilitation or replacement in-kind of the existing belt filter presses, including a life-cycle analysis of operational costs.

Encina Wastewater Authority – Wastewater Facilities Condition Assessments and Asset Management.

Project Engineer/Deputy Project Manager responsible for performing condition assessments of various assets at the 40.5 MGD Encina Water Pollution Control Facility. Coordinated with the Authority and various specialty consultants to

Education

- M.S. Environmental Engineering and Science, Stanford University, 2009
- B.S. Civil Engineering, Northeastern University, 2007
- B.S. Environmental Geology, Northeastern University, 2007

Registration/Accreditation

- Professional Civil Engineer, California, #C77953
- NCEES Record Certificate #52195
- Qualified Storm Water Pollution Prevention Plan Developer, #24821
- LEED® Accredited Professional with a Neighborhood Development Specialty, #10492874-AP-ND
- Envision™ Sustainability Professional

Affiliations

- American Society of Civil Engineers – Orange County Branch
 - Water Environment Federation, California Water Environment Association
 - Orange County Water Association
 - WaterReuse Association – Orange County Chapter
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complete the internal structural integrity assessment of the landward portion of the facility's ocean outfall, which required an overnight outage and included CCTV filming. Conducted condition assessment field work and prepared recommendations for repairs, replacements, upgrades, or continued monitoring of underground electrical structures, the onsite 9,900 gpm stormwater pump station, the 1,100 gpm digester drain pump station, chlorine contact tanks, odor reduction facilities, and 50-foot diameter digesters. Incorporated results of past condition assessments and studies into the EWA Comprehensive Asset Management Plan, which includes a project prioritization process to rank competing rehabilitation and replacement projects.

City of San Clemente, CA – Sewer Master Plan. Project Engineer responsible for developing conceptual alternatives for improvements to two urban runoff diversion systems within the City of San Clemente. Prepared schematic layouts, cost estimates, and an overview of permitting/regulatory impacts for each alternative, including options for augmenting recycled water production at the City's 7 mgd Water Reclamation Plant.

City of Riverside, CA – Influent Flow Metering for the Water Quality Control Plant. Deputy Project Manager/Project Engineer responsible for preparing the preliminary design report, hydraulic calculations and modeling, conceptual plans, and a preliminary construction cost estimate for three new electromagnetic flow metering stations for major influent trunk sanitary sewers as retrofits. The meters were sized to accommodate present total influent flows of 33 MGD and future flows of up to 52 MGD.

Baxter Healthcare Corporation – Wastewater Neutralization System Expansion. Project Engineer analyzed existing information and field flow and pH studies to develop a Basis of Design for expanding an onsite 1 mgd Wastewater pH Neutralization System. Nathan was responsible for authoring the design report including process flow diagrams and construction cost estimate of approximately \$2.9M. Participated in a Failure Mode and Effect Analysis (FMEA) workshop, contributed to the FMEA report, and incorporated recommendations arising into the design concept.



MARK TAKEMOTO, PE

SENIOR WASTEWATER ENGINEER

Professional Profile

Mark specializes in engineering for projects involving wastewater treatment and recycled water, specifically solids handling, wet weather treatment, and treatment process planning and design.

Related Experience

City of Brentwood, CA – Brentwood Wastewater Treatment Plant (WWTP)

Expansion, Phase II. Project Engineer leading the design team that is providing preliminary design, final design, and bidding and construction support to expand capacity at the City's WWTP from 5.0 MGD to 7/5 MGD, eventually to 10.0 MGD. The goal of this phase is to meet the City's near-term needs, while optimizing new facilities to meet long-term goals, as well as making the facility as energy efficient as practical. Addressing the secondary aeration energy efficiency; biosolids drying; and disinfection by-products formation. Mark and the design team just completed pre-design.

Encina Wastewater Authority (EWA) – Encina Water Pollution Control Facility

Expansion. Project Engineer responsible for evaluating options to replace a digester gas booster on one of Encina's existing digesters. Worked on the design for replacement of one of the automated backwash strainers on the utility water system. Providing program management services for EWA for the expansion of the Phase V expansion of the Encina Water Pollution Control Facility (EWPCF) to the capacity needed by 2025 projected to be approximately 49.8 MGD liquid and 51.8 MGD solids. Services have included condition assessment of 72-inch Primary Effluent and 72-inch Secondary Effluent Pipelines, developed the bypass pumping and outage plans, conducted workshops with outage team, provided inspection services and coordination, prepared final condition reports with conclusions and recommendations. Developed project concepts for over 150 plant capital improvement projects for all areas of the EWPCF, the Carlsbad Water Reclamation Facility and remote pumping facilities operated by EWA. Also, in order to produce a triple pass heat dryer to produce Class A biosolids and replacement of cogeneration facilities with new engine generator sets, services have included technology upgrade for process control and monitoring, and installation aeration basin and digester improvements. Digester improvements also included conversion from gas mix to pump mix system, coating, repair of curtain wall, gas piping and appurtenance replacement, and digester cleaning. Also performed nocardia control evaluation to address foaming issues.

City of Yuba City, CA – Yuba City O2 and 12kV Design and Engineering Services

During Construction. Project Manager providing engineering services during construction for Yuba City's Oxygen Reactor Upgrade and 12kV Switchgear Replacement projects. Prior to construction, Mark was a member of the project team that designed both improvement projects.

Education

- M.S., Environmental Engineering, University of California at Berkeley, 2001
- B.S., Civil and Environmental Engineering, University of California at Berkeley, 1999

Registration/Accreditation

- Professional Civil Engineer, California, #64369

Affiliations

- CWEA – Past President, San Francisco Bay Section
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City of Yuba City, CA – Solids

Thickening Improvements. Project Engineer of record for the design of Yuba City's Solids Thickening Improvement Project. The \$1.5 million facility was integrated into the existing process at the plant and included the installation of two new rotary drum thickeners, thickened waste activated sludge pumping, polymer make-up units and sludge drying improvements. Mark also led the team providing Engineering Services During Construction (ESDC) for the thickening improvements.

City of Yuba City, CA – Wastewater Treatment Facility Expansion.

Project Engineer evaluated solids thickening, pure-oxygen reactor, and site plan improvements for the wastewater treatment facility expansion project to address aging infrastructure, to meet regulatory requirements, and to provide capacity for projected build-out. The project included the pre-design of treatment process upgrades to every process, and final design of a new solids thickening facility. A recycled water feasibility study was completed as part of the project to look at potential reuse options as well as new outfall locations.

Yucaipa Valley Water District – Digester Cover and Gas System Rehabilitation.

Technical Review/Project Manager working with Yucaipa Valley Water District on the inspection and replacement of the digester covers at the Henry N. Wochholz Wastewater Reclamation Facility (WWRF). The project involves condition inspection of all four digester covers. One of the covers is in need of immediate replacement and will be replaced by a new steel cover as part of the project. The digester gas piping will also be replaced so that buried sections of pipe can be abandoned.

Sausalito-Marín City Sanitary District – Treatment and Wet Weather Flow Upgrade Final Design.

Design Lead, as follow-up to planning and predesign,

worked on the design of the project to add headworks (screening and grit), a primary clarifier, fixed film reactor upgrades, equalization and tertiary filter improvements to the existing wastewater treatment plant. The project aims to improve treatment plant performance, provide additional redundancy, and decrease maintenance and operator labor requirements. Assisting SMCSD with obtaining a CWSRF low-interest loan to finance the project. Prepared the General, Technical, Financial, and Environmental Package portions of the application and coordinated with the District and State Water Resources Control Board throughout process.

Sausalito-Marín City Sanitary District (SMCSD) – Wet Weather Evaluation.

Project Manager, Sausalito-Marín City Sanitary District recently evaluated conveyance system and treatment plant issues associated with wet weather flows. As part of whole system approach, including conveyance and treatment plant improvements, responsible for overall project management as well as development of the No Feasible Alternatives Analysis addressing wet weather blending. Also developed conceptual level treatment and hydraulic improvements for the treatment plant to address wet weather flows.

Union Sanitary District (USD) – Site

Use Study. Project Engineer evaluated near- and long-term site planning needs for USD. The Site Use Study will be used as planning tool for USD to assist in the implementation of new facilities at the existing Alvarado WWTP site. A key component of the site use study is identifying long-term space requirements and the feasibility of expanding the treatment with and without purchasing additional land. A lifecycle cost analysis was completed to compare the cost of rehabilitating the existing plant versus constructing an all new plant.

Novato Sanitary District (NSD)

– Wastewater Treatment Facility Upgrade, Engineering Services during Construction (ESDC). Project Engineer and lead contact for ESDC work for the construction of the District's upgraded wastewater treatment facility. Responsible for coordination and review of contractor submittals, RFIs and change orders for the \$66 million improvement project.

Novato Sanitary District Wastewater –Treatment Facility Upgrade, Final Design.

Project Engineer for the detailed planning and design of the major facility upgrade, responsible for developing and designing the solids handling and treatment facilities for the treatment plant upgrade, which include waste activated sludge thickening, anaerobic digestion and digester gas handling. Mark also evaluated process improvements during the pre-design stage including options for implementing a solar energy system. Developed a greenhouse gas emission estimate for the new facility and investigated energy efficient design elements including adjustment of the hydraulic gradeline through the facility.

Sunnyslope County Water District – Long-term Wastewater Management Plan.

Project Engineer evaluated dewatering facility alternatives including belt filter press, screw press and sludge bagging systems for the District's wastewater treatment plant. The project was formulated to meet the requirements of the District's new Regional Water Quality Control Board Waste Discharge Requirement Permit. The Long-term Wastewater Management Plan found that the existing wastewater treatment plant would need to be upgraded or the District could convey its flow to the City of Hollister's wastewater treatment facility. The Plan identified next steps for the District as well.