Wastewater
Services



MWH

BUILDING A BETTER WORLD

Our focus: *conservation and control of the world's irreplaceable resource – water.*
Our goal: *Building a Better World.*

We Rank at the Top of the Wet Infrastructure Sector

According to *Engineering News-Record,* our industry's leading trade publication, the MWH organization ranks at or near the top of nearly every water category. We are proud to be:

#2 in Water Treatment and Desalination

#2 in Transmission Lines and Aqueducts

#2 in Sanitary and Storm Sewers

#2 in Water Supply

#2 in Wastewater Treatment

Source: *Engineering News-Record,* July 2009
A complete list of our industry rankings is available at www.mwhglobal.com.

Leading Wet Infrastructure **Around the World**

The MWH organization is driving the wet infrastructure sector globally, and we are leading the world in results-oriented management, technical engineering and construction services to create a better world. The wet infrastructure sector we serve encompasses a variety of water-related projects and programs ranging from water supply, treatment and storage to water resources management and coastal restoration, and from design and construction of hydropower and renewable energy facilities to full environmental services.

...more than 7,000 employees on six continents...

With a rich legacy that dates back to 1844 and more than 7,000 employees on six continents, our global team includes program managers, business consultants, engineers, geologists, operators, scientists, technologists and regulatory experts who provide solutions to the world's most challenging wet infrastructure projects.

The MWH team is driven to meet today's challenges, dedicated to innovation and committed to mastering and applying emerging technologies to create client-focused results. We have engaged in the engineering, construction, financing and management of some of the world's largest and most technically significant wet infrastructure projects for our client base of more than 4,000 municipalities, governments, multi-national corporations and industries.

We are Building a Better World

"Building a Better World" is inherent to the way we do business and the way we live our lives as individuals. And as global leaders in the wet infrastructure sector, our employees see firsthand how critical water is for life on Earth. We partner with organizations who strive to ensure every single community – and every human being – has access to clean water.

In addition, a sustainable future for our planet and its people remains a top priority for our company and its employees. This is why we conduct and support educational outreach programs designed to address climate change and encourage sustainable practices.

We recognize that the health of our planet is deeply rooted in the wellbeing of its people. Therefore, we support global humanity by supporting efforts to cure disease, fight poverty and lend a hand to the many charitable organizations dedicated to causes that fuel our passion.

We conducted the first full-scale demonstration of UV technology for wastewater treatment, which is now used to meet stringent water reclamation requirements.

We Offer **World-Class** Wastewater **Services**

Our wastewater experience is all encompassing, and includes collection systems, treatment facilities, residuals management and handling, odor control and air pollution. On the treatment side, we have significant expertise in all facets of wastewater liquid stream and solids stream treatment ranging from simple process and compliance evaluations to turn-key delivery of completely operational facilities.

Master Planning

We have prepared more than 400 master plans and feasibility studies for water, sewerage and wastewater systems. These master plans involved a full range of services, including:

- Collection system modeling
- Treatment capacity verification and re-rating
- Operational analysis
- Pilot and demonstration facilities
- Odor modeling risk analysis

Design

MWH engineers have designed hundreds of wastewater treatment facilities ranging in size from 0.25 mgd to more than 800 mgd. Our designs have included primary treatment, biological secondary treatment, tertiary treatment and solids handling. We have also designed numerous plant upgrades to meet stringent water reclamation requirements. Our award-winning designs can be found all over the world, including at:

- **Hyperion Wastewater Treatment Plant (WWTP), Calif.** – continuing to provide a range of services from design to construction management at this WWTP, one of the largest WWTPs in the U.S.
- **JD Phillips WRF, Colo.** – designed a completely covered WRF with real time control of process operations
- **Reuse Pilot Facility, Fla**.– investigating nitrogen and phosphorus removal at very low levels of treatment using membranes and reverse osmosis for water reuse
- **Donald C. Tillman and Los Angeles-Glendale WRF, Calif.** –upgraded the plants to meet stricter effluent nitrogen standards

Program Management

The MWH organization is a global leader in providing program management services to wastewater utilities, with more than 35 years of experience in executing wastewater capital improvement and maintenance programs around the world. A major benefit of our global experience is our ability to implement global program management best practices at a local level.

Construction Services

In addition to the firm's third-party construction management services, all "at-risk" construction and design-build projects are performed by the firm's licensed and bonded general contracting arm–the MWH Constructors organization. With a bonding capacity in excess of $1B, the MWH Constructors team has been involved in some of the most complex and technically challenging alternative delivery projects worldwide.

Training, Operations & Maintenance and Commissioning

Successful plant commissioning starts with early training of plant operations staff by MWH personnel. We have certified operators in house who can provide a range of process and operational knowledge through easily understandable training modules. We also offer state-of-the-art electronic operations and maintenance manuals that contain actual training videos and equipment photos.



MWH Engineers are **Experts** in **Treatment Processes** and **Technology**

MWH engineers are experienced in the evaluation and design of all conventional and state-of-the-art processes for wastewater treatment and reclaimed water. Reliable, low-cost solutions for some of our projects have ranged from facultative ponds, aeration lagoons and extended aerobic systems such as oxidation ditches to sophisticated diffused-air-activated sludge plants requiring biological nutrient removal. We have also performed numerous wastewater treatment plant upgrades to meet Title 22 reclamation requirements.

MWH experts plan and implement wastewater programs from preliminary treatment through disinfection, biosolids handling and odor control.

Biological Nutrient Removal (BNR)

We use state-of-the-art process modeling and hydraulics tools to optimize our wastewater plant designs in order to achieve very low levels of nutrients in plant effluents. Our recent BNR process designs have included the following technologies:

- Activated sludge
- Biologically aerated filters/de-nitrification filters
- Integrated fixed film/activated sludge
- Membrane bioreactors (MBR)

Disinfection /Tertiary Treatment

In the final phase of wastewater treatment, MWH experts can filter and disinfect wastewater to remove disease-causing organisms. Our engineers are experts in the latest technological advances including:

- Membrane filtration
- UV and ozone disinfection
- Advanced oxidation (UV/UV-peroxide, UV/ozone)
- Ballasted flocculation

MWH RESEARCH Develops Innovative Solutions to Environmental Challenges

MWH RESEARCH develops innovative and cost-effective solutions to its clients' environmental challenges by evaluating emerging and innovative technologies and facilitating their integration into projects worldwide. MWH RESEARCH routinely receives highly competitive water industry grants in support of innovative wet infrastructure sector research that leverage our technical capabilities to our clients.

MWH RESEARCH has conducted over 200 bench- and pilot-studies for municipal and industrial clients focused on disinfection and advanced oxidation, energy minimization and water reuse, biological nutrient removal, granular media and membrane filtration, carbon absorption, micro-constituents removal and waste concentrate minimization.



Reducing Costs through Resource Efficiency Management

Guided by its purpose - Building a Better World - the MWH organization is committed to helping clients develop sustainable solutions that meet their business and economic objectives. As such, the company provides a suite of services designed to accomplish a fundamental purpose for its clients: reduce their on-site capital and operating expenses caused by inefficient resource use. MWH experts assist clients in developing new and innovative methods to manage energy and take advantage of renewable energy alternatives.

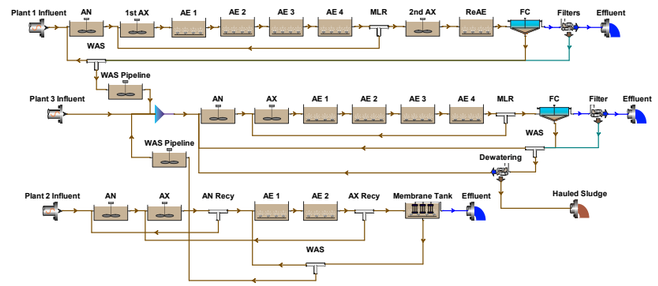
Solids/Biosolids Processing and Handling

MWH experts provide a full range of biosolids and solid waste management services, including biosolids master planning, design, permitting, air emissions and environmental monitoring, sanitary landfill design and construction, leachate management, gas monitoring and control, closure planning, comprehensive solid waste planning for waste reduction and alternative management of solid wastes, and design and construction of processing facilities. Recent project elements include:

- Enhanced digestion using thermal hydrolysis
- Temperature-phased digestion
- Thermal drying
- Co-combustion with municipal solids wastes
- Dewatering

Process Modeling

Using state-of-the-art process models, we provide optimized solutions to meet a wide range of effluent quality. From conventional secondary effluent quality (BOD 30 mg/L; TSS 30 mg/L) to level of technology (LOT) limits (TN ≤ 3.0 mg/L; TP ≤ 0.1 mg/L), we provide energy efficient systems designed to minimize chemical addition by maximizing biological processes.



Odor Control

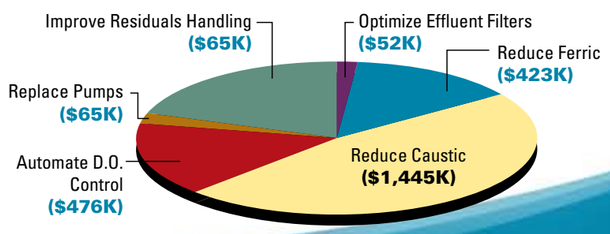
Having developed, planned, designed and constructed numerous odor control facilities, our wastewater and odor control project experience is solid. Our high-quality, innovative and cost-effective solutions include all aspects of emission treatment—from sampling, modeling and designing to permitting, construction oversight and operational assistance.

Real Time Controls

The quality of on-line monitoring instruments has improved significantly, yielding a range of influent, in-process and effluent measurements, which when used in combination with process models results in real time control (RTC) of process operations. Implementing RTC at the J.D. Phillips WRF in Colorado Springs, Colo., has reduced variability in effluent quality by proactively controlling the process as opposed to identifying needed process changes then implementing them.

Operational Optimization

Operational optimization at existing wastewater treatment plants reduces operating costs through optimizing or eliminating chemical addition and reducing energy costs by maximizing the use of existing resources. By automating the DO control system to optimize blower operation and reducing ferric and caustic addition by relocating the ferric feed location to allow biological P removal instead of chemical P removal, the City of Atlanta realized an annual operating cost savings of $3M at its three activated-sludge plants. Modifications made to the solids handling processes also are resulting in significant operating cost savings.



We Have Worked on Some of the **World's Most Complex** and **Technologically Advanced** Wastewater Facilities



The MWH team recently designed an expansion of the Tri-City Water Pollution Control Plant in Portland, Ore. The expanded facility is a unique combination of conventional wastewater treatment technology – activated sludge (CAS) – with the latest wastewater technology – **MBRs** – operating in parallel. The MWH team sought to not only ensure the expanded facility will be a "good neighbor," but a model for stormwater management and sustainable development practices, including facilities for treating and pumping reuse water (offsetting water demands on the fish-sensitive Clackamas River), **LEED-certified building design**, stormwater management and **heat recovery for in-plant heating.**



The MWH project team prepared a **countywide residuals management plan** for Hillsborough County, Fla., which will be used as a management tool for near-term and future disposal and reuse of the wastewater biosolids generated at the Counties' wastewater treatment facilities. The MWH project team also designed a new centrifuge dewatering and thermal drying facility, which now **allows the County to sell its pelletized biosolids product** to regional growers as a fertilizer.



MWH designed a new 30-mgd (expandable to 200 mgd) state-of-the-art **membrane filtration and ozone disinfection facility** for Clark County Nevada's wastewater reclamation facility. New hollow-fiber membranes were designed to fit into existing concrete basins located on the project site. **Ozone disinfection is used to reduce pollutants of concern** and minimize the formation of disinfection by-products in the effluent.



For Watercare Services, Inc., a water purveyor in Auckland, New Zealand, the MWH team served as technical advisor/program manager for the completion of a WWTP project called Project Manukau. MWH experts performed pilot plant studies to determine the **design parameters of the BNR process**, particularly the filtration and disinfection stages, to ensure the peak flow of 16.5 cubic meters per second (380 mgd) would meet stringent effluent requirements. The resultant filter/UV disinfection installation is **one of the largest in the world**, given the peak flows, the virus inactivation requirements and the other microbiological standards.



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