Expression of Interest
Innovative Sewage Treatment And Resource Recovery Technology

ZeeWeed® MBR Ultrafiltration Treatment Systems

Proposal Number: 50622-07

Submitted to:

Dwayne Kalynchuk
General Manager, Environmental Services
Capital Regional District
PO Box 1000, 625 Fisgard Street
Victoria, B.C. V8W 2S6
Tel: (250) 360-3092
Email: dkalynchuk@crd.bc.ca

Submitted by:

GE Water & Process Technologies Canada
3239 Dundas Street West
Oakville, Ontario L6M 4B2
Andrea Yust
Regional Manager
Tel: (905) 465-3030 ext. 3201
Email: andrea.yust@ge.com

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1 About ZENON Membrane Solutions

GE Water & Process Technologies acquired ZENON Environmental Inc. on June 1, 2006, uniting ZENON Membrane Solutions with GE's global presence and financial depth to provide unparalleled performance and the best overall water treatment solution for your facility.

From modest beginnings in 1980, ZENON, now 'ZENON Membrane Solutions', a part of GE Water & Process Technologies, has grown to become the global leader of membrane filtration technology. Spurred by our vision that membranes are the world's answer to water shortages, overuse, and pollution, ZENON Membrane Solutions has always focused on a single goal—to make superior membrane systems a cost-effective solution for everyone who needs them.

ZeeWeed®, developed in 1990, was a paradigm shift in membrane technology. At that time, membrane systems were primarily using pressurized cartridges with many components and high energy requirements. ZENON Membrane Solutions transformed the industry with the introduction of membranes that are immersed directly into process tanks and need only a slight vacuum to filter water. Throughout our 26 years ZENON Membrane Solutions has endeavored to listen to our customers and anticipate the needs of the market in order to respond with practical solutions for drinking and wastewater treatment, and water reuse. Today, a complete family of membrane products provides large-, medium- and small-scale solutions for municipalities, industries, land development and emergency applications.

Our teamwork, dedication, and persistence is responsible for bringing ZENON membrane systems to hundreds of sites in more than 45 countries, and numerous awards such as the Manning Innovation Award and the prestigious Stockholm Industry Water Award. As the need for clean water continues to become more pressing, ZENON Membrane Solutions will work even harder to ensure that membrane technology plays a leading role in preserving the environment and protecting public health with clean, safe water supplies.

ZENON Membrane Solutions Center of Excellence in Oakville Ontario, Canada, is the focal point of GE's ultrafiltration membrane research and development. The ZENON Membrane Solutions division employs over 1,400 people worldwide and is 100% focused on developing, manufacturing, and supporting leading-edge, hollow fiber water treatment solutions.

1. Headquarters and North American Assembly Plant
2. ZENON Technology Centre *(ZTC comprises a portion of this building)*
3. North American Manufacturing Plant
4. European Membrane Manufacturing Plant

2 Company Overview

GE Water & Process Technologies is a leading global solutions provider of water, wastewater, desalination and process systems. GE delivers customer value by improving performance and product quality, by reducing operating costs and by extending equipment life. A broad range of products and services are used to optimize total water/process system performance, safeguard customer assets from corrosion, fouling and scaling, and protect the environment through water and energy conservation. With over 2500 field engineers bringing onsite expertise, we are able to deliver value by solving our customers' most challenging problems and improving the bottom line.

Headquartered in Trevose, Pennsylvania, Water & Process Technologies employs over 6500 people worldwide. Global Centers Of Excellence conduct leading edge research in our fields of expertise. Sites include Minnetonka, Minnesota; Watertown, Massachusetts; Norfolk, Virginia; The Woodlands, Texas; Guelph, Ontario; Oakville, Ontario; Heverlee, Belgium; San Pablo, Brazil and the GE Global Research Centers in Niskayuna, New York, Bangalore, India and Shanghai, China.

2.1 Fields of Expertise

GE is unique in the industry, bringing a full array of products and service offerings to our customers. Our core competencies include:

- Reverse Osmosis, Nanofiltration, Ultrafiltration and Microfiltration membrane systems for removing suspended and dissolved solids from fresh water, wastewater and seawater
- Electrodeionization (EDI) for producing ultrapure water without chemical regenerants
- Mobile water treatment solutions for short-term and emergency use including deionization, filtration, RO and EDI trailers in the industry's largest fleet
- Service agreements to Design, Build, Own, Operate and Maintain water treatment systems, allowing customers to focus their resources on their key operations
- Water treatment chemicals and application engineering for raw and wastewater clarification, process water and industrial boiler and cooling water
- Process chemicals and additives for improved performance in refining, pulp & paper and metals processing applications

2.2 We don't just promise value. We Prove it.

With GE, you know precisely how our water and process technologies help your bottom line. A Value Generation Plan quantifies how we enhance your key business results. To create your Value Generation Plan, we discuss your strategic objectives and suggest projects that can help you meet them. Then we monitor and manage all projects and report in detail how each one helped to:

- ❑ Improve productivity
- ❑ Optimize critical equipment life and performance
- ❑ Increase process uptime
- ❑ Drive out costs
- ❑ Reduce waste
- ❑ Improve regulatory compliance
- ❑ Ensure performance through continuous monitoring and preventative diagnostics
- ❑ Preserve your capital and protect your cash flow with flexible financing

2.3 Global Leadership

A comprehensive portfolio, innovative technology, application expertise and personal service are what made GE Water & Process Technologies a leader in water and process treatment. A passion for solving the world's most challenging water and process problems, being environmentally responsible and most importantly, helping our customers win guides our roadmap for the future.

Part of that future is ecomagination, an aggressive, long-term initiative from GE to bring to market new technologies that address the world's biggest environmental challenges. As part of ecomagination, GE pledges to double its investment in cleaner technologies, introduce more products that provide significant environmental performance advantages to customers, and offer more products and services that help customers meet their pure water and wastewater demands, reduce greenhouse gas emissions and improve efficiency.

3 ZENON Membrane Solutions Recognition

- 2003 Stockholm Industry Water Award - For the development of energy efficient, innovative and forward-looking water treatment technologies that can be applied to the treatment of water at all stages of the water cycle.
- 2003 Canada Export Award
- Popular Science Best of What's New Award, 2004 - The ultimate Popular Science accolade, awards innovations that impact the way we live and change the way we think about the future
- 2004, 2002 Canada's Top Corporate Citizen - ZENON Membrane Solutions was ranked #1 among Canada's 300 largest publicly traded companies for overall business practices.
- 2003, 2002, 2001 Canada's Top 100 Employers - For the third consecutive year, ZENON Membrane Solutions was ranked as a top company to work for by Maclean's magazine.
- 2002 Canada's Top Exporter - Presented by the Department of Foreign Affairs and International Trade.
- 2002 Canadian Innovation Award for Sustainable Development - Received from the Manufacturers and Exporters Alliance for the development of new technologies that improve the environment.
- George Warren Fuller Award - Presented to Andrew Benedek by the American Water Works Association
- 2002 Outstanding Business Achievement Award - Presented by the Ontario Chamber of Commerce
- 2002 Technology of the Year - Determined by Frost & Sullivan, one of the world's leading market research consultants.
- 2002 Product Achievement Award - Presented by Filtration & Separation Magazine for the development of ZeeWeed 1000
- Ernst C. Manning Principle Award - Presented by the Ernst C. Manning Foundation
- Industry Export Award - Presented by the EECO and The Globe Foundation

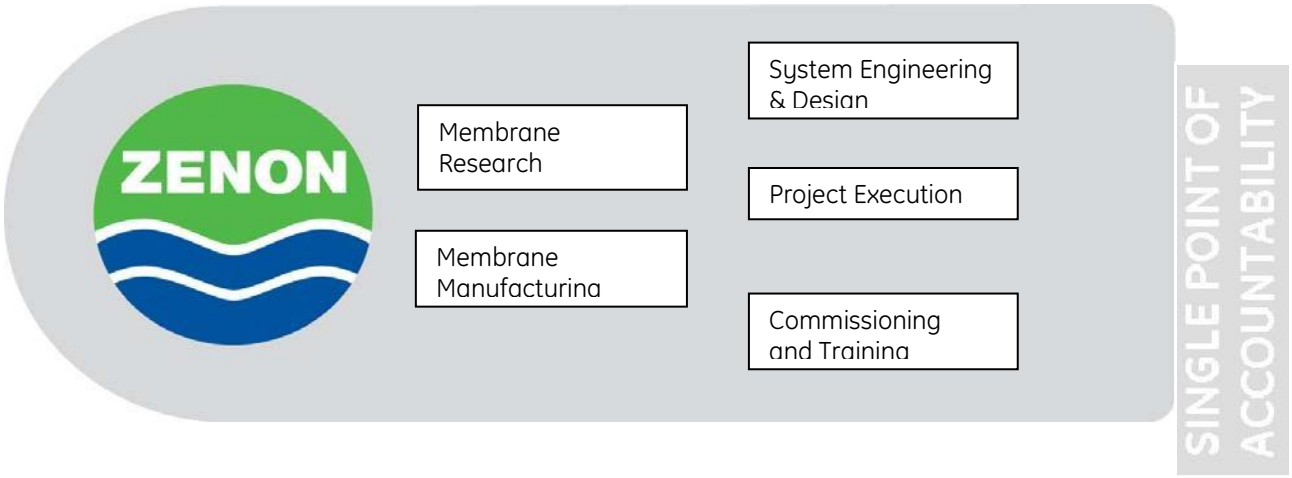
4 Features and Benefits of Choosing ZENON Membrane Solutions

Resource	ZENON Membrane Solutions Capability	Customer Benefit
Research & Development	Global R&D facilities Largest & most experienced team Over $75 million invested to date	Significant capital and operating cost reductions over the past 5 years Introduction of large "building block" membrane units to simplify large plant design and operation
Product Testing	Accelerated testing accurately predicts up to 10 years of service life	You can be confident that all membrane technologies have been rigorously tested prior to commercialization
Manufacturing	Largest hollow fiber manufacturing capability in the industry State-of-the art robotic assembly of membrane modules	On time membrane delivery – no project delays Minimized warranty claims
Quality Assurance	Global quality assurance team The quality management system is ISO 9000:2000 certified	Product and process reliability is assured through rigorous testing and troubleshooting
Piloting	Global fleet of over 60 pilots for wastewater and water treatment	Vast amounts of data have been collected and analyzed to optimize plant design
Project Management	Team of 23 dedicated professionals	Your support team has extensive experience and a successful track record in delivering projects
Process Engineering	Team of 48 focused professionals dedicated to regional water or wastewater projects	Your support team has over 200 man years of experience with process engineering with plants of all sizes
System Design & Controls	Team of 10 Engineers and Designers	Your support team has delivered the world's largest water and wastewater jobs
Plant Commissioning	Over 110 Field Services Representatives bring global experience to every plant floor Small, medium, and large plant experience	Experienced field personnel that have commissioned other large membrane projects and have developed a best practices approach to ensure a trouble-free start-up
After Commissioning Services	Regional account managers support your needs Servicing, optimization, and process/technical support Regional offices all over North America offer project capabilities	Unparalleled after sales service designed to help you to continually lower capital and operating costs and ensure that the system is optimized at all times

4.1 ZENON Membrane Solutions Offers a Single Point of Accountability

ZENON Membrane Solutions is 100% focused on the development of membrane-based technologies and their integration with wastewater and water processes, offering the Customer a single point of accountability for the delivery of water or wastewater projects. The systems, including membrane modules and cassettes, are entirely designed, tested, manufactured, delivered and supported by ZENON Membrane Solutions. ZENON Membrane Solutions has the technology, people, experience and ability to execute a temporary mobile project.

The benefit to the Customer is that you will have a single, knowledgeable point of contact at all times for your system. Any questions can be quickly answered; any process adjustment can be quickly made by your ZENON Membrane Solutions support team.



4.2 Committed to Long-Term Partnerships

ZENON Membrane Solutions endeavors to develop close, long-term working relationships with our customers. We are particularly proud of the fact that many of our industrial installations are from repeat customers including two installations for Shell, five installations for GM, two installations for Toyota, and six installations for Holland America. Other partners include:

Kodak	Pemex	Pfizer
Exxon	Unilever	Volkswagon
Samsung	Chrysler	Kraft
Danone	GlaxoSmithKline	Ford

In some instances, ZENON Membrane Solutions has developed relationships with strategic corporate partners in order to commercialize our innovative technologies that provide unique solutions to global environmental and process problems. For example, ZENON Membrane Solutions has developed, in partnership with General Motors, a patented membrane biological treatment process for treatment of oily wastewaters. This process has also been

demonstrated in site remediation and is now widely used in many industrial or municipal applications.

In the municipal sector, ZENON Membrane Solutions has also developed a series of long-standing, mutually rewarding relationships with a variety of local regions including:

City of Shoshone, Idaho	King County, Washington
Sudbury, Ontario	Nelson, New Zealand
Gwinnett County, Georgia	City of Aspen, Colorado
City of Orangeburg, South Carolina	City of Redlands, California
Town of Collingwood, Ontario	Olivenhain Municipal Water District, California
Waikato, New Zealand	Town of Seekonk, Massechusetts
Town of Walkerton, Ontario	Draper City, Utah

ZENON also has significant experience in working with a variety of engineering procurement and design build companies. Some of our long standing partners on a variety of water/wastewater projects include:

- CH2M Hill Consulting
- Black & Veatch
- SPI
- Veolia Water
- Ondeo Degremont

4.3 Corporate and Regional Offices

ZENON Membrane Solutions currently has over 850 staff employed in North America and over 1,400 globally. ZENON Membrane Solutions also has a significant Field Services team of 110, responsible for commissioning, operations support, on-going plant optimization, and service agreements. ZENON Membrane Solutions Regional Offices offer technical support, field project management, and operations capabilities.

Office	Location	Role
ZENON Membrane Solutions	Oakville, Ontario	Head Office
GE Water & Process Technologies	Trevose, Pennsylvania	Head Office
ZENON Membrane Products	Burlington, Ontario	Membrane Mfg. Facility
ZENON Environmental Systems, Inc.	Edmonton, Alberta	Services/ Regional Office
ZENON – Asia-Pacific	Singapore	International Office
ZENON – Asia-Pacific	Mumbai, India	International Office
ZENON – Australia	Perth, Australia	International Office
ZENON – Australia	Ingleburn, Australia	International Office

Office	Location	Role
ZENON – Beijing	Beijing, China	International Office
ZENON – Germany	Hilden, Germany	International Office
ZENON – Italy	Melzo, Italy	International Office
ZENON – Hungary	Tatabánya, Hungary	European Mfg. Facility
ZENON – Hungary	Oroszlány, Hungary	International Office
ZENON – Poland	Tychy, Poland	International Office
ZENON – Netherlands	AE Duven, The Netherlands	International Office
ZENON – Isreal	Kefar Saba, Isreal	International Office
ZENON – Middle East	Sharjah, United Arab Emirates	International Office
ZENON – United Kingdom	Sheffield, UK	International Office
ZENON – Spain	Madrid, Spain	International Office
ZENON – Brazil	São Paulo, Brazil	International Office
ZENON - Barbados	St. Michael, Barbados	International Office

4.4 ZENON Membrane Solutions Manufacturing

Built on a solid foundation of dedication and excellence, the ZENON Membrane Solutions manufacturing division is committed to delivering high quality membrane products to its global customers. ZENON Membrane Solutions owns and operates all of its manufacturing resources to ensure strict controls over the manufacturing process and rigid quality standards for every membrane module that leaves the plants.

With two world-class manufacturing facilities—Burlington, Ontario, Canada, and Oroszlány, Hungary—ZENON Membrane Solutions leads the membrane industry with the world's largest capacity for membrane manufacturing. By leveraging the capabilities of each manufacturing hub, ZENON Membrane Solutions can assure customers of on time and on budget product delivery no matter where treatment plants are located.

North American Membrane Manufacturing Plant in Burlington, Ontario. ZENON Membrane Solutions also owns the land shown to the right of the plant for future expansion.

ZENON Membrane Solutions employs the industry's most advanced manufacturing techniques which enables the production of top quality membranes with maximum efficiency and minimum cost. Over the past three years, our manufacturing infrastructure has easily accommodated the rapid demand increases for ZENON Membrane Solutions products—increasing production by more than 500 percent during this period. Our production staff has successfully delivered membranes for plants ranging from 3,000 GPD (11.3 m3/day) to over 96 MGD (363,400 m3/day).

Despite such sharp increases in production, ZENON Membrane Solutions manufacturing retains a great deal of spare capacity and can increase current production by more than 50 per cent without building additional factory space.

While our facilities maintain an inventory of products, we constantly monitor bidding activity to confirm that sufficient manufacturing capacity is available to meet customer demand and that adequate product supplies are available to avoid project delays.

Currently our global manufacturing operations have facility space to increase capacity by more than 50% without the need for building additional factory space.

Over 340 employees are employed in the manufacturing facility.

Prior to shipping, all of our products undergo a rigorous inspection to verify that all system components meet the quality and performance standards that ZENON Membrane Solutions customers have come to expect.

European Membrane Manufacturing Plant in Oroslany, Hungary.

By 2010, membranes are expected to comprise more than 20 percent of the global market for water and wastewater treatment equipment. Our proactive manufacturing plan has accounted for this growth, and ZENON Membrane Solutions is well positioned to increase manufacturing capacity over this period.

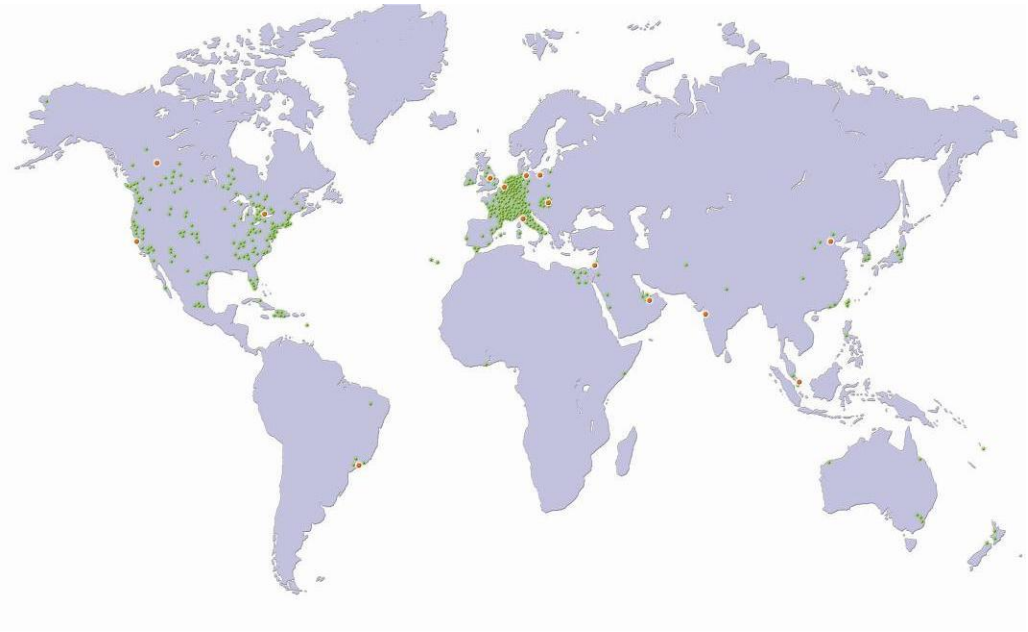
Our production increases, coupled with continued efficiencies in manufacturing, will enable our manufacturing teams to quickly and efficiently deliver high quality membrane products while constantly improving system performance and value. Through these streamlining efforts, ZENON Membrane Solutions also strives to improve on a key success metric shared by both the company and its customers—reducing the cost of each gallon of water treated.

5 Experience and History

ZENON Membrane Solutions is a world leader in membrane filtration technology and has been a pioneer in the development of membranes for water treatment applications. The patented ZeeWeed® membrane is well proven with many installations ranging in size and feed water quality.

Global Installations

Over 550 Installations in 45 Countries



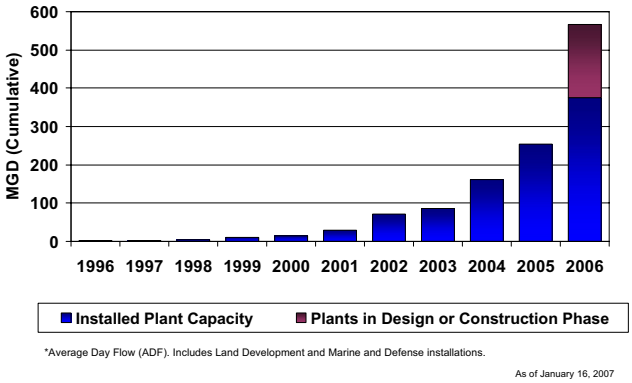
5.1 Western Canada Experience

ZENON has fourteen wastewater treatment plants and twenty-one drinking water plants in western Canada, thirty-two in operation and three under construction. The map below shows the location of these facilities. ZENON also provides local support throughout western Canada through our local office in Edmonton, AB.

5.2 WasteWater Treatment: Unmatched Global Experience

In North America and world wide, ZENON Membrane Solutions has over 450 wastewater installations, in design or operating. The graph below illustrates how ZENON Membrane Solutions, its employees and products have gained worldwide notoriety for providing the most reliable membrane wastewater treatment products in the market. Since our humble beginnings in 1980, our employees have managed to deliver over 350 MGD of wastewater treatment capacity using ZENON Membrane Solutions products.

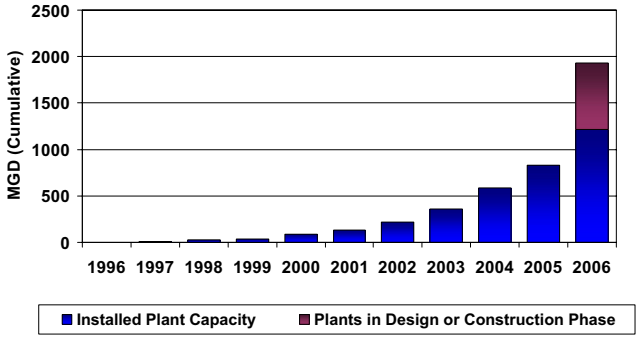
Total Installed ZeeWeedMBR Wastewater Treatment Capacity*



*Average Day Flow (ADF). Includes Land Development and Marine and Defense installations.

As of January 16, 2007

Total Installed ZeeWeed Capacity*



*Average Day Flow (ADF)

As of January 16, 2007

ZENON Membrane Solutions pioneered the concept of low pressure, immersed membranes in an open-tank design; a breakthrough that dramatically improved membrane performance, while reducing system capital and operating costs. This giant step forward made membranes a realistic alternative for small-, medium-, and large-scale treatment applications by offering robust and reliable systems with lower energy requirements, and more effective membrane cleaning procedures.

ZENON Membrane Solutions is a single-source membrane supplier; manufacturing its own polymer formulations, membrane fibers, modules and systems. Through extensive R&D efforts, the cost of immersed membrane systems is now comparable to conventional treatment systems in many cases. This competitive cost has enabled many municipalities to utilize advanced membrane technologies to protect public health and preserve the environment while keeping operating costs down.

5.3 Demonstrated Experience

ZENON Membrane Solutions currently has over 450 ZeeWeed wastewater treatment plants throughout the world either operating or under design including 204 in North America. The quantity of wastewater plants demonstrates the acceptance of ZENON Membrane Solutions ZeeWeed® membranes as the technology of choice for wastewater treatment plants.

Total number of ZENON Membrane Solutions immersed membrane plants worldwide (in operation or design, drinking water, wastewater, industrial)	728
Total number of ZENON Membrane Solutions immersed membrane plants in North America (in operation or design, drinking water, wastewater, industrial)	373
Total number of ZENON Membrane Solutions immersed membrane wastewater plants in North America (in operation or design)	204

The following table summarizes ten largest projects that are either already operating or in various stages of design or construction using ZENON Membrane Solutions ZeeWeed® membranes:

Location	Flow	Units
Brightwater, WA	31	MGD
Brescia, Italy	11	MGD
Johns Creek, GA	10.9	MGD
Loudoun County, VA	9.4	MGD
Hollister, CA	8	MGD
Tempe Kyrene, AZ	7.5	MGD
Traverse City, MI	7.1	MGD
Bonita Springs, FL	7	MGD
Beaver Creek, TN	6.0	MGD
Gainesville, GA	4.6	MGD

Notes: 1. Feed flow

5.4 Municipal Wastewater Case Studies

Municipality of American Canyon, California

Application:	Treatment of raw municipal sewage and industrial wastewater
Capacity:	2.5 MGD (9,500 m3/day) Annual Average 5.0 MGD (19,000 m3/day) Peak Hour
Commissioned:	August 2002
Location:	American Canyon, California, United States

With concerns about water shortages and a rapidly increasing population, the City of American Canyon needed a treatment facility that could reduce the amount of fresh water drawn from the Napa River for golf course and vineyard irrigation. The solution was to produce a high quality reuse stream that meets California's stringent Title 22 water reuse standards.
ZENON was the first company to be granted Title 22 approval for membrane bioreactors.
The plant treats two distinct feed sources: municipal sewage and industrial wastewater. The effluent is chlorinated and stored in a 1.5 million gallon reuse tank or treated with UV and discharged to the Napa River.

Fulton County, Georgia

Application:	Treatment of primary effluent for reuse
Capacity:	10.9 MGD (41,260 m3/day) Annual Average 24.7 MGD (92,500 m3/day) Peak Hour
Commissioned:	
Location:	Fulton County, Georgia, United States

Reliability, flexibility and expandability of the Johns Creek Environmental Campus (JCEC) were some of the key criteria for selecting a ZENON membrane filtration system to meet Fulton County's goal to implement a beneficial urban water reuse program. The proposed ZeeWeed membrane filtration system will consist of eight separate ZeeWeed membrane trains adjacent to the biological process tanks. As opposed to immersing the membranes directly in the activated sludge process tankage, separate membrane tanks results in an inherently more reliable and flexible integrated treatment process. Reliability is particularly critical as JCEC will be an end of pipe plant and therefore require to be operational at all times.

Brescia Wastewater Treatment Plant

Application:	Treatment of raw municipal sewage
Capacity:	11 MGD (41,600 m3/day) Annual Average
Commissioned:	November 2002
Location:	Verziano, Brescia, Italy

A five-month pilot study was performed to test the ability of a ZENON MBR to upgrade the existing conventional secondary clarifiers in order to meet increasingly stringent European Union discharge standards. ZeeWeed MBR was selected to replace one of the three existing activated sludge treatment lines, and ZENON was requested to operate as the main contractor.

The new ZeeWeed MBR system replaced one of the conventional treatment lines, increasing the design capacity from 3 MGD (12,000 m3/d) to 10 MGD (38,000 m3/d) and subsequently to 11 MGD (41,600 m3/d). By upgrading only one of the existing process lines, the combined effluent from the entire plant is now able to meet and exceed the quality requested by EU regulations.

Varsseveld Wastewater Treatment Plant

Application:	Treatment of raw municipal wastewater
Capacity:	1.90 MGD (7,200 m3/day) Annual Average 4.79 MGD (18,100 m3/day) Peak Hour
Commissioned:	October 2004
Location:	Netherlands, Europe

Municipal wastewater from the surrounding area of Varsseveld was previously treated using traditional settling methods. Due to the significant increase in water demands and stringent future discharge requirements, an upgrade of the existing plant was deemed necessary with minimal footprint expansion.

Following one of the most comprehensive pilot studies lasting over two years, ZENON MBR demonstrated the reliability and effectiveness to meet the plant's treatment objectives in terms of quality, capacity and reliability. As a result, Varsseveld was selected as the demonstration location for implementing the first full-scale ZeeWeed MBR in the Netherlands.

F. Wayne Hill Water Resources Center

Application:	Treatment of chemically clarified secondary effluent
Capacity:	50 MGD (189,270 m3/day)
Commissioned:	October 2005
Location:	Gwinnett County, Georgia, United States

Although the current wastewater treatment plant (WWTP) was meeting existing discharge standards, a required capacity expansion inspired the county to seek out a new technology that could also improve the quality of effluent produced.

ZENON's ZeeWeed ultrafiltration (UF) technology was selected to treat secondary effluent. The final effluent has a level of quality that exceeds some drinking water standards and is safely discharged to the Chattahoochee River, with the potential to be used for irrigation at local parks and golf courses. Upon approval by the State, the effluent will be released into Lake Lanier, a major source of drinking water for the greater Atlanta area.

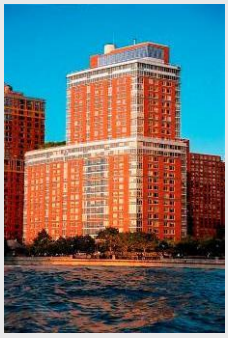
At the end of 2005, Gwinnett County had the largest UF tertiary treatment facility in the world.

City of Pooler Wastewater Treatment Plant

Application:	Wastewater treatment applying sequential aeration for potential water reuse
Capacity:	2.5 MGD (9,464 m3/d)
Commissioned:	December 2004
Location:	Pooler, Georgia, United States

The city of Pooler, GA had decided to upgrade and expand its existing 1.0 MGD wastewater treatment plant, and construct a water reclamation facility using ZENON's ZeeWeed MBR technology. The new ZeeWeed MBR plant, currently treats 2.5 MGD of sanitary wastewater.
As part of a commitment for continuous performance improvement and energy reduction, the strategy used to aerate the ZeeWeed membranes has been optimized. This aeration strategy is referred to as 10/30 eco-aeration, and Pooler is the first full-scale facility in North America to apply the strategy. In this configuration, a single blower sized to aerate one train is used to aerate two trains, resulting in a 50% reduction in air required. This translates into a 21% reduction in energy usage and an 8.5% decrease in lifecycle cost.

Solaire Apartment's WWTP, Battery Park



Application:	Urban water reuse system
Capacity:	25,000 gpd (95 m3/d)
Commissioned:	December 2003
Location:	New York City, New York, United States

The 250 unit, Solaire Apartments in Battery Park continues the city's trend to reusable, sustainable, and efficient residential development. This development is the first "green" residential high-rise building that incorporates advanced materials, energy conservation and water reuse in an urban setting.
The Solaire Apartments selected a ZENON ZeeWeed MBR to treat, store and reuse the wastewater for toilet flushing, irrigation and cooling towers. This approach reduces the freshwater taken from the city's water supply by over 75%, and significantly decreases energy costs as less drinking water is pumped from the city's treatment plant and wastewater is not transferred to the city's wastewater treatment system. The system is the first onsite water recycling system in the U.S. built inside a multifamily, residential building.

The Manor Golf & Country Community

Application:	Wastewater reuse
Capacity:	500,000 gpd (1,892 m3/d)
Commissioned:	June 2005
Location:	North Fulton County, Georgia, United States

ZENON Membrane Solutions was selected to supply an on-site wastewater treatment plant consisting of a Z-MOD system incorporating ZeeWeed MBR technology for gray and black water treatment. The Z-MOD system treats 100 percent of the community's wastewater, which is reused for beneficial irrigation within the community. A dedicated wastewater reuse system ensures an unlimited supply of water for golf course and home-site irrigation, even during hot summer droughts. The wastewater treatment plant is discreetly disguised as a barn house located on the green of the Manor's golf course.

Cauley Creek Water Reclamation Facility

Application:	Raw municipal sewage treatment
Capacity:	2.5 US mgd (9,500 m3/day) Annual Average 5.0 US mgd (19,000 m3/day) Peak Hour
Commissioned:	April 2002
Location:	Duluth, Fulton County, Georgia

ZeeWeed MBR technology was selected for its minimal footprint and proven reliability. The treatment process consists of fine screening, grit removal, aerated/unaerated bioreactor zones for biological nutrient removal, membrane filtration and UV disinfection. Biosolids treatment consists of aerobic digestion and centrifugation of digested sludge. The combined liquid and sludge treatment processes occupy less than 0.5 acres. In order to satisfy aesthetic concerns, architecturally pleasing structures were constructed over the plant headworks and membrane filtration tanks. In addition, the plant is equipped with a membrane sludge thickener to minimize the aerobic digester tank volume.

ZENON Technology was Designed for Wastewater

The ZeeWeed® 500 (ZW500) membrane technology has been operating in wastewater plants for over 15 years. The patented reinforced membrane has withstood the toughest municipal and industrial wastewater environments. The membrane was specifically developed for application in wastewater with membrane bioreactors. Capable of holding up to 80 lbs, it is the strongest membrane available on the market today. The reinforced membrane structure prevents membrane failures that would result in the loss of water quality. In the ZW500d cassette, ZENON has developed a large "building block" of membrane cassettes allowing larger plants to become a reality. Larger "building blocks" mean fewer points of connections to headers, reducing risk of failure. The ZENON product development team has focused on reducing the cost of operating the technology and has developed patents such as cyclic aeration, resulting in the further reduction of operating cost.

Operating and Design Experience Means No Surprises

ZENON has been focused on the development of membrane bioreactors for nearly 25 years. As a company, ZENON has traveled up the "learning curve" of membrane treatment and has designed many membrane bioreactors of small scale to several million gallons per day capacity. Our three largest operating plants – Nordkanal, Germany; Brescia, Italy and Traverse City, Michigan – all incorporate the lessons learned from previous experience.

In addition, ZENON's wastewater products and experience cover a full range of treatment applications, including industrial, commercial/institutional, and municipal MBR, as well as industrial and municipal tertiary wastewater and reverse osmosis treatment applications.

6 ZeeWeed® Ultrafiltration for Wastewater

Simple and Reliable ZeeWeed® MBR Technology

MBR systems are increasingly being specified as the best available technology for virtually all wastewater treatment applications—from greenfield plants, to retrofits, to water reclamation projects. MBR systems offer economic and operational advantages over conventional wastewater treatment plants including extremely compact footprints, simplified operation and consistently higher quality effluent—all at comparable lifecycle costs.

Hundreds of municipalities have discovered that with ZeeWeed® MBR, you don't have to worry whether your system will meet current or future discharge and reuse regulations. The physical barrier of the UF membrane ensures a crystal clear effluent at all times that exceeds the world's most stringent regulations, including California's Title 22 reuse and the European Bathing Water Quality standards.

A membrane bioreactor is a process that consists of a suspended growth activated sludge system (biological reactor) integrated with an ultrafiltration membrane system. Microorganisms in the bioreactor degrade organic wastes, and the membrane system serves to clarify the effluent.

In the bioreactor, the microorganisms consume the organic wastes as a source of food. The waste is converted to carbon dioxide, water, chemical intermediates and new microorganisms. The bioreactor in a MBR system is capable of operating at higher biomass concentrations than conventional activated sludge system and will produce a much higher quality effluent. This is possible because the membrane acts as an absolute barrier to sludge loss, and therefore is not subject to upset at high biomass concentrations, as a conventional settling clarifier would be.

Sludge from an MBR system is wasted at a low rate to produce a high solids retention time (SRT) within the bioreactor. The high SRT allows for sludge digestion to occur, therefore producing 50% to 80% less sludge than a conventional activated sludge system. The high SRT and mixed liquor suspended solids concentration also allows the microorganisms to degrade high molecular weight, soluble materials more completely. In addition, better denitrification can be achieved with MBR systems, since the membranes prevent the loss of slow-growing denitrifying bacteria. The most critical component in the operation of the MBR process is the ZeeWeed® ultrafiltration membrane.

ZeeWeed® membranes utilize "outside-in" flow, through a hollow-fiber membrane filled with microscopic pores. The small pore size excludes particulate matter including Giardia cysts and Cryptosporidium oocysts from the treated water. Additionally, some viruses are removed by a combination of adsorption onto the solids in the process tank and by direct size exclusion.

The membranes operate under a vacuum created within the hollow membrane fibers by a permeate pump. Treated water is drawn through membrane pores and enters the inside of the hollow fibers. Water then flows through the permeate pump to the treated water storage tank (or distribution system). During backpulsing, air is introduced at the bottom of the membrane modules to create turbulence along the membrane surface. Rising air bubbles scour and clean the outside of the membrane fibers, maximizing membrane performance.

ZENON brings over 25 years of experience to MBR systems—setting the industry standards for research and development, membrane manufacturing, system design and support. Our successful global track record with small, medium and large MBR projects ensures that you get the best value for your money with smart design features that provide trouble-free performance.

Enhanced Nutrient Removal (ENR) and Biological Nutrient Removal (BNR) of Nitrogen and Phosphorus

ENR and BNR effluent standards are among the most stringent in North America and demand the best available technology to ensure compliance at all times. ZeeWeed® MBR systems are extremely flexible and process configurations can be tailored to meet specific wastewater characteristics, discharge requirements and plant retrofit applications. ZeeWeed® UF membranes allow the biological reactor to operate at MLSS concentrations of up to 12,000 mg/L. This optimizes nitrification and denitrification, while extending the sludge retention times to ensure complete nitrification and conversion of organic nitrogen compounds.

Cyclic Aeration

As part of a commitment for continuous performance improvement and energy reduction, ZENON Membrane Solutions has optimized the aeration techniques for the ZeeWeed® membrane bioreactor (MBR). The new intelligent aeration controls incorporate a suite of new operating strategies developed by ZENON to lower the operational cost for customers.

Energy usage for membrane aeration is a significant operating cost for any membrane bioreactor facility. ZENON's unique new intelligent aeration controls drastically reduce operation costs by up to 75% while ensuring superior plant performance under all conditions.

6.1 Process R & D

The mandate of the R&D group is to develop and improve membrane-based processes. It is also responsible for developing optimum process conditions and parameters for new products and validating process performance.

R&D takes place at ZENON Membrane Solutions Oakville Head Quarters, a pilot testing facility in Guelph, Ontario and at the Canada Centre for Inland Waters in Burlington, Ontario and consists of 30 personnel.

Experimental work is conducted on over 20 fully automated pilots focusing on the following areas:

- ❑ Validation of membrane chemistry improvements
- ❑ Scale-up of modules and cassettes
- ❑ Determination of operating envelop
- ❑ Solids tolerance (coagulants and powdered activated carbon)
- ❑ Fouling and cleaning
- ❑ Membrane integrity test and pathogen challenge testing

7 ZENON Membrane Solutions Technology

ZENON Membrane Solutions focus is in the application of membrane technology to water and wastewater treatment. With more than twenty-five years of experience in microfiltration, ultrafiltration, nanofiltration and reverse osmosis, as well as ancillary systems such ion exchange, softeners, electrodeionization, and GE ABMet®, ZENON Membrane Solutions has a comprehensive base of technology to serve our customers every need.

Custom Engineered Systems for any size plant

Consumer Products for Home Use

Mobile Water and Wastewater Treatment Systems

7.1 ZeeWeed® Ultrafiltration

ZeeWeed® Ultrafiltration (UF) represents a major advancement in membrane treatment technology, which has found widespread application worldwide in the field of water and wastewater treatment. ZENON Membrane Solutions has developed a series of membrane solutions to provide low cost, high quality treatment systems for wastewater applications.

Summary of Benefits from ZeeWeed® Ultrafiltration

- The ZeeWeed® membrane provides many benefits compared to conventional pre-treatment systems, such as clarifiers and multi-media filters. In addition, the unique design features of the ZeeWeed® membranes allow them to provide superior treatment compared to other UF membranes. The design features that have been adopted to ensure reliable and consistent performance are summarized below.
- ZeeWeed® Ultrafilter is a physical barrier to particles and therefore is capable of achieving a turbidity of < 0.1 NTU, SDI of < 3, six (6) log bacteria removal and four (4) log virus removal regardless of the feed water characteristics. This makes it an ideal pretreatment technology for Reverse Osmosis.
- The ZeeWeed® membrane is an "outside-in" hollow fiber. This means that the dirty water is on the outside of the lumen and only the clean permeate enters the fiber. This translates into a lower probability for fouling of the membrane due to plugging of the small fiber flow channels.
- ZeeWeed® UF does not require upstream clarifiers or multi-media filters for pretreatment. Only gross screening of the raw feed water is required.
- ZeeWeed® UF does not require potentially troublesome polymers or chemicals.
- ZeeWeed® is immersed directly into the water it is treating, which allows for a very small system footprint. This also provides an opportunity for retrofits of existing plants by installing the membranes in existing clarifiers, bioreactors, media filter basins and other tanks.
- To serve the needs of different water sources, ZENON Membrane Solutions has developed two levels of the ZeeWeed® UF membrane: the ZeeWeed® 500 and the ZeeWeed® 1000.

7.2 ZeeWeed® 500 Series

The ZeeWeed® 500 series is the most robust and flexible ultrafilter with applications in industrial wastewater, sewage and process water treatment ranging from 20 to more than 1000 NTU. The ZeeWeed® 500 series membrane utilizes a reinforced fiber backing upon which the membrane is cast. With an outer/inner diameter of 1.95 and 0.75 mm respectively, the fiber is extremely strong and very resistant to breakage.

Development of the membrane, although a significant technological development, would be of no commercial importance if it were not integrated into a well-engineered module. With more than 2000 fibers per element, the ZeeWeed® 500 series membrane is

integrated into a module that packs a large surface area into a relatively small volume. Each ZeeWeed® 500d module is integrated into a cassette that encompasses forty-eight (48) to sixty-four (64) ZW500d modules. These modules are in-turn connected to a main permeate header pipe in trains of up to fifteen (15) ZeeWeed® cassettes in series. This highly efficient and well-designed system means the maximum surface area is installed in the minimum volume, thereby reducing process tank sizes and overall plant footprint.

Some key advantages include:

- The ZeeWeed® 500 membrane is a true ultrafiltration membrane with a pore size of 0.04 micron
- The ZeeWeed® UF system offers complete modulating control.
- ZENON Membrane Solutions design allows operation of the ZeeWeed® UF at an overall recovery 90 - 95%.
- The system can be supplied with the capability of operating in enhanced coagulation mode for the removal of TOC and color.
- The system employs logical process monitoring and control systems including flow transmitters and pressure transmitters.
- The ZeeWeed® membrane tolerates up to 500,000 ppm-hours of sodium hypochlorite.
- Periodic automatic in-situ air scouring of the membranes ensures reliable operation at a variety of feed conditions.
- Automated Backpulsing ensures higher overall permeation rates at lower pressures.

7.3 ZeeWeed® 1000 Series

For cleaner waters with a turbidity of < 20 NTU, the ZeeWeed® 1000 series is preferred. Unlike the 500 series, which uses a reinforced fiber, the ZeeWeed® 1000 is a single cast membrane with an outer/inner diameter of 0.65 and 0.35 mm respectively and a pore size of 0.02 micron. It was designed to provide our customers with an even more cost-effective product for low turbidity water sources.

With more than ten times the number of fibers per module, the ZeeWeed® 1000 series packs a much higher surface area in a relatively small volume. In addition, as opposed to the ZeeWeed® 500 module, the ZeeWeed® 1000 membrane fibers are mounted horizontally in modules that can be stacked into two or three modules high. These stacks are further integrated a ZeeWeed® 1000 cassette, of eight or sixteen stacks.

Each stack of modules is connected to the cassette permeate header through a permeate collection pipe. Cassettes can be lifted from the membrane tanks for service using an overhead crane or lifting gantry.

This highly efficient and well-designed system means the maximum surface area is installed in the minimum volume thereby reducing process tank sizes and overall plant footprint.

ZENON Membrane Solutions ZeeWeed® 1000 Ultrafiltration System brings together:

- Over twenty years of Research and Development in the field of Ultrafiltration membranes
- Over twenty years of experience in Ultrafiltration membrane production
- Over twenty years of experience in Plant Design of membrane systems for a broad variety of applications from wastewater to ultra pure water

Some key advantages include:

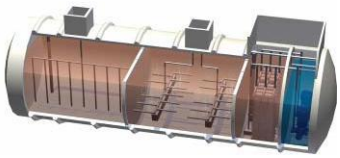
- The ZeeWeed® membrane is robust and has a proven record for long membrane life with the lowest potential for irreversible fouling
- The ZeeWeed® 1000 membrane is a true ultrafiltration membrane with a pore size of 0.02 micron
- The ZeeWeed® membrane is manufactured from PVDF; the most elastic and tolerant to fouling membrane material available
- The ZeeWeed® membrane system is a simple, fully automated, easily maintained and inspected system

7.4 Packaged Plants

ZENON Membrane Solutions offers a broad line of package membrane based water and wastewater treatment plants that are ideal for flows from 100 gallons per day to 5 million gallons per day. The simple and efficient designs produce safe, reliable product water while significantly reducing capital and operating costs.

Some key advantages include:

- Pre-assembled and factory tested systems
- Minimize on-site construction costs
- Ensure quick delivery and simplify plant start-up
- Cost-effective for virtually all water filtration applications
- Superior effluent quality

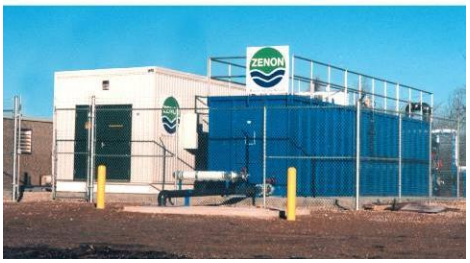


- Utilize proven ultrafiltration (UF), reverse osmosis (RO) and complementary technologies
- Simple operation and maintenance
- Require minimal operator supervision
- Most comprehensive cleaning capability ensures peak system performance
- Significantly reduces sludge generation – vs conventional systems
- Ancillary Equipment

In order to provide complete systems solutions, ancillary equipment is also supplied by ZENON. These ancillary systems include:

- ❑ Forced Draft Degasifiers
- ❑ Vacuum Degasifiers
- ❑ Multi-Media Filters
- ❑ Inclined Plate Clarifiers
- ❑ Recessed Plate Filter Presses
- ❑ CRUD Filters

7.5 Mobile Systems



In some cases, the need for water is unpredictable and industries need rapid and reliable treatment services. In addition, there are situations during plant upgrades or maintenance where industries require temporary treatment equipment for a relatively short period of time. In either case, ZENON Membrane Solutions is ready to assist in solving these problems. Included in our product offering is a complete line of containerized mobile membrane plants that provide quick and reliable water and wastewater treatment solutions. Incorporating simple-to-operate ultrafiltration (UF) or reverse osmosis (RO) technology, the systems are easily transportable and consistently produce high quality water that meets the world's most stringent requirements.

ZENON Membrane Solutions has an established track record for providing mobile water filtration systems for a wide range of municipal, industrial and military clients. ZENON Membrane Solutions maintains an inventory of mobile systems for use as large-scale demonstration plants or as interim full-scale production units. Lease periods typically range from three months to two years. Our mobile water treatment systems are highly automated and simple to operate.

Features and Benefits:

- ❑ Easily transportable
- ❑ Fully tested and ready for installation
- ❑ Proven, reliable barrier technology
- ❑ Fully automated for ease of operation
- ❑ Minimal installation time required

8 Project Implementation

8.1 Project Approach

ZENON Membrane Solutions believes that successful projects are built on quality teams and communication. Our proven approach is to provide a dedicated engineering and project management team with extensive wastewater treatment plant (WWTP) design experience for each project. The goal of the team is to ensure on-time delivery and overall project success through:

- Frequent communication allows ZENON Membrane Solutions to better understand the needs of the Owner;
- Intimate understanding and knowledge of the project including budget, schedule, and regulatory, technical and political issues – ensuring milestones are met;
- Partnerships and communication protocols that will remain in place for the duration of the project.

This clear and defined project approach guarantees that the owner, design engineer and the construction contractor will receive the best possible support from ZENON Membrane Solutions and therefore the best value for rate payers.

8.1.1 ZENON Membrane Solutions Team

Our Operations Division staffs over 160 employees over a wide range of departments and job functions. Each staff member plays a vital role in the delivery of every project ranging from small standard system units to multi-million dollar projects.

The dedicated team consists of the following:

Project Manager – The dedicated ZENON Membrane Solutions project manager will be the primary contact for the project from project inception through facility start-up. The ZENON Membrane Solutions project manager will be responsible for overall schedule control, communications and ZENON Membrane Solutions team coordination and will be the single point of contact for the buyer during the project.

Project Engineer – A project engineer will be responsible for the primary technical details of the project, including all piping design, process equipment, valves and instrumentation selection, final design of the layout of process tanks and other components. The project engineer will participate in a portion of the on-site activities, including the construction phase of the project, to ensure that the design is correctly implemented in the field.

Electrical Engineer – A dedicated electrical engineer will be responsible for the hardware design of the control system associated with the ZENON Membrane Solutions system. Our group of electrical engineers have significant water treatment controls engineering experience that expands from designing and programming small controllers to SCADA systems, from relay logic controls to starter and VFD panels.

Controls Engineer – A controls specialist will assist in the overall design of the ZENON Membrane Solutions system to ensure seamless integration of ZENON Membrane Solutions controls with other processes in the plant. This engineer with the support of the Controls

Engineering group, will take part in controls workshops with the owner, design engineer and the construction contractor to ensure seamless integration with the overall control philosophy of the WWTP.

Programmer – Programmers will be dedicated to writing and testing the control system PLC code for the ZENON Membrane Solutions system. The programmers will also assist the owner, engineer and general contractor with the inclusion of the ZENON Membrane Solutions controls in the overall plant SCADA system. This programmer will also be available for site work during the commissioning phase of the project to ensure that the control system start-up is completed in a timely fashion.

Field Service Representatives (FSRs) – In addition to the on-site start-up and commissioning activities, the FSRs will be involved in Factory Acceptance Testing of ZENON Membrane Solutions supplied instrumentation and a programmable industrial controls simulation (PICS) at ZENON Membrane Solutions. This ensures that the FSRs will have intimate knowledge of the project prior to arriving on-site providing significant timesavings in the field.

In addition to the resources available, ZENON Membrane Solutions has a number of checks-and-balances and procedures in place that ensure that a project is properly documented following ISO 2001 procedures. This allows for information to be easily and smoothly transferred to a new team member or group.

As a company and as individuals we strive on meeting our Corporate Values. These values include working as a team to provide our clients with the best possible service and support and 'delivering what we promise'.

8.2 Project Delivery

Meetings are held to introduce our team members to the rest of the Owner, Design Engineer and Construction Contractor teams. The roles and responsibilities will be defined along with establishing the correct routes of communication to ensure that we provide the required support. The most important aspect of these meetings is to develop team building. ZENON Membrane Solutions firmly believes that the method of delivering a successful project is to promote the value of a unified team, both within our organization and with the Owner and Design Engineer team members.

The first design kick-off project is scheduled as soon as possible to maintain the design momentum and familiarity developed throughout the sales phase of the project. This ensures that the knowledge that our team has developed is imparted to the Owner, Design Engineer and Construction Contractor early on in the design process. This experience also allows us to quickly assess innovative and value engineering ideas that can provide cost reductions as well as process optimization and flexibility.

Throughout the project, a series of meetings are set up to facilitate communication and involvement of all parties to accomplish a number of goals. These meetings include:

- ❑ Preliminary design meeting
- ❑ Design review meetings
- ❑ On-site meetings during construction
- ❑ Start-up, commissioning planning, and progress meetings

In addition, regular design meetings with the Owner, the Engineer and the Construction Contractor are scheduled to ensure that design progress is monitored and design challenges are dealt with quickly. This process may include multi-day meetings, video conference calls and weekly conference calls to ensure that design details are fully coordinated.

8.3 Project Engineering

The design strategy for the WWTP optimizes the use of resource expertise to produce an ideal final plant design that is functional and efficient. ZENON Membrane Solutions is responsible for the design of the membrane process tanks, process equipment and instrumentation included in ZENON Membrane Solutions WWTP scope of supply, configured to enhance the operation of the ZENON Membrane Solutions membrane filtration system.

The success of this design strategy is the result of a co-operative and collaborative team approach, where ZENON Membrane Solutions, design consultants and plant owners/operators are able to focus their expertise appropriately.

Close communication between design teams and the application of design gates, or milestones, ensure that the teams remain coordinated through design development. Typical design gates, in sequential order, include:

- ❑ Development of design goals and specifications
- ❑ Preliminary Process Development
- ❑ Process Flow Diagrams (PFDs)
- ❑ Process and Instrumentation Diagrams (P&IDs)
- ❑ Preliminary Plant Design Development
- ❑ Line sizing
- ❑ Tank sizing
- ❑ Plant design requirements
- ❑ Conceptual Building/Facility and Plant Design
- ❑ Draft process layout
- ❑ Tank size and locations,
- ❑ Pipe size and required piping configurations
- ❑ Pipe support concepts
- ❑ Draft building layout
- ❑ Operability
- ❑ Access
- ❑ Maintenance
- ❑ Draft hydraulics development
- ❑ Detailed Process Development
- ❑ PFDs

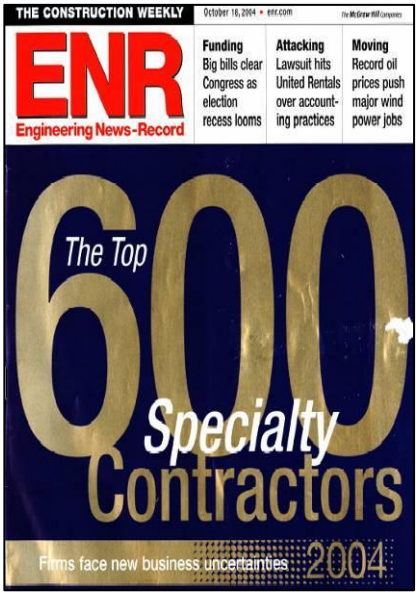
- P&IDs
- Hydraulic Design
- General Arrangements and Plans

Through close communication and collaboration in the design process, and through the application of design gates, the result is a final detailed design, minimizing the need for modifications during construction.

8.4 Project Construction

Over the last 26 years, ZENON Membrane Solutions has completed over 450 membrane treatment plants – each in conjunction with a Contractor. All of these projects were completed with the Owner completely satisfied and the Contractor profitable. ZENON Membrane Solutions knows how to work with Contractors with previous experience installing membrane technology and "first-time" General Contractors with minimal membrane installation experience.

We enjoy working with Contractors of all sizes and levels of sophistication. In fact, we have completed projects with many of the Engineering News Record listing of the Top 20 water and wastewater contractors in the United States. In 2004, we completed 35 municipal construction projects with the average construction change-order (due to Membrane Design) being less than 0.2%. This is a testament to our system of partnering with our clients and their design engineers during the design phase of the project.



We know how to assist Contractors: Accurate Shop Drawings, On-time deliveries, and rapid resolution of site issues.

During the construction phase of the project, communication will occur between ZENON Membrane Solutions, the Construction Contractor, Owner, and Design Engineer in the following ways:

Our Project Manager will continue to be the prime contact for all communication and will coordinate all activities to ensure all appropriate team members are available as required. Telephone, e-mail, video conferencing and participation in site meetings will be the prime modes of interaction during this period.

Our FSR will come to site to review, with the Construction Contractor, the details of proper installation of our equipment.

During the later stages of installation and the commissioning period, we will provide a team of Field Service Representatives that will be on site full time. This team will direct the General Contractor on proper installation and will complete the process of commissioning our system. Field Services will work closely with the Wastewater Process Group to confirm that all components meet system specifications.

Throughout commissioning and testing, we will assign an internal Field Service Coordinator that will support the Field Team to ensure rapid response to any on-site commissioning issues that may arise.

The FSRs, along with the Project Manager will be responsible for developing schedules and testing procedures for the membrane equipment. While onsite, the FSRs will test the requirements of the each component, complete a System and Operational Test using clean water for all the ZENON Membrane Solutions supplied equipment.

Once the ZENON Membrane Solutions system has been fully commissioned and the control system verified, the Wastewater Process Group will oversee the process start-up.

9 ZENON Membrane Solutions Services

Capabilities

ZENON Membrane Solutions backs up each system it builds with a comprehensive range of services to assure client satisfaction and system success. We work hard to bring to each client partner the concrete benefits of our 26 years of experience on hundreds of systems. Our goal is to offer flexible, responsive, and professional service packages.

ZENON Membrane Solutions is uniquely qualified to deliver commissioning services, technical support, and maintenance activities through all phases of the plant's life, from equipment installation to long-term plant operation. Specific services are included with the equipment supplied to provide the Contractor with assistance for equipment installation supervision, membrane installation, equipment checkout, wet testing, operator training and process start-up.

With over 75 service agreements spanning the Municipal and Industrial water and wastewater markets, ZENON Membrane Solutions Services has developed the tools and technical capability to anticipate and resolve virtually any process or equipment problem that might occur.

ZENON Membrane Solutions Services is organized by functional and geographical areas, each focused on providing one-on-one interaction with our clients. Every ZENON Membrane Solutions Service Representative has the key tools, computer resources, and training to conduct their job effectively.

Depth

ZENON Membrane Solutions provides a complete menu of services for its leading membrane technology and to all levels of its business network. Globally, the ZENON Membrane Solutions team consists of the following personnel:

- 44 Senior Management
- 220 Professional Engineers and Technicians
- 45 Supervisors
- 212 Office Staff
- 570 Skilled Trades

The Pilot Department maintains a fully stocked and tooled 8,000 square foot shop facility used in maintaining 80-plus pilot plants and supporting other ZENON Membrane Solutions operational needs.

Trained field staff provide on-site client support for pilot set-up and operations. When it comes to meeting your project and service requirements, ZENON Membrane Solutions has the depth needed.

Reach

ZENON Membrane Solutions offers a global reach in the water treatment sector. This brings the assurance to each client that they are moving forward with a technology partner who is attuned to the latest developments. Service offices are strategically located to balance the benefits of proximity for the client with the benefits of a staff size that is large enough to assure timely response of qualified staff and to allow for specialization.

9.1 Commissioning

With over 350 full scale wastewater and water treatment plants started up and in operation, the Commissioning section of ZENON Membrane Solutions Services has developed a powerful infrastructure that provides timely support and management of all commissioning activities. This department takes full responsibility for in-house Factory Acceptance Testing. Seven active PICS (Programmable Industrial Control Simulations) stations are available at ZENON Membrane Solutions headquarters for testing newly developed PLC code before deployment. Client training packages are developed, maintained and delivered by this same group.

ZENON Membrane Solutions provides the Client with:

- assistance with ZENON Membrane Solutions equipment off-loading and installation;
- assistance with ZENON Membrane Solutions membrane installation;
- assistance with commissioning and start-up of the membrane system;
- operator training; and
- assistance with acceptance testing of the system.

9.1.1 The Factory Acceptance Test (FAT)

ZENON Membrane Solutions inspects system components in a Factory Acceptance Test (FAT) before they are installed. During the FAT, components are tested for compliance with the Engineering Bill of Materials (BOM), including functionality and accuracy. Testing the components in-house saves time fixing or returning faulty equipment and adjusting operating parameters in the field.

To assure the proper function of large pieces of equipment that are often impossible or impractical to test at ZENON Membrane Solutions' facilities, ZENON Membrane Solutions requires that its vendors test their own devices at their facilities prior to shipping the equipment to ZENON Membrane Solutions.

9.1.2 Programmable Industrial Control Simulation (PICS)

Programmable Industrial Control Simulation (PICS) is a software package that provides a means to simulate plant operation in the office. This advanced software simulates real inputs from an operating plant, which allows the program code to respond as if the plant were actually there. The programmer, together with the ZENON Membrane Solutions Service Representative (FSR) assigned to commission the project, test the entire control documentation. This software allows us to test the control logic of the plant to 90% accuracy - prior to the program, programmer or FSR leaving ZENON Membrane Solutions!

We minimize the time spent working with program-related issues on site so our Clients will benefit from a stable control program and a plant that is commissioned on schedule.

9.1.3 Equipment Off-Loading and Installation Assistance

A ZENON Membrane Solutions representative will be present at site to assist the Client in three ways:

- identification of all ZENON Membrane Solutions supplied equipment to ensure all equipment is installed in its intended place;
- ensuring all ZENON Membrane Solutions supplied equipment has been delivered in good order and that no damage has occurred during delivery;
- identification of discrepancies between the shipping lists and the equipment received;

ZENON Membrane Solutions representatives will be present when the membranes are delivered and will assist by advising the Client on the details of installing the membrane cassettes within the membrane tanks.

9.1.4 Membrane Installation Assistance

ZeeWeed® membranes are normally installed just prior to wet testing/commissioning and after a Field Service Representative has checked that installation work has been carried out correctly.

The ZENON Membrane Solutions Service Representative will be present during membrane installation to advise and provide direction to the Client on the assembly and installation of the ZeeWeed® membrane cassettes into the membrane tank.

Once the membranes are installed, the ZENON Membrane Solutions Service Representative will perform a bubble test to ensure membrane quality. Once completed, the ZENON Membrane Solutions plant is ready for wet commissioning.

9.1.5 Field Testing & Commissioning Assistance

After the Client's staff has completed the installation of the membrane filtration system equipment and prior to the installation of the membranes and commissioning/wet testing of the equipment, a ZENON Membrane Solutions Service Representative will again visit the site. This visit is to ensure the installation work has been carried out correctly and has reached a degree of completion adequate to allow installation of the membranes and plant commissioning to proceed smoothly and without delays. The items to be completed include:

- inspection of all ZENON Membrane Solutions supplied equipment;
- inspection of equipment by others (providing it is necessary for the correct operation of the ZENON Membrane Solutions system);
- inspection of all wiring to ZENON Membrane Solutions supplied equipment (I/O checks);
- rotation checks on all ZENON Membrane Solutions supplied equipment;
- witness flushing of all piping using potable water for ZENON Membrane Solutions supplied equipment;
- witness correct operation of prescreening equipment ;
- setup of ZENON Membrane Solutions supplied instrumentation;
- stroking ZENON Membrane Solutions supplied valves;
- testing operation of ZENON Membrane Solutions supplied pumps and blowers;
- establishing communication between ZENON Membrane Solutions supplied controls equipment and controls equipment supplied by others;

Upon completion of this work, ZeeWeed® membrane installation may commence. Please refer to Membrane Installation Assistance section.

Once membrane installation is complete, the ZENON Membrane Solutions representative will assist with further commissioning, which includes:

- flushing glycerin solution from the membranes;
- testing the ZENON Membrane Solutions system operation on clean water;
- running chemical and cleaning systems;
- tuning ZENON Membrane Solutions system operation;
- seeding the ZENON Membrane Solutions system with activated sludge;
- introducing feed sewage gradually to build up the biological treatment system.

Once operation on the feed water meets the design treated water quality, the treated water is suitable for discharge. This effectively completes the installation and commissioning of the equipment and at this time, ZENON Membrane Solutions shall receive Notice of Substantial Completion from the Owner/Purchaser.

9.1.6 Operator Training

ZENON Membrane Solutions has developed numerous Operator Training Courses, each catered to the individual needs of its client. The training included by ZENON Membrane Solutions will empower the staff to operate the membrane system proficiently and confidently.

ZENON Membrane Solutions has a full-time training expert responsible for training methodologies and curriculum development.

Pre-Commissioning: ZENON Membrane Solutions has developed a pre-commissioning training program for our operating partner's plant management and selected plant operators. Participants receive an introductory exposure to the theory and practice of the ZeeWeed® system operation at an existing ZeeWeed® treatment plant. This training creates a more receptive knowledge base upon which to build the plant-specific operating capabilities required for the actual ZeeWeed® ultrafiltration plant.

Shadowing: During the commissioning and startup of the system and for membrane installation, ZENON Membrane Solutions recommends that an operator representative shadows the Service Representative. Shadowing provides superior operator understanding and confidence in all aspects of membrane system operation. Our partner-focused Service Representatives will instruct a "shadow" over the course of startup and commissioning.

Classroom: ZENON Membrane Solutions will conduct classroom training at the facility. It is recommended that this section of training is conducted prior to the completion of commissioning, but after the installation of membranes, so that the information learned is quickly put into practice and reinforced through actual application on the system.

One of our training specialists will deliver the classroom training, covering the theory and practice required to operate a ZENON Membrane Solutions system. Group sizes of five (5) to ten (10) are optimal for classroom training, but up to twenty (20) people can be accommodated in one session. Material to be covered includes:

- membrane application theory,
- performance monitoring,
- membrane cleaning theory,
- system controls theory.
- the reasoning method of trouble-shooting

ZENON Membrane Solutions requires that there is a suitable classroom with associated teaching facilities and materials such as blackboards, overhead, projectors, pens, pencils, writing pads etc., for the duration of the course. It is preferred that, where possible, training be carried out at the plant where the equipment supplied is located.

Hands-On: Immediately following classroom training, both the training specialist and the ZENON Membrane Solutions Service Representative will train our operating partner's personnel through hands-on operation of the membrane system. The material to be covered includes:

- use of the computer operator interface,
- plant maintenance,

- instrumentation and equipment maintenance,
- membrane cleaning,
- troubleshooting.

ZENON Membrane Solutions' experience in training shows that groups for hands-on training should be kept to five (5) or less.

9.1.7 Acceptance/Performance Testing

Following completion of the Functional Test of the Membrane Filtration System, ZENON Membrane Solutions will assist the Client with Acceptance/Performance Testing to ensure that treated water quality meets the design quantity and quality. This will take place using both clean water process feed water. During this time, ZENON Membrane Solutions will also monitor system performance remotely, employing ZenoTrac™.

24/7 Emergency Telephone Technical Support will be initiated during this time to ensure that round-the-clock support is available.

9.2 Post Commissioning Services

9.2.1 ServiceOne

To assure the best possible startup process, ZENON Membrane Solutions offers a premium package of service support covering the first year of plant operation.

This package is called ***ServiceOne*** and includes the following components:

- 24/7 Emergency Telephone Technical Support
- ZenoTrac™ - Monitor Service
- Scheduled Site Visits
  - Visit 1 - First Cleaning supervision near the 3rd month of operation and open issue resolution.
  - Visit 2 - Refresher Training, dosing validation, and open issue resolution.
  - Visit 3 - Pre-Warranty Expiry near the 11th month of operation and a Plant Performance Audit.
- Partnership Communication
  - customized client web site MyZENON.com
  - ZeeWeed® Users Group participation
  - Regional Account Manager (RAM)

9.3 24/7 Telephone Technical Support

Business Hours - Technical Support

For the life of the system, Plant Operators have telephone access to a skilled ZENON Membrane Solutions technical support specialist who will assist Plant Operators in troubleshooting of system problems during normal working hours 8:30 am to 5:00 pm (Eastern Time Zone, GMT -5:00). Plant Operators call 905-465-3030 and ask for Technical Support or for Ext. 3406, 3426, 3479 or 3499.

After-Hours - 24/7 Emergency Telephone Support

As part of ***ServiceOne***, for the Mechanical Warranty Period, at no charge, the plant will be covered by 24/7 Emergency Telephone Technical Support service.

Our technical support team is always on call and is equipped with the client's system information to effectively talk a Plant Operator through an emergency. This allows Operators to contact a knowledgeable ZENON Membrane Solutions representative in the event of any emergency condition, potentially averting loss of plant production and expensive call outs. The Plant Operator calls 905-333-8057 and provides the Plant's Access Code.

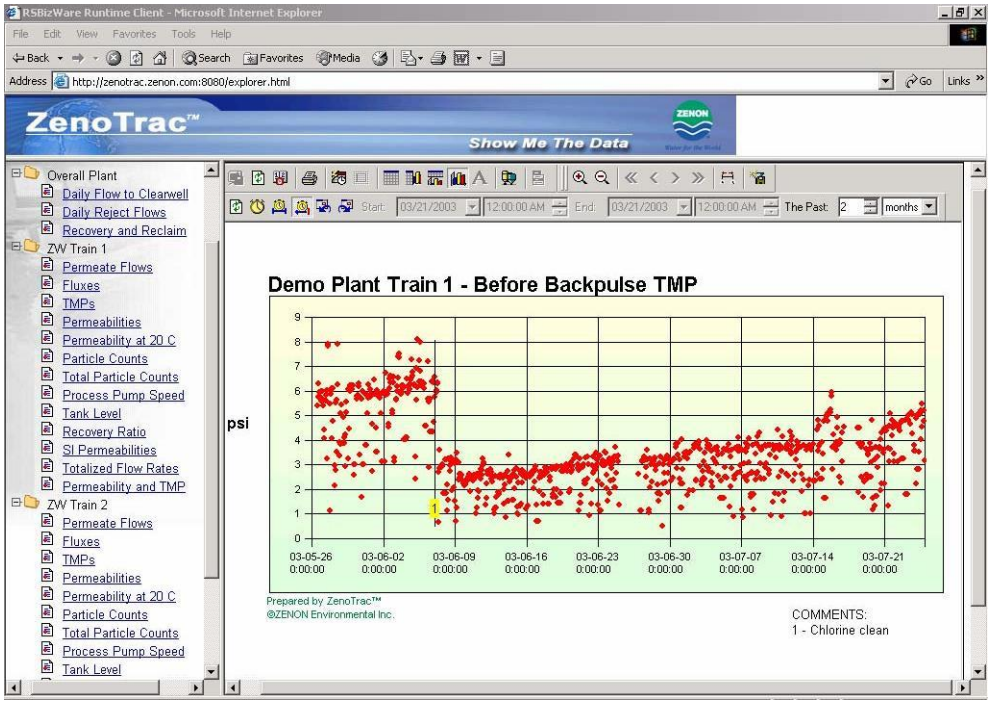
The Telephone Support Group has laptop computers with them to dial into the plant control system (if so equipped) in order to gain a better understanding of the situation, and make any necessary adjustments to set points or software. The Group also maintains their own dedicated hard copy of all plant drawings for reference during support calls.

Should the situation require a more detailed investigation of control code, ZENON Membrane Solutions maintains an on-call programmer at all times. Process Support engineers are pulled in as required to resolve the more difficult process issues.

Calls of a non-urgent nature are to be made during the period 8:30 am to 5:00 pm. (Eastern Time Zone GMT -5). Not all issues can be resolved through telephone support. In the event that the ZENON Membrane Solutions Technical Support Group cannot resolve the problem with the Operator over the phone, Field Service is available at the rates and under the conditions published in ZENON Membrane Solutions's Field Service Labor Rate sheet.

9.4 Automated Process Support - ZenoTrac™

Operate with Confidence - ZenoTrac™ provides automated data collection and graphical reporting of key process information. Please see the full ZenoTrac™ Introduction attached.



With ZenoTrac™ Monitor Service, authorized users can review, from anywhere, at anytime, the operational results of the plant and, in particular, can monitor average and peak flows, trans-membrane pressure, and flux in any selected time frame.

Plant data is reviewed and evaluated daily using AIDER™ functions applied to key parameters. AIDER™ is a proprietary program that identifies data exceptions and notifies the ZENON Membrane Solutions Process Engineer with e-mail "alerts".

The Process Engineer reviews all issues highlighted by AIDER™ and communicates with the plant staff on key issues.

ZENON Membrane Solutions provides a periodic report with analysis of key trends and recommendations to improve plant operation, membrane cleaning and overall performance.

The Client has web access to all ZenoTrac™ data for the plant.

Full responsibility for process monitoring and operating decisions remains, at all times, with the Plant Operators.

ServiceOne provides ZenoTrac ™ Monitor Service at no-charge in Year One. Clients enjoy the best possible access to all forms of ZENON Membrane Solutions expertise and support.

9.5 Site Visits

Scheduled Site Visits - Year One

As part of ***ServiceOne*** care, a first site visit is timed to correspond with the first recovery cleaning of the membranes (eg in the 3rd month).

A second ***ServiceOne*** site visit will be timed to provide refresher training and to validate the chemical dosing settings.

The third ***ServiceOne*** site visit will be timed to occur just prior to expiry of the mechanical warranty period, (eg in the 11th month). A full plant audit will identify and document all warranty eligible issues.

Agenda Setting

In addition to the activities set out above, ZENON Membrane Solutions and the Client will cooperatively plan the time allotted to site visits to complete priority activities selected from the scope of service below. Not all items in this scope or checklist are necessarily performed on every visit. The ZENON Membrane Solutions Service Representative and the Plant Operators will initially define Priority Deliverables and jointly revise these priorities as required.

Typical Site Visit Scope of Service

Process Monitoring

- ❑ Inspect the facility with operator(s) for the proper operation of the membrane system in accordance with the Operation & Maintenance Manual.
- ❑ Review the results of analytical tests.
- ❑ Review operating logs and ZenoTrac™ data (if available) with the operator(s). Discuss operator concerns and ZENON Membrane Solutions issues emerging from this review.
- ❑ Discuss imminent seasonal shifts. Plan and implement forward looking adjustments.
- ❑ Advise the operations manager of technical updates as they become available from ZENON Membrane Solutions.

Membrane Integrity

- ❑ Evaluate the aeration patterns in the tank.
- ❑ Lift and inspect membrane cassettes, as required, to assess their condition.
- ❑ Assess pressure decay test or bubble test data as it correlates to the membrane condition and/or permeate water quality. Assist Plant Operators to repair membrane fibres as required.
- ❑ Provide guidance and direct assistance, where required, to the plant operator(s) in the recovery/soak membrane cleaning procedure.
- ❑ Assess the effectiveness of ongoing membrane cleaning procedures and provide recommendations to the plant operator.

Controls

- ❑ Review system alarm history, discuss any related issues with operator(s) and recommend appropriate actions to be taken.
- ❑ Perform limited PLC code modifications as planned in advance, secured by proper documentation, dial-in capabilities and file backup precautions.
- ❑ Verify operation of all safety interlock/controllers, pressure switches and temperature switches.

Verification of Instrument Calibration

- ❑ Review system setpoints.
- ❑ Assist the Plant Operator, as required, to verify the condition of all control instruments, sensors, probes, and transmitters including switching action and output. If re-calibration is required, assistance will be provided by ZENON Membrane Solutions on site, if feasible, and will include training of Plant Operators, wherever possible.
- ❑ When recalibration must be done by the OEM or where recalibration requires specialized equipment (example - magnetic flow meters and particle counters), ZENON Membrane Solutions will work with the Plant Operator to arrange for recalibration.
- ❑ The ZENON Membrane Solutions Service Representative will collaborate with the Plant Operator in maintaining a log of calibration activities.

Preventive Maintenance Planning

- ❑ Assist the Plant Operator to develop a Preventive Maintenance Plan in a spreadsheet format.
- ❑ **Spare Parts Monitoring** - It is assumed that an adequate package of spare parts will be procured by The Client. The ZENON Membrane Solutions Service Representative will review the Spare Parts provisions with the Plant Operator during site visits and identify any additional spares parts that should be brought into inventory to provide the desired level of security to the plant including spares related to non-ZENON Membrane Solutions equipment.

Training

Our experience with many plants and many operators shows that a single training event, taken alone, does not guarantee successful learning. Full understanding comes from on-going coaching and reinforcement of concepts through hands-on application.

During scheduled site visits, the ZENON Membrane Solutions Service Representative will provide operators with on-site, informal training to cover any areas of concern, to explain the operation, process, maintenance or troubleshooting activities and, in general, to enhance operator ability and confidence.

On at least one site visit per year, the ZENON Membrane Solutions Service Representative will organize with operators for at least one session of 3 hours of formal training on curriculum selected jointly from a comprehensive menu. Material will be presented using PowerPoint screens on a portable computer.

Reporting

At the end of each site visit, prior to departure of the ZENON Membrane Solutions Service Representative, The Client will be asked to sign a Work Order that describes the hours on site and tasks accomplished.

ZENON Membrane Solutions will provide a site visit report to the plant operator within 10 days of the ZENON Membrane Solutions Service Representative's return to the office. This report will record observations about the condition of the membranes, report on tasks accomplished during the visit, and identify key operating and maintenance issues requiring further attention.

9.5.1 Spare Parts

All components associated with the ZeeWeed® membrane system can be obtained from ZENON Membrane Solutions. Our dedicated Parts department will provide quick response to any emergency parts requirement. As the original equipment manufacturer of the membrane components, we provide a reliable source of replacement parts.

Recommended Spare Parts List - The reliability and continuity of a plant depends on having the right selection of spare parts in stock at the plant when a critical breakdown occurs. A well thought out Recommended Spare Parts List (RSPL) will strike a smart balance on the following considerations:

- component criticality to plant operation,
- acceptable down-time limit - how long can one train or the whole plant afford be out-of-service,
- risk of unforeseen breakdown by component,
- delivery lead times,
- cost,
- options for timing of expenditure (delayed purchases),
- risk of deterioration in storage,
- warranty expiry of on-the-shelf components,
- plant preferences for either plug & play maintenance vs hands-on repair,
- available inventory space.

Through our experience in many plants, ZENON Membrane Solutions has developed an RSPL format which is divided into three levels according to urgency:

1. Critical Spares: potentially required within the first year of operation.

The plant risks losing partial or complete production capability if these parts are not on hand. Critical Spares provide for commissioning spares during the initial start-up period and for 'swappable spares' for potential claims during the warranty period. If a warranty claim is validated, these spares are restocked at ZENON Membrane Solutions' expense.

Examples: cards for a PLC, MCC fuses and starters, air filters, pressure transmitters, cyclic aeration valves, control relays, ZeeWeed repair kits.

2. Recommended Spares: required for repair/replacement in years two to five.

In many cases, recommended spares will be spared as complete replacements. In some cases, pumps, analytical instrumentation and larger valves will have spare parts or repair kits available.

Examples: valves with actuators/solenoids, sample valves, transmitters, switches, gauges, analyzers, PLC battery, power supplies, memory modules, modems.

3. Maintenance Spares: for items that require regular maintenance

Examples: blowers, pumps, metering pumps, motors, mixers, larger automatic self-cleaning strainers, calibration fluids, immersion heaters, air compressors.

9.5.2 Warranty Support

To ensure that potential problems are dealt with in a swift and efficient manner, ZENON Membrane Solutions Services has a Warranty Coordinator dedicated to that function only. Our Warranty Coordinator has access to all of the ZENON Membrane Solutions' resources to ensure a timely resolution of any problem that may occur.

9.5.3 Training

ZENON Membrane Solutions recognizes the critical role that training can play in assuring plant success.

We have specialized training staff who develop curriculums and who train our trainers in:

- ❑ providing learner focused sessions,
- ❑ carefully identifying intended training outcomes,
- ❑ assessment methods, and
- ❑ managing the training environment for learning effectiveness.

ZENON Membrane Solutions offers training events customized to the needs of new or existing operators, managers, and technical support staff. These training sessions can be planned for pre-commissioning preparation, prior to plant start-up or as refresher trainings. Pre-commissioning training at a similar existing plant can be organized. We try to plan for formal and informal training opportunities to occur during all our site visits, as time permits. Training documents are stored after a training session on the MyZENON.com web site for access and reference.

9.5.4 Health & Safety

ZENON Membrane Solutions is serious about health and safety and wants to work thoroughly with each client to assure the well-being of all concerned. The following provisions typically guide our collaboration with clients on health and safety.

The Client

The Client will advise the ZENON Membrane Solutions representative of any site-specific safety issues and procedures.

If any type of lifting devices will be used on site, The Client will provide proof of its maintenance, inspection and certification documentation upon request and will assist the

ZENON Membrane Solutions Service Representative to complete a safety inspection checklist.

ZENON Membrane Solutions

All work on site will be performed in accordance with applicable law and will be performed reasonably, in a clean and safe manner. The ZENON Membrane Solutions Service Representative will abide by the more stringent of the applicable health, safety and environmental policies and procedures of either The Client or ZENON Membrane Solutions.

ZENON Membrane Solutions will provide all applicable safety training required by the health and safety policies. Our Service Representative will have undergone Workplace Hazardous Material Information System (WHMIS) training and will come equipped with necessary Personal Protective Equipment (PPE).

ZENON Membrane Solutions is responsible for ensuring that our subcontractors comply with these foregoing health and safety provisions.

Emergencies - In emergencies affecting the safety of persons, work or property at the site and adjacent thereto, ZENON Membrane Solutions will act, without previous instructions from The Client, as the situation warrants. ZENON Membrane Solutions will notify The Client immediately thereafter.

9.6 Partnership Communication

We are very aware of the important, long term implications involved in selecting a membrane supplier. ZENON Membrane Solutions is committed to building a sustainable and durable partnership with each client. Good communication is an essential ingredient to achieve this. ZENON Membrane Solutions invests in two communication mechanisms: MyZENON.com and the ZeeWeed® Users Group to strengthen our relationship with each client.

9.6.1 MyZENON.com

ZENON Membrane Solutions offers a shared CLIENT/ZENON Membrane Solutions website with an exclusive client-controlled password. Each website contains the following:

- ❑ System drawings
- ❑ Operating Manual
- ❑ Equipment vendor data
- ❑ Training Documents
- ❑ Telephone / e-mail listing of Who is Who at your plant
- ❑ Telephone / e-mail listing of Who is Who at ZENON Membrane Solutions with photos
- ❑ Site visit reports
- ❑ PLC Code
- ❑ Recommended spares list
- ❑ A file transfer facility
- ❑ Any other useful data that either partner wishes to hold in common at the web site.

9.6.2 ZeeWeed® Users Group

To facilitate interaction between ZeeWeed® Plant Operators, and to provide a forum for real-world feedback to ZENON Membrane Solutions management, the Wastewater ZeeWeed® Users Group was formed in the year 2000. The Group is chaired and organized by representative ZeeWeed® plant operators, and meets on an annual basis at a different ZeeWeed® plant. Previous User Group meetings have attracted operators from all over North America and from as far away as New Zealand. New technologies are introduced, current issues tabled, and roundtable discussions ensue on such topics as plant design or spare parts strategies. The Users Group has become an excellent forum for experienced operators to exchange the "tricks of the trade", to renew old acquaintances, and to impart their hard won knowledge to newer ZeeWeed® operators and to ZENON Membrane Solutions' management, design and operations staff.

The annual meeting typically takes place over 2 days and consists of formal meetings, a tour of the hosting ZeeWeed® plant, and informal team building exercises. All ZeeWeed® plants are invited to participate in the Users Group. At right are pictures of the group and the training session held in 2003 in Newport, RI.

9.6.3 Regional Account Manager

To assure that our clients are fully supported in the post-commissioning period, ZENON Membrane Solutions Services assigns a Regional Account Manager to each client. This Regional Account Manager (RAM) will act as the "quarterback", engaging in frequent communication with plant staff assuring timely access to all the technical resources required from ZENON Membrane Solutions.

9.7 Service Planning

ZENON Membrane Solutions Services offers a full range of support services. As a complement to any services included with the capital purchase, the Regional Account Manager or one of our service planning specialists will be pleased to work with plant personnel to design a package of services suited to the plant needs and budget, including:

- ❑ additional years of ZenoTrac™ coverage
- ❑ greater frequency of site visits
- ❑ special provision for emergency site visits
- ❑ Programmable Industrial Control Simulation (PICS) services
- ❑ Plant Optimization
- ❑ Membrane Replacement planning/budgeting
- ❑ Consumables Supply

The service plan can be developed to cover a multi-year period, according to client needs and interests.