



# **Expression of Interest**

## **Innovative Sewage Treatment and Resource Recovery Technology for Victoria, British Columbia, Canada**

**January 31, 2007**



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Mr. Dwayne Kalynchuk  
General Manager, Environmental Services  
Capital Regional District  
625 Fisgard Street  
Victoria, British Columbia  
V8W 1R7 - Canada

**Subject: Expression of Interest  
Innovative Sewage Treatment and Resource Recovery Technology  
for Victoria, British Columbia, Canada**

Dear Mr. Kalynchuk:

As the leader in providing wastewater project solutions to communities across North America, as well as across the globe, Veolia Water is pleased to have the opportunity to present our Expression of Interest for this initiative. We recognize that this is the first stage in a process that will lead to the selection of a project partner that will provide the optimum technical solution for effectively and sustainably treating and processing sewage for the Capital Regional District (CRD)'s service area. The new system will serve a population base of approximately 40,000 in the seven municipalities that are covered as a part of the CRD's service area.

Veolia Water is a company that has been recognized for our innovations in the wastewater field, a field that we have worked in for more than 150 years. From the very beginning, our firm has been committed to running research and development (R&D) programs that focus on three aims: anticipating customers' needs; reducing costs; continually innovating by developing customized and environmentally friendly new technologies. The benefits of our R&D efforts and the innovations and approaches we have developed in working with literally thousands of communities across the globe are brought to bear in our work with clients across Canada.

**Veolia Water Canada, Inc.**, a company that was founded in Ontario almost 30 years ago, is the Veolia Water company that will lead the efforts for this project with the CRD, drawing from the rich base of resources and experience that our firm has in-country. These resources include the technology and technical capabilities offered by **John Meunier Inc.**, a St-Laurent based firm that traces its roots in Canada back to 1948. Today, the firm provides state-of-the-art technologies and tools for the treatment of potable water, process water, wastewater and stormwater management. They are also ISO 9001:2000 certified and provide access to a comprehensive range of wastewater treatment technology solutions.

In North America, our companies provide water and wastewater services to some 600 communities, delivering design/build, design/build/operate, and comprehensive long-term operations, maintenance and management solutions. This has included working with communities to build and operate new systems to meet expanding needs, as well as working with communities to address the operations and capital project needs of existing systems.

Applying our commitment to quality and innovation, our firm has achieved continuous growth, expanded the scope of services and technical solutions that we have to offer, and been recognized with literally hundreds of awards for our project performance and commitment to delivering the best value solution to our clients.

Mr. Dwayne Kalynchuk, General Manager, Environmental Services  
Capital Regional District, Victoria, British Columbia  
January 31, 2007

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We have prepared the Expression of Interest response that follows to best demonstrate the specific capabilities and experience that our company offers for this initiative. We also highlight many of the key technologies that will be available to the CRD through Veolia Water. These are technologies that have been developed and proven in application for communities similar to those that you serve and that are currently installed and operating at wastewater facilities throughout North America and across the globe.

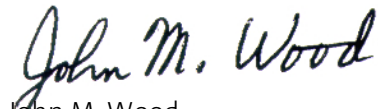
As the President of Veolia Water North America – Central, LLC, I have executed this letter which affirms our interest in participating in this procurement process. We very much look forward to working with the CRD as this project continues to develop, and then to providing you with a Proposal that outlines a best-value solution for meeting the wastewater needs of the communities that you serve.

Our contact person for this procurement process will remain Mark Sanderson, our Vice President for Development in the Central Region and Canada, and his contact information is as follows:

Mr. Mark Sanderson  
Vice President - Development  
Veolia Water  
1220 Waterway Boulevard, Indianapolis, Indiana 46206  
Telephone: 317.726.0076 - Fax: 317.263.6369  
E-mail: mark.sanderson@veoliawaterna.com

I invite you to contact Mr. Sanderson or me if you have any questions regarding this Expression of Interest, or if we can provide you any additional information regarding our company and/or the treatment technologies that we can offer.

Sincerely yours,



John M. Wood  
President - Veolia Water North America – Central, LLC  
and Principal - Veolia Water Canada, Inc.



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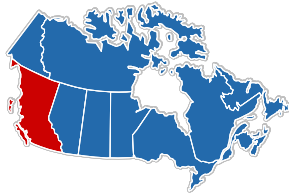


## **Expression of Interest**

# EXPRESSION OF INTEREST

## Innovative Sewage Treatment & Resource Recovery Technology for Victoria, British Columbia, Canada

### Project Understanding & Commitment



This Request for Expression of Interest (RFEI) marks the first step in the Capital Regional District (CRD)'s process of identifying potential project implementation partners and innovative sewage treatment and resource recovery technologies and strategies for effectively and sustainably treating and processing sewage generated by a residential community of approximately 400,000 people.

At present, the CRD is responsible for liquid waste management in the greater Victoria area of the Province of British Columbia, with an existing wastewater infrastructure that provides only screening of flows prior to discharge, through two outfalls (at Clover Point and Macaulay Point), to the Jaun de Fuca Strait.

This system currently serves the needs of seven municipalities, including Victoria, Saanich, Oak Bay, Esquimalt, View Royal, Colwood and Langford.

On July 21, 2006, the Ministry of Environment of the Province of British Columbia ordered the CRD to develop and submit for approval an amendment to its Core Area Liquid Waste Management Plan, providing a "fixed schedule for the provision of sewage treatment." This plan is due to the Ministry no later than June 30 of this year, and as a part of these efforts, the CDR is soliciting information on sewage treatment and resource recovery technologies that will maximize environmental, social and economic benefits to the community.

Each of the technologies identified will be evaluated with regard to economic, social and environmental factors, and the results of this effort will be used by the CRD Board to make informed decisions regarding a number of issues, including plant design criteria, treatment technologies, as well as the number, location and timing of treatment plant(s) construction.

The goal of the CRD is to develop a long-term plan and approach for providing innovative and cost effective wastewater treatment services for the communities that it serves in the Province of British Columbia.

As a leader in providing wastewater treatment planning, implementation and operations services to communities throughout North America and the world, **Veolia Water** understands your needs and the drivers for this project. We have met these types of needs for other similar regional agencies and individual communities, and we bring the broad base of experience and range of technologies that will be critical to this planning effort, as well as for the implementation of the selected wastewater plan and approach.

We have prepared the Expression of Interest response, which follows, to provide you with an understanding of the background and history of our company, encompassing our work in Canada and across the globe, as well as to profile the unique technologies, resources and experience that we can



Map of outfalls in the CRD's service area. (Source: CDR website)

bring to bear on this project. While the intent of your initial solicitation is to identify innovative project and technology approaches, we have provided you with an understanding as to how our firm can work with you as a partner at all stages of this project – from the evaluation of technologies and project implementation approaches to the design, construction and long-term operations, maintenance and management of cost effective wastewater collection, treatment and disposal/reuse approaches. Included as part of this response is a discussion of specific projects and our technical and management resources, as well as the range of technologies that the Veolia Water companies can provide to meet your immediate and long-term wastewater needs.

## Overview of Veolia Water

Veolia Water is a group of companies that brings together industry-leading technologies and services approaches that are focused on meeting the water, wastewater and related environmental needs of municipal/government, industrial and private clients in all parts of the world.

In Canada, **Veolia Water Canada, Inc.**, traces its history back to 1978, and today the company provides a comprehensive range of services for municipal and industrial clients across the country, with active water and wastewater projects in the Provinces of New Brunswick, Ontario and Nova Scotia.

Veolia Water Canada, Inc., is part of a regional company, Veolia Water North America - Central, LLC, which serves clients in 16 U.S. states (as well as the Provinces of Canada). With a staff base of over 500 – this regional company has annual revenues of over \$92 million (U.S.).

Veolia Water North America - Central, LLC, is one of four regional companies established under Veolia Water North America Operating Services, LLC, North America's premier supplier of water and wastewater treatment services and technology. The company traces its origins to the start of the municipal operation, maintenance and management (O&M) business in the United States in 1972. Collectively, the company serves over 265 municipal and industrial clients in North America and has annual revenues of over \$540 million (U.S.) and a staff of more than 3,000.

Veolia Water companies today provide water and wastewater services to more than 13.8 million people in some 600 communities across North America.

Veolia Water, S.A., the ultimate parent company of Veolia Water's North American operations, is a corporation that traces its history in the water and wastewater industry back more than 150 years. The firm is today the leading global provider of water and wastewater services for government and industrial clients throughout the world, providing water and wastewater services to over 110 million

**VEOLIA ENVIRONNEMENT**

- Only Global Company Providing the Entire Range of Environmental Services to Municipal and Industrial Clients
- Present in 78 Countries with 250,000 Employees
- \$30.2 Billion in Revenues in 2005

**VEOLIA WATER**

- Leading Water/Wastewater Firm in North America
- \$11.8 Billion in Revenues in 2005
- Serving 110 Million People
- 80,000 Employees in 57 Countries

**VEOLIA TRANSPORTATION**

- Largest Private Manager of Transport Services in the U.S. (taxi, bus and subway services)
- \$4.4 Billion in Revenue in 2005
- 61,300 Employees in 25 Countries

**VEOLIA ENVIRONMENTAL SERVICES**

- One of the Largest Solid Waste Companies in the U.S. (formerly Onyx Environmental Services)
- \$7.9 Billion in Revenues in 2005
- 78,700 Employees in 38 Countries

**Dalkia VEOLIA ENERGY**

- Facilities Management and Energy Delivery Management Services in the U.S.
- Leading Energy Company in Europe
- 47,000 Employees in 35 Countries





**VEOLIA WATER CANADA, INC.**  
**PROJECTS AND RESOURCES**  
Ontario and Country-wide

- 28+ Years of O&M Experience in Canada
- 27+ Years of O&M Experience in Ontario
- 25 Municipal & Industrial Projects in Canada
  - 23 Projects in Ontario
  - O&M of Water & Wastewater Systems
  - Design/Build, Design/Build/Operate Projects
  - Long-Term Projects
- Canada Regional Headquarters in Ontario
  - Disciplines Representing O&M, Engineering, Construction, R&D

people, under 7,000+ contracts with governmental and industrial clients in 65 countries across the globe.

The Veolia Water companies are a part of **Veolia Environnement**, which is the only global company to offer the entire range of environmental services in the water, waste management, energy and transportation sectors. The company has been creating global and integrated solutions for public- and private-sector clients the world over for more than 153 years and today has more than 250,000 employees. Veolia Environnement companies have a strong base of current and past work experience in Canada, as well as specific experience working in Montreal, Vancouver and other communities in Canada.

**John Meunier Inc.**, a Veolia Environnement company based in St. Laurent (Quebec), is a leading provider of equipment and services for water and wastewater applications in Canada. This firm was established in 1948 and is a founding member of the Industrial Chair on drinking water at the University of Montreal.

John Meunier Inc. is renowned for introducing innovative technologies from across the globe to the Canadian market. The firm's efforts are focused on continuously advancing and improving water and wastewater treatment technologies in response to current and future treatment challenges. They also maintain partnerships with universities and research institutes around the world to ensure that they maintain technological leadership in the water and wastewater industry.

The firm's products are designed for every type of pollution, from clarification of domestic wastewater or sludge and air treatment, to stormwater management. Further, John Meunier Inc. is recognized for its expertise and offers a full range of solutions and services to treat wastewater.

John Meunier Inc. is based in Montreal (which is also the location of its manufacturing facility), with a regional office in Mississauga, and has a staff base of more than 150 people.

The firm's customer base in British Columbia includes the Greater Vancouver Regional District, the District of Summerland, as well as the CRD. The Greater Vancouver Regional District (GVRD) selected



*"We maintain very close ties with our clients and talk with our operating installations on a regular basis," explains Gilles Fillion, the President of John Meunier Inc.. "And we specialize in turnkey approaches - where we can integrate process engineering and technologies with installation, startup and technical services into an efficient package that establishes a single point of responsibility and saves time and money for our customers."*

John Meunier Inc. for a portion of the new Seymour-Capilano filtration plant located in North Vancouver. Three prefabricated Actiflo® ballasted floc clarifiers will be supplied to treat filtration plant residuals before water is discharged into Burrard Inlet. The plant will be commissioned in 2008. The GVRD requires a water treatment solution to meet the stringent requirements of the discharge permit issued by Fisheries and Oceans Canada. The Actiflo® process, as discussed in greater detail later in this EOI response, is a cutting-edge technology that uses microsand ballasted flocculation for exceptional performance in clarification of water and wastewater.

Of special note is John Meunier Inc.'s past work with the CRD, and other clients, on past wastewater planning and development projects in British Columbia. Despite the fact that these partnerships did not proceed the knowledge and experience gained on these efforts will be valuable for this new effort.

## The Solutions that We Offer

Wastewater treatment systems are designed to safeguard health and protect the natural environment. Therefore, choosing the right technologies as well as efficiently managing treatment facilities directly contributes to improving every aspect of the quality of life. Veolia Water companies assist municipal decision-makers in fulfilling their obligations by supplying a comprehensive range of services and technology solutions that provide wastewater treatment systems and operations approaches to address compliance with regulatory requirements.

### Service Capabilities

In Canada, Veolia Water Canada is the leader in delivering this a comprehensive range of services to address the needs of wastewater and water systems, which includes:

Today, Veolia Water operates more than 260 municipal and industrial wastewater treatment plants, ranging in size from less than 1-MGD to over 100-MGD, delivering a comprehensive scope of services:

- **Operations & Maintenance** - Veolia Water provides comprehensive O&M services for water and wastewater systems of all sizes, including repair, maintenance, preventive maintenance, replacement, cleaning, stoppage crews and television inspection. We are experienced in the operation of potable water, process water, collection and distribution, wastewater, biosolids (sludge) and residuals, stormwater management and related systems. Under the contract O&M approach, Veolia Water delivers the management, employees, facility maintenance and purchasing power to provide a full-service approach to managing a client's facilities operations and management needs all for a fixed, guaranteed contract price for the term of the agreement. We also guarantee to meet or exceed all permit requirements, and provide a comprehensive maintenance management approach. Our maintenance programs address the corrective, preventive and predictive maintenance of equipment and structures, using an industry-standard computerized maintenance management system (CMMS). Finally, Veolia Water emphasizes preventive and predictive maintenance schedules for the facilities that we operate and manage. These two facets of our comprehensive maintenance program positively affect cost reductions in overall maintenance dollars expended.

VEOLIA WATER O&M STATISTICS North America	
• 179 Municipal Clients	
• 190 Municipal Wastewater Facilities	
• 102 Municipal Water Facilities	
• 4,400 Miles Collection System Lines	
• 5,800 Miles Distribution System Lines	
• 382,000 Meters Read	
• 87 Industrial Clients	
• 72 Industrial Wastewater Facilities	
• 35 Industrial Water Facilities	
• 1.128 Billion Gallons of WW Treated Daily	
• 857 Million Gallons of Water Treated Daily	
• 13.8 Million Population Served Daily	
• ~ 600 Communities Served	

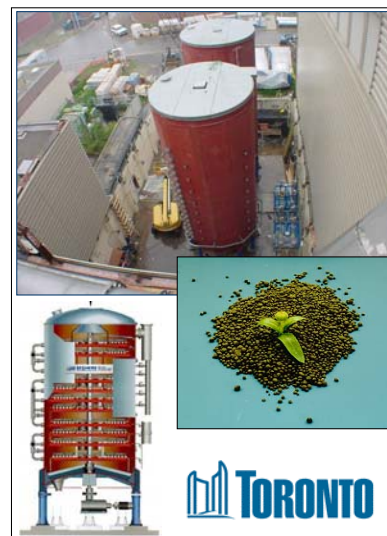
- As highlighted above, Veolia Water has some 25 current O&M contracts in Canada with a wide range of governmental, industrial and private clients, and the newest of these is with the **Municipality of Brockton, Ontario** (formerly Walkerton). This comprehensive services partnership unifies the Municipality's water and wastewater services under a common contract that emphasizes safety, reliability and environmental responsibility. Under this long-term agreement, Veolia Water operates water and wastewater systems including a 1.98-MGD wastewater plant, three water treatment plants of 1.98 MGD, 0.019 MGD and 0.012 MGD capacities and related collection and distribution systems that serve approximately 10,000 residents in southwestern Ontario. The Municipality of Brockton includes the former Township of Brant, Township of Greenock and the Town of Walkerton. Water and wastewater operations transitioned on June 28, 2006, without interruption of service to Brockton residents.



*“We are looking forward to a partnership with Veolia Water. Our confidence has been bolstered by the numerous positive references from communities that have had lengthy, successful relations with Veolia Water. We are anticipating safe, clean, affordable water from a world-class operator with a great track record,” said Brockton Mayor Charlie Bagnato.*

- Biosolids Management** - Veolia Water is a leading firm in the area of biosolids management and beneficial use, with proven experience in the O&M of in-vessel composting systems, compost marketing and distribution, as well as other biosolids management approaches. Indeed, our firm is currently managing residuals disposal for over 140 of our municipal clients, with responsibility for processing some 255,000 dry tons per year (DTPY). Veolia Water operates and maintains several stand-alone, dedicated mechanized biosolids management facilities. Three of these projects are large, in-vessel composting facilities that use high technology systems to manufacture compost products that meet U.S. Environmental Protection Agency's (EPA) standards for Excellent Quality (EQ) and Class A biosolids for bulk market sales and distribution. A key part of our firm's biosolids management work involves developing, implementing and operating Class A solutions that provide for beneficial use of the processed biosolids product. Currently, we operate a number of Class A biosolids facilities, using enclosed composting and thermal drying technology solutions, as well as alkaline stabilization. One of Veolia Water's largest biosolids management projects in recent years is for the City of Toronto, Ontario.

- The public-private partnership between the **City of Toronto** and Veolia Water Canada dates to 1999 and the initial design and construction of the wastewater biosolids management facility at the City's 216-MGD Ashbridges Bay Wastewater Treatment Plant. Our firm's engineering and construction affiliate, Veolia Water Solutions and Technologies (VWS), provided design/build services for this biosolids dryer-pelletizer system, which was designed to produce approximately 25,000 tonnes per year of all-natural, low-nitrogen content fertilizer pellets suitable for a variety of beneficial use applications. The design included two SEGHOdryerPELLETIZER indirect, vertical multi-tray dryer units with 17 horizontal trays, each approximately 5.2 metres in diameter (approximately 20 feet including the dryer shell and insulation), which were designed to be heated in a closed loop system with thermal oil. These



units were designed to receive biosolids cake at approximately 26% dry solids from which the dried, organic fertilizer product was to be manufactured. This system was designed to produce dust free pellets dried to a moisture content of less than 10%. In 2003, during the startup and commissioning phase of the pelletizer facility construction, a fire heavily damaged this facility. As a result, the facility was shutdown and the City of Toronto and Veolia Water Canada worked together to develop a recovery/reconstruction plan. These efforts resulted in a design/build contract to rebuild the facility. This work is now completed and the pelletizer facility is once again ready to begin the process of producing product.

- **Regulatory Compliance & Permitting** - Veolia Water works with our O&M customers to ensure that they maintain environmental and regulatory compliance, while assuming full responsibility for our violations. Regulatory compliance becomes our business when we enter into an O&M agreement, an agreement under which we guarantee compliance within the design parameters of a given facility. Veolia Water Canada has over 28 years of water and wastewater facilities operations experience in Canada and, coupled with the experience of John Meunier Inc., brings a proven history in terms of compliance with local, provincial and federal laws and regulations in Canada.
- **Research & Development** - One of the greatest strengths of Veolia Water is the ability to improve the quality of life for the citizens of a community through application of a wide range of treatment technologies — from basic to cutting-edge — all while improving health and protecting the environment in the communities that we serve. Through Veolia Water, S.A., Veolia Water Canada provides access to experts that offer unmatched technical support and know-how to provide the right technology solution for almost every need. One of these resources is, as discussed earlier, John Meunier Inc., a Quebec-based based company that develops designs, manufactures and installs technologies, equipment and services covering the entire treatment cycle of wastewater and drinking water. Established in 1948, the company was the first in Canada to be granted ISO 9001 certification in 1998 and then ISO 9001:2000 in 2001. In total, Veolia Water companies invest millions annually in the area of research and development (R&D) efforts, with a dedicated research centre and partnerships with more than a hundred different organizations such as ministries, universities and institutions throughout the world. The company's Anjou Recherche enter was established in 1982, and today its researchers concentrate primarily on topics relating to water (from drinking water production to distribution) and wastewater (municipal and industrial wastewater treatment, odour control and so on). In addition, a team at Anjou Recherche provides support for the various programs in all aspects of modeling (advanced process design, use of simulation tools for networks and plants, etc.).
  - Veolia Water's R&D activities and research centres directly support projects at the local level by addressing problems and conducting research projects designed to enhance the performance of water and wastewater facilities. When Veolia Water assumed O&M responsibility for the surface water treatment plants in the **City of Brockton, Massachusetts**, citizens faced serious taste and odour problems in their potable water supply, the result of metabolites secreted by algae and actinomycetes in Silver Lake. Specialists from Anjou Recherche worked with the company's local O&M team to modify existing treatment facilities to address this problem and provide a safe and reliable water supply for the citizens of Brockton. At the **City of Indianapolis, Indiana**, Veolia Water's water experts identified an ozone-BAF (biologically activated filter) process as the most suitable process to control taste and odour problems, reduce disinfection by-product algal toxins and inactivate microorganisms such as cryptosporidium for the City's water treatment plants. Additionally, Veolia Water's R&D staff were involved in the design-build stages of a new 66-MGD

*Research & Development at Veolia Water, now integrated with R&D at Veolia Environnement, world leader for environmental services, benefits from a global network of 600 high-level experts including 350 research staff. The most widely respected water research center in France, Veolia Water's Anjou Recherche center has received the European Commission's label as a Marie Curie Centre of Excellence for its work in membranes, disinfection and modeling. Additionally, Veolia water is currently the world leader in publishing research works on water and has a portfolio of more than 3,000 patents.*

**Centralized  
R&D**



**R&D  
Budget:  
€ 115 Million**

**R&D  
Staff:  
600+  
Experts**



surface water treatment plant for **Tampa Bay Water, Florida**. Researchers managed and directed a bench-scale study aimed at characterizing natural organic matter and conducted enhanced coagulation studies to determine coagulant dosages. They recommended a static mixer with a side stream for ozonation and participated in the preparation of the proposal and equipment selection, reviewing computations, plans and specifications, design and permitting of the ozonation process. This static mixer design resulted in tremendous savings in capital, operation and maintenance costs with a small footprint for the ozonation process. In addition, Veolia Water's O&M projects also are often sites for pilot studies conducted by Veolia Water's R&D facilities. As an example, the O&M project team for the **Atlanta-Fulton County Water Resources Commission, Georgia**, project (where

Veolia Water has operated a 90-MGD surface water treatment plant since 1990) participated in an effort directed at gaining insight into fouling mechanisms of microfiltration and ultrafiltration membranes, with the interaction between water quality parameters, treatment chemicals and membrane materials being a focus of this evaluation.

- Engineering & Construction** – Veolia Water Canada, through its affiliated engineering and construction companies under Veolia Water, provides access to resources that include engineering, construction management and other support functions. Veolia Water's Capital Program Management (CPM) group is part of the regional technical and management resource base that the company provides to municipal clients throughout North America. The focus of this group is on providing engineering design and construction support services for the implementation and management of upgrades, improvements and other capital project work at Veolia Water-operated and managed facilities. The CPM group is composed of senior-level engineering design and construction professionals who are able to effectively manage and implement design and construction projects, drawing on a combination of in-house resources and expertise, and local firms (pre-qualified subcontractors) that provide design, construction and related expertise. Under this approach, O&M teams draw on the internal engineering and construction management expertise of our CPM group, and then manage the work of the subcontractors to deliver the design and construction of capital improvements projects as well as new construction. Using creative process design, our engineers and engineering partners can design new facilities complete with the latest technologies or make modifications to improve on performance and operating costs. Additionally, Veolia Water's engineering and construction services arm, Veolia Water Solutions and Technologies (VWS), specializes in the planning and execution of the design/build of municipal water and wastewater facilities. The engineering and construction staff of VWS includes over 175 professionals providing design/build services in the municipal market for literally hundreds of projects around the world.

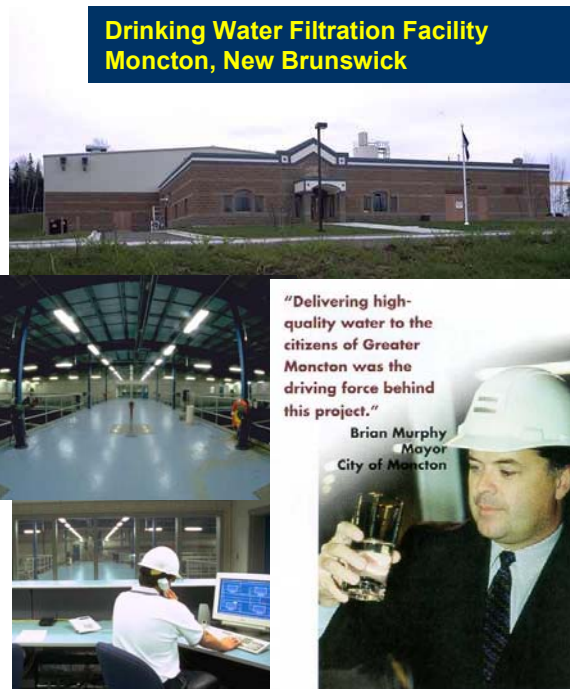
*Veolia Water currently holds almost 35% of the outsourcing market, O&M and Design/Build/Operate (DBO) — which is more than twice the market share of our nearest competitor — and our revenues from governmental outsourcing projects are more than double that of the other two top competitors in the field.*

*- Source: Public Works Financing – March 2006*

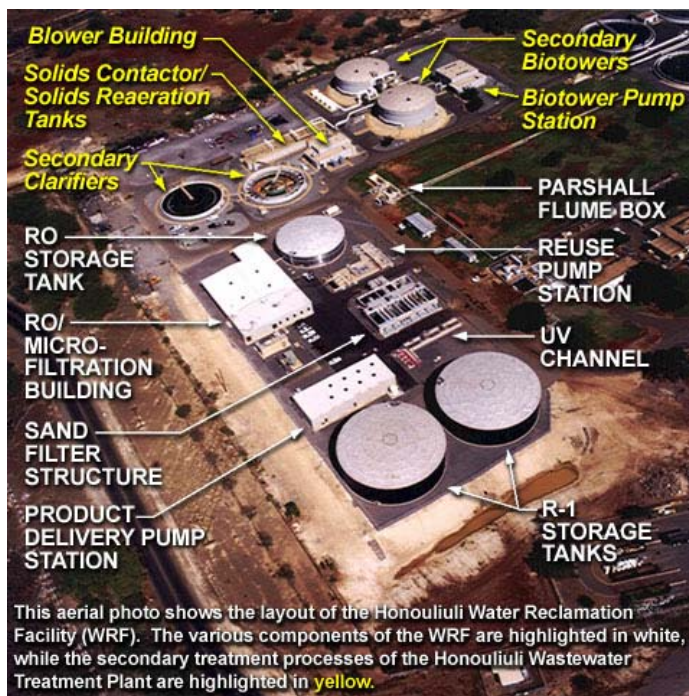
- Veolia Water Canada’s largest municipal project in Canada is that with the **City of Moncton, New Brunswick**, a 20-year agreement valued at approximately \$85 million. This has involved the financing, design, construction and startup of a new 94.64-MLD (25-MGD) drinking water filtration facility. Upon the facility’s commissioning in fall 1999, the City purchased the plant, and Veolia Water Canada entered into a 20-year lease and license agreement with exclusive rights to operate and manage the plant as well as to sell water to the Municipality. The Canadian Council for Public-Private Partnerships presented Veolia Water Canada with the 1998 National Award for Innovation and Excellence, recognizing our plant design with an Honourable Mention for Infrastructure. After more than six years of operation, Veolia Water Canada continues to meet and consistently exceed the City’s standards for water quality.

Previous drinking water issues included taste, odour, colour and TTHM levels as high as 167 ppb, compared to the maximum allowable level of 100. Within weeks of plant startup, taste, odour and colour issues were resolved and TTHMs were at the lowest levels in the City’s history. The facility, which receives water from Turtle Creek Reservoir, serves three communities: Moncton, Riverview and Dieppe. Trihalomethane levels that sometimes exceeded maximum allowable levels by nearly 70% and extremely high chlorine levels were concerns that led to Veolia Water’s presence in Moncton. At 0.1 NTU, the turbidity standard for treated water from this facility, as established by Moncton, is 10 times more stringent than existing Guidelines for Canadian Drinking Water Quality (GCDWQ). Veolia Water consistently produces water with NTU levels of 0.03 – 30 times better than the GCDWQ.

- **Technologies and Equipment** - One of the greatest strengths of Veolia Water is our ability to improve the quality of life for the citizens of a community through application of a wide range of treatment technologies—from basic to cutting-edge—all while improving health and protecting the environment in the communities that we serve. Through our parent company, Veolia Water, S.A., we provide access to experts that offer unmatched technical support and know-how. In addition, through our affiliations with equipment manufacturers and suppliers of virtually every technology required for water and wastewater treatment, Veolia Water can provide the right technology solution for almost every need.
  - To implement this award-winning project for **Tampa Bay Water, Florida**, Veolia Water brought together a management and O&M team from the resources of our firm, a design/build team from our engineering and construction group (VWS), including local engineering and construction partners, and process and technical experts from our parent company, Veolia Water, S.A., to support the implementation of our proprietary ACTIFLO® treatment process. This new 66-MGD water treatment plant is designed to meet the drinking water needs of 1.5 million people. The \$144 million design/build/operate (DBO) public-private partnership contract included \$79 million in capital (construction) costs and \$56 million in O&M fees, and is expected to generate a 21% savings (about \$85 million) over the 20-year life of the project.



In 1998, the City and County of Honolulu, Hawaii, and Veolia Water entered into a \$140 million, 30-year agreement for the company to DBO and own (and transfer) the Honouliuli Water Reclamation Facility (HWRF). The facility is designed to treat 13-MGD of secondary effluent from the Honouliuli wastewater treatment plant to produce some 12-MGD of reclaimed water for beneficial reuse. The facility is the largest reclamation plant of its type in the Hawaiian Islands, and employs state-of-the-art technology to treat secondary effluent previously discharged into the Pacific Ocean. The processes generate two qualities of water: one, a high-purity reverse osmosis (RO) water, which is sold to the industrial users for power and petrol-refining uses at nearby Campbell Industrial Park; and the other quality, R1 Water (R1), is used for irrigation.



- **Community Relations/Community Involvement** - From supporting local schools to providing facility tours to creating Web sites and literature, Veolia Water Canada provides public and community relations programs that are designed to help strengthen the understanding of water and wastewater and other environmental issues in the communities that the company serves. Veolia Water Canada makes a commitment to being a part of the community and a good corporate citizen. This commitment may take the form of contributions of time, money and materials for community programs; plant tours and open houses targeted to community and school groups; scholarship programs focused towards providing needy students with the resources to pursue a career in environmental protection; and educational initiatives. The company also commits to working closely with local community associations as well as elected representatives.

What this all means is that Veolia Water companies bring together world class expertise, experience and resources, which, as has been demonstrated in our current partnerships with communities across Canada, can be applied to meet needs at the local level. The operations, engineering, administrative, management and support resources that we commit to wastewater projects in Canada draws from these world class resources.

## Technologies and Solutions

Veolia Water companies offer technologies that assist municipal decision-makers in evaluating and implementing wastewater collection, treatment and disposal solutions. Our technologies and services products are designed for every type of pollution, from clarification of domestic wastewater, or sludge and air treatment, to stormwater management.

Recognizing the challenges that face the CRD, we are pleased to be able to provide you with a full range of technology solutions and services in the area of wastewater treatment. Table 1, on the page that follows, provides a selected listing of technologies that our company offers, and many of these are discussed in the presentation following this table.

<b>Veolia Water - Processes and Technological Solutions</b>	
<b>Primary Treatment</b>	
<b>Fine Screening</b>	Drumfilters
	Discfilters
	Idrascreen™: Drumfilter
	Cont-Flo®: Bar Screen
	Escalator®
<b>Grit Removal</b>	Rotopac®: Screw Compactor
	Mectan®: Grit Chamber
<b>Clarification</b>	SAM®: Grit Dewatering Screw and Conveyor
	Multiflo™
<b>Flotation</b>	Actiflo™ and Actiflo™ Package Plant: Lamellar Settling
	Idraflot™: Dissolved Air Flotation (DAF)
	TiPSS™: Range of Dissolved Air Flotation (DAF)
<b>Grease Removal</b>	AF-Float™: Dissolved Air Flotation (DAF)
	TiPSS™: Tilted Plate Separators
<b>Grease Treatment</b>	Biolix™
<b>Secondary Treatment</b>	
<b>Aerobic: Biofiltration</b>	Biostyr™ and Biostyr™ Package Plant
	Biosep™ and Biosep™ Pack: Membrane Bio-Reactor (MBR)
	Ecodisk™: semi-immersed rotating disk filters
<b>Aerobic: Activated Sludge</b>	BioSAF™: submerged aerated filters
	Ecobatch™: Sludge Batch Reactor (SBR)
	Azenit™: Nitrification-Denitrification with Anoxic Zone
<b>Anaerobic</b>	Biodenipho™- Biodenitro™: N & P Removal
	Anaerobic Treatment Solutions
<b>Specific &amp; Tertiary Treatments</b>	
<b>Concentration and Crystallization</b>	Evapo-concentration Solutions
	Evapo-crystallization Solutions
<b>Precious Metals Recovery</b>	Electro-dialysis Solutions
	Electrolytic Systems: Retec™ and Auroclaim™
<b>Heavy Metals Removal</b>	Metclean™
	Hardtac™



<b>Veolia Water - Processes and Technological Solutions</b>	
<b>Fine Screening</b>	Drumfilters
	Discfilters
<b>Flotation</b>	AF-Float™: Dissolved Air Flotation (DAF)
<b>Clarification</b>	Actiflo™ and Actiflo™ Package Plant: Lamellar Settling
<b>Filtration</b>	FILTRAFLO™: Gravitational
<b>Ultraviolet Disinfection</b>	Wedeco
	UV Pure (flow rates below 3700 m³/d)
<b>Ozonation</b>	Wedeco
<b>Microfiltration / Ultrafiltration</b>	Microfiltration and Ultrafiltration Solutions
<b>Reverse Osmosis</b>	Reverse Osmosis Solutions
<b>Instrumentation</b>	
<b>Applications</b>	Disinfection
	Gas Detection
	Chemical Dosage
	Laboratory and Field Instruments
	Water Sampling Instruments
	Online Analytical Instruments
	Flow Monitoring
	Level Measurement

The paragraphs that follow provide a sampling of the technologies that Veolia Water can bring to bear to assist the CRD as you move forward with the process of evaluating sewage treatment and resource recovery technologies that will maximize environmental, social and economic benefits to the community.

### **Treatment**

#### **Actiflo®**

This is a high-rate Lamella settler which can be used for the primary treatment of wastewater, the treatment of surface water, and for tertiary treatment. The system can be used in a package plant approach for:

- Potable or process water production.
- Treatment of groundwater and surface water.
- Backwash water clarification.
- Wastewater primary treatment, before discharge or additional biological treatment.

- Stormwater treatment.
- Tertiary treatment for suspended solids, colour or phosphorus removal, replacing tertiary filters.

The main features and benefits of this application include:

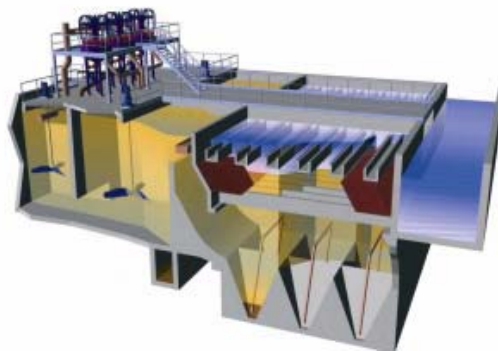
- Allowing for high overflow rates and short retention times, and wastewater consistency whatever the TSS load.
- Providing high treatment efficiency under all raw water conditions, stable process which handles extreme conditions, with high up-flow velocities (40-150 m/hr) and immediate response time (less than 10 minutes which makes it an ideal approach for storm flows)
- Small footprint and standardized systems, which allows for optimized investment costs due to standardization and efficient use of chemicals.

At a larger scale, Actiflo® can be used for pre-treatment, tertiary treatment and reuse of wastewater flows, with the following applications:

- Sedimentation of biofilter washwater and trickling filter treated wastewater.
- Treatment of primary, CSO wastewater (suspended solids, colloids, phosphorus, heavy metals, grease removal) and stormwater, with 75 to 95 percent removal of suspended solids (mainly depending on inlet water characteristics and coagulant feed).
- Tertiary treatment for suspended solids, colour or phosphorus removal, replacing tertiary filters: 5-15 mg SS/L at the outlet with adjusted coagulant feed.
- Treatment of potable (groundwater and surface water) or process water production and backwash water clarification.

The main features and benefits of this application include:

- Compactness (low surface available), with a small footprint.
- High operating flexibility, semi-automatic operation; allowing for high overflow rates and short retention times.
- Reagent dosage may be manual or automated.
- Quick startup and immediate response time (less than 10 minutes), which is ideal for storm flows.
- Excellent quality and stability of the treated water, with high treatment efficiency under all raw water conditions, stable process which handles extreme conditions, and low sensitivity to changes of temperature and water quality.
- Low sensitivity to changes of temperature and water quality
- Good decantability of sludge.
- High up-flow velocities (40-150 m/hr).



- Optimized investment costs due to standardization, efficient use of chemicals, and wastewater consistency whatever the TSS load.

In summary, Actiflo® is a physico-chemical treatment and clarification (ballasted flocculation/clarification) process that can be used in municipal and industrial applications, including:

- Primary and tertiary treatment of wastewater.
- Sedimentation of biofilter washwater and trickling filter treated water.
- Treatment of CSO and stormwater flows.

### A/O®

This is a high loaded activated sludge process for secondary wastewater treatment of municipal and industrial wastewater. The A/O® system consists of at least two tanks interconnected in serial operation in which biological treatment takes place.

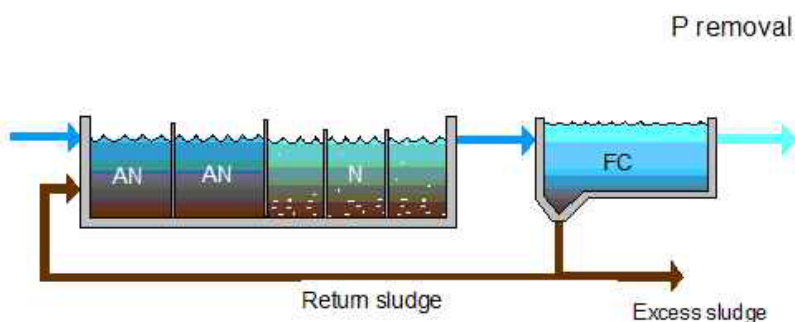
The system provides for biological phosphorus and BOD removal from domestic wastewater with typical effluent values of:

- Suspended Solids: < 10 mg/L
- BOD: < 10 mg/L
- Total Phosphorus: 0.5-2 mg/L

It features a proprietary selector design, with operations to optimize P-removal and prevent filamentous sludge, and consists of a staged anaerobic selector followed by multiple oxic reactors operating in series.

The design is based on wastewater composition, loading, temperature and effluent demands. The A/O® process improves upon the activated sludge process by using an anaerobic selector to develop a selective biomass that is naturally reoccurring in nearly all treatment plants. The process enhances phosphorus removal while reducing sludge-bulking organisms.

The unique design of the selector, as shown on the diagram to the right, optimizes the anaerobic conditions necessary for effective biological phosphorus removal. Return activated sludge (RAS) is the only flow to enter the first stage, where chemically bound oxygen in the form of nitrate is removed. The RAS then flows to the second stage where it is mixed with the raw influent.



The anaerobic residence time is typically one to 1.5 hours in this anaerobic selector. Then the mixed liquor enters the ditch to begin oxic treatment. The remaining soluble and insoluble BOD is consumed by heterotrophic organisms, while nitrifying bacteria oxidize ammonia to nitrate. Phosphorus is removed from the system as a fixed biological material in the waste sludge.

## Biodenipho®

A biological treatment process for nitrogen and phosphorus removal, Biodenipho® ensures the minimization of the content of total nitrogen and total phosphorus in wastewater in addition to a high reduction of organic matter, ammonia and suspended solids.

The Biodenipho® process, as shown on the diagrams (right), consists of an anaerobic tank located before two interconnected biological tanks of equal volumes and a final settling tank. The biological tanks work in an alternating mode of operation and are equipped with aerators, inlet distributors and outlet chambers.

The process can be utilized at both municipal and industrial facilities and has been successfully implemented on more than 200 installations worldwide.

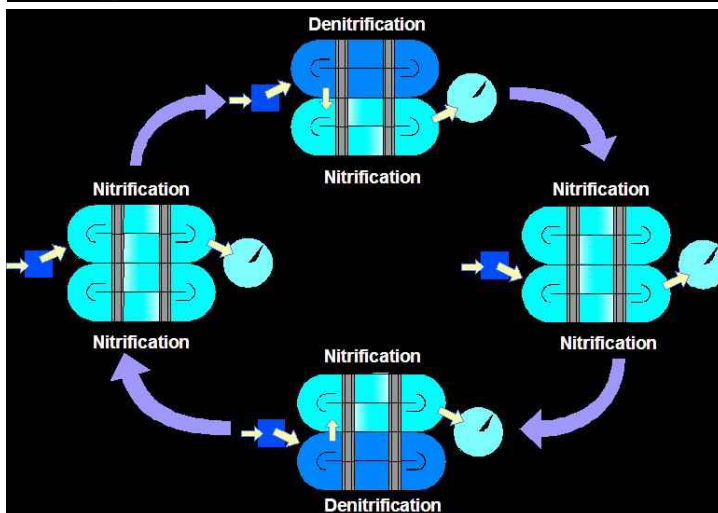
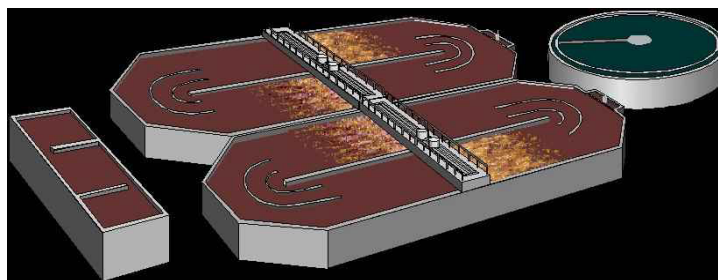
The Biodenipho® process is an expansion of the BIODENITRO® process, incorporating a unique anaerobic selector technology to promote biological phosphorus removal. It combines the process flexibility and energy efficiency of the BIODENITRO® process with the advantages offered by an anaerobic selector, resulting in a highly efficient biological nutrient removal (BNR) system.

In terms of performance for typical effluent values for domestic wastewater, the system offers:

- Suspended Solids: < 10 mg/L
- BOD: < 10 mg/L
- Ammonia Nitrogen: < 1 mg/L
- Total Nitrogen: 4-8 mg/L
- Total Phosphorus: 0.5-2 mg/L

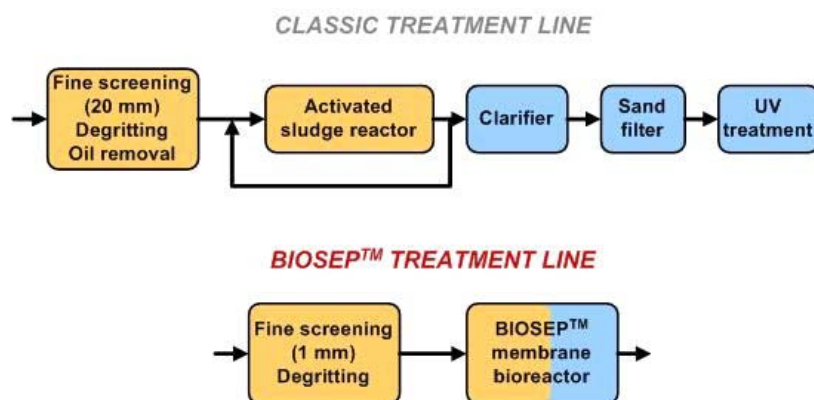
The key features of this process include:

- **Flexibility:** Offering wide variation of the phases to cope with variation in pollutant loads, flows and temperature.
- **Simplified Management:** Offering continuous control, monitoring and optimization of the process through a computerized system.
- **Reliability:** Offering hundreds of treatment plants worldwide.
- **Economy:** Providing energy saving by avoiding high flows for denitrification.
- **Adaptability:** Can be used for various climate, plant size, tank configuration and type of inlet wastewater.



## Biosep® MBR

This is an activated sludge treatment process where the clarification step is replaced by a submerged membrane separation technique. The system can be used for municipal and industrial applications for the treatment of raw wastewater in small-scale plants and for nitrification-denitrification and when stringent requirements are requested (very low SS and BOD, disinfection, reuse of water).

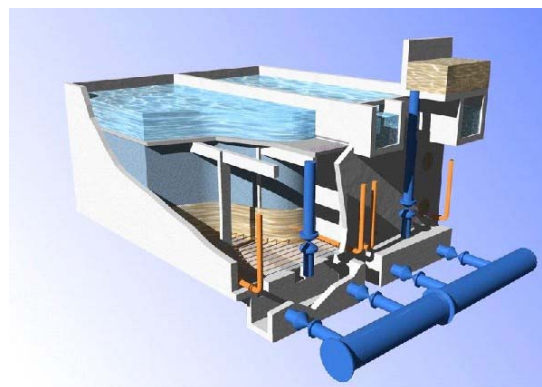


The key features of the system include:

- A compact, modular design.
- No clarifier required.
- Can be used to increase the capacity and upgrade an existing installation.
- Adaptability to load variations.
- No nuisance (odour) and no sludge recirculation.
- Air membrane: cyclic aeration.
- Membrane guarantee of five years.
- Automatic cleaning (backpulse chemical cleaning).

## Biostyr® Large/Concrete Units

Biostyr® is a compact biological aerated filter with immersed media for organics removal and reduction of suspended solids. It is a simple and innovative highly compact process that combines (in a single structure) a biological reactor to degrade soluble pollution and a filter to retain the solids and the biomass growth. The process was originally developed for nitrogen elimination in secondary and tertiary treatment and is capable of attaining the highest discharge quality standards.



The Biostyr® system has been in use for more than 10 years, with installations at more than 100 reference submerged biofiltration plants in Europe, Asia, and North America. Effluent from the system is generally capable of obtaining BOD below 10 mg/L, TSS below 10 mg/L, ammonia below 1-2 mg/L and total nitrogen below 5 mg/L.

The key features of the system include:

- Dedicated supply backwash pumps are not required as the head of the effluent above the filter is sufficient to backwash the filter.



- Access to the nozzles is very easy with no need to empty the media.
- No risk to loose media.
- Nitrification and denitrification are possible within the same cell (single treatment stage).
- Odour and aerosol emissions are minimized since ambient air is only in contact with treated water and used backwash water remains enclosed without exposure to the atmosphere.
- Media size and density can be adapted to suit the wastewater to be treated.
- Since Biostyr® combines biological process with a filter, no further clarification is needed, thus providing advanced purification in extremely compact units.
- A residence time of just one to two hours in secondary purification is sufficient to produce an effluent quality, which complies the strictest effluent standards.

The operations mode for the system include:

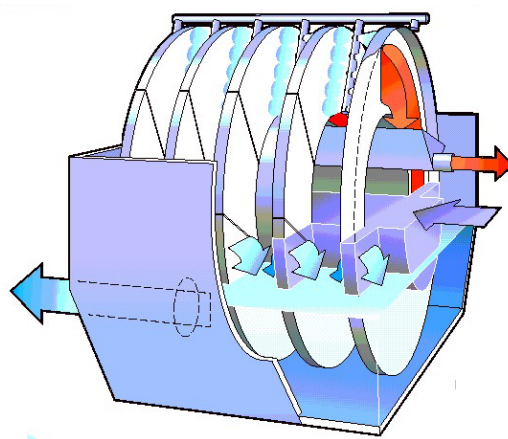
- Nitrification Mode: The process air grid is placed below the filter media so that the whole filter bed is aerobic. Biostyr® can be used either for secondary nitrification purification, or for removing carbon and ammonia in one stage. Biostyr® can also be used as tertiary nitrification to remove ammonia and polish the TSS/carbon effluent.
  - When only TSS and BOD need to be removed, Biostyr® can be used as a carbon-only system. The configuration is similar to the nitrification case, but there is no ammonia removal.
- Simultaneous Nitrification and Denitrification: The process air grid is placed within the filter media dividing the filter into a lower anoxic zone and an upper aerobic zone. The nitrates produced by the nitrification process in the aerobic zone must be recycled to the process inlet so that they can be denitrified in the anoxic zone. The denitrification process utilizes the BOD in the influent waste stream as a carbon source. Recent development in the research centre showed that nitrification and denitrification can be achieved in a fully aerated bed by controlling the dissolved oxygen in the system. This is called “simultaneous nitrification and denitrification.” This new Biostyr® configuration is now in successful operation in five wastewater treatment plants. With the Biostyr® system, the carbon source from the raw water is used for denitrification to minimize the usage of external carbon source.

### Discfilters®

This technology can be utilized for municipal and industrial wastewater applications for effluent polishing. It utilizes a woven media filter for fine solids removal and product recovery, with a large filter area in a small footprint and a long service life and low maintenance costs. The key features of the system include:

The types of systems: tank version, without tank – open inlet, and without tank – pipe inlet.

- Polyester or stainless steel woven filter media.
- Stainless steel frame.
- Discfilter: 304 or 316 stainless steel (or special alloys for extremely corrosive environments).
- Automatic level control system.



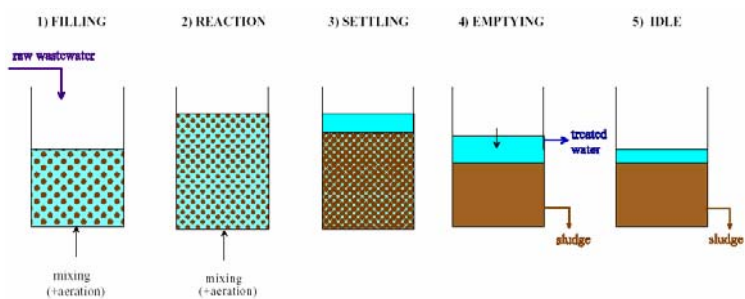
The operational sequence for the system is as follows:

- Water flows by gravity into the filter segments from the centre drum.
- Solids catch on the inside of the filter panels mounted on the two sides of the disc segments.
- Water level inside the discs begin to rise, triggering a level sensor to start the disc to rotate and a backwash cycle begins.
- High pressure rinse water backs the solids off the filter media and into the solids collection trough. Typically the backwash requires one to two percent of the total flow and filtered water is used.

### Ecobatch®

This is a sequencing batch reactor (SBR) treatment technology that uses a basin, or a set of basins, of waste activated sludge (WAS) working discontinuously, alternating filling and emptying phases. A settling phase is used to deliver treated water, providing both an activated sludge basin and a final clarifier.

The system can be used for both municipal and industrial wastewater applications and is used for small- or medium-sized plants with discontinuous wastewater treatment. It features a five-step discontinuous process, alternating filling and emptying phases, which is repeated during a cycle that consists of: filling, reaction, settling, emptying and idle (as shown on the process flow diagram at the right). The cycle duration ranges from four to 48 hours, with a sludge concentration ranging from 2- to 6-g/L



Ecobatch® provides the same performances as a conventional activated sludge process.

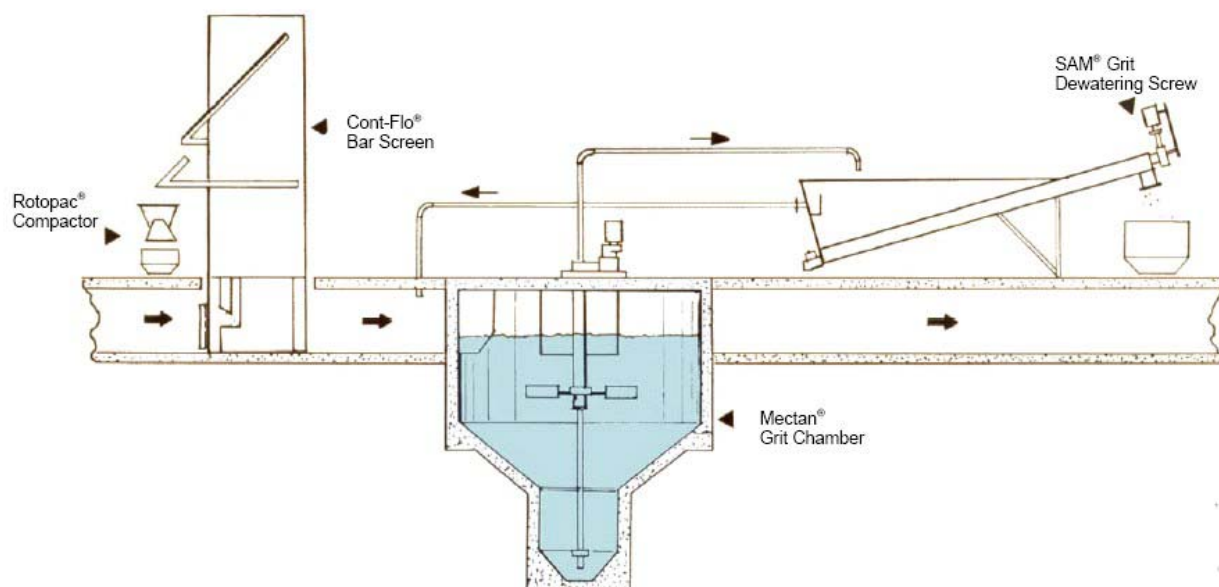
### Mectan® Grit Removal System

This is a vortex grit removal system that can be utilized for municipal and industrial wastewater applications. The system is engineered to remove grit over a wide range of particle size:

- Mesh size = 50 - Removals = 95% of grit
- Mesh size = 70 - Removals = 85% of grit
- Mesh size = 100 - Removals = 65% of grit

The main features and benefits of the system, as pictured in the diagram at the top of the next page, include:

- Compact size results in low excavation and civil works costs during construction and installation.
- Retrofittable into existing plants.
- Energy efficient with low cost maintenance.
- Simple mechanics and minimum mobile parts.
- No moving parts subject to wear located underwater.
- Reliable simple design, and efficient operation on a wide range of flow rates.
- Constant velocity assisted by only two paddles with low head loss.



- Sloped transition and rotating motion eliminates accumulation of grit in the chamber under all conditions.
- Full accessibility to grit collecting well.

The Mectan® grit removal system operates efficiently over a wide range of daily flowrates, with a circular design that sets it apart from other systems by its sloped transition section between the upper chamber and the central grit collecting well.

This design takes full advantage of the tangential inflow velocity along the peripheral wall of the chamber, to assist in the grit removal process.

### **Sludge/Biosolids Management**

#### **Actidyn® Lamella Thickening**

This process provides for high load thickening of sludge performed by chemical flocculation followed by lamellar clarification. The system can be used for municipal and industrial applications, and provides sludge thickening for:

- Wastewater (primary or tertiary treatments) applications.
- Drinking water applications.

The advantages of this process includes:

- Good supernatant quality (excepted for the sludge from Actiflo® used as primary settler).
- High thickened sludge concentration: DS in thickened sludge between 10-60 g/L
- Compact design.
- It can be used with other chemical sludge which require thickening before being dewatered.

In the Actidyn® process, the flow goes successively through:

- A coagulation stage, where the raw water is thoroughly mixed with coagulant (stage not needed if the sludge was previously coagulated)





- A flocculation stage, where polymer is added to form and develop dense flocs.
- In both stages, dynamic mixers are designed to produce optimum velocity gradients (Turbomix option)
- A settling stage, where the sludge is separated from the clarified water: the water is clarified by a counter-current separation, then flows out through a system of collectors ensuring an equal flow distribution; the lamella must present a minimum risk of clogging (interspacing = 70-100 mm, inclination = 60°). The sludge settles and thickens at the tank bottom and is recovered by a scraper or a hopper and then pumped to the sludge treatment stage (solids loading rate = 250-1,500 kg/m<sup>2</sup>.d).
- Hazen velocity = 1-3 m/hX.

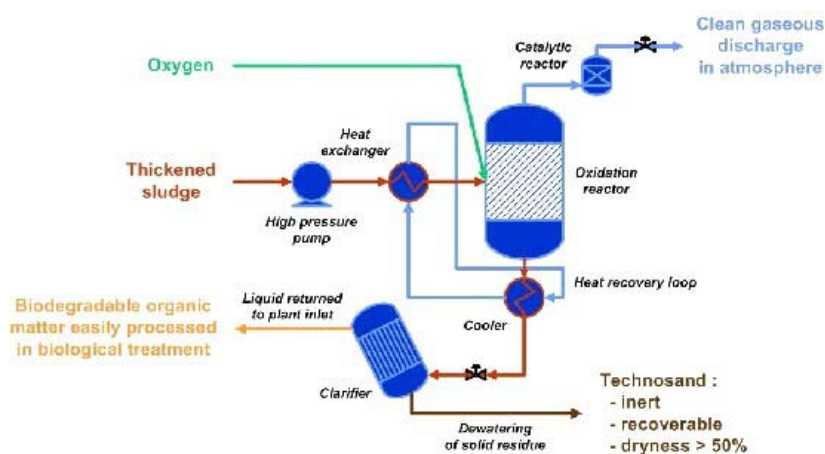
### ATHOS®

ATHOS® is a wet air oxidation reactor (WAO) system allowing for total organics removal from wastewater treatment sludge. The system is used for the treatment of thickened sludge (primary, secondary, tertiary, fresh or digested).

This is a sludge treatment process that couples thermal treatment by WAO with biological oxidation. It can be used to treat municipal sludge (thickened), industrial sludge (primary, secondary, tertiary, fresh or digested, or other industrial wastes that are similar to sludges).

The system features:

- Compact and flexible process.
- Low NH<sub>3</sub> content on the liquid phase.
- Liquid recyclable for use by treatment plant.
- Simplified flue gas treatment and no-nuisance emissions (50% less of CO<sub>2</sub> emission than incineration).
- Small-scale dewatering facility (without conditioning).
- Leaching resistant solid residue.
- Inert and reusable solid residue (can be used for road building or in manufacture of tiles or concrete).



Under the combined effect of temperature and pressure, the sludge is transformed into: a clean gaseous discharge; a liquid which is essentially organic and biodegradable, with a limited ammonia content; or a residual inorganic solid which is completely inert and reusable (Technosable).

## BioPasteur®

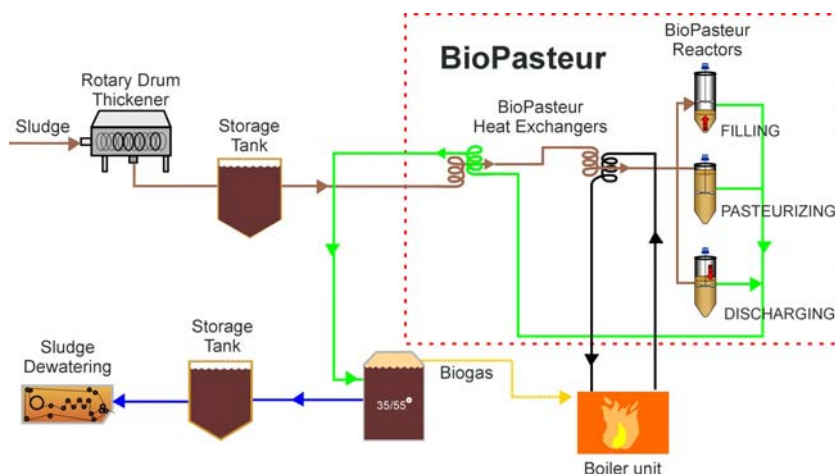
A method of sludge hygienization, BioPasteur® uses heat exchangers and batch pasteurization tanks, either to upgrade existing anaerobic digestion systems, or, in combination with a new digester, provide a system to meet Class A pathogen reduction requirements.

This EPA Class A process uses batch processing with simple time/temperature requirements, and it can be used for both municipal and industrial sludge and biosolids.

The principal features and benefits of the system include:

- Small Footprint Requirements (> 0.5 hour retention time)
- Energy Efficiency (variable heat recovery)
- Long-term Operating Experience (proven history of performance)
- PLC controlled:
  - Automatically adjusts to variations in feed biosolids temperature and flowrate
  - Target pasteurization and digester temperature easily changed
- Continuous Feed to Digesters:
  - Increased process stability
- Stainless Steel Construction:
  - Longer equipment life, chemical cleaning possible
- BioPasteur® Benefits:
  - Simple and effective cleaning system.
  - No pathogen short-circuiting.
  - Pathogen reduction step is accomplished before digestion.
  - Entire digester volume can be dedicated to VS destruction.
  - Lower O&M costs.

In the first stage of the process, the BioPasteur® system heats the biosolids to 70°C for approximately one hour, to provide pathogen destruction, so that it reaches the demands stated in the regulation on sludge (2xEPA requirements). In the second stage of the process, the anaerobic digestion system provides volatile solids reduction at either thermophilic or mesophilic operating temperatures. BioPasteur® is a simple retrofit for sites existing anaerobic digestion systems.



The plant comprises heat exchangers and retention tanks, with typically three retention tanks required, and this allows for a continuous supply of sludge to the plant and also to the subsequent digester. While one tank stands at the desired temperature, the other two tanks will receive and discharge the sludge alternating by pumping. The energy input is significantly reduced because the heat from the pasteurized biosolids is transferred to the cooler influent biosolids.

The heating requirement is typically only for increasing the biosolids temperature from approximately 50°C to 70°C, instead of 15°C to 70°C. By this mode of operation, maximum heat recovery is obtained from the hygienized sludge and thus the heat requirements for the process are reduced to a minimum.

Pathogen reduction requirements are met by maintaining a minimum biosolids temperature for a set period of time under batch conditions (e.g., 70°C for 30 minutes).

The heart of the process is the SWS heat exchanger, a new concentric pipe heat exchanger that consists of a biosolids/water/biosolids section, a biosolids/hot water section, and a biosolids/cooling water section.

The intelligent control ensures that the desired digester temperature is maintained. Even though the system is continuous, there is no risk of pathogen short-circuiting because the biosolids are batch pasteurized. Also, a continuous and uniform sludge feed enables increased process stability during subsequent anaerobic digestion. The hygienized wastewater sludge can be used for spreading on farmland without the risk of dissemination.

### Inos® Dry Cake Discharge System

This technology offers a dry cake discharge solution for municipal and industrial facilities, with low temperature sludge drying, which allows for the control of the cake dry solids output from 30% to 90%. The system combines, in a single unit, both filter press dewatering and thermal drying of sludge/ biosolids. The key feature of the Inos® system include:

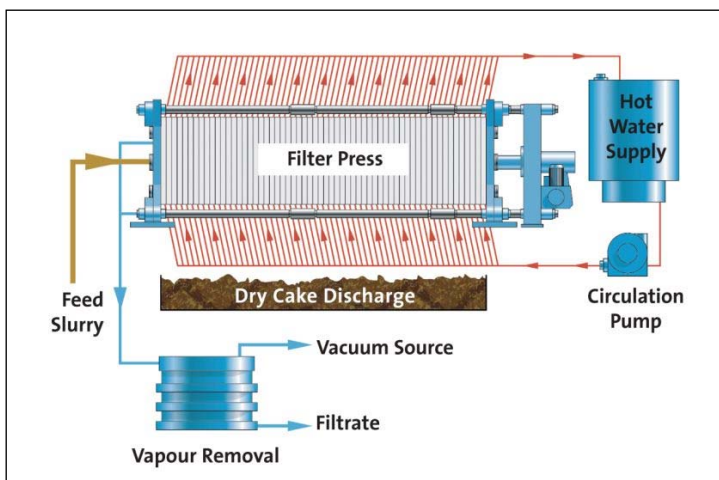
- Increased potential for cake recycling and secures future disposal routes.
- Fulfills the time/temperature objectives to give Class A sludge to meet EPA 503 Regulations and the ADAS Matrix.
- Fully controllable output cake solids up to 97% dried solids (DS), yielding a high density product.
- Dewatering and drying within single unit.
- Controlled cake dry solids and drying profile.
- Process containment, with a safe, low temperature environment, when compared to a thermal drier.
- Low and simple maintenance.
- Energy efficient operations - boiling water at low temperature.
- Can be installed as a retrofit to existing filter presses, maximizing existing assets.



- Minimize material handling and volumes which decreases haulage and disposal costs.

The sequence of operation for the system, as shown on the illustration to the right, features:

- Dewatering
- Hot water - membrane squeeze
- Vacuum application
- Drying phase
- Cake discharge
- Drying Phase with four modes of operation, including: dewatering, high solids dewatering, pasteurisation drying to 97%.
- Conventional dewatering with the filter press.
- High solids dewatering - selectively attain cake output.
- Pasteurization, fulfilling time/temperature obligations to achieve pathogen kill.



The sequence of operation starts with a membrane filtration phase, using water as the membrane inflation media, which produces a sludge cake. Then the combined use of hot water circulation (85°C) with the application of a vacuum via the filtrate manifold helps deliver a dry cake, at a low temperature, in total security.

### Odour Control

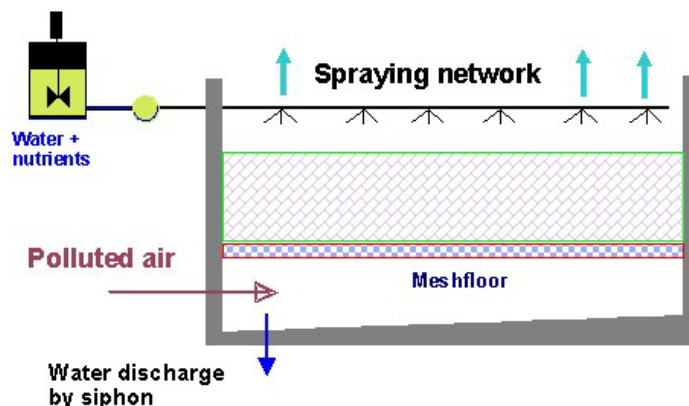
#### Alizair®

This is a biological odour control process developed and designed to remove H<sub>2</sub>S, mercaptans, NH<sub>3</sub> and amines from a polluted air by using a media called Biodagene® (autotrophic treatment). The primary features of this process, which can be used at both municipal and industrial facilities, includes:

- Adapted low to medium polluted air and for high air flows due to high velocities inside the media.
- Compact technology easy to operate with a very minimal maintenance.
- Inorganic non-degradable media (Biodagene) with a high porosity.

The operations approach for the system, as shown on the diagram (right), features:

- Upflow air filtration introduced through a pipe and into the bottom tank.
- First layer of gravel: ease the air distribution through the bed above.
- Second layer of Biodagene®, small size and uniform shape media providing high specific surface area.



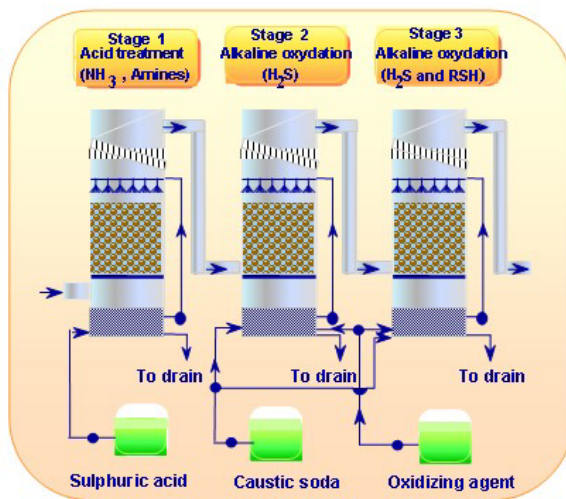
- Polluted air is treated through the biodagene layer by an autotrophic biomass specialized in the degradation of sulphur compounds.
- Intermittent irrigation (water + nutrients) of the biofilter initiated on a pre-set timer via a single nozzle.

### Aquilair®

Aquilair® is a chemical process used for the odour removal from H<sub>2</sub>S, NH<sub>3</sub> and amines, mercaptans, some aldehydes and ketones. The system can be used at municipal and industrial wastewater facilities, and is characterized by: efficient contact between gas and liquid, minimum head loss, and optimization of the removal efficiency.

The Aquilair® process at any of four stages, depending on the type of air pollutants:

- First Stage: Acid addition (pH 3) for nitrogen compounds removal.
- Second Stage: Caustic soda addition (pH 8-9) for H<sub>2</sub>S removal.
- Third Stage: Caustic soda addition + chlorine (pH 10.5-11) for mercaptans removal.
- Fourth Stage: Can be added to treat some aldehydes, alcohols or ketones (neutral pH and bisulphite addition).

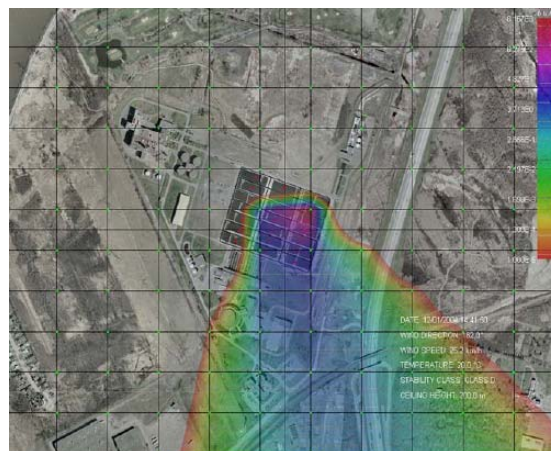


### OdoWatch™

This is an automated electronic-nose-based wireless odour monitoring system that can be used at municipal and industrial wastewater facilities. The sensor matrix of the e-noses is optimized for targeting putrefaction odours of incinerators, composting, landfills, wastewater etc.

The OdoWatch™ system centralizes and automates odour impact monitoring, displays the odour plume continuously in real time, and models the atmospheric dispersion of odours. Its has three major components:

- Electronic Noses: An e-nose is a multi-module assembly:
  - Sensor Matrix comprising an array of different sensors.
  - Signal Processing Module
  - Wireless Communication Module
  - Power Module
- Weather Tower: The weather tower is equipped for wireless transmission of weather data to the CCU, on the same frequency as the e-noses.



Odour plume displayed on the Central Control Unit screen

- Central Control Unit (display): The CCU is a computer that hosts the OdoWatch® operating software and is equipped with a wireless link. Its data base acts as an archive for future reference in case of odour complaints by the public. OdoWatch® provides automatic reports and issues alerts when preset thresholds are exceeded.

The OdoWatch® system consists of OdoNose® electronic noses (e-noses) deployed strategically on a site, near the odour sources, so as to characterize the odour emissions for the purposes of odour impact monitoring. Once the e-noses have been trained (calibrated) using field data, they indicate – in odour units (o.u., measured according to European Standard EN 13725) – the odours emitted by the site for which the training has been effected. The sensor matrix of the e-noses is optimized for targeting typical waste water treatment plant odours.



OdoWatch™ E-Nose at Water Treatment Plant

By means of an integral micro-pump and an automated system for treatment of the samples (particles, temperature, humidity, etc. as required by the specific application), each e-nose sucks in air samples, quickly and continuously. The (mostly metal oxide) sensors in the measurement chamber respond by sending an electrical signal to an electronic signal processing card; the processed signal is then transmitted via the OdoLink® wireless communication network to the Central Control Unit (CCU), where the signal acts as the input to the modelling software (that merges it with the meteorological data received from the weather tower), the final result being an estimate of the odour impact materialised, in particular, by the odour plume displayed on the screen and superimposed on the aerial map of the site and its surroundings. Because the odour plume is colour-coded, the operator can tell at a glance on the map what region is being impacted by odour of what level.

When OdoWatch® is fed weather forecast data, it will also predict the odour impact up to 24 hours ahead. The operator can then see the odour impact on the vicinity 2, 4, 6 etc. hours in advance. By taking appropriate steps, it can reduce odour and prevent the predicted impact.

E-nose training in order to recognize the specific site odours is affected by means of olfactometry; the correlation between the odour pattern of the e-noses and the perception of the olfactometry panelists is achieved by means of advanced statistical methods. In addition, OdoWatch™ can distinguish between the odours generated by the site, and those originating from other sources.

## **Project Delivery Approaches - Forming a Public-Private Partnership with the CRD**

Veolia Water understands that the present focus of the CRD's process is on identifying innovative sewage treatment and resource recovery technologies and strategies for effectively and sustainably treating and processing sewage generated by a residential community of approximately 400,000 people. Implementing the technical and management approaches that will be identified through this process will require a partner that can deliver the capabilities, resources and proven record of performance that will be critical to the immediate and long-term success of this initiative.

Based on our experience with projects of a similar nature, Veolia Water anticipates that a number of critical concerns for this proposed project will require thoughtful planning and coordination with the CRD to mitigate.

Throughout North America, communities like yours are faced with the need to spend millions of dollars to rehabilitate, repair, expand and run water and wastewater infrastructure systems. And, in addition to the need to upgrade and maintain compliance, public agencies grapple with water quality concerns and the need to identify and implement solutions that protect the environment, providing an environmentally sustainable approach. Public-private partnerships can offer the much-needed answers in these areas.

Government agencies and political officials from all spectrums have endorsed the idea of combining the resources of the public and private sectors to manage their community's water system in public-private partnerships. These partnerships with water companies are enabling local officials to solve their most pressing water challenges. In fact, public-private partnerships are at work in more than 2,000 North American communities.

Veolia Water companies offer these municipalities a range of products and services that can involve managing entire water and wastewater systems, including treatment plants, distribution systems, billings and collections, meter replacement and parts/inventory management. Benefits include:

- Clean, quality water and improved customer service
- Tremendous costs savings and rate stability
- Environmental compliance
- Employee opportunities (improved training, professional growth and development, and opportunities in other markets or industries depending on an employee's skill sets and interests)

### **Cost Savings and Rate Stability**

Economics is usually a driver in the creation of public-private partnerships, since some municipalities do not have the capital necessary to upgrade water infrastructures and operations. A municipality often is interested in lowering costs while ensuring quality service. Veolia Water, as we have demonstrated in this submittal, can provide all equipment and technology to efficiently manage a municipality's water and wastewater operations. Through the application of technology and operations know-how, Veolia Water usually can reduce or stabilize a municipality's cost per gallon of treated water or wastewater. In fact, many communities can save between 10 and 40 percent through public-private partnerships.

### **Strategic Control for the Municipality**

Municipal agencies such as the CRD are in strategic control of projects managed through a public-private partnership, no matter what happens. Water partnerships and contracts with Veolia Water are designed in a way that gives municipalities the flexibility to make changes in the future to meet new needs.

### **Employee Opportunities**

In most public-private partnerships, employees receive better pay, improved training, professional growth and development, and opportunities in other markets or industries depending on an employee's skill sets and interests. Staff reductions are usually limited to transfers or attrition.

### **Environmental Compliance**

Environmental regulations and standards are constantly changing and creating new challenges for local governments. As water experts, Veolia Water employees are required to stay up-to-date on all applicable regulations. Consequently, we assume full responsibility for compliance within the design capability of the facility. In cases where a city is facing a consent decree order or other compliance

issues, we can offer solutions – such as installing cutting-edge technology – to make a facility operate within environmental guidelines.

### **Facility Performance**

Designing, operating and improving a municipal water or wastewater facility or infrastructure is a major investment for any municipality. As with any investment, municipalities want to ensure a fair return and long-lasting benefits. Even the most minor repair or replacement is important for maintaining a facility that is safe, compliant and capable of operating for years to come.

### **Other Elements of a Partnership Approach**

In developing a public-private partnership approach with the CRD for this project, Veolia Water will assure your communities our commitment to environmental sustainability and to being a good corporate citizen.

### ***Environmental Sustainability***

Veolia Water will partner with the CRD to use a Sustainable Development Strategy in the approach to the identification of the best wastewater management solutions for the communities that you serve. In the past, municipalities and corporations produced and made efficient use of goods with an economic focus. With recent global changes and Canada's commitment to the Kyoto Protocol, more emphasis is being placed on social and environmental factors. Adopting a business plan rooted in sustainability can position a municipality or corporation to master change in an uncertain future while maximizing economic goals.

Minimization of input raw materials and energy, making more efficient use of materials and energy, and waste minimization are all integral to our design and O&M approach. For each unit process in the wastewater treatment plant, we will evaluate the use of alternative processes, building materials and products, which will embody a sustainability strategy yielding a project meeting the goals and objectives of the CRD. The sustainability effort will use a comprehensive approach for the useful life of the facilities, assessing:

- The impact of materials and energy input.
- Construction materials and methods.
- The impact of process technologies.
- Building systems.
- Disposal of construction debris.

Veolia Water is also committed to meeting the growing demand from both local authorities and consumers to inform and evaluate and to facilitate access for all to this essential resource. In order to achieve an objective analysis of the performance of Veolia Water's businesses, the performance of our company is assessed by organizations that specialize in analyzing corporate responsibility results. These firms are responsible for:

- Auditing performance from the annual reports sent annually to local authorities (customer service, safeguarding of the water supply, conserving resources, water treatment quality).
- Producing a written summary, available to all, containing essential information on water service operations.

As a result of these efforts, Veolia Environnement (the ultimate parent company of Veolia Water) has been included in the Dow Jones STOXX Sustainability Index (DJSI STOXX), as well as other similar indices.



As a division of Veolia Environnement, Veolia Water participates fully in identifying the environmental issues of the group as well as setting and following properly quantified goals.

### **Active Participation in the Community**

Mayors, city managers and council members look for water industry experts that are good corporate citizens. Participation in local community activities is an important aspect of every water partnership Veolia Water enters. From river cleanups to little league soccer, our firm can be found at the heart of community service. Veolia Water companies provide for community relations and communications programs using both formal and informal efforts at project sites. The company focuses its efforts on developing and implementing highly effective community relations plan that are designed to address the information needs of the community to be served and to be a good corporate citizen within that community. Interacting effectively with the community is as critical to the success of a project as interfacing with regulatory agencies. The citizens in the community are the ultimate recipients of the services provided by the firm, and effective interaction with each community and neighbourhood helps to promote understanding and contributes to mutual trust and respect.

Veolia Water Canada has a strong community relations component as a part of the delivery of services approach to communities in Canada. The program for the Town of Goderich, Ontario, project provides a model for the company's work with communities in Canada. Over the past few years this program has included:

- **Monetary Contributions** - \$10,000 for the construction of a new community centre complex and for library upgrades.
- **Staff Time Contributions** – Asst. Project Manager was provided a flexible work schedule to allow for participation in Young Canada Week activities.
- **Materials Contributions** – Heavy equipment provided for Kinsmen Service Club community playground renovation, and bottled water donations for community events.
- **Tours and Speakers** – Regular water and wastewater facilities tours for schools and community groups, and provide speakers for community meeting and professional training.
- **Internships/Student Programs** – Working with the University of Guelph on student programs.

In Canada, Veolia Water Canada uses a communications/public relations plan that is tailored to the unique and specific concerns of each community served, one that is focused on a number of primary areas, including:

- Environmental Awareness
- Community Relations, Public Education/Outreach and Media Relations
- School Science Program Support
- Business Community Relations

As part of this Community Outreach Program, Veolia Water Canada also encourages employees to participate in community events and service work. The firm also encourages the establishment of a project-related speakers' bureau and actively seeks opportunities to speak at community and civic functions.

Additionally, at the water and wastewater facilities operated and managed by the firm, Veolia Water Canada makes it easy for customers to contact O&M personnel and get a prompt, professional and courteous response to concerns or questions. This is accomplished using a plan and approach that includes the following:

- Publishing telephone numbers in the local telephone directory for normal business hours and after-hours contact.

- Providing a Call Centre-type service for all calls received during normal business hours, Monday through Friday, with after-hours and weekends calls to the business number handled by an automated answering system, which provides an emergency number to use.
- Maintaining formal records of all calls received, with those records used for tracking purposes and to ensure that the appropriate follow-up action has been taken.
- Documenting significant contact with the public, reporting issues to the client in a timely fashion.
- Providing summary reports of customer calls to the client on a monthly basis, with the client's managers having free access to all recorded information.

All company vehicles carry proper identification signs on the doors, including a local phone number, and each Veolia Water Canada employee carries a photo identification card and business cards to provide to members of the public when requested. Company policy also requires all staff members to identify themselves to any person who requests identification. The company also uses project fact sheet to better inform the community of the services they receive.

Any printed or promotional materials, signs or information produced for distribution to the general public relating specifically to individual facilities/projects are reviewed with and approved by the client before they are released.

O&M staff who perform the day-to-day services are trained and empowered to communicate directly with the citizens and management of the communities they serve in order to provide the quickest possible response to questions and concerns.

Additionally, the company encourages groups, local and regional environmentalists, and other interested parties to tour operated and managed facilities as a part of our overall public awareness program.

### ***Competence in Financing***

Finally, Veolia Water companies have worked with a wide range of governmental and industrial clients to identify, develop and implement innovative project financing approaches for the lease/ownership and management of water and wastewater systems and facilities. The focus of these efforts has been on providing the funding needed to bring a project to reality without unduly burdening the community and the people that it serves.

In Canada, Veolia Water's project financing experience includes the company's work with the City of Moncton, New Brunswick.

In 1998, Veolia Water Canada was contracted to design/build and own a new surface water treatment plant that would address myriad water quality problems facing the tri-community of Moncton, Dieppe and Riverview. This 20-year agreement, valued at approximately \$85 million (CDN), called for the financing, design, construction, operation and maintenance of a 94.6-ML/d (25-MGD) drinking water filtration facility.

Upon the facility's commissioning in fall 1999, the City of Moncton purchased the plant, and Veolia Water entered into a 20-year lease and license agreement with exclusive rights to sell water to the municipality.

The Moncton project was Canada's first privatized water treatment facility, and this public-private partnership is expected to save area rate-payers approximately \$12 million (CDN) in capital, engineering and operating costs over the term of the agreement. The agreement allows Moncton to manage the community's water to meet and exceed the quality expectations of their customers and the GCDWQ.

Further, through this partnership, Moncton secured a state-of-the-art water treatment facility without having to make any up-front capital investment and without having to assume any risk for design, construction or performance of the facility. The Canadian Council for Public-Private Partnerships presented Veolia Water with a 1998 National Award for Innovation and Excellence, recognizing our plant design with an “Honourable Mention for Infrastructure.”

While Veolia Water Canada has the capability and the resources to provide project financing, it is incumbent on our firm to advise the CRD that we do not think it is in the best interests of this project or your community for the private sector to be involved in financing this proposed project. Your agency can finance any potential project at less cost than any private firm could, and the additional costs that a private firm would require may compromise the public’s acceptance of this project — an important concern. However, if this project requires private financing, then Veolia Water Canada would add a third-party financial institution to our proposed project team to provide it.

## Case Studies

Throughout this document we have provided a number of examples of how Veolia Water companies have worked with municipal agencies like the CRD to provide innovative and cost effective wastewater management solutions. Following here are additional examples of where Veolia Water companies have worked with regional agencies, individual communities and others to develop new wastewater systems to meet the needs of their growing service areas. These projects are indicative of the ways in which we can work with the CRD under a public-private partnership approach to identify the best wastewater solution and then deliver that solution using a comprehensive design/build/operate approach.

### Cle Elum, Washington

To ensure the development and success of the Suncadia resort and continued urban growth of the cities of Cle Elum, South Cle Elum and Roslyn, resort developer Suncadia, Inc., and the cities formed a relationship to provide essential utility services, including ample and quality wastewater treatment that will keep pace with anticipated development while also meeting Washington State’s stringent environmental regulations. Charged with obtaining a qualified firm, in 2003, Suncadia entered into a \$14-million agreement with Veolia Water to design, build and startup a new wastewater treatment plant while operating, maintaining and managing Cle Elum’s existing facility during the construction phase.

Under a separate contract, Veolia Water provided O&M services for the existing wastewater facilities during construction of a new regional wastewater plant, which we now operate and manage under a long-term agreement. This contract involved providing services to design, build and start up a new wastewater plant while operating, maintaining and managing the City’s existing facility during the construction phase. In 2005, Veolia Water was selected for the O&M of the new treatment plant for the next 10 years.

Veolia Water’s proposed value-engineered solution represented a significant savings to Suncadia and the three Cle Elum-area communities to be served by this new regional plant. By eliminating the planned mechanical sludge processing equipment and using the existing lagoons for sludge storage and digestion, Veolia Water is saving the client more than \$3 million (22 percent) over the initial design.

Upon completion of the wastewater plant construction, Veolia Water conducted the facility startup and acceptance testing, ensuring that the plant performed as designed and to the expectations of the clients. The facility was then turned over to the City of Cle Elum, which had selected Veolia Water,

through a competitive procurement, for the long-term O&M of the new plant. The agreement includes an initial term of 10 years followed by two 5-year renewal options.

The new wastewater treatment plant is a Jet-Tech® sequencing batch reactor facility. An ultraviolet system disinfects effluent to ensure the quality of water discharged to the Yakima River. Solids are disposed to an existing lagoon, which was modified as part of the construction.

The decommissioned wastewater treatment plant, which Veolia Water operated during the new facility construction, was an aerated lagoon system that was converted for sludge storage. Effluent was disinfected with ultraviolet prior to discharge. Solids were discharged to a constructed wetlands system, where they provided nourishment for reeds and marsh grasses that offered habitat for wildlife.

### **Stora Enso, Port Hawkesbury, Nova Scotia, Canada**

Stora Enso, one of the world's largest pulp and paper companies, is located in Nova Scotia on the east coast of Canada. The company's Port Hawkesbury Mill has been in operation since 1962 and has an annual capacity of over 190,000 tons of newsprint and 360,000 tons of super-calendered paper (SC). Since its startup in 1998, the SC paper machine has reached several world daily speed records, and approximately 85% of the paper produced at the mill is sold to the United States, with the remainder sold within Canada.

The company, seeking to eliminate the use of raw, untreated water in its two paper machines and related processes, needed to quadruple the capacity of its existing water treatment plant while achieving higher quality water. After conducting several pilot studies, John Meunier, Inc. designed and supplied a turnkey plant capable of providing 60,000-m<sup>3</sup> of process water per day, consisting of process water treatment plant with a capacity of 60,000 cubic meters per day.

The treatment solution provided included two Actiflo® ballasted clarification units and six Dusenflo® gravity filters. These units were designed to provide process water quality to required specifications, avoiding effects of turbidity, iron, aluminum and manganese contained in the raw water on paper quality. The installation of these units also reduced operating time and maintenance costs for the company's treatment facilities.

### **City of Lathrop, California**

Under a \$24 million, 20-year agreement, Veolia Water provided fast-track design and construction services for a new 0.75-MGD tertiary treatment plant while keeping the existing wastewater treatment plant in operation. The new wastewater treatment facility is designed to replace the existing wastewater plant and will, when fully expanded, meet California's Title 22 requirements for effluent reuse. The new plant is designed for expansion, in increments of 0.75-MGD, up to an ultimate capacity of 6-MGD. The first phase added redundant solids handling equipment to ensure efficiency in managing plant biosolids. The new plant also features several state-of-the-art components: an immersed membrane bioreactor, a grit collector system and a biological odour control system. Additionally, Veolia Water completed preliminary designs to add sand filters to the existing plant. When the City authorizes implementation, these improvements, along with changes to the aeration system and possibly influent equalization, will bring the facility into full Title 22 reuse compliance. Veolia Water also assisted the City in developing a land application program for the beneficial use of biosolids, and we are developing O&M manuals to meet State regulatory agency requirements.

As a part of this agreement, Veolia Water is responsible for providing O&M of the City's existing 0.25-MGD secondary wastewater treatment plant. We installed a computerized equipment maintenance system (CMMS) that will be used to provide maintenance management and tracking for the wastewater treatment plants. Veolia Water is also responsible for all regulatory reporting and compliance, developing an OSHA-approved site-specific safety program and providing an emergency preparedness plan.



### **Town of Goderich, Ontario, Canada**

The Town of Goderich had historically operated its wastewater treatment facility until restructuring by the Town resulted in the disbanding of its Public Utilities Commission. As part of its restructuring program, the Town sought an expert firm to assume responsibility for the operation and maintenance of its water and wastewater facilities. In exchange for transferred risk and continued high quality operations, in 2000, the Town entered into a public-private partnership with Veolia Water.

Goderich's drinking water treatment facility draws its water supply from Lake Huron. Lake water is screened, pre-chlorinated, conditioned with alum, flocculated, passed over sedimentation beds and then filtered through dual-media filter beds. The water is treated with chlorine and fluoride before being pumped into the Town's distribution system. Veolia Water Canada also operates and maintains approximately 62.7 km (39 miles) of water distribution mains, an elevated water tank and a ground-level reservoir. Sludge generated by the treatment process is stored in a dewatering lagoon, and then disposed at the local landfill site.

Wastewater from the Town is collected via approximately 56.3 km (35 miles) of sewer mains. Four areas of the Town are served by pumping stations that move the sewage to gravity flow sewers at higher elevations on the system. Following preliminary treatment, the flow passes through primary settling tanks followed by secondary aeration and clarification. Alum is used to remove phosphorous, and the final effluent is disinfected with chlorine before discharge into Lake Huron.

Raw and secondary solids generated from the process are dewatered on a belt filter press. Filtrate is returned to the plant, and the resulting sludge cake is disposed at the local landfill. Air from the dewatering process is collected and passed through a scrubber system to control odours.

Six existing staff transitioned from the Town and the former PUC to employment with Veolia Water Canada. All employees were hired at equal or better benefits and wages, and they retained their previous pension status through a special arrangement between Veolia Water Canada and the Ontario Municipal Employees Retirement System.

Early-on in this contract, Veolia Water Canada recognized a flaw in the Town's flow monitoring and recording system at the wastewater facility. We incorporated minor changes (at no cost to the Town) that gained approximately 25 percent more treatment capacity and significantly reduced heavy rainstorm-related bypasses.

Tourism is vital to Goderich and the surrounding Bayfield resort areas. And top-notch water and wastewater services are critical to the continued growth of the economy and protection of the environment. Veolia Water Canada believes water quality and the environment is everybody's job and is not a "contractual requirement." Case in point: Thirty-five miles north of Goderich, the Town of Kincardine operates its own water and wastewater treatment systems. When Kincardine's water system was placed under a Boil Water Advisory by the Health Unit, the Town sought technical and

operational assistance from Veolia Water Canada. Finished water turbidity levels had reached 13.0 NTUs, compared to the regulatory limit of 1.0 NTU. Regulators required that the Town staff its automated plant 24/7 until an effluent level of  $>0.5$  could be reached. Our Goderich project provided a licensed operator to work a regular shift until 'round-the-clock staffing was lifted. We continued to provide certified personnel to assist Kincardine until the Boil Water Advisory was rescinded.

One month later, Kincardine reached out to Veolia Water Canada a second time. The Town was experiencing a severe flow restriction on their raw water intake due to "shove ice." The Town inquired about the availability of water from the Lakeshore water system owned by the Township of Huron-Kinloss – which is managed by the Goderich project team. We acknowledged that Huron-Kinloss had the capability to temporarily provide drinking water to Kincardine; however, the necessary was well was out of service for routine work. Kincardine agreed to pay any costs necessary to restore service to the well. Working with Huron-Kinloss and two regulatory agencies, Veolia Water Canada staff worked through the night to return the well to service and disinfect the system.

Two weeks later, the Town of Kincardine called upon Veolia Water Canada a third time. On this occasion, the water plant had been shut down due to "untreatable" raw water entering the system. Veolia Water Canada immediately began supplying water to Kincardine from the Huron-Kinloss system, based on a plan negotiated with the regulatory agencies. The Town of Kincardine honoured the Goderich project team with two Certificates of Appreciation for their selfless response in Kincardine's times of need.

Veolia Water Canada's commitment to our acclaimed environmental health and safety program is reflected in the staff's safety performance. Goderich staff have worked more than six years – their entire O&M history – without a lost-time incident. Veolia Water's safety culture benefits more than 53,000 citizens in the some 20 community and resort areas served by the Goderich project.

Veolia Water Canada has been involved with the Goderich community since day one. We have made a significant financial contribution to the new community centre, participated in fund raising for the new medical centre and contributed to the library/art gallery renovations. Veolia Water Canada maintains a presence in many community events by distributing bottled water. Additionally, we are a major supporter of the annual municipal golf tournament and have contributed in kind to such projects as the Kinsman playground development. Our facilities are always open to schools and the general public for tours.

The project was honoured with the 2001 Award of Merit for Service Delivery by the Canadian Council for Public-Private Partnerships.

### **Kingston Ravensview Water Pollution Control Plant, Kingston, Ontario, Canada**

The Ravensview Water Pollution Control Plant (WPCP) supplies a primary level treatment for wastewater for the town of Kingston (including Pittsburg County and the Canadian Armed Force base in Kingston). The existing process at Ravensview WPCP includes a mechanical screening, a ventilated granulation tank, a primary treatment with chemical enhancement, sodium hypochlorite disinfection and a bisulphate sodium dechlorination; the effluent treated is discharged in the St-Lawrence River.



A study had been done in June 2004 to determine the client's need and to be in conformity with the F-5 provincial requirements (15 mg/L BOD<sub>5</sub>, 15 mg/L TSS, 0.08 mg/L TP and 5 mg/L ammonia) and to anticipate a future growth in the services sector (new average daily flow of 95,000 m<sup>3</sup>/d and a maximal flow of 193,000 m<sup>3</sup>/d, per day). Veolia Water's Biostyr® biological filter process has been identified as the most efficient for the secondary treatment of the wastewater.

To confirm the necessity of a secondary level of wastewater treatment at the Ravensview Water Pollution Control Plant and to make the selection of a technology supplier easier, a pilot installation had been set on the WPCP site. Once the pilot project was over, Veolia Water's Biostyr® process was selected as the best process to offer to Ravensview WPCP.

### **Town of Boisbriand, Quebec, Canada**

The Town of Boisbriand is located near the low Laurentians region, north of the Mille-Iles River, and has a population of over 27,400 citizens. It includes an important industrial concentration, and, over the last 20 years, the Town has known an important demographic growth passing from 19,000 citizens in 1989 to 25,000 in 1996.

The Town is served by a "biological filtration" wastewater treatment plant which was started up in 1990. Following the important industrial, residential and commercial growth in the Town over the 1980 and 1990s, it was determined that the wastewater treatment plant could no longer meet the environmental requirements of the community.

John Meunier, Inc. suggested the installation of an Actiflo® clarification unit, which improved the treatment at the wastewater plant, and, more specifically reduced the load admitted to the biological aerated filters (BAF). The Actiflo® clarifier was installed in 1998 as secondary treatment upstream the BAF, with this process, the existing BAF was able to meet the environmental requirements.

John Meunier, Inc. also supplied the chemical titration systems and the process control system, provided engineering, the treatment units manufacturing, as well as piping and installation of this equipment.

### **City of Adelaide, Australia**

Established in 1995, United Water (a joint venture of Veolia Water and Halliburton KBR) is the largest private water company operating in Australia and New Zealand, providing comprehensive water and wastewater services to almost 1.2 million people. In Adelaide, South Australia, the JV has a 15.5-year contract to manage, maintain and operate the City's water and wastewater assets. These utilities serve more than one million residents, and the contract is still the largest water outsourcing contract in Australia.

The provision of public services by the private sector is a relatively new concept in Australia, and as part of its overall objective in ensuring that South Australians receive a high standard of service delivery, the government has set performance standards that are higher than previously achieved. This contract has three primary objectives: reducing the cost to government for operating the water and wastewater systems, improving the quality and levels of service for the South Australian community, and facilitating the export opportunities for South Australian businesses. We are achieving these objectives and since 1996 have raised service standards, saved the state government \$10 million each year and helped facilitate over \$422 million worth of water related business and exports for South Australian companies.

The contract includes O&M responsibility for Adelaide's five wastewater treatment plants, located at Bolivar, Christies Beach and Glenelg, which treat more than 237-MGD (90,000 million liters) of wastewater each year, amounting to an average of more than 66-MGD (250 million litres) per day. More than 17 percent of the wastewater flow is reused for irrigation (market gardens, grapevines or grassed areas) with the remainder disposed of in the ocean.

In 1998, the JV was the first company in Australia operating water and wastewater treatment plants to achieve international certification to ISO 9001 for all core operations plus ISO 14001 for our wastewater treatment activities. In Adelaide, the JV has also achieved certification to health and safety standards

ISO 4801. The JV also undertakes extensive research and development activities in Australia and New Zealand to improve water and wastewater quality, and is a key node in the international research and development network of Veolia Water.

The JV also has a strong to the environment on this and other projects, which is documented in United Water, as part of the Veolia group, manages, operates, and maintains water the "Ten Commitments to Sustainability," which focuses on the global responsibility of the firm in terms of working toward sustainable economic, environmental and social development.

Recently the JV has won a number of awards for the work it has done with regard to environmental protection. In 2000 they were awarded a South Australian Urban Forest Award (Industrial Category) for their work with community groups in helping the revegetation of areas including Hillbank, Glenelg and at Bolivar. They received the 1999 Engineering Excellence Award for the Bolivar DAFF Wastewater Recycling Project from the Institution of Engineers (SA) as recognition of the JV's role in the delivery of this project. They also received a commendation in the 1999 AWWA South Australian Water Awards category, for "Development of Systems for Continual Improvement in Environmental Performance".

Additionally, in Ballarat, Victoria, Australia, the JV has a 25-year operational contract to manage, maintain and operate two water treatment plants, serving 100,000 people. In Auckland, New Zealand, the JV has a 30-year contract to provide water and wastewater services to 40,000 people in the Papakura District.

### Chicago, Illinois

Veolia Water is currently managing a large-scale design/build project for a new biosolids pelletizer facility. As the majority principal of the Metropolitan Biosolids Management LLC (MBM), Veolia Water was awarded a 20-year contract by the Metropolitan Water Reclamation District of Great Chicago (MWRD) to design, build, finance, own, operate and maintain a 150-dtpd biosolids drying/pelletizer at the Stickney Wastewater Treatment Plant. The Stickney Plant is one of the world's largest wastewater facilities, with a treatment capacity of 1.4 billion gallons per day.

## Corporate Environmental Management Plan 2005/2006

United Water, as part of the Veolia group, manages, operates, and maintains water and wastewater assets in Australia and New Zealand. Veolia has adopted "Ten Commitments to Sustainability", which underpin their global responsibility for working towards sustainable economic, environmental and social development.

United Water has adopted these commitments as a basis for preparing our Environmental Management Plan, ensuring our business promotes the principles of sustainable development in all interactions with clients, staff and our customers.

**United Water's Ten Commitments to Sustainability:**

- 1 To protect the environment, to preserve natural resources and encourage biodiversity;
- 2 To establish and deploy an Environmental Management System enabling objectives to be identified, actions plan to be implemented and progress to be monitored;
- 3 To ensure that our facilities and services comply with relevant regulations, taking account of standards as they develop;
- 4 To go beyond minimum legal requirements;
- 5 To increase our efforts in terms of research, development and innovation, in order to improve our ability to respond to environmental challenges;
- 6 To develop our employees' skills, to encourage them to be autonomous and to promote corporate innovation;
- 7 To encourage our partners, sub-contractors and suppliers to abide by our sustainable development commitments;
- 8 To anticipate the needs and expectations of the public in terms of environmental services;
- 9 To participate in the social development of communities where our facilities are based;
- 10 To promote communication within United Water, with our stakeholders, and the community at large on environmental issues and performance.

United Water's Environmental Management Plan has been prepared with our objectives set out under the various commitments. Associated environmental targets have been developed in order to achieve each objective by the end of June 2006.

The Environmental Management Plan 2005/2006 includes the following core areas:

- Corporate EMP
- Water Treatment EMP (Adelaide)
- Wastewater Treatment EMP (Adelaide)
- Water Networks EMP (Adelaide)
- Wastewater Networks EMP (Adelaide)
- Water Treatment EMP (Ballarat)
- Papakura EMP (New Zealand)
- Ruapehu EMP (New Zealand)
- Wellington EMP (New Zealand)
- Thames-Coromandel EMP (New Zealand)



MBM's long-term services contract also includes responsibility for marketing and distribution for beneficial uses of the final product. VWS is currently completing the build (construction) phase services for this new facility, which will recycle approximately one-third of the biosolids generated at the plant. The biosolids drying/pelletization facility is located near the center of the Stickney Plant, occupying a very small footprint, on a site that uses less than three acres of the plant's 560-acre complex.

### **Haldimand County, Ontario, Canada**

Haldimand County is located on the north shore of Lake Erie, southwest of Toronto, Ontario. Eight urban areas comprise the County, which covers nearly 1,300 square kilometres. In 1998, the Regional Municipality of Haldimand/Norfolk jointly entered into an agreement with Veolia Water Canada for an O&M contract that covered the seven wastewater treatment plants, six lagoon systems and nearly 40 lift stations serving the region.

The Veolia Water Canada transition was completed smoothly with no negative impact on the operations or maintenance of these facilities, and we successfully retained all of the O&M staff from the former operator (a provincial government-owned agency) by offering them comparable wages and benefits. Our approach to the transition and to the handling of employees helped to meet the objectives of this contract for lowering costs while minimizing the impact on the employees and ensuring the environment was protected.

Veolia Water Canada was selected for this O&M partnership after a very competitive process involving six international firms. Our approach offered the best in operations, maintenance and management, coupled with nearly \$5 million in savings over the contract period. In addition, our firm's experience in operating and maintaining multiple facilities over a large geographic area for one client was clearly superior to that of our competitors.

The ongoing partnership between Haldimand/Norfolk and Veolia Water Canada has resulted in overall O&M cost savings, with constantly improving service levels as part of our project guarantee. Indeed, as a result of our successful partnership, Haldimand County has realized savings of \$3.8 million. The savings are the result of the County's decision to enter into an O&M service contract with Veolia Water Canada versus retaining the existing service provider (whose 1997 costs have been CPI adjusted to reflect the County's estimated costs if it had continued with their services). Additionally, Veolia Water Canada has been able to mitigate environmental concerns through cost-effective services and then pass those savings onto the County.

In 2004, to meet the changing needs of the two counties, services were separated for each County (Norfolk and Haldimand). During this process, Veolia Water Canada's management provided a seamless transition, realigning our resources and duties and establishing new reporting functions, all while maintaining high-quality service for both counties.

Under a new and now separate contract with Haldimand County, Veolia Water Canada now has O&M responsibility for four wastewater treatment facilities with a combined capacity of 18,628 m<sup>3</sup>/d, four sewage lagoon systems, and 18 lift stations. Additionally, we oversee the land application of up to 400 dry tons per year of biosolids. Our O&M partnership allowed Haldimand County to realize a first-year cost savings of \$1 million (when compared to the previous contractor's service costs), and, since that first year, the County has been able to save an additional \$2.8 million.

Veolia Water Canada's goal has always been to provide high-quality, cost-effective wastewater services for the Haldimand community, and our staff working at this project has completed eight years without a lost-time injury. We have also maintained a solid environmental compliance record, despite the increases in flow. The average monthly influent flow into the County's wastewater facilities over the

last seven years has increased 6 percent at Hagersville, 17 percent at Caledonia, 25 percent at Dunnville, and 29 percent at Cayuga. Along with increased flows, facility influent loadings (total suspended solids and biochemical oxygen demand) have also increased. Indeed, in the last three years alone we have seen a 43 percent increase in total suspended solids at the Caledonia facility, as well as a 37 percent increase at the Dunnville facility. Despite these increases, Veolia Water Canada has maintained a high quality effluent --- with a 96.79 percent compliance rate at these facilities since 1998.

We have maintained our safety and regulatory compliance records for the County's wastewater facilities by staying committed to the health and safety of our employees. A key part of this commitment is in the area of training and ongoing education. In this regard, we hold monthly safety meetings, optimize O&M practices and conduct peer audits by our own Environmental, Health, Safety and Security (EHS&S) teams to ensure our employees work in a safe environment. Veolia Water Canada's employees are also required to stay up-to-date on all applicable regulations, allowing you to feel at ease for not having to navigate the complicated and ever-changing environmental policies and regulations.

Additionally, in times of distress, Veolia Water Canada has provided services to meet the need, including around-the-clock service to minimize the effects of the 2002 ice storm and 2003 power outage on environmental issues. Throughout the 2002 ice storm, our staff worked around-the-clock, logging over 100 hours of overtime, monitoring the treatment process. When the 2003 power outage occurred, we quickly responded by switching to our emergency generators to keep the treatment process functioning until power could be restored.

During the nine years that we have worked as Haldimand County's O&M partner, Veolia Water Canada has managed and implemented capital project work for the upgrade of the Hagersville WPCP, as well as for other elements of their wastewater system.

### **City of Red Deer, Alberta, Canada**

The City of Red Deer (population 80,000) is a vibrant community located halfway between Calgary and Edmonton. With a growing population and increased demand, an existing plant near its capacity and facing new Alberta Environment regulations, the City was planning a costly water treatment plant expansion. Under this approach, an additional clarifier and UV disinfection would be installed in an extension to the existing building.

Seeking other solutions, the Actiflo® process was tested and selected by the City, as its small footprint made it the only process that would allow for a complete retrofit inside one of two existing contact clarifiers all the while increasing the plant capacity by 80 percent (120,000 m<sup>3</sup>/d). Additionally, the process was selected given its performance at removing organic carbon.

In June 2005, heavy rainfall caused the Red Deer River to reach record levels, and turbidity reached extremely high values. Many water treatment plants in the area were forced to reduce treatment capacity in order to maintain treated water quality, but, as Mr. Randy Reaman, the water treatment plant supervisor, explains, the Red Deer plant met the challenge: "During the recent flood event in Red Deer, the treatment plant experienced influent turbidities as high as 3 250 NTU. The Actiflo® clarification system functioned well during this event. Average clarified water turbidity was around 1.75 NTU. Filtered water turbidity averaged about 0.1 NTU throughout the flood event, with filter run times of 24 hours. We were very pleased with the performance of the Actiflo® clarifiers during this event. They are quick to respond to changing conditions and have a range of forgiveness if chemical dosages are not precisely known. Other treatment plants in the Central Alberta area which use solids contact clarification appeared to have more difficulty in maintaining water quality."

## Diablo Grande Development, Patterson, California

Veolia Water is managing and implementing a comprehensive DBO contract for the water treatment facilities for the Western Hills Water District that is delivering water and wastewater facilities for a growing development community in Central California known as Diablo Grande. This project began in 2003 when, seeking consistent and reliable delivery of water treatment and operations services for its new resort community, the district and the developer turned to Veolia Water. What began as a short-term contract for interim support expanded into a full-scale agreement for contract O&M of the existing facilities and the DBO of an expanded surface water treatment plant that will accommodate future growth and anticipated more stringent State treatment requirements.

The planned Diablo Grande development will include: two golf courses; a proposed destination resort with hotel, conference centre; equestrian, swim and tennis centres; residential neighbourhoods; and 40 acres of vineyards and a winery set on 33,000 acres. This is a three-phase project that is focused on accommodating growth and more stringent treatment permitting requirements. The work scope has included providing operations assistance and O&M services, planning, design and construction of new facilities and upgrades to existing systems, as well as potential collections and distribution work.

Veolia Water's original 2003 agreement with the District was for startup assistance and interim operation of a new 0.4-MGD ACTIFLO™/Pressure Filtration Water Treatment Plant and 0.4-MGD wastewater treatment facility. (The ACTIFLO™ treatment system is a Veolia Water proprietary technology.) We provided management oversight for staff, ensuring that all State treatment requirements were met.

This interim assistance project transitioned into a full-service agreement under which Veolia Water assumed O&M responsibility for the water treatment plant and the 4.5-mile finished water distribution system. Until wastewater flows reach a level that requires startup of the treatment plant, we have arranged for a liquid waste hauling service on behalf of our client. Effluent from the treatment process is 100 percent reused through land application to nearby alfalfa fields. Our O&M of the facilities has resulted in 100 percent compliance with California's rigorous water quality regulations.

## City of Arvin, California

Veolia Water performed a DBO project for the City under which our firm also provided project financing. In July 1998, our firm was awarded a 35-year, \$54-million agreement to finance, build, operate and maintain a 2-MGD wastewater plant that expanded the City's small treatment facility.

The Arvin project was driven by the needs of projected growth, as well as the need to upgrade an aging and inadequate infrastructure system. Veolia Water worked with the community to develop an innovative project financing and implementation approach that provided for the fast-track upgrade and expansion of its existing wastewater facilities. The new 2-MGD wastewater treatment plant has expanded the capacity of the existing, smaller treatment facility. This secondary activated sludge facility features mechanical bar screens, grit removal, primary clarification, an Envirex® oxidation ditch for activated sludge treatment, anaerobic digestion, solids thickening beds and effluent retention ponds.

Prior to contracting with Veolia Water, the City was struggling to provide adequate services to its citizens as the result of unprecedented growth, developing housing tracts and the possibility of a new 1,100-bed prison, all of which made the plant expansion urgent. Construction of a wastewater facilities expansion was critical to the City's emergency timeline, which required completion of the entire project within a one-year period. Later, when the prison failed to materialize, plant upgrade plans were modified; however, the plant was designed to easily accommodate future expansion.

Veolia Water worked with City of Arvin to be the first to take advantage of a new State privatization statute (Government Code Section 5956 et. seq.). To further assist the City, Veolia Water provided upfront savings of \$1.7 million to help the City retire outstanding debt.

### U.S. Virgin Islands

In March 2004, the Government of the U.S. Virgin Islands awarded its first-ever DBO contract to Veolia Water for two 4-MGD wastewater treatment facilities to be built on the islands of Saint Thomas and Saint Croix. The contract offers the Virgin Islands a comprehensive long-term solution to the wastewater management needs of the two communities. The design phase lasted 10 months, followed by a 24-month construction period. The contract offers the Virgin Islands a comprehensive long-term solution to its wastewater management needs of the two communities. It also will help the territory meet the requirements of a 1996 agreement with the EPA concerning ocean discharge.

As a part of the design, Veolia Water has responsibility for obtaining all required governmental approvals, from site preparation to environmental compliance. The waters surrounding the islands are some of the most pristine in the world. One of Veolia Water's objectives will be to keep the water at its unspoiled level by treating the wastestream using our proven technology and years of operating expertise.



St. Thomas WWTP



St. Croix WWTP

### City of Wilsonville and Tualatin Valley Water District, Oregon

In 2001, the City of Wilsonville and the Tualatin Valley Water District awarded Veolia Water a contract to operate and maintain their new surface water treatment plant, which was under construction.

Veolia Water helped the City prepare for startup by reviewing overall processes and equipment installation. Our firm had trained staff on-site well in advance of facility startup. Employees were educated on the project's design and process operation. They had ample time to become familiar with the plant and all installations.

City and Valley residents were rewarded by this planning and preparation: Facility startup went smoothly, making an easy transition from groundwater to surface water. Veolia Water staff operated the plant during hydraulic and performance tests. Water quality objectives were exceeded even prior to official plant startup.

Prior to the construction of this new plant, the City had relied on wells for its water supply, which was becoming inadequate for the needs of a growing population and expansion of local industry. In making the decision to move to surface water, the City sought to attain water quality levels that exceeded already strict state and federal standards.

While our own sampling as well as historic testing demonstrated the Willamette River to be a quality water source for this high-profile project, the public remained quite concerned about using river water. The plant features Veolia Water's Actiflo® process, proven superior for treating variable quality raw water. In addition to Actiflo, the treatment process employs deep bed granular activated carbon and ozonation to generate exceptional quality drinking water. The success of the Actiflo® process was a key factor that allowed the City to lift a moratorium it had imposed on new development because of the City's inadequate water supply.

The plant continues to surpass client operational goals and objectives, producing outstanding quality water that looks, smells and tastes good – and is of higher quality than the previous groundwater. Further, local businesses, such as soft drink bottlers and dialysis clinics that must further treat city water to ultra-pure levels for their processes, report that less extensive treatment is now needed to meet their requirements. In fact, the Wilsonville plant and Veolia Water's staff are producing a finished water that is of higher quality than that being produced by other agencies in the region.

Veolia Water, working with the City of Wilsonville, provides frequent tours and educational events to a variety of public and professional groups. Due to the initial concern of using the Willamette River as a raw water source, public education regarding the treatment process and water quality has been a high priority for the entire duration of the project.

Under a separate agreement, Veolia Water provides management consulting services to the City, assisting them in improving and optimizing the City's O&M of its 3-MGD wastewater treatment plant and the associated collection system.

In 2003, the Wilsonville project was Veolia Water's regional and national OPEX award for operational excellence among our mid-sized projects.

### **Glenmore Water Treatment Plant, City of Calgary, Alberta, Canada**

Calgary is one of the fastest growing cities in Canada (population 1,050,000), and the City's Water Services provide drinking water to a variety of customers, including 260,000 residential customers, 20 000 industrial, commercial and institutional customers, as well as customers in the surrounding communities of Airdrie and Chestermere.



The Glenmore Water Treatment Plant draws water from the Elbow River. Because of high turbidity of river water during times of spring runoff, the City was sometimes forced to reduce the plant capacity to preserve drinking water quality. The river has recorded turbidities of more than 1,000 NTU (nephelometric turbidity units) during spring runoff, which caused temporary overload for the existing pretreatment sedimentation basins and filters.

The City's Water Services invested \$200 million in upgrades to its two water treatment plants, Bearspaw and Glenmore. These plants underwent extensive upgrades, aimed at improving the ability to produce high quality drinking water that meets the increasingly stringent regulatory requirements imposed by the federal and provincial regulations. Another important goal of the upgrades is to improve overall plant capacity to ensure they can meet the increasing demand for water in Calgary. After expansion, the Glenmore plant will be capable of producing up to 550 million litres of water per day.

In phase 1 of the Glenmore project, John Meunier will supply four Actiflo® clarifiers with a total capacity of 400,000 m<sup>3</sup>/d. In Phase 2, two additional Actiflo® clarifiers will be installed, bringing the total capacity to 550,000 m<sup>3</sup>/d.