



Delco Water, a division of Delco Automation Inc., has operated as a water and wastewater treatment solution and equipment integrator since 1994. Delco Water has successfully designed and supplied countless treatment technology systems, including plant integration, equipment supply, and automation. Utilizing our unique blend of talented staff with a variety of educational and technical backgrounds, we have realized our vision:

“ Making the world a better place through the use of technology “

THE DELCO ADVANTAGE

- o We support our partners by offering a personal and customized approach to each application
- o Our team is committed to continually exploring improved approaches and technologies
- o We offer turnkey solutions for equipment supply, site commissioning, training, and continued service packages
- o Our framed, pre-wired, or containerized skid solutions offer better quality control and lower construction costs
- o We utilize Delco Automation’s customizable control system package: the advanced **HydraMAX**
- o We maintain a dedicated piloting services group, flexible for various configurations and site setups



REVERSE OSMOSIS & NANOFILTRATION

These are pressure-driven separation processes with a semi-permeable spiral-wound membrane barrier to remove dissolved constituents. Reverse Osmosis membranes are ideal for brackish water sources removing substances such as salt, trace metal ions, and total dissolved solids. Nanofiltration technology is best suited for higher quality sources removing substances such as hardness, multivalent ions, colour, and dissolved organics.

KEY PRODUCT FEATURES

Custom system engineering unique to each project

- o Flux optimization, hybrid arrays, targeted water quality
- o Skid footprint flexibility
- o Reduction in system operation costs
- o Standard clean-in-place system (on or off membrane skid)

Partnerships with multiple leading manufacturers

- o Membrane options for performance and chemical tolerance
- o Wide array of automation and instrumentation options
- o Competitive pricing and warranty terms

HydraMAX control system

- o Real-time system health metrics with online access
- o Integrated functions and modes based on best industry practice
- o Measures key performance indicators for maintenance action
- o Removes guess work for operators



**Thompson, Manitoba
Regional Airport Authority**
13.5 USgpm (0.85 L/s) per train
81.5 – 126 psi (562 – 868 kPa)



**Melville, Saskatchewan
SaskWater**
380 USgpm (24 L/s) per train
129 – 194 psi (889 – 1337 kPa)

“ Delco’s methods have provided us with excellent results so far, surpassing projections made during plant design. Their service team is very experienced and confident in providing the best results for our plant. Their automation system for our distribution pumps has saved us 41% in power consumption since our upgrade. ”

- Water Treatment Supervisor

ULTRAFILTRATION

Ultrafiltration is Ideal for removing substances such as bacteria, viruses, suspended solids, colloids and pathogens. Delco Water often utilizes ultrafiltration specifically to reduce turbidity and achieve desired log removal credits for Cryptosporidium and Giardia.

KEY PRODUCT FEATURES

Strategic partnerships with major membrane vendors

- o Robust cleaning, sustainable flux, regulatory approvals
- o Extensive installation history
- o Various flow configuration options

Instrumentation features

- o Flow / pressure / temperature (standard)
- o Site specific analytical options

FiltraMAX control system

- o Fully automatic process control options including:
 - Chemically enhanced backwashing
 - Clean-in-place
 - Direct integrity testing - online log removal value
- o Dual stage alarming for integrity issues and shutdown
- o Optimized cleaning and maintenance cycles



Pauingassi First Nation, Manitoba
90 USgpm (4.73 L/s) per train

See table below for sample water quality



Northern Village of Buffalo Narrows, Saskatchewan
330 USgpm (17.35 L/s) per train

Parameter of Interest	Raw Water	Permeate
Iron	0.69 mg/L	0.0047 mg/L
Manganese	0.033 mg/L	0.0021 mg/L
Arsenic	0.000502 mg/L	0.000183 mg/L
TOC	8.39 mg/L	1.0 mg/L
Hardness	77.0 mg/L	55.5 mg/L
Ammonia	< 0.10 mg/L	< 0.10 mg/L
Turbidity	0.3 – 7.2 NTU	0.1 NTU
Colour	9 CU	< 3 CU

BIOLOGICAL FILTRATION

Delco Water biological treatment technologies, known as BioF_x, are unique designs tailored to North America's cold environments. The BioF_x solutions are environment-friendly technologies with zero chemical consumption, minimal waste production and can be applied at any scale.

KEY PRODUCT FEATURES

Robust treatment technology

- o Delco Water BioF_x targets: **Fe, Mn, NH₄⁺, and As**
- o Significant waste reduction due to low backwash frequency
- o Minimal chemical consumption

Delco Water designed and developed innovation

- o Effective performance at low water temperatures (<5 °C)
- o Modular design adapting to different water source/chemistry
- o Ability to convert existing media filter set-ups to a biological process
- o Continuous R&D implementing innovations and applications
- o Automated control requiring minimal supervision

Advantages when utilized as pre-treatment for RO/NF applications

- o Extends membrane life expectancy
- o Reduces inorganic and biomass fouling
- o Reduces frequency of membrane CIP cleaning

Opportunities as a stand-alone treatment process

- o Applicable to low TDS groundwater sources (TDS<500 mg/L)
- o Basic automated process can be directly coupled to distribution
- o Economical option for small, remote communities while still providing a robust system with easy-to-maintain operations



Montreal Lake Cree Nation
160.0 USgpm (10.1 lps) per train

See table below for sample water quality

Parameter of Interest	Raw Water	Permeate
Iron	4.3 mg/L	0.010 mg/L
Manganese	0.376 mg/L	< 0.0010 mg/L
Arsenic	8.4 ug/L	0.000182 mg/L
TOC	4.96 mg/L	1.70 mg/L
DOC	4.94 mg/L	1.25 mg/L
TDS	1002 mg/L	87 mg/L
Ammonia	0.95 mg/L	< 0.10 mg/L
pH	7.9	6.8



Duck Mountain Provincial Park
100 USgpm (6.31 L/s) per train

Delco Water's NanoFX process utilizes Pentair's X-Flow HFW1000 module, a hollow-fibre crossflow membrane module. The HFW1000 is a chlorine tolerant nanofiltration module, ideally suited for the treatment of surface water with excess amounts of dissolved organic carbon.

KEY PRODUCT FEATURES

Integral development agreement with Pentair

- o Fibres can be cleaned with chlorine to inhibit biological growth
- o Conservative design flux for sustainable operation
- o Has been tested in harsh & cold climates

NanoMax control system

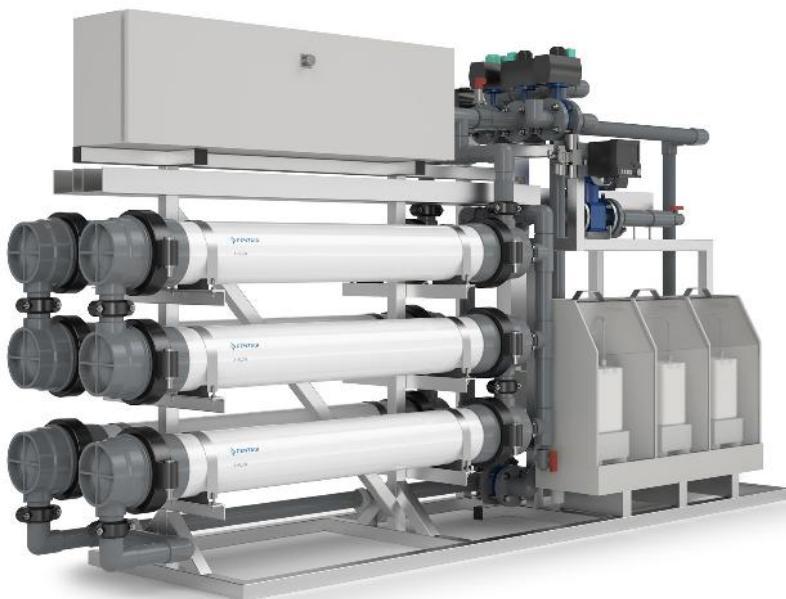
- o Fully automatic process control including:
 - Chemically enhanced cleaning
 - Direct integrity testing - online log removal value
- o Variable speed feed & cross-flow pump control
- o Scalable to multiple trains

Process advantages

- o Qualifies for log removal credits for surface water treatment
- o Built standard with pre-filtration automatic strainers
- o Skid-based and plant-integrated options
- o NanoFx has the capability to replace a UF + NF process



Pentair's HFW1000 Membrane
Specializing in Nanofiltration



" ... Delco Water's expertise, including their technical knowledge, automation capabilities, project management and service teams played a pivotal role in working with [us] to expedite all aspects of project delivery to ensure completion of the project on schedule, thus putting an end to a drinking water advisory for the community that had been in place since September 2014. "

- Director of Water and Wastewater

MEDIA FILTRATION

Media filtration is a water treatment process that uses granular material to remove impurities. Media filtration also aids in removing biological matter such as bacteria, algae, protozoa and other pathogenic micro-organisms. Filtration efficiency, backwashing, media replacement, media regeneration requirements, and filtration performance monitoring are all considered when identifying the applicable media filtration option.

KEY PRODUCT FEATURES

Delco Water offers a wide variety of media filtration

- o Granular Media
- o Catalytic Media
- o Ceramic Media
- o Adsorptive Media
- o Ion Exchange

Comprehensive project integration

- o The control and automation of the media filtration can be:
 - Standalone
 - Integrated to the larger treatment system
- o Convenient and cost friendly installation
 - Equipment can be supplied loose for site install
 - Option for vessels to come complete with frame and face piping for lower onsite construction costs
- o Strategic industry partners to source products for the application

Targeted water parameters include, but not limited to:

- | | | | |
|------------|-------------|------------------|------------|
| o Arsenic | o Hardness | o Organic carbon | o Iron |
| o Chlorine | o Manganese | o Turbidity | o Fluoride |



Duck Mountain Provincial Park
100 USgpm (6.31 L/s) per train



Filtralite® - A highly porous engineered ceramic media



Battlefords Provincial Park
50 USgpm (3.15 L/s) per Greensand filter

PILOTING AND FIELD SERVICE

Effective predictive and preventative maintenance activities are essential elements in the smooth operation of any water treatment facility. Piloting helps ensure the best value from your initial capital investment. Ongoing and productive plant maintenance can prevent costly and disruptive emergency outages, reduce costs and maximize operational efficiencies, and optimize the quality of your treated water.

PILOTING SERVICES

Establish project design basis

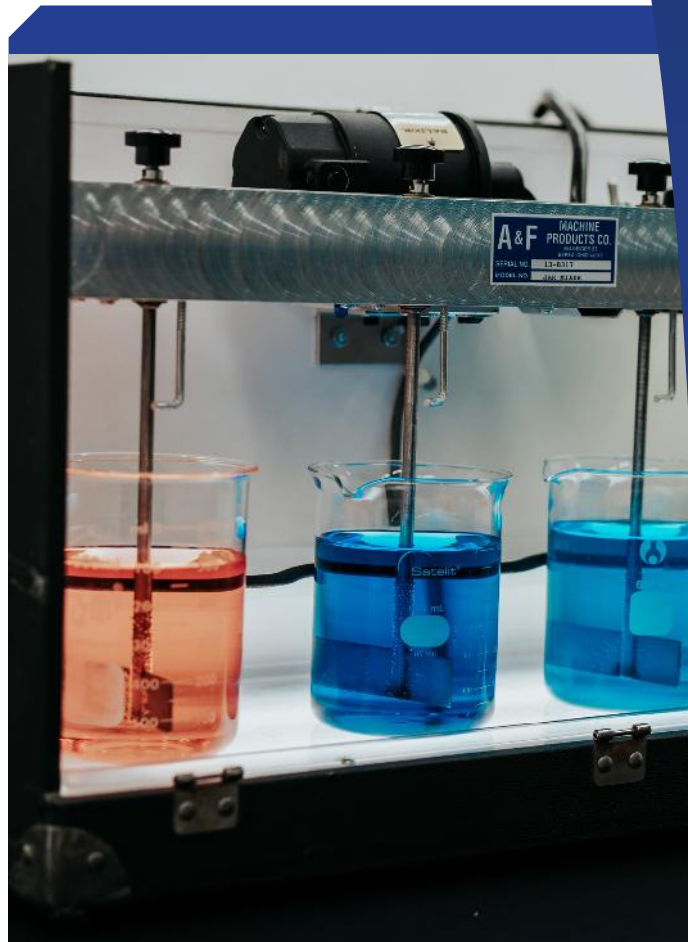
- o Determines the water quality capable of being produced
- o Establish cleaning and backwash requirements
- o Define design constraints and parameters
 - Process type
 - Membrane type
 - Height of media
 - Flux rate

Process configurations for simulating full scale operation

- o Equipment available for chemical optimization studies
- o A wide array of options available:
 - Reverse Osmosis & Nanofiltration
 - Ultrafiltration
 - Biological Filtration, Media Filtration, and more

Client collaboration

- o Fluid pilot goals and objectives
- o Site training and involvement in process
- o Regular Process trending from data acquisition



FIELD SERVICE & SUPPORT

Some of Delco Water's services include:

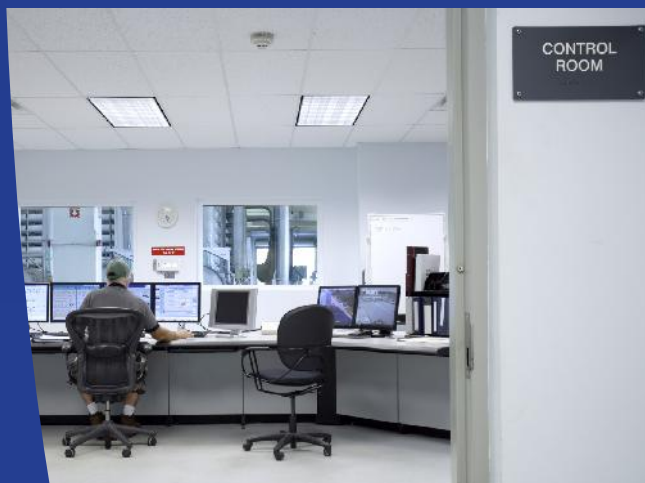
- o 24/7 emergency response
- o Scheduled visits for cleanings & instrumentation calibration
- o A comprehensive inspection and testing routine
- o Operator training and maintenance manuals
- o Cleaning studies
- o CIP cleaning and backwash support
- o Membrane replacement and autopsy
- o Equipment repairs
- o Secure remote monitoring of all key operating parameters



Ultrafiltration Pilot Plant

AUTOMATION

Delco Water is a division of Delco Automation with a shared headquarters and manufacturing facility. Delco Automation is an engineering, system integration, manufacturing and field service company specializing in process control and information systems, and has provided the automation integration scope for over a thousand of water treatment plants since 1995, and has the expertise to be able to meet any requested project specification.



KEY AUTOMATION BENEFITS

Process Specific Programs - **FiltraMAX & HydraMAX**

- o Fully automated processes for increased MTU functionality
- o Designed for ease of operation
- o Predictive and pro-active maintenance recommendations
- o Increases membrane efficiency and overall life expectancy

A system integrator for the entirety of the plant

- o Focus on the most cost-effective products for the client
- o Ability to customize any portion of the control system
- o Reducing the complexity of contractor arrangements on site
- o Better controlled project schedule and cost

High Performance HMI's

- o Interacting with the HMI creates intuitive system standards
 - Increases efficient decision making
- o Enables situational awareness of high-level system performance
- o Restricted use of color under normal operating conditions
- o Mitigates potential confusion or instances of color blindness
- o Use color during abnormal, warning, or critical alarm scenarios
 - Captures operators attention to investigate issues

Enhance the system with **Delco Security's** technologies

- o Credential Access Control
 - Authorized personnel are permitted and tracked
- o IP Video verification of systems to visually verify alarms
- o Administration and 24-7 monitoring of alarms and video
- o Roll Call and Visitor Management
- o Advanced deep learning analytics to highlight anomaly
- o Real Time Locating products and services
- o Man Down, work alone and safety products and services
- o Emergency Mass Notification Systems
 - Indoor, Outdoor, and by your side
- o Full Unification with existing Delco and 3rd party systems for one single pane of glass operation

ANCILLARY EQUIPMENT

Delco Water offers a comprehensive list of water treatment equipment. We offer replacement parts for virtually any water treatment plant by any manufacturer and can supply media, valves, meters, and control panels for any system. Containerized systems are applicable where building space is limited, the need is temporary, or portability is required.

KEY ANCILLARY EQUIPMENT

Containerized Systems & Rental Units

- o Available in a variety lengths for any application
- o Made with convenience; portable, relocatable, and winterized
- o Highly cost efficient
- o Factory tested to ensure quick start-up times
- o Turn-key system with internal plumbing and wiring completed
- o Customizable aesthetics to fit your preference
- o Wide array of process technologies for rent
- o Rentals available on a monthly, bi-annually, or yearly basis



Containerized Systems

Calcite Contactor Systems

- o Limestone/calcite contactors
 - Adds hardness back into water
 - Beneficial add-on to processes such as RO
- o PVC and FRP construction for maximum corrosion prevention
- o Custom hopper for even distribution of added limestone
- o Other options for media contactors include:
 - Corosex
 - Magox



Calcite Contactor

Chemical Panels

- o Premium Grundfos dosing pumps as standard
- o Multi-function valve to control pump outlet pressure
- o Calibration column used to verify dose rate
- o Isolation valves simplify pump calibration
- o Can be equipped with pressure gauges

Membrane Degasifiers

- o Minimizes OPEX costs due to low pH/alkalinity
- o Modular design offering expansion for future capacity
- o Custom selected maximum efficient vacuum pump
- o Small footprint & low installation costs
- o Simple operation for reduced maintenance requirements
- o Environmentally friendly and safe for employees



Membrane Degasifier



a Division of Delco Automation

Delco Water is a division of Delco Automation Inc. and has operated as a water treatment solution provider and equipment integrator since 1994. Delco, as a whole, currently employs over 215 employees across Canada. Delco Water has over 55 employees with a variety of educational and technical backgrounds including, but not limited to: electrical, mechanical, chemical, environmental, and civil engineers; CAD, mechanical, water resources, and instrumentation technologists; certified operators, journeyman plumbers, and pipefitters. It is Delco's unique blend of passionate and talented staff that has helped us realize our vision:

“Making the world a better place through the use of technology”.



Delco Water is a premier water treatment solutions provider in North America and currently has a significant number of installed and operating water treatment plants across the continent. Our organization offers a large line of technologies including reverse osmosis (RO), nano-filtration (NF), and ultra-filtration (UF) membrane units for treatment of surface or well water applications as well as moving bed biofilm reactors (MBBR) and membrane bioreactors (MBR) for treatment of wastewater. We also offer a line of non-membrane related products, such as conventional manganese greensand filtration, calcite contactors, containerized systems, and our in-house developed biological filtration system. It is through our strong commitment in Research and Development that Delco has gained the reputation as a leading Canadian technology innovator.



Delco has recently moved into our new 90,000 sq. ft. engineering and manufacturing facility, located in Saskatoon, Saskatchewan, which also includes a training facility, multiple research and development labs, as well as our Center of Excellence (currently under construction). Our Center of Excellence will be our command center that allows us to monitor, troubleshoot, and operate remotely, many of the systems that we design and manufacture. This allows us to provide our customer with unrivalled support through the life of the system.

Delco Water is proud to say that our designs are completely customized to the specific needs of the client. We understand that each community, municipality, or company has unique water quality demands and concerns that require tailored treatment solutions. This customized approach has allowed us to design, manufacture, commission, and service innovative water and wastewater treatment equipment throughout North America, resulting in safe drinking water for countless industrial and commercial end users as well as municipalities and First Nation communities.
