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**of the Northern Territories
Water and Waste Association**

September 2013

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artisan, also artisan:

1. A skilled (esp.) manual worker; a craftsman
2. A person who practices or cultivates art



Editor's Notes

KEN JOHNSON

This ninth installment of the *NTWWA Journal* offers some broad perspectives on the past, present and future of drinking water in the north. I am particularly pleased to include an historical perspective on northern water and sanitation from Don Stanley, that he presented in 1958 (the year I was born). I stumbled upon this article in the bound proceedings of the National Northern Development Conference. It is interesting to note that as much as things have changed in the north over the past 55 years, the fundamental challenges still remain the same

– for example, planners and engineers still don't get along (LOL).

The technology being applied to water treatment is continuing increase throughout the communities of the north, and with this increase in technology, it is good to see that the operators are increasing their voice through the *Journal* and the NTWWA conference. Many thanks to Alan Harris for his article on Fort Laird, and Jean Soucy for his article on Fort Smith; Jean's article is particularly interesting because it provides an update

to a *Journal* article he wrote in 2005.

My soapbox for this edition of the *Journal* is an article on the Ecojustice report card for the north; a presentation I made at the 2012 Yellowknife conference articulated the general flaws in this report, which "struck a chord" with several communities attending the conference. I have added to this presentation, and an article I wrote for the *Western Canada Water* magazine, with information on the consequences this broad brush report had on the City of Iqaluit, and the GNWT. 💧

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The two-day Operators Workshop will take place on Monday, November 25th and Tuesday, November 26th, also at the Cadet Hall.

We are also planning for the 2013 Great Northern Drinking Water Challenge.

The conference will feature exhibits with many companies, products and services, as well as product representatives who know what works in the north.

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MAJOR WATER TREATMENT IMPROVEMENTS FOR YELLOWKNIFE, NWT

The City of Yellowknife is nearing the anticipated commencement of construction of a new, potable Water Treatment Plant (WTP), a process that started over ten years ago in 2002. Originally the city drew its water from Yellowknife Bay. At that time there were concerns with arsenic in the water column due to the ore processing techniques at both Giant and Con mines, and concerns with the discharge of sewage from Niven Lake into Back Bay. To address these concerns, the City, in conjunction with the federal government, constructed the current Yellowknife River water intake and pumphouse, and underwater pipeline

in 1969. Since this time, the city has drawn raw water from the Yellowknife River and provides simple chlorination as the only form of treatment on the source.

The City has had growing concerns over seasonal turbidity spiking in the river and is therefore in the process of considering the alternatives available to them either for enhanced treatment of the river source, or switching back to the bay source, or both. The main water quality concerns posed by either source are predominantly due to the aesthetics of increased turbidity during spring runoff (See Figure 1), and the interference this imposes upon the

achievement of effective disinfection. A lesser concern at this time, although one which the city considers a potential risk, is the level of arsenic in the lake source water. Since the 1960s, the Con mine switched to an Autoclave gold extraction process and recently shut down entirely, and the Giant mine shut down eliminating the original sources of arsenic contamination. Presently, raw water arsenic levels are well below present and anticipated future regulatory targets, and given maintenance of the status quo are not expected to increase.

The City retained AECOM in 2002 to conduct an analysis of raw water quality and proceed with a pilot treatment plant process to determine which technology would best meet the needs of the city. Two main candidate process trains were considered viable:

- “Conventional” treatment, based upon granular media filtration. For a source of low turbidity year round (even during spiking events, raw water turbidity rarely exceeds 10 NTU), it was considered that so-called direct filtration was a suitable treatment alternative, i.e. coagulation-flocculation-granular media filtration, with no clarification pre-treatment.



FIGURE 1. Sediment in the flow of the Yellowknife River periodically occurs and the new water treatment plant has the capability of removing it.

By Chris Greencorn,
Director of Public Works and Engineering, City of Yellowknife

**YELLOWKNIFE
NORTHWEST TERRITORIES**

- Membrane filtration – use of low pressure micro- or ultra-filtration membranes for filtration of the water. Such membranes, composed of engineered polymeric fibres with tightly defined pore sizes, act as a physical barrier to the passage of particulate matter and pathogens, and can achieve a high degree of treatment in a single stage, often without any pre-treatment (under good raw water quality conditions).

A preliminary design report was completed to evaluate feasible options for water supply, including water treatment processes and raw water source, to provide a basis for future design. Using the population growth trend and historical water consumption of the city, it has been determined that the new WTP will require a capacity of 20 ML/d to meet the projected maximum daily demand for the next 20 years (to 2029). This capacity was made on the basis of using the existing service water reservoirs to address the predicted peak hourly flows of 30 ML/d. Recommended water quality objectives for the city's new WTP were created based on present Guidelines for Canadian Drinking Water Quality (GCDWQ), that were accepted as legislation by the Government of the Northwest Territories in 2009, as well as several drinking water regulations promulgated by the U.S. Environmental Protection Agency (USEPA).

The report concluded, based upon the future population growth, tightening of water supply regulations and the overall operational and economic benefit of each option, that the application of a membrane filtration system is the best fit with regards to water treatment for the City of Yellowknife. With the application of Yellowknife Bay as the raw water source, the option to provide arsenic treatment is advisable and must be included in the subsequent design steps. However, after public consultation, the decision was made to retain the Yellowknife River as the city's water source. With

all these decisions in place, the detailed design commenced along with the membrane plant manufacturer selection process.

The decision was made to select and pre-approve a membrane plant manufacturer prior to the completion of the final

design and tendering of the project. The City issued a request for proposals for the membrane selection in 2012, and PALL Canada was chosen as the successful candidate. Through a novation agreement, the successful general contractor for the



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YELLOWKNIFE NORTHWEST TERRITORIES

FIGURE 2. The site of the new water treatment plant is along the shore of Yellowknife Bay between an existing pumphouse (on the left) and an existing reservoir (on the right).



project will have shop drawings and details already complete for the membrane plant, they will simply need to notify PALL when to start production of the membrane plant. This also allowed a custom design of the water treatment plant build around the details of the PALL treatment system. It is anticipated that this process will greatly reduce construction change orders due to an unknown element such as the membrane treatment process.

The detailed design process was completed in May 2013, with the new wa-

ter treatment being located adjacent to the existing water reservoirs at the Pump-house #1 site along Great Slake Lake. Parts of Pumphouse #1 and the reservoir will be incorporated into the new plant.

The construction tenders closed on July 10, 2013, and three tenders were received on the project, with the lowest tender from Ontario-based NAC Contractors Ltd. for a total amount of \$30,280,950. Two Northern companies bid for the contract, including Det'on Cho Nahanni Construction Ltd. and Clarke Builders, which put in

bids of \$30,978,876 and \$31,153,755 respectively. The City of Yellowknife has officially awarded the contract to NAC contractors, and the project is scheduled to be completed in 2015.

It will be the first, large scale, water treatment plant in the Northwest Territories, equipped with a training room where the City of Yellowknife hopes to be a community partner in training new treatment plant operators from communities across the north. 💧



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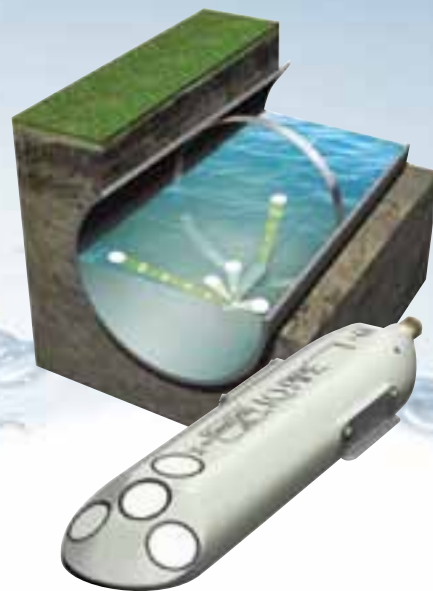
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EMERGENCY WATER SUPPLY SYSTEM FOR ARVIAT, NUNAVUT

Introduction

Arviat (population 2,318) is located on the western shore of Hudson Bay in the Kivalliq Region of Nunavut. Arviat is the southernmost community on the Nunavut mainland and is close to the geographical centre of Canada.

Wolf Creek is the seasonal community drinking water supply for Arviat, and raw water is pumped from the creek into two clay-lined open reservoirs, which provide over winter storage. In the winter of 2010, a leak in the larger of the two reservoirs was detected; however, the cause of the leakage could not be determined because of the ice cover on the reservoir and, therefore, water continued to leak from the reservoir. Given the rate at which water was leaking, and the anticipated water use, it was estimated that there was only sufficient water to last until the middle of May 2011. This would be too early in the season to refill the reservoirs; therefore, an alternate drinking water source was required for the community.

Initially the use of three nearby fresh water sources was evaluated; however, none of these offered a reliable solution. A fourth option was ultimately chosen, which was to use reverse osmosis (RO) to treat sea water from the Hudson's Bay. The decision to implement a RO system was made in March 2011, which allowed only two months for the system to be designed, procured and constructed before the reservoirs were forecast to be empty. Typically a system of this complexity would take over a year to design, procure and construct.

Design and Procurement of RO System

The design criteria for the treatment system included an operating capacity of 5 L/s, which provided enough water for the hamlet with a 14-hour daily operation of the system. Raw water would be continuously pumped from the Hudson's Bay and recirculated back to provide freeze protection for the supply line. Raw water was to be filtered prior to the RO system to prevent any particles from damaging the RO membranes, and filtered water

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By Nisa Jayathilake,
Stantec Consulting Ltd., Edmonton



was to be stored in a tank upstream of the RO system to ensure consistent flow. Sodium carbonate was to be added for pH adjustment post-RO and to help stabilize the alkalinity of the water, and secondary disinfection was to be achieved through the addition of calcium hypochlorite. Treated water was to be stored in tanks to provide contact time for disinfection and to allow lag time between delivery truck arrivals. RO reject was to be discharged back into the Hudson's Bay to allow for dilution in the bay. The RO system would be modularized so that it could be used in the future for other emergency water supply applications in Nunavut.

In discussions with potential suppliers, it was determined that the timeline to design, manufacture and ship a RO unit would take up to 16 weeks, well beyond the time available to the community with the existing water supply. Therefore, a search was completed by contacting suppliers to source available RO units. Two proposals for the supply of an RO system were received and evaluated. It appeared that both proposals were for the same RO system located in storage in Reno, Nevada. Both suppliers proposed to purchase the RO system from a third party and refurbish the system if needed.

The available RO system consisted of two skid-mounted trains of RO seawater membranes, and it also included a RO feed pump, PLC control panels, a cartridge pre-filtration system, treated flush system, instrumentation, anti-scalant system and a clean in place system (See Figure 1). The production capacity of



FIGURE 1. Skid mounted reverse osmosis membrane for Arviat.

the available RO system was substantially higher than what was specified (360 L/min versus 262 L/min); therefore, the associated pumping system had to be redesigned to accommodate a higher flow rate.

The supplier intended to first visually inspect the RO system in Reno in order to identify possible equipment that may need to be refurbished. This would allow time to procure parts while the RO system was shipped from Reno to Canada. After testing, the need for new membranes could be determined.

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The unit was prepared for mobilization to another location that would enable future deployment as an emergency water treatment system.

FIGURE 2. Sprung structure for sheltering RO system in Arviat.

Knowing the expected flow rates and rejection rates, associated pumps and chemical feed systems were sized. The increased effluent flow rate altered the required volume for the effluent storage tanks, designed to provide 12 mg/L/min of contact time. Coordination was crucial to the procurement of a temporary structure to house the treatment system, and the building footprint remained in a state of continuing revision as more information on the RO units and process tanks was received; a sprung structure was finally sized and mobilized to Arviat (See Figure 2).

Environmental Considerations

The raw water intake line and screened intake structure were designed to be the maximum practical size in order to decrease the raw water intake velocity, which would reduce the hydrodynamic effects of the intake. The screened intake was located at an elevation high enough above the sea floor to prevent hydrodynamic scouring of the marine sediments by supporting the pumping system with a floating structure. A stainless steel screen was

used on the intake line to prevent entrainment of small-bodied fish or other similar-sized marine biota.

The RO reject discharge of the system was designed to minimize the negative impacts of introducing this waste stream into the environment, and a multipart diffuser was used to minimize localized discharge velocities. The diffuser helped to reduce the hydrodynamic impact of the discharge, as well as help to disperse the salt load in the Hudson's Bay. The salt concentration was not considered to be a significant environmental issue as the percent recovery of the RO system was only 45%; therefore, the salt concentration of the reject was about twice as high as the original seawater.

Delivery and Commissioning

Transportation in and out of Arviat is limited to year-round air transport and seasonal marine transport. With project delivery timeline, a marine delivery of the system was not possible; therefore an airlift would be required. All of the system



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FIGURE 3. Floating intake for RO system in Arviat.

components were reviewed to ensure conformity to the size and weight limitation of airlift mobilization. A total of seven charters, using a Hercules C130 aircraft, were required to deliver all the material required for the RO system.

Due to reduced consumption rates by the residents of Arviat and the early seasonal availability of Wolf Creek, the RO system was not required within the original May timeframe. The system was ultimately commissioned onsite in August 2011. The floating raw water pump operated well with changing tides and wave direction (See Figure 3). After commissioning of the system, the unit was prepared for mobilization to another location that would enable future deployment as an emergency water treatment system to other Nunavut communities. 💧

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A perspective for the north that should be offered ... should be one of relative improvement not absolute performance.

NORTHERN WATER – TREATING IT WITH CONTEXT

In November, 2011 The City of Iqaluit issued Public Service Announcement (PSA), which quite simply said that the city's water is "completely safe to drink". One would imagine that this PSA was the result of some particular local public health issue, but this was not the case. This issue was created by the Vancouver-based environmental watchdog group Ecojustice, which generated an overall grade for the water protection systems in each province and territory. Nunavut's water protection systems were given a "D" grade, which by association translated into a "D" grade for Iqaluit as well.

The PSA from the City also stated that Iqaluit has a fully operational treatment plant, and drinking water is tested for bacteria

and other contaminants on a daily basis. As well, monthly samples are submitted to the territorial public health agency for testing.

The end result for the City of Iqaluit of this broad brush evaluation was that it created a significant issue for residents of Iqaluit and a necessary response by the City of Iqaluit.

The Northwest Territories fared somewhat better in the grading, as it was given a "C" for its job at safeguarding residents' drinking water. The "C" grade for the NWT represents a drop since the last Ecojustice report 2006 – when the territory received a C+ – and ranks the NWT 10th nationwide, ahead of just Alberta, the Yukon and Nunavut. According to the Ecojustice report "Waterproof

3", the Northwest Territories received a "C" because, while it has begun to develop source water protection plans and improve its water treatment and testing standards, the territory dropped a requirement that water be tested at certified laboratories.

The GNWT's Department of Municipal and Community Affairs stated that the grade doesn't reflect the reality in the NWT. In particular, the grade does not reflect the tremendous effort over the past half dozen years that the GNWT has put into the roll out of water treatment systems for each and every community in the NWT (see article in *NTWWA Journal* 2010).

The national drinking water report card is the third such report released by Ecojustice. Previous reports were released in 2006 and 2001. The Ecojustice report assigns grades based on a variety of criteria, including water policies, programs, legislation, treatment and testing requirements, source water protection, transparency and accountability.

The report highlighted that Nunavut has no source water protection in place and its drinking water standards are among the lowest in Canada, which are fair comments in the context of the rest of Canada. Digging deeper into the report provides a sense that Ecojustice lacks an understanding of the Canadian north and Nunavut itself. While source water protection is an important objective for water quality everywhere, it may not have complete relevance to Nunavut given the ongoing challenges with social



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Senior Planner and Engineer, Stantec Consulting Ltd., Edmonton

NORTHERN WATER

science issues at all levels of government. Social science is a term used to describe all the other “stuff” including administrative, financial and human resources associated with community infrastructure in the north, outside the pure science and the applied science (engineering). While source protection is not explicit in Nunavut legislation, water supply is a notable part of the community planning documentation, and the source of community water is usually delineated in the community plan. In a practical sense, the land use identification of a water supply may be considered to be an equivalent to source water protection.

The water regulations under the Nunavut Health Act reflect a 20-year-old regulatory regime and do not reflect the current Guidelines for Canadian Drinking Water

Quality (GCDWQ). In practical terms, it may not be appropriate for Nunavut to aspire to this benchmark at this particular time given the relatively pristine water supplies that are generally available to communities. Southern Canada still fails to some degree to acknowledge the challenges that geography, climate and culture pose to Nunavut and to a lesser degree to the Northwest Territories and the Yukon. For example, water is an abundant resource in Nunavut except for the simple fact that it remains frozen for over eight months of the year. Water supply must contend with the fact that Nunavut is essentially a desert when the amount of precipitation is considered. Water storage must contend with either heating/insulating the supply for temperatures of -40 C, or making allowances for ice accumulations

of upward of two metres. Water delivery must contend with the fact that trucks are the primary means of delivering water to households (with the exception of the communities of Iqaluit and Rankin Inlet).

A perspective for the north that should be offered in the Waterproof document should be one of relative improvement, not absolute performance. A mere 25 years ago, minimum water use standards of 90 litres per person per day had just become a policy of the Government of the Northwest Territories. This policy initiated a concerted effort to provide consistent and adequate potable water supplies for each community, as well as indoor plumbing to each household in the community. Water in the far north should be treated within the context of the far north. 💧

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FORT SMITH, NWT STRUGGLES AND SUCCEEDS WITH WATER FILTRATION

In 1993, a new water treatment facility was constructed to supply the Town of Fort Smith with many years of good potable water. This treatment facility has continued to produce very good water quality in spite of some filtration challenges and a source water supply that is anything but splendid (reference article "Treating High Raw Water Turbidity in Fort Smith, NT" in NTWWA Journal, 2005), with seasonal turbidities that peak at 5,000 NTU. This sediment load requires pre-treatment through sedimentation ponds, which are periodically cleaned during this annual period of the plant operation (See Figure 1).



FIGURE 1. Washing down of pre-treatment settling ponds in Fort Smith to deal with turbidity spikes of 5000 NTU.

The facility is a Level III conventional water treatment facility with a maximum designed capacity of 2,000 cubic metres per day, including pre-settlement, solids contact clarifier, two dual-media gravity filters (with available room for third filter), gas chlorination, water softening and fluoridation. This facility has experienced a fair amount of filter breakdowns in its 20 years of operation; these systems are normally relatively free of such mechanical failure for at least 20 to 25 years.

The construction of the water plant clarifier, filters, clear well and waste tanks were all originally constructed from epoxy-coated steel, with cathodic protection on all exterior tanks. The interior

clarifier and filter steel tanks did not have any corrosion control or protection, and as a result it was observed very early after plant commissioning that a fair amount of corrosion was occurring in the two filters. Although some effort to repair all visible corrosion spots were made with some form of epoxy coating, it was understood that due to the retention of only two filters it was almost impossible to disassemble one filter for repairs and operate with the other and not affect water quality. It was expected that the lower interior walls and tank floor would continue to corrode and eventually corrode through at some point 10 to 15 years down the road from the original commissioning.

In 2008, the first leak became evident, and a quick repair was completed to put this filter back online. This began the long tedious journey which produced a commonly used phrase by the Ft Smith water plant operators, "What is the problem with these filters this time." The Fort Smith filtration process went from the envy of others to the root of all evil.

In order to proceed with the repairs, the tender, and construction of a third filter was required in order to accommodate a complete shutdown repair of the other filters. This time the new filter was fabricated using (304) stainless steel, which addressed any future corrosion problems (See Figure 2).



FIGURE 2. New stainless steel filter unit to be installed at Fort Smith water treatment plant.

By Jean Soucy,
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(Formerly with the Town of Fort Smith)



Once the third filter was installed, repairs of the other two filters could commence. First, the filter under drain was removed, cleaned and prepped for reinstallation. The single greatest portion of this filter repair work consisted of sand blasting and recoating the tanks with a 6-8 mil epoxy coating. The original stainless steel under drain laterals were then reinstalled using new anchor bolts and a top plate, and sacrificial anodes were installed to minimize any future corrosion. These filters all received new sand and anthracite to approximately one metre in depth, as well as a new air scour system, including all supporting mechanical, electronics and online turbidity analysers.

In 2012, as a backwash was in progress, the operator noted a significant crater within filter #1, in addition to a spike in turbidity levels from the normal levels of .07 NTU to .30 NTU. Upon further investigation it was found that this filter's under-drain top plate and some anchor points had failed due to improper installation and gasket failure. The result was filter media break through, which left media trapped within the under drain. When the air scour and backwash systems were activated, the trapped media destroyed the protective under-drain screens.

A problem became evident that over 200 screens per filter needed replacement, but this option was not very practical. A more permanent and prompt solution was essential as two of the three filters were damaged. After some research, the Phoenix under drain laterals designed by AWI seemed to be the appropriate answer to the problem (See Figure 3). This system is readily adaptable to any filter size, shape and dimension; however, the single most important benefit to this system is the one-piece design, which significantly reinforces the entire structure and provides a more permanent seal bond to the tank floor. As well, with the louvered strainer assembly, there is no chance of strainer failure, even if some of the filter media makes it past the strainers.





FIGURE 3. New stainless steel Phoenix under drain at Fort Smith water treatment plant.

Along with the installation of two new filter under drain laterals, the drive pulleys on the air scour fan motor were also changed. This conversion reduced the air flow volume and pressure by 40%, as it was apparent the air scour was originally over designed as part of the work in 2008. This change optimized the air scour process by reducing air pressure on the laterals during air scour, which would ultimately extend the life of the filter media.

After completion of the work, a more comprehensive filter surveillance program was also adopted to optimize over all filtration, and extend the filter life cycle. Backwash flow rates, as well as under-drain pressures before, during and after backwash, are now monitored to better understand and enhance filter performance. In addition, more elaborate and frequent filter media quantity measurements are made.

The Town of Fort Smith Water Treatment Facility has experienced a fair share of problems and struggles with water filtration during the last 20 years or so. However, the future looks clearly promising with the recent improvements and we look forward to providing many years of good quality water to the residents of Fort Smith for years to come. 💧



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BAKER LAKE
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BAKER LAKE, NUNAVUT - WATER TREATMENT INITIATIVE

Baker Lake, Nunavut is the only inland Inuit community in Nunavut located on the shores of a freshwater lake rather than the ocean. Baker Lake has approximately 1,900 permanent residents; however, visitors and construction workers can add up to another 1,000 people during the summer months. The drinking water supply is surface water from a lake that bears the same name as the community. The lake is approximately

90 kilometres long, has a maximum width of approximately 25 kilometres and has a surface area of 1,900 square kilometres. At latitude 64 degrees north, the lake is frozen more than eight months per year, so turbidity is normally low. During the many windy summer days, the lake water can have high levels of sediment and dissolved minerals.

In 2008, a Baker Lake resident reported that people living in the hamlet were

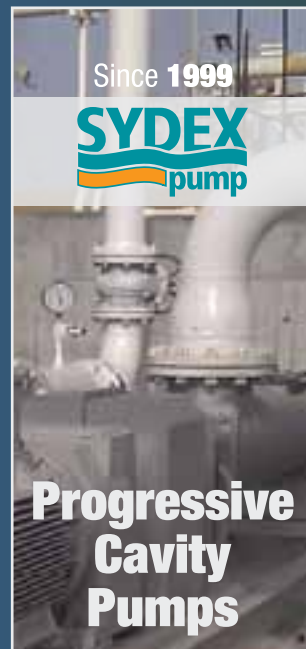
experiencing diarrhea and vomiting from the drinking water. Shortly after the allegations were made, federal inspectors tested the hamlet's drinking water for a variety of contaminants and minerals, from hydrocarbons to arsenic and iron. The test results indicated that the water quality was within national standards.

Concerns with the surface water supply, and other issues, culminated in



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By George Thorpe,
Engineering Manager, BI Pure Water Inc., Vancouver

BAKER LAKE
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September 2010 with an announcement that \$5.8 million was available for a water treatment facility and a new truckfill facility. The new facility would replace an existing truckfill facility, which applied just chlorination for water treatment. The facility would be constructed in the south and arrive by barge ready to go. The new facility was coinciding with the acquisition of two new sewage trucks and two new water trucks by the community.

The new water treatment facility and dual truckfill system was installed in Baker Lake in 2012. The water treatment plant was partially commissioned and has been operating over the past winter; site work and the balance of the commissioning will be completed in 2013.

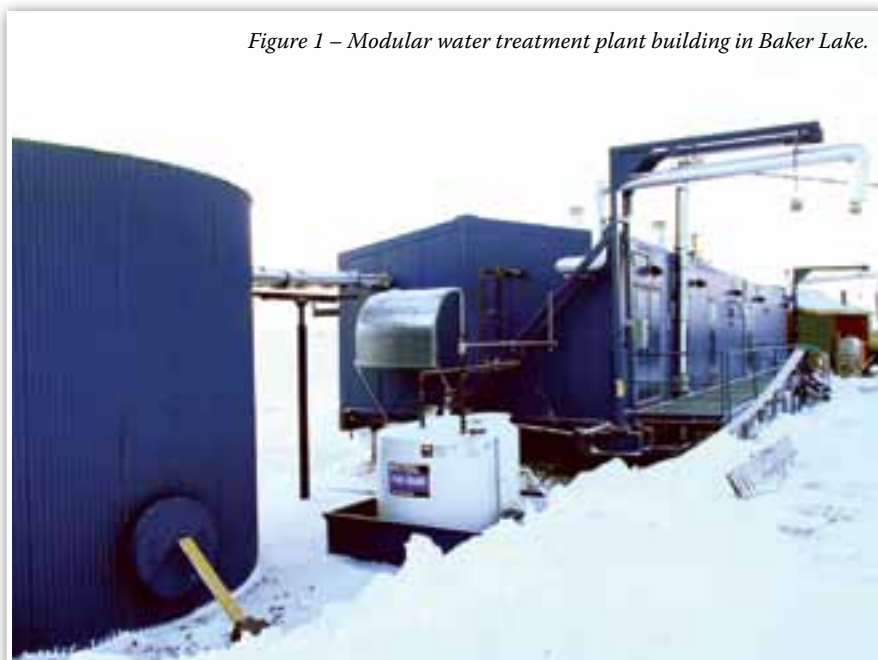


Figure 1 – Modular water treatment plant building in Baker Lake.

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The 6-metre wide x 28.6-metre long package water treatment plant building was sealifted to the community in four modules, then assembled into one single building on site (See Figure 1). The intake pump system for the plant is designed to deliver up to 1,200 litres per min (72 cubic metres per hour) of raw water from the lake to the plant. The plant has systems for media filtration, ultra-violet irradiation and chlorination.

Water is delivered to most houses and buildings by tanker trucks; however, the new water treatment plant is connected to the nearby health centre and seniors' centre with an insulated piped system. Water is recirculated through the piping system to prevent freezing. The proximity of the health centre and seniors' centre facilitated



Figure 2 – Four parallel silica sand filters at Baker Lake water treatment facility.

the piping connection, which saves hauling water to these two locations. In the future, the utilidor piping may be extended to other buildings.

The water treatment process applies four parallel silica sand filters, two parallel UV units for redundancy and a calcium hypochlorite dosing system (See Figure 2).

The four-unit filtration configuration allows backwashing of one filter, while the other filters remain in service. The chlorination system is designed for injection both before the water storage tank and into the distribution lines to the truckfill arms. Stainless steel pipe is used throughout the facility (See Figure 3).

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Figure 3 – Interior of Baker Lake water treatment facility with stainless steel piping.

Auxiliary equipment in the plant include three boilers, day-use fuel tank, glycol heating system, heat recovery unit, diesel generator, battery bank and a motor control center (MCC).

The primary fuel tank, welded filter backwash collection tank (4.9 metres high

x 6.1 metres in diameter) and the welded treated water storage tank (7.3 metres high x 8.1 metres in diameter), are located outside the truckfill building. The water tanks are equipped with heat transfer coils.

The truckfill operation can be manual or fully automatic, in the latter case con-

trolled by the controller based on HMI touch screen input.

A “Remote Monitoring and Trending” system was installed in the facility. The system provides alarm reporting and data monitoring, as well as trending of important parameters such as chlorine level, pressure differentials, pump speeds, flow, alarms and outputs from the turbidity and chlorine analyzer instruments. This information is available on computer screens in Baker Lake and at the contractor’s offices in Vancouver. Quick problem resolution and ongoing training is the result, with the contractor staff available to help the operator diagnose problems in real time.

The contractor for the water treatment system was BI Pure, and the design consultant was Stantec. 💧



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FORT LIARD, NWT WATER TREATMENT PLANT



Fort Liard water treatment plant and truckfill facility.

The Hamlet of Fort Liard's supply of good, potable water continues to improve for residents of the small community located in the southwest corner of the NWT, 550 kilometres southeast of Yellowknife. Prior to 1989, in spite of having a well, raw water was pumped directly out of the bordering Petitot River due to the high mineral content in the well water. In 1989, the hamlet completed construction of the community's first water treatment plant.

With a population of just over 600, the hamlet operates a trucked water and sewage service operation; the Class 1 water treatment plant is located directly above the banks of where the Petitot empties into the Liard River. The source water is two separate shallow wet wells; well #1 is 18 metres deep and well #2 is 15 metres deep. The raw water is consistently high in iron (Fe) at a concentration of 1.0 to 1.8 mg/L and manganese (Mn) (at a concentration of 0.3 to– 0.5 mg/L, which creates a challenge for water treatment. The original plant and filter system have undergone various changes, additions and upgrades since 1989, including the installation of a water softening system and a community car wash.

Upgrade work, completed in late 2011, is expected to keep the plant operational for another 20 years. The work included replacement of existing well pumps and Greensand filters, new chemical injection pumps, installation of twin Trojan D06 Ultraviolet disinfection filters, new fuel supply and heating system, along with a large part of original piping and the associated electrical upgrades. During installation of the replacement Greensand filter system and new ultraviolet filters, the existing water softening system helped serve double duty by filtering the raw water, while still helping to reduce its hardness. The treatment system is designed with two parallel water trains; each using one Greensand and one UV filter with a portion of the filtered water passing through the softner system. This twin filtration system allows for the weekly switching of filters for the necessary backwash procedure or when any system service needs to be performed.

The raw water supply uses 3.73 kW (5 hp) submersible well pumps, using only one well and associated pump at any given time. Both wells are piped into a Tech-Taylor three-way ball valve that isolates either well from service if not the duty pump in use. Imme-

By Alan Harris,
Manager of Municipal Operations, Hamlet of Fort Liard

**FORT LIARD
NORTHWEST TERRITORIES**



Greensand filters in Fort Liard.

UV filters in Fort Liard.

diately above the Taylor valve is the test point for raw water entering the plant, where samples for testing Fe and Mn, along with turbidity levels of the source water, are taken. A chlorine injection pump then feeds a pre-mixed batch of reverse osmosis water and sodium hypochlorite into the water train, giving it time to mix before entering the Greensand filter in use. There are test points located pre- and post-filter where Free Available Chlorine (FAC) is tested in order to adjust the chlorine injection pump rate to maintain the levels of FAC needed. In the post-Greensand, Fe, Mn and turbidity levels are tested before it feeds through a UV Filter.

Tests for FAC, Fe and Mn are again tested post UV filter before feeding 76 per cent of the filtered water into the twin softener units to reduce the hardness level of water. The softener system has two brine tanks requiring a daily re-fill of four to six 40-kg bags of salt and a



FORT LIARD NORTHWEST TERRITORIES

small amount of liquid resin cleaner to help restore the exchange capacity and keep the resin beds clean. The softened water is blended back in with 24% of the filtered hard water to maintain the level of hardness in water at five to six grains per gallon.

The treated water is then transferred into three reservoir holding tanks, two smaller tanks located immediately below, and a third tank buried directly beside the plant, providing a total storage capacity of 130,000 litres. At the completion of the

Currently the hamlet employs three trained Class 1 operators who split the daily shift that the water treatment plant requires.

treatment line, where the treated water feeds into the storage reservoirs, FAC, Fe and Mn levels are again tested along with trihalomethane (THM) levels. Normal plant operation is automatic but can be easily switched to manual on the main plant control panel. FAC and turbidity levels of the reservoirs are tested daily to ensure adequate water for supply to customers and for emergencies if needed.

Water trucks utilize a card lock system with the control switch located on an exterior panel to control the filling from the reservoirs. The truck fill transfer pump has a flow rate of 1,000 l/min filling the tanks through an exterior four-inch hose line installed on the truck fill arm. The truck fill is located on the front of the water plant and is equipped with a motion activated overhead light and emergency shut off switch. The water trucks are equipped with 12,000-litre holding tanks, and the average tank re-fill time is about 11 minutes.

The truckfill system currently serves 200 clients, both residential and commercial, on a delivery schedule that provides service to all customers every second day. The plant processes an average of 57,000 litres of raw water per day, including all water needed for in-plant use including daily softener and weekly greensand filter backwash cycles. This total increases slightly during warmer periods of the year when the coin-operated car wash is in operation. In 2012, the hamlet used a total of 20,437,313 litres of source water to supply all customers and provide water for in-plant operations.

Currently the hamlet employs three trained Class 1 operators who split the daily shift that the water treatment plant requires. The plant operates 364 days of the year, Christmas day being the one day the community has no scheduled water deliveries and the plant is not in regular operation. 💧

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KUGAARUK, NUNAVUT WATER SUPPLY, AND ALTERNATIVE WATER SUPPLY STUDY




FIGURE 1. The mechanism for salt water intrusion into a freshwater supply.

Salt water intrusion into community drinking water supplies is not a new phenomenon, and in fact, it has been regularly occurring in Kugluktuk, Nunavut for decades. Salt water intrusion is the result of tidal action which pushes seawater in a wedge up a freshwater river (See Figure 1). If the freshwater supply intake is reasonably close to the ocean, the wedge may migrate to the intake, making the water supply unusable.

In Kugluktuk, despite various past efforts to solve the intake of seawater and sediment from the Coppermine River, murky brine flowing from the community's taps has been the norm during the river's fall freeze-up and spring break-up periods. A solution to the Kugluktuk water supply problem has been underway for several years (see article *NTWWA Journal* 2011).


Salt water intrusion is also a problem for the community of Kugaaruk in Nunavut. The name *Kugaaruk* means "a river flowing through a community used for fishing and to supply water." Formerly known as Pelly Bay, Kugaaruk is located on the Simpson Peninsula, south of the Gulf of Boothia, and is home to some 830 people.

In November 2011, the Hamlet of Kugaaruk was advised of contamination of their fresh water supply. Salt water intrusion wedged its way more than 2.5 kilometres up to the water intake on the



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By Ken Johnson,
Senior Planner and Engineer, Stantec Consulting Ltd., Edmonton

KUGAARUK
NUNAVUT

Kugaaruk River adjacent to the community. The water delivery continued for some time after the intrusion occurred and many of the water storage tanks and water trucks were filled with salty water. Tests indicated that the drinking water had a salt content four to five times over accepted guidelines.

The initial response to the crisis was the hiring of several people by the hamlet to haul water from a lake about 11 kilometres outside of town. Water was hauled using snowmobiles with kamotiks and large water containers (See Figure 2). The water was kept in large containers in the fire hall, where people could pick it up. The fresh water is also delivered to elders and others who could not pick up water on their own.

A concurrent response to the crisis was the hiring of contractors by the Government of Nunavut (GN) Department of Community and Government Services to build an ice road to a point two kilometres further up the Kugaaruk River, where it was anticipated that the wedge had not migrated. The community built a temporary pump house (See Figure 3), and the water supply was restored.

However, since this temporary system was built on ice, this supply would only last until the river broke up in June. After break up, it was anticipated to deliver salty water from the permanent intake to homes for use in things like washing or flushing the toilet. After the river intake was taken out of service with break up, the drinking started coming from a body of water that local people call "Swimming Lake".

Ultimately, it was anticipated that once the flow in the river increased after breakup, the water intake would be flushed of salt and the community could go back to the permanent pump house

and water supply. However, this emergency brought to light that the people in Kugaaruk, Nunavut could face uncertainty with their drinking water, even months after the tidal surge occurred. With spring runoff that year, the river, in fact,

managed to flush out the salt water from the drinking water intake on the river.

This event, along with other water supply issues in Kugluktuk, Arviat, Grise Fiord, Cape Dorset, and Cambridge Bay, identified the need for a GN initiative to

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This event identified the need for a GN initiative to identify alternate water sources for communities.



FIGURE 2. Hauling water by komatik in Kugaaruk, and storage in the community fire hall.

identify alternative water sources for communities in the event that main water sources or related infrastructure goes out of service:

- Kugluktuk and Kugaaruk have issues with salt water intrusion into the water supply;



FIGURE 3. Temporary truckfill station built in Kugaaruk.

- Arviat has an issue with the stability of the water supply reservoir;
- Grise Fiord has an issue with water supply quantity for the annual reservoir filling; and
- Cape Dorset and Cambridge Bay have issues with freeze up of the water supply main.

This study was initiated in 2012 and is scheduled for completion in 2014. The first phase of the project was a desktop study which involved identifying, reviewing and compiling any and all background data on potential community water supplies, along with community interviews. This phase is anticipated to deliver a substantial amount of background information, since most communities in Nunavut have had water supply planning studies completed, which generally provide a significant number of alternate water supplies.

Phase 2 of the study will encompass site visits to verify and update the compiled information recognizing that a lot of the compiled information will be decades old. The majority of the site visits will be completed in the spring and summer 2013. The final phase of the study will be the report preparation that will incorporate the current site information into the compiled background information.

The water supply emergency in Kugaaruk was successfully tackled through multi-faceted cooperation of various levels of government and through the efforts of the community applying technologies old and new. This problem will occur again, and the knowledge and experience gained from the first emergency will pay off.

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WATSON LAKE, YUKON WATER SYSTEM IMPROVEMENTS



FIGURE 1. Watson Lake water system pumphouse, built in the 1970s.

The Town of Watson Lake is a community of 1,600 people located on the Alaska Highway in the south-eastern region of the Yukon Territory at 60 degrees north latitude and 128 degrees west longitude. Watson Lake is situated at Mile 635 (Kilometre 1016.8) on the Alaska Highway, 460 kilometres southeast of Whitehorse.

The majority of the water and sanitation infrastructure currently servicing the community was constructed in the mid-1970s, when the population of the community was 750. The original infrastructure includes several water supply wells and a water distribution system. Water is pretreat-

ed with chlorine injection at a pumphouse, then pumped to an elevated underground storage reservoir located on the north side of the townsite.

An initiative to benchmark the water system condition and plan for improvements was completed in 2004 and produced an assessment report of the overall system, with particular emphasis on the distribution pumphouse (See Figure 1). The major concern at the time was piping corrosion (See Figure 2) and control challenges. The assessment report also commented on water quality and supply, water treatment, wellhead protection, the distribution pump-

house, the water reservoir and the water distribution system.

The water supply wells in Watson Lake have been developed at four different times over the past 35 years. The first two wells were developed in the mid-1970s, and a third well was drilled in 1993 and brought into service in 1995 with a pumping capacity upgrade. However, the third well was later abandoned due to poor water quality and the potential for contamination from surrounding development. A fourth well was drilled in the summer of 2006 but was not placed into production due to high turbidity, iron and manganese levels. A fifth well

By Ken Johnson,
Stantec

was drilled and brought into service in mid-April 2013.

Water quality data indicates that the iron and manganese in the drinking water is marginally above the Aesthetic Objective limits in the guidelines of the Guidelines for the Canadian Drinking Water Quality. A water treatment could easily reduce the iron and manganese. Water is being drawn from a relatively shallow, highly permeable aquifer zone and, as such, may tend to be at a higher risk of contamination from potential surface or subsurface sources. Although there was no obvious development or activities near the well sites noted at the time of the study, it would be prudent to provide protection to the areas around the well-heads. Wellhead protection was also raised as a concern under the assumption that the original wells were installed without the proper casing seals to prevent surface contamination of the aquifer.

The water pump house serving the town was over 30 years old and designed for a community population of approximately 750. The condition assessment of the pump-house identified a number of deficiencies in the pump house associated with water storage, heating and ventilation, process piping and instrumentation and controls.

The existing elevated reservoir for Watson Lake has a working capacity of approximately 1.1 million litres (250,000 gallons) and needs to be enlarged because it does not have the capacity to supply enough water to adequately extinguish a large building fire. Even with the existing wells in production during a fire, the total production and storage falls short of the fire storage requirements.

The water distribution system was approaching its service life, and there are segments of water mains and services to undeveloped lots which freeze seasonally. The looping of water mains and the installation of valve stops at the vacant lots would

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There are segments of the water mains and services to undeveloped lots which freeze seasonally.



FIGURE 2. Severe piping corrosion on process piping in Watson Lake pumphouse.



FIGURE 3. Process piping replacement with stainless steel pipe in Watson Lake.

help to alleviate the recurring freezing and subsequent massive water leakage into the ground. There are also homes within the core of the residential area that do not have water or sewer available to them and consequently must rely on small wells and septic systems.

The specific recommended improvements from the Pumphouse segment of the Assessment Report included:

- water storage improvements, including adding baffles to increase contact time;
- replacement of chemical systems;
- replacement of HVAC system;
- replacement of process piping inside the building with stainless steel piping (See Figure 3);
- replacement of high lift pumps;
- replacement instrumentation and control systems (See Figure 3);
- a backup power supply; and,
- replacement of the process piping outside the pumphouse.

This work was completed in 2006, with the exception of the backup power supply.

Further work is ongoing in Watson Lake in 2013 to replace the water distribution system and sewage collection system. The Yukon Government is in the process of replacing 3,500 metres of sanitary sewer, 60 manholes, 1,200 metres of water main and 10 fire hydrants. The construction began in the summer of 2012 and is scheduled to be complete by the end of the 2013 construction season.

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A major engineering challenge in providing facilities for modern communities in the North is the need to provide adequate service at reasonable cost.

A FIFTY-FIVE YEAR OLD VIEW ON “MODERN” WATER AND SANITATION DEVELOPMENT IN THE NORTH

The cost of providing modern utilities in the North is sometimes so high that residents may prefer not to take the services rather than to have to pay the rates that would be required if the income from said rates were to pay for capital and operating costs. If such is the case, it is necessary that a grant be made toward the construction of the utilities in order that the cost to the consumer maybe reduced to the point where a high percentage of the residents will become customers. For example, in Yellowknife, the federal government paid the cost of installing water and sewer systems and donated these facilities to the Town. The rates now charged for water

and sewer services in Yellowknife pay only for the operating costs and are not any higher than those charged for many similar sized communities in Alberta. However, the town which is now considering extensions is faced with a problem. If the cost of the extensions has to be paid for by the new consumers rather than by the community as a whole, the cost to these consumers will be much higher than to those now being served by the existing system. One solution to this problem is to raise the rates in the entire town to help pay for the cost of the extensions. The other alternative is to obtain grants from the federal government to help pay for the greater part

of the capital cost.

There is little doubt that subsidy is required to aid in the development of modern communities in the North. This subsidy could come from the federal government or from industry. However, when industry subsidizes community development, the resulting company town will have proper facilities, but a shack town without any services may spring up close to it.

At present, a major engineering challenge in providing facilities for modern communities in the North is the need to provide adequate service at reasonable cost. When speaking of engineering, I am including all phases of community planning and design. No doubt, the breadth of my definition will not meet with approval of the town planners; but I feel that in the past one of the major faults of community planning and development has been the lack of coordination between the various phases of community design.

This lack is probably as much the fault of the engineer as of the planner. Engineers are notorious for their tendency to bury their heads in the details of a problem without questioning the overall purpose of the project on which they are working. By the same token, planners and policy making administrators, both in government and industry, are prone to take the engineers' work for granted. They assume that once the requirements to provide certain services at certain points have been determined, the engineer,



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By Don Stanley, B.Sc., S.M., S.D., P.Eng.
Stanley, Grimbale, and Roblin (now Stantec), excerpt from presentation at
National Northern Development Conference, Edmonton, Alberta, 1958.

HISTORY

like a mechanical brain — simply by following recognized procedures — comes out with the answer. Nothing could be further from the truth. One engineer's answer may be considerably different from another's, and it may result in a considerably different cost.

The approach to design should be a coordinated effort between planners, engineers, and even administrators. Recently, we worked on the design of an urban subdivision which contained about 1,500 lots in its first stage. Before a decision was made on the final layout plans, four layouts were prepared. Moreover, preliminary designs for water, sewer, and drainage were made and costs of servicing each layout estimated. The final choice of layout was arrived at after a number of discussions had taken place among the planners, the engineers, and the owners responsible for selling the lots and houses. The second lowest cost layout was chosen because it appeared to provide the best value for the money to be spent.

In most subdivision developments — especially those handled by public bodies — there is generally little, if any, coordination between the town planners and the engineers. In many cases, the planning and engineering departments are bitter rivals, a situation which is not conducive to coordinated effort.

In the North, the cost of providing utilities for communities is generally so expensive that in many cases subdivision layout should be subordinated to the design of utilities. In any event, no planning should be done nor any layout accepted without first submitting the plan to an engineer experienced in economical subdivision planning, in order to determine if changes in layout could save in utility costs.

When an engineer is asked to design the facilities required by a modern community in the North, he is immediately faced with problems of design for which there are no proven answers. It is relatively sim-


ple to solve any problem if unlimited funds are available; but in many cases, it is very difficult to design facilities that will give the desired services at a reasonable cost. Because of limited knowledge and experience in the North, engineers are forced to

provide uneconomical factors of safety. Such "factors of safety" could more appropriately be called "factors of ignorance", and in the final analysis no single item costs more than the provision of this factor of ignorance. ♦

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STATISTICS CANADA - 2013 SURVEY OF DRINKING WATER PLANTS

Statistics Canada will be conducting an update to the 2011 Survey of Drinking Water Plants. This survey is a census of public drinking water plants serving communities greater than 300 people. The survey results will produce a national portrait of treatment processes and costs, and source water quality across Canada. This data will be used to track the state of source water stocks and treatment on a regional basis and will also be used in the development of environmental accounts and indicators.

Drinking water plant operators will be contacted by phone in the fall of 2013 to verify contact name and address. The survey will be mailed out in January 2014, and we encourage all utilities that receive the survey to complete it as best and as soon as possible and return it to Statistics Canada. Specific enquires about this survey should be directed to Environment Accounts and Statistics Division, Statistics Canada, Ottawa, Ontario, K1A 0T6 or by email to environ@statcan.gc.ca. 💧



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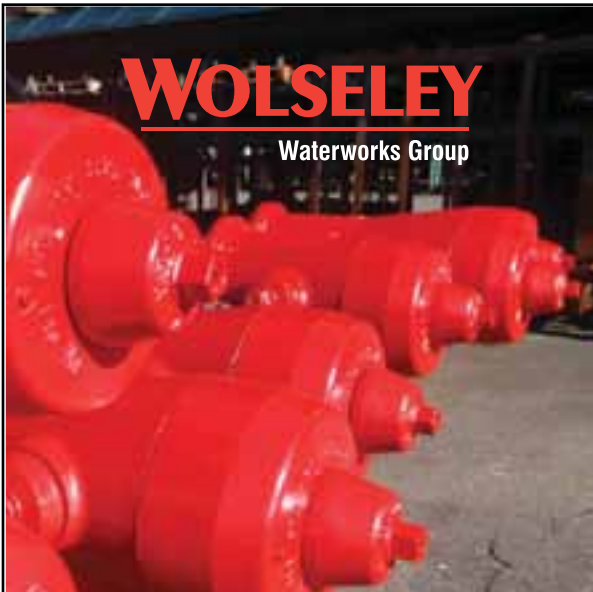
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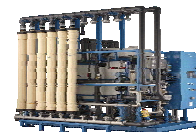


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*The new voices on the board present new outlooks
and ideas on how we may better meet the needs
of the NTWWA members.*

2013 NTWWA President's Report

ALAN HARRIS

Greetings and thanks to our membership that gave me this opportunity to sit in my role as President of the NTWWA over the past year. I hope you had a good year in the directions and challenges involving water and waste in the north. The NTWWA board has changed in the past year, with several of our long-term members stepping down. Ken Johnson, one of our longest-serving board members, is moving on but continuing his involvement in our Journal. Doug Steinhubl, Industry Director, has left, and Ryan Ethier now fills that position. Olivia Lee, our Executive Director since 2007, has stepped down, and Jennifer Spencer has stepped into that role. However, the new voices on the board present new outlooks and ideas on how we may better meet the needs of NTWWA members.

Our 2012 Annual Conference in Yellowknife saw our largest turnout ever. We had 15 tradeshow representatives, which are a source of knowledge, expertise and much appreciated support to the NTWWA. The presenters did a great job of passing on information of current updates and the possible changes that we may face. We also had a record participation in the two-day Operators Workshop, with 27 operators from Nunavut and 27 operators from the NWT. My thanks to the contributors who make these yearly events possible, particularly considering the time and expense involved.

A highlight of the meet and greet at the conference was the music of Water, a band lead by Ron Kent, a founding member of the NTWWA. Thanks to the band

for the good tunes and to Ron for passing on stories of our past and thoughts on our future. Our 2013 event will be held in Iqaluit from November 23rd to 26th, with our meet and greet scheduled for Friday the 22nd to kick things off. Hopefully many of you will be there to exchange stories, look at the four-day agenda, workshop topics or just say hello after a busy year.

The board is looking at expanding our operators workshops. Historically, operator training was a strong focus of what we did, and the NTWWA was involved with the writing of the water and waste instruction materials used and then passed on the GNWT, School of Community Government. It has been expressed by operators, through the event evaluations, that they need more training opportunities, and we are advancing this interest. The differences in waste and water operations, and costs involved, make this difficult to do. One of the biggest problems operators struggle with is that most training is based upon text book information, with limited hands-on information. Due to cost, short time together and differences in community operations, it is difficult for the NTWWA to arrange this for our operators. This is a topic that we are looking at, and in future years we hope to offer more.

I hope many of you will be in Iqaluit at the 2013 NTWWA Conference and Workshop this November. 💧



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EXECUTIVE DIRECTOR'S REPORT

2013 NTWWA Executive Director's Report

JENNIFER SPENCER

The 2013 NTWWA Annual Conference, Trade Show, and Operator's Workshop will be hosted in Iqaluit, Nunavut November 22nd to 26th. The conference theme is "Water and Waste North of 60". The conference program will include approximately 20 technical presentations, and the conference will be followed by a two-day Operators Workshop. Last year's conference featured our second two-day workshop, and the feedback from operators was very good.

The NTWWA provides a very worthwhile and interesting opportunity for those working in the northern fields of water and wastewater, and others who are concerned about these vital services, to meet, network and hear about the projects others have been working on during the past year. If you are a northern water or wastewater professional, mark your calendars and join us at the annual event to share ideas and learn about northern water and wastewater challenges and solutions.

Last year the Annual Conference, Trade Show and Operators Workshop in Yellowknife was a huge success, with approximately 130 delegates. Thanks to those

operators who sat on the Operator's Panel and shared their experiences. A big thank you to Pearl Benyk and Olivia Lee for all the hard work coordinating the logistics of the 2012 NTWWA annual event. The delegates, presenters and trade show participants are key to the success of the annual event, so thank you very much for your participation.

Since 2005, the NTWWA has been hosting a friendly drinking water competition for the water treatment plant operators who attend the conference. If you want to take home the trophy and bragging rights remember your H₂O in 2013!

The board tries to maintain diverse representation and currently consists of water treatment plant operators, consultants with expertise in the areas of water and waste, a water and wastewater industry representative, and government employees. If you are interested in becoming a board member, please step forward at the Annual General Meeting held following the conference.

This is my first year as Executive Director of the NTWWA, and I want to thank the NTWWA Board of Directors for their sup-

port. I would especially like to thank Olivia Lee, who held the Executive Director position for the previous five years, for her encouragement and support during the transition. I would also like to thank Pearl Benyk for her support during the transition and for all of her help in keeping the organization running smoothly. It has been a year of new and exciting challenges for me and I hope that we can continue to build on the excellent work that has been completed by the board over the past number of years. Every year we say goodbye to dedicated members and welcome newcomers and this year is no exception. On behalf of the board, I would like to thank all of the board members who are leaving us for their dedication. To all of the new board members: thanks for volunteering your time; we are excited about the new experiences, knowledge and ideas you bring. Special thanks are due for the efforts of the President, Alan Harris, the Vice President, Bill Westwell, the Past President, Bhabesh Roy, the Journal editor Ken Johnson, and our administrator Pearl Benyk.

I look forward to seeing you in Iqaluit. 💧



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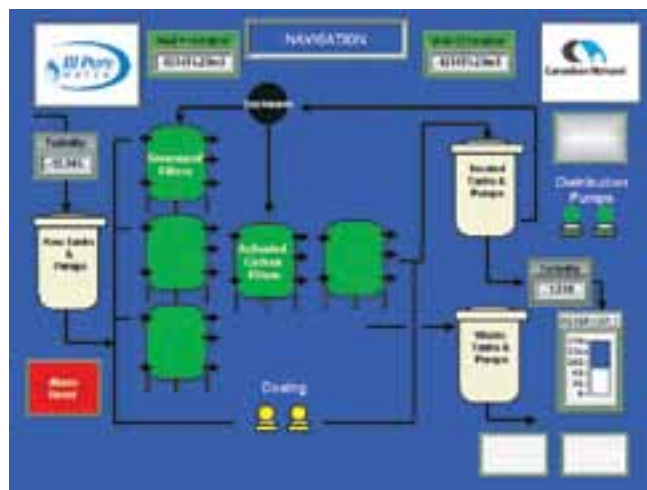
How can operators save travel time, keep water/wastewater treatment plant downtime minimal and further his/her training? One solution is to have a remote monitoring and control system (RMACS) installed in the plant.

Water and wastewater utilities need to control costs, and provide operators with real-time process information. Most full-meal-deal supervisory control and data acquisition (SCADA) systems that have remote monitoring and control are very expensive. Not many small utilities can afford these costs.

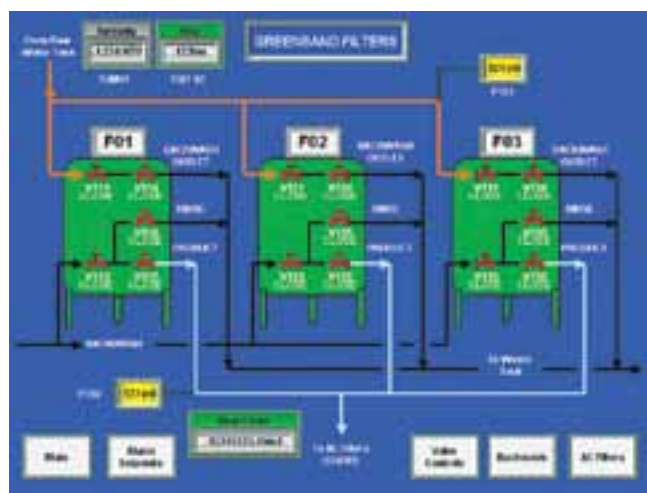
Also, the lack of trained operators available to northern communities is a growing issue. Remote monitoring and trending allows the supplier to help with problem diagnosis and operator training. Being able to quickly determine the problem is crucial to the solution.

The water treatment plant operation can be monitored via screens created for the computer. These screens start with a main menu, allowing the operator to select the next screen by clicking on a specific box along the bottom. The main system status menu provides the operator with a quick overview of the plant operating conditions, such as flow rates, total water treated, pressures and other critical items. The operating equipment will show a green light. More operating details can be accessed by clicking on one of the buttons on the bottom of the page. The operating equipment will show a green light.

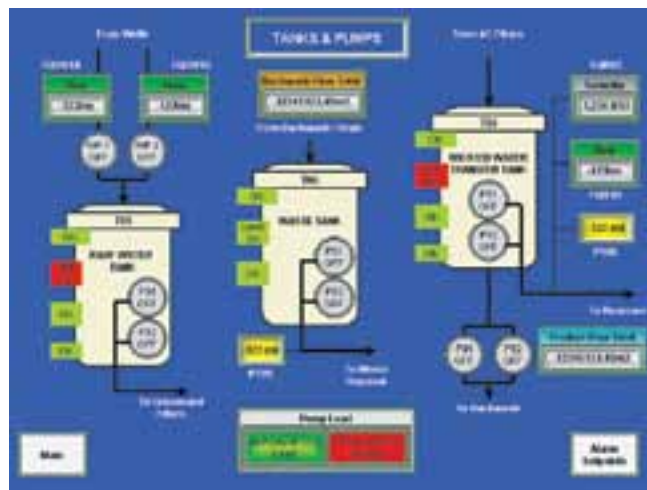
Typical additional screens include detailed information such as tank levels, filters status, system faults, fault delay settings, alarm set points, and pump controls. Leak detection, security, and trending (flow, operating pressures, chlorine residual, filter pressure differentials, water quality, pump speeds). These screens are meant to be easy to understand as can be seen from the system and filter status screen examples shown.



Main Process screen showing the equipment, sensors, alarms, etc.



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Tanks and pumps screen showing the tanks, pumps and data readouts.



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One operator could look after several plants without constant travel.

If one of the flow trending screens is selected, it will appear at a larger scale. The details are easier to read and information from the previous hours can be viewed by scrolling the screen. Differences in the two flow rates will indicate either filter backwashing is taking

place or water is bypassing through a pressure-relief valve. The goal of trending is to improve performance and save money.

The basic components of a basic cost-effective RMACS package, with trending, consists of:

1. A modem to send alarms and data to the desktop computers
2. A PC-based Human Machine Interface (HMI) SCADA software.
3. Remote Access & Control software
4. Logging of the operational data and screens for trending/graphing.
5. Setup of a remote monitoring and trending program.

Through real-time remote monitoring of the plant's critical operational data, an operator's job is made much simpler. An RMACS will assist operators to become aware of and easily diagnose problems 24 hours a day. This program can provide alarm reporting, data monitoring and trending of important parameters such as chlorine, turbidity, pressure differentials, flows, tank levels, pump status, and more. This monitoring takes place both at the suppliers and at the operator's office.

Utilizing state-of-the-art instrumentation and electronic communications technology, customized monitoring systems are developed to provide 24/7/365 system monitoring, operational analysis, pre-alarm alert and alarm notification. For remote communication, cellular equipment, satellite data transmission systems, radio sets, or standard modems can be utilized.

In summary, cost savings accrue to the owners because of the reduction in labour cost due to less travel to the plant. One operator could look after several plants without constant travel. Customers experience less unplanned downtime because once an alarm occurs, the response can start. This usually means little or no plant downtime. Public health is assured if the problem can be quickly solved. Environmental benefits include a reduced carbon footprint due to use of less vehicle travel per plant, and therefore less fuel consumption. ♦

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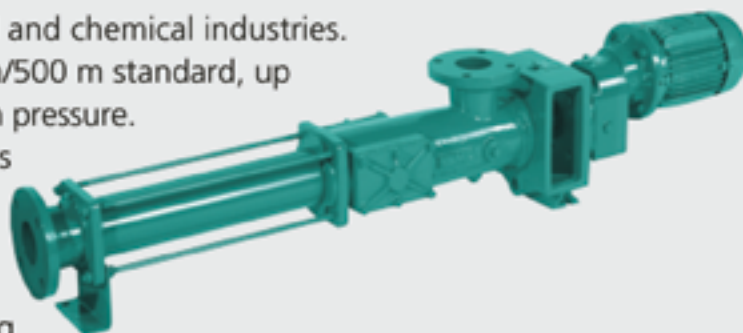


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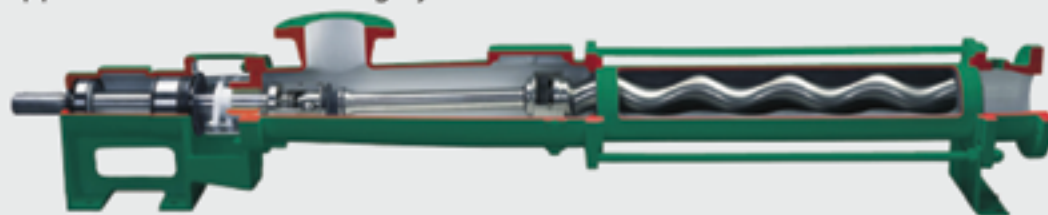
BY Pumps

- Industrial applications in oil and chemical industries.
- Capacities up to 2,200 gpm/500 m standard, up to 3,400 psi/240 bar as high pressure.
- Four rotor/stator geometries for optimized performance.
- For low fluids with or without solids.
- Design with bearing housing and drive shaft allows for universal use of all types of drives.



SY Pumps with bearing housing and drive shaft

- Compact design.
- Four rotor/stator geometries for optimized performance.
- Capacities up to 1800 gpm/400 m³/h with pressures up to 720 psi/48 bar.
- Low investment and operating/maintenance costs.
- Applications for low and highly viscous fluids with or without solids.



NETZSCH, the world market leader with 60 years of experience and over 500,000 progressing cavity pump installations worldwide. With sales, production and service on 6 continents ensuring customer support to provide

Solutions you can trust.

NETZSCH

Learn more. NETZSCH Canada, Inc.
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One *Stop Shop* for All Your Water and Waste Water Needs.



QUALITY ALWAYS
Emco's Commitment

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