

“We got it good here”:

Exploring the drinking water system in Makkovik, Nunatsiavut

Introduction

Makkovik is one of five communities that make up Nunatsiavut. It is physically located on the north coast of Labrador. While Inuit have lived in the territory for over a thousand years, Makkovik was not settled until 1860 (JW Consulting Associates, 2009).



Makkovik Bay (photo by Janine Lightfoot)

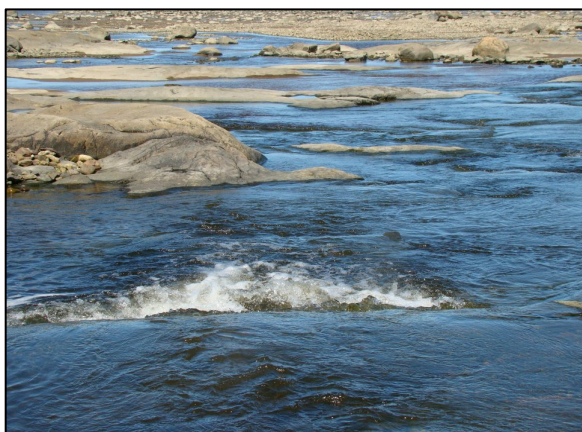
The community of Makkovik has a population of approximately 365 people (JW Consulting Associates, 2009). Although the community falls under the jurisdiction of the Nunatsiavut Government (NG), individuals in the community are made up of Inuit and Settler descendants. The community of Makkovik is only accessible by plane, boat or snowmobile (during winter). This means that shipments of any goods or access to local natural resources are subject to weather conditions depending upon the time of year. This also impacts the availability of work in some cases as Makkovik has its own fish plant that operates during the summer, which also attracts workers from outside communities (JW Consulting Associates, 2009). According to the Integrated Community Sustainability Plan (ICSP) construction, office jobs, education and retail make up a significant portion of employment in Makkovik. There is also a proportion of the

population who travel in and out of the community to Voisey's Bay to work 'in camp'. Shifts there typically operate on a two-week turn around (JW Consulting Associates, 2009). Present day Makkovik is growing in size both in population and infrastructure. Statistics show that the total birth rate (ratio of live births to the population expressed per 1,000) for 2012 for Makkovik was 27.8, in contrast to 8.6 for the province) (Government of Newfoundland and Labrador Statistics Agency, N.D). Also, since 2009 Makkovik has built: a new subdivision, a teen center, a new craft center, and a new government building, which houses a larger children's daycare than the community previously had. Although infrastructure is expanding, according to the ICSP it is projected that the quantity of drinking water from the watershed should be sufficient to meet the needs of the growing community (JW Consulting Associates, 2009).

Source Water

Makkovik's source water supply is, "from Ranger Bight Pond, which has a water storage level of 76m, with a maximum preferred service elevation of 50m (based on service pressure of 35 psi)" (JW Consulting Associates, 2009, p. 25). This water source is designated as a Protected Public Water Supply Area under Section 39 of the Water Resources Act.

The Department of Environment and Conservation (DOEC) Water Resources Portal data indicates that according to the Physical Parameters and Major Ions report for Makkovik, the water colour score from 2005-2011 has consistently been above the recommended aesthetic parameters set by the provincial guidelines (Government of Newfoundland and Labrador DOEC, 2014a).



Fresh water at Ranger Bight. (photo by Janine Lightfoot)

These findings are consistent with the levels of turbidity, which also tend to be close to the parameters set by DOEC (Government of Newfoundland and Labrador DOEC, 2014a). In particular the readings for the fall months, when it is typically windier, are higher than in other seasons when the weather is calmer, such as in August. However, while these levels are high, interviews with residents gave the impression that this is not a major concern for them when it comes to drinking water.

Tastes better than Goose Bay. It's not nasty and chlorinated, I'm ok with it being a bit cloudy... it is what it is. It comes from a pond back there.

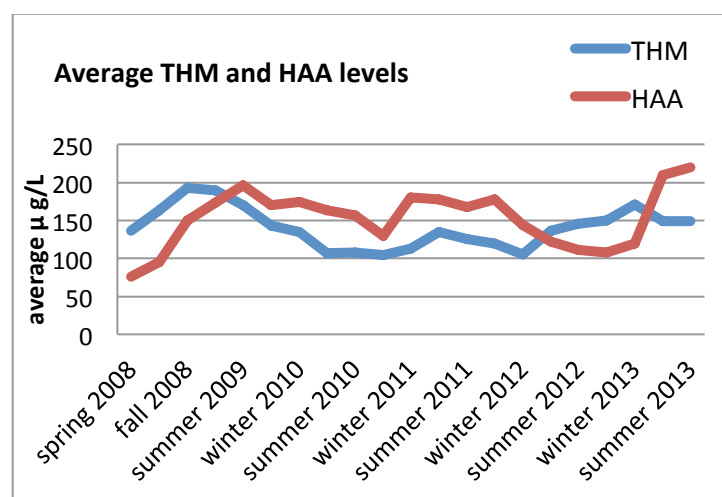
– NG employee

Although Makkovik's drinking water system is operating well overall, and the community has an adequate quantity of water from a protected source (under the Water Resources Act), having a physically secure water supply is expressed as a concern for the community. Although the water source is protected, residents expressed concern about the possibility of swimmers in the area as well as possible contamination from snowmobiles and ATVs.

Since 2011, Makkovik had not received a Drinking Water Quality Index (DWQI) rating from the DOEC due to high levels of THMs and

HAA's measured in their water supply (Government of Newfoundland and Labrador, 2014). Disinfectant by-products such as THMs and HAA's are formed when chlorine used for drinking water treatment mix with the organic and inorganic matter in the water (Health Canada, 2006). Chlorination disinfection by-products (CDBPs) are chemical compounds that form when water containing natural organic matter is chlorinated (Government of Newfoundland and Labrador, 2013). This raises concerns because DBP's are possible human carcinogens (Health Canada, 2006, p. 3). However, communities continue to use this method due to its effectiveness for treating other water born bacteria and diseases (Government of Newfoundland and Labrador, 2013).

According to the DOEC reports, Makkovik's THM and HAA levels have consistently been above the guidelines. Health Canada guidelines state that the maximum acceptable concentration for THM in drinking water is 0.100 mg/L (100 µg/L) and 0.08 mg/L (80 µg/L) for HAA's (Health Canada, 2008). Below is a graph of Makkovik's THM and HAA levels from spring 2008 until winter 2013.



(Government of Newfoundland and Labrador DOEC, 2014b)

Infrastructure

Drinking water infrastructure is made up of fixed capital assets for public use and includes water treatment, storage, and distribution systems (Government of Newfoundland and Labrador, 2005). According to the community's ICSP, "Makkovik's town's infrastructure is sound, and Makkovik was the first coastal community in Labrador to commit to the provision of water and sewer services to residents." Furthermore, the community has "underground infrastructure that is properly maintained and operated" (JW Consulting Associates, 2009, p. 10).

Existing infrastructure consists of the water intake, a dam, two pump houses, a storage tank and a lift station. Water is gravity fed down to the community from the holding tank, which has the capacity to hold enough water for three days. The community is set to have a PWDU available some time this summer in an effort to address the high levels of THMs and HAAs (the PWDU does not use chlorination).

Water distribution lines have been a challenge for Makkovik's water infrastructure. Although the majority of the community's water lines are in good condition several homes water freezes in the pipes during the winter months. In order to mitigate this concern some people in the community have resorted to continually running their water during the winter months.

I think there's a problem that we don't engineer our water system for our climate and for our geotechnical challenges.... Maybe we're just lucky at our house we haven't had any problems with freeze ups but other people do. It's because it's badly engineered. I mean technology is being done differently elsewhere and there's no need for it to be done this way anymore. It's the north coast there's no reason for us to try to put

in any water and sewer system that's based on the island, when we have completely different geotechnical issues. And it's not like we are the only place in the world that is subarctic with discontinuous permafrost and has geotechnical issues.

– Resident

Admittedly, like any community, Makkovik does have its share of challenges. However, the community of Makkovik has been fairly fortunate in the past in that it was one of the first Nunatsiavut communities to receive a water system. Also, with good planning, a strong budget and a number of skilled workers its water system has been operating fairly well (JW Consulting Associates, 2009). Every home in the community is on town water and sewer, and there has been a new lift station installed to meet the needs of the community. These projects have been successful with the help of the provincial and Nunatsiavut governments.

Policy/Governance

Ensuring safe drinking water in Canada is the shared responsibility of the federal, provincial, territorial, and municipal governments (Government of Newfoundland and Labrador, 2013). The principal responsibility of ensuring the safety of drinking water generally rests with the provinces and territories, while municipalities usually ensure the day-to-day operations of treatment facilities and distribution systems. Federally, Health Canada works in collaboration with the provinces and territories, through the Federal-Provincial-Territorial Committee on Drinking Water, to develop the Guidelines for Canadian Drinking Water Quality (GCDWQ). The GCDWQ are published by Health Canada and used by all Canadian jurisdictions (provinces, territories

and the federal government) as a basis to establish their own enforceable requirements for drinking water quality.

Makkovik is unique from other NL communities in that it has an added layer of jurisdiction as it is within the NG land claims area. Nevertheless, like other communities, it has provincial guidelines that it follows, and the province along with the Inuit Community Government is responsible for delivering safe drinking water to the public. This legislation is laid out in the *Labrador Inuit Land Claims Agreement*. Delivery of safe drinking water is accomplished by following four acts: the Municipalities Act, the Municipal Affairs Act, the Environmental Protection Act, and the Water Resources Act. Currently there are 315 protected public drinking water sources under provincial jurisdiction (Government of Newfoundland and Labrador DOEC, 2013). In NL the provincial government has four departments that oversee the management of public water systems under the Multi-Barrier Strategic Action Plan (Government of NL, 2014): The Department of Environment and Conservation (DOEC), the Department of Health and Community Services, Municipal and Intergovernmental Affairs, and Service NL. This plan is then the responsibility of all levels of government (Government of Newfoundland and Labrador DOEC, 2013; Government of Newfoundland and Labrador DOEC, 2014a; Government of Newfoundland and Labrador DOEC, 2014b).



Flying over Nunatsiavut near Makkovik

The *Municipalities Act* governs the day-to-day delivery of safe drinking water to Makkovik, which operates under the Nunatsiavut Government's regulations. Those who own property in the community contribute to municipal water and sewer tax. However, due to the small size of the community the tax base is not large enough to completely cover the costs of operation and maintenance. Therefore the province and NG cover much of the cost for maintenance, staffing and operation of the water system. Makkovik's specific plans, regulations and guidelines are posted in the community. They are also recorded in their ICSP and in their other plans, which are all available on their website at www.makkovik.ca. The ICSP states that the community's gas tax monies are to be used to help improve drinking water infrastructure and that plans are being made to improve the community's pump house (JW Consulting Associates, 2009, pp. 10-11). The town does have up to date plans, maps and testing information available for the community's water infrastructure. As well it is worth noting that the water operator and other municipal staff have water operator training, and diving training for confined spaces. Diving training for confined spaces is needed in order to do maintenance on the holding tank.

Public Perception, Awareness, and Demand

General public perception around the water quality in Makkovik is of mixed opinion. Most community members feel that the water is of good quality, with some noting that people from outside communities, like Goose Bay and Nain, prefer Makkovik's drinking water. It was mentioned through interviews that even the boats that come into Makkovik request to fill their water tanks with local water before heading out due to its high water quality. Some community residents also mentioned that among older people there is the general perception that the water quality is good enough that water treatment is not necessary.

I like to think that our water is cleaner and safer than living in the city.

–Resident respondent

However, there are still many who are grateful that the water is tested and maintained. And while there are those that are happy with how things are running other residents do acknowledge that they are concerned about the THM levels and discolouration.

I think it's really good, like right now. It's not a treated system but we do chlorinate it... there's good testing done on it. There's testing we send out samples every week to government, like every 3 months to government to do different mineral samples and so it's well tested. And there are high readings in some areas, like THMs and stuff like that but overall the feedback that we get from the town, like residents, is that the water quality is very good. Even visitors even say that the water quality is very good.

–Town representative

I have faith in the local community government because I know they comes and do regular checks, and they do monitor daily the water supply, and there's the chlorine count, there's a bit meter thing, that they checks in the garage. They have to check it four times a day.

–Resident

General awareness around drinking water quality in Makkovik is low regarding specifics of testing results, however knowledge around Makkovik Inuit Community Government's testing for bacteria and chlorine residual levels is high. In general residents know who to

contact if there are issues, when and where testing is done, the state of human resources, and of boil water advisories (BWA) when they happen.

Community members' perspectives on government at the local level are positive, with a high level of trust. This is consistent with Community Accounts indicators, which state that the "percentage of population that have very strong or somewhat strong sense of belonging to the community [is] 86.4%" (Government of Newfoundland and Labrador Statistics Agency, N.D). Local trust in the NG seems to be at a similar level, however trust in the provincial and federal government is where there is deviation.

I believe that the town is doing the best that they can, if only because everyone on town council and staff is drinking the same water. So we all have an interest in making sure it's safe. I have very little faith in the province because all they do is cut budgets for service delivery. In my opinion they're just been cutting budgets on things like environment and natural resource management. Maybe on everything but that's just where I see. And that's a concern. Federally is possibly worse.

–Resident

Conclusions and Future Directions

The community of Makkovik's drinking water quality and infrastructure is mixed. While there are problems with THM and HAA levels, turbidity/water colouration, and freezing pipes these problems are being addressed through planning and current projects being undertaken by the Makkovik Inuit Community Government with the help and support of the Nunatsiavut and provincial governments. Concerns over the THM and HAA levels are being addressed by providing residents with the option of a PWDU that will be attached to the fire hall. This will

only take care of drinking water but it is a proactive step toward continuing to maintain and improve Makkovik's drinking water infrastructure and quality. Makkovik has also been fortunate in that it has access to an adequate supply of drinking water, supplied to all of the community's residents, that is projected to meet the growing needs of the community.

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To see the full case study report please visit the *Exploring Solutions for Sustainable Rural Drinking Water Systems* website: <http://nlwater.ruralresilience.ca>

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