

Cambridge Bay, Nunavut

July 2016

The hamlet of Cambridge Bay has a population of approximately 1,800 people and growing, and it is the largest stop for passenger and research vessels traversing the Northwest Passage. It's located approximately 700 kilometres northeast of Yellowknife, at a latitude of 69.4° N.



The hamlet's aged and undersized potable water infrastructure was causing significant issues with water shortages and reliability concerns. The water delivery system consisted of three 12,500 L water trucks operating on a seven-day, eight hour per day delivery schedule. A new water treatment system design needed to address ongoing problems associated with the trucked delivery system, the limited underground distribution lines, and inconsistent chlorine residual.



The water treatment plant arrives in four sections at Hay River, Alberta at the start of its Mackenzie River journey. Top: the re-assembled complete treatment plant in Cambridge Bay

The treatment system fabrication was awarded to BI Pure Water, and Stantec Consulting in Yellowknife was retained as the engineering consultant. NDL Construction of Winnipeg was awarded the construction of the infrastructure. A "plug and play" package water treatment system would serve this remote community far away from resources.

A four-unit modular system was fabricated in Surrey, BC, trucked to Hay River in July 2015, then barged more than 1,800 kilometres up the Mackenzie River to Tuktoyaktuk. It was then barged

another 1,800 kilometres east to Cambridge Bay, arriving in August 2015, when the modules were skidded to site. The building was set on piles, re-assembled and sealed up, as the snow was starting to fall, and further work on site was halted until the spring of 2016.

The water treatment is a zeolite-based filtration system combined with chlorination and UV. The design flow is 1,200 L/min. The design generates half the backwash wastewater of alternate systems. This is an important feature, as the backwash is collected in a 60-cubic-metre insulated steel tank stored on-site and hauled away by trucks. A 570 cubic metre tank stores

CASE STUDY

treated water to be pumped through the underground infrastructure, and accessed by truck-fill for distribution to homes.

BI Pure Water contributed 17 custom built access vaults suitable for the extreme conditions and modified 8 others. A new 2,000-metre-long water main completed a circulation loop that helps reduce the operation and maintenance costs of the existing main by eliminating costly pumping and repairs associated with the previous pipe. The new loop will also service the new Canada High Arctic Research Station (CHARS).



Left to right: The three automatic 48-ft³ zeolite filters for reducing turbidity, two UV units, turbidity meters, and the major pumps in the main room of the treatment plant.

Within the first year water users started to complain about “yellow water”. Water sampling in all seasons hadn’t been completed. It was revealed that iron and manganese and other minerals became more concentrated in winter with ice formation. Chlorine reacting with iron and manganese turned the water yellow. It was learned that the community had historically experienced yellow water but had turned down the chlorination system to avoid it. A different media such as GreensandPlus can be used in the filter vessels in future to precipitate out the iron and manganese.

Operators use the remote monitoring so they visit the plant just a few times a week. Otherwise the PLC takes care of filter backwashes and most treatment duties. If there are any issues, BI

Pure Water engineers access the control system remotely to help troubleshoot. To assist with operator training and turnover, operators can watch the training and maintenance videos specific to the system.

Cambridge Bay is the seventh community water treatment system built and serviced by BI Pure Water for the government of Nunavut. BI Pure Water specializes in custom engineering, build, install, and servicing of package water treatment plants for remote communities.



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