Water Supply in Grise Fiord

BACKGROUND

Grise Fiord is the Smallest and Northern last Municipality of Baffin Region. The Population in 2020 is approximately 178. The Grise Fiord potable water source is surface runoff which runs about 45 to 50 days a year during the summer from mid June to beginning of August, resupplying two storage vertical steel tanks through gravity feed. The Community has a secondary water source about 300m away from these tanks which was never certified or used as a potable water source.

One storage tank was built in approximately 1986 (Tank A) and the other was built in approximately 2002 (Tank B). Each tank has a capacity of about 4 million litres.

Historical community annual water consumption is approximately 6 million litres, leaving about 2 million litres for a consumption safety factor as well as for a fire-fighting reserve. Delays in filling or technical issues preventing complete filling of the two tanks create risks to the adequacy and reliability of the community's water supply for the subsequent 12 months.

TANK B ISSUE

During the Hamlet's cleaning of Tank B early in July, significant irregular settlement (up to 400mm) of the steel plate tank floor was observed, It was noted that a middle column designed to support the tank roof was unsupported and suspended from the roof structure. The issue was reported by the Hamlet to CGS on July 15th.

The hamlet reports that Tank A is currently 100% filled.

CGS PHASE 1 RESPONSE

On July 19th CGS mobilized a contractor from Resolute Bay to undertake initial structural steel repairs to support the central column. The structural steel repair work is coated with a potable water certified epoxy protection which is currently being cured in accordance with manufacturer's directions and will be ready for service (i.e. contract with potable water) on August 2nd.

At present, reports from the community are that the surface water source is still availability. However, flow rates and expected surface flow duration are not known.

Between July 20th to 23rd, CGS mobilized a certified tank inspector, engineering consultants and CGS staff to review and inspect the tank. Preliminary determinations are that the tank floor deformation is likely due to permafrost degradation beneath the tank. While no failure of the tank enclosure was observed, the deformation is placing stress on the welds between the tank wall and the tank floor that may limit the tank's capacity to as

little as 50% (2 million litres). Further structural analysis is underway, and this recommendation is expected to be updated.

CGS is preparing a plan for geotechnical/permafrost investigations take place later this summer. This will include the installation of temperature monitoring around and under the tank to gather more information on permafrost conditions and future projections.

CGS is preparing to ship via 2020 sealift between 60,000 and 120,000 litres of bottled potable water to partially mitigate any possible water shortage.

CGS is awaiting lab results and Department of Health input stemming from sampling of the potential secondary water source.

In the even that the primary surface water source ceases to flow prior to Tank B refill, and subject to regulatory stakeholder approvals it is feasible that Tank B could be filled from the secondary water source.

CGS has flown in the required potable water pumps and hoses in the event that refilling Tank B from the secondary sources is required and approved

CGS PHASE 2 RESPONSE

Further engineering review, inspection and repairs will take place leading up to the spring and summer of 2021. Repairs in May/June 2021 will include weld repairs and high-pressure injection of structural foam beneath the tank floor plates to retard further floor plate settlement.

Phase 2 work is expected to restore Tank B to its full capacity.

Consultant recommendation and design for permanent tank foundation stabilization and repair options are expected to be obtained prior to summer 2021.

CGS PHASE 3 RESPONSE

Subject to the results of Phase 2 investigations, additional repairs may be undertaken as needed in the following years.

GN’s Tentative Action Plan:

1. Fill this Tank B 50% using water from either of the available sources.
2. Complete bacteriological and chemical analysis on Secondary source water.
3. If water is drawn from the secondary uncertified water source, this water will be stored separately and designated for fire demand and other non-potable uses.
4. Complete geotechnical investigations to support planning of work for summer of 2021 and beyond.
5. Investigating additional options to transport bottled water to the community via air cargo if necessary, to supplement the community’s supply.
6. Evaluate the availability heated storage space, and potential distribution procedures for bottled water shipped to the Community
7. Engage the municipality in developing a water conservation strategy, giving full consideration to current health pandemic considerations