

5.35 Mendenhall Water Supply System

Mendenhall is located about 50 km west of Whitehorse, Yukon along the Alaska Highway. Mendenhall Subdivision has a self-serve water system with water sourced from a 67 m deep bedrock well (TW1-2013). Treatment for the self-serve system includes uranium removal and chlorination. This small public system is governed under the Sections 12.1 (a) and (b) and 17 of the Public Health and Safety Act and Section 5 of the Public Health Regulations (C.O. 1958/079, O.I.C. 2009/194), which provide measures for inspection and oversight by an officer of medical health for systems that provide water for human consumption.

5.35.1 Data Compilation Methodology

Tetra Tech approached stakeholders including YG departments, water system operators and owners to let them know the project was in progress and to request their assistance in compiling the most complete data set possible. Through the process of compiling the data, Tetra Tech obtained data regarding the Mendenhall Water Supply system from the following proponents:

- YG Community Services (the client) – YG CS provided data for the Mendenhall Water Supply as this system is owned and operated by YG CS. The YG CS operator provided review comments and edits for the final summary to ensure completeness and accuracy.

5.35.2 Hydrogeology

The lithology of the Mendenhall area generally consists of sand silt, gravel and cobbles overlying bedrock (Tetra Tech 2006). The depth to bedrock varies from 3 m bgs to 30 m bgs. All wells drilled past 30 m in depth in the Mendenhall area are completed in bedrock. There is insufficient information to establish a definite groundwater flow direction in the area; however, based on topography and proximity to surface waterbodies, it is inferred that the groundwater flow direction is likely south or east. The depth of the wells in this area, and the deep sequences of overburden deposits over the bedrock decrease the vulnerability of bedrock aquifer to surface sources of contamination (Tetra Tech 2006).

Previous studies indicate that uranium at concentrations above the GCDWQ MAC value of 20 µg/L are naturally occurring in groundwater in the Mendenhall area. However, there are some domestic wells in the area that have uranium concentrations below the GCDWQ MAC value (Tetra Tech 2006 and 2014).

Residents of Mendenhall and other users of the water fill station have been notified of the presence of uranium in the groundwater source (Tetra Tech 2006 and 2014).

5.35.3 Summary of Wells

The well log for Well TW1-2013, which serves the Mendenhall Subdivision drinking water system is included in the GIS map and database. The following table summarizes the completion characteristics of TW1-2013.

Well Construction Parameters	Details	Source
Date of construction	Well was completed by Midnight Sun Drilling Inc. in October 2013	MH 2013
Total well depth	67.0 m bgs	p.c. Steve Perrin 2017

Table 5-91: Mendenhall Subdivision Public Drinking Water Supply, TW1-2013 Summary

Well Construction Parameters	Details	Source
Casing	6" (152 mm) OD Steel Well Casing	
Casing depth	9.45 m bgs (approximately 0.7 m into bedrock)	
Well screen	Well is completed open hole in a bedrock aquifer.	
Static water level	19.3 m bgs (October 8, 2013)	
Sanitary seal	Sanitary seal extends to approximately 5.6 m bgs	
Wellhead completion	Pitless adaptor within chain-link fenced enclosure	
Wellhead stickup	0.79 m ags	
Well rated capacity (estimated by the driller)	0.75 L/s (10 IGPM)	
Well GUDI status	Not Assessed	
Well Construction Comments:	Well was constructed to meet Canadian Groundwater Association Well Construction Guidelines.	

5.35.4 Source Water Quality

MH collected a groundwater sample from TW1-2013 during the October 2013 constant-rate pumping test, just prior to pump shut down, and the following are the key observations and comments noted by MH (2013):

- The water quality results indicate that the samples collected meet all of the tested health and aesthetic related parameters of the GCDWQ with the exception of the total uranium concentration. The total uranium concentration from TW1-2013 was found to be higher (0.0742mg/L) than the MAC of 0.02 mg/L;
- The TDS concentration from TW1-2013 was lower (352 mg/L) than the aesthetic objective of ≤ 500 mg/L;
- Water from TW1-2013 was considered very hard, with a measured hardness of 272 mg/L as CaCO₃. According to Health Canada, “hard water causes incrustation in distribution systems and excessive soap consumption. Public acceptability of the degree of hardness may vary considerably from community to community depending on local conditions. Therefore, a maximum acceptable level for hardness is not specified by Health Canada. Waters with hardness levels in excess of 200 mg/L are considered poor but have been tolerated by consumers;”
- A comparison of results between the total and dissolved metals indicate similar concentrations, suggesting that adequate development has occurred, particulate matter was not contributing to the total metal concentrations, and that the clarity/turbidity of the water was very good;
- Groundwater samples collected from TW1-2013 were analyzed and found to have gross alpha and gross beta detections of 1.13 Bq/L and 0.46 Bq/L respectively. Since the gross alpha threshold value of 0.5 Bq/L was exceeded, individual alpha emitters identified under the GCDWQ were then analyzed. There is only one

individual naturally occurring alpha emitter regulated under the GCDWQ (Radium 226) and it has a maximum allowable concentration of 0.5 Bq/L. The re-test of individual alpha emitters found the Radium 226 level to be 0.0047 +/- 0.0059 Bq/L, which was considerably less than the applicable MAC. In summary, the tested radiological parameters were found to meet the GCDWQ;

- Samples were also collected and submitted for a suite of common hydrocarbons. All tested parameters were well below the relevant GCDWQ, and furthermore these compounds were found to be less than their analytical detection limits, suggesting that impacts from hydrocarbons are currently not detectable in the aquifer; and
- The THM Formation Potential results from TW1-2013 indicate a concentration of 0.091 mg/L, which was marginally less than the drinking water quality guideline of 0.100 mg/L. This result suggests a low but modest potential for THM to be formed if a chlorinated treatment system is to be utilized. It was recommended by MH that further testing be conducted in conjunction with the other water treatment requirements (i.e., uranium removal) to ensure that potential THM health issues are addressed and that THM concentrations at the point of consumption do not exceed the GCDWQ (MH 2013).

Tetra Tech did not review recent water quality data but understands water chemistry analysis is completed at this system annually and bacteriological monitoring is completed on a regular basis with results sent to YG EHS for review.

5.35.5 Water Treatment and Distribution

Table 5-92: Mendenhall Subdivision Public Drinking Water Supply Treatment and Distribution Details		
Item	Details	Source
Owner/Operator	Government of Yukon, Community Services	Tetra Tech 2013
Water source	Groundwater	MH 2013
Number of wells serving the system	One (TW1-2013)	
Treatment type	Uranium removal and chlorination	Tetra Tech 2013 p.c. Steve Perrin 2017
Number of connections	Approximately 165 people	
Delivery method	Blue jug fill and 2" pickup truck fill point serving	
Age of system/last known major work	Water Treatment Plant was installed in 2015	

5.35.6 Source Water Protection Planning

There is no SWPP in place for the Mendenhall Subdivision Large Public Drinking Water System. Due to the significant thickness of overburden overlying the bedrock aquifer at the well location, the aquifer likely has low vulnerability to surface sources of contamination; however, as the system provides drinking water to residents in the area, Source Water Protection Planning may be merited to provide additional tools to protect the groundwater resource.

5.35.7 Water Supply Information Data Gaps

Based on communication with YG CS (Elise Bingeman) and on Tetra Tech’s involvement in the water treatment feasibility study in 2013, Tetra Tech considers that the water supply information presented here is complete and up to date, with the exceptions of the following data gaps:

- The GUDI status of the well has not been evaluated; and,
- There is no SWPP in place for this system.