5.33 Mayo Air Terminal Building Water Supply System

The Mayo Airport Terminal Building (ATB) has water supplied from a 38 m deep well (Well 5653) located in a pit below grade. The 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 require safety measures and inspection for water and water sources for systems that provide for human consumption.

5.33.1 Data Compilation Methodology

Tetra Tech approached stakeholders including 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 has had communication with YG PMD regarding all water systems they operate and/or maintain. YG PMD has provided review comments review comments and data for the compilation.

5.33.2 Hydrogeology

No well log was available for review for Well 5653. Examination of well logs in the Mayo area show that well completion depths and lithology in the area is highly variable (Tetra Tech 2006). Wells are completed at various depths, ranging from shallow dug wells to drilled wells greater than 150 m deep.

The Mayo area has been affected by one or more glaciations, sediments in the Village of Mayo area tend to consist of recent alluvium overlying fine-grained silts with varying interbedded sand and gravel (Tetra Tech 2006). Sediment deposits are generally underlain by metamorphic bedrock, which is exposed in much of the upland areas. Widespread discontinuous permafrost is known to exist in the Mayo area and has been noted in several of the well logs examined (Tetra Tech 2006).

Based on topography and proximity to surface water sources, the groundwater flow direction is inferred to be in the range of south to west towards the Mayo and/or Stewart River. Given the depth of the well and based on the surficial geology of the area, it is likely that the well is completed in a confined aquifer and may have thick sequences of fine-grained soils overlying the aquifer (Tetra Tech 2006).

5.33.3 Well Summary

Tetra Tech was not able to obtain a well log for Well 5653. The following table summarizes the completion details for the well.

Table 5-87:Mayo ATB, Well 5653 Summary

Well Construction Parameters	Details	Source
Date of construction	1968	Tetra Tech 2006 p.c. Nick Barnett 2017
Total well depth	38 m bgs (reported)	
Casing	6” (152 mm) OD Steel Well Casing	
Casing depth	Unknown (> 10 m)	
Well screen	Unknown	
Static water level	Approximately 9 m bgs (measured on August 17, 2005)	

Table 5-87:Mayo ATB, Well 5653 Summary		
Well Construction Parameters	**Details**	**Source**
Sanitary seal	No records of sanitary seal installation. It was noted that a steel plate is welded over the annulus between the 8" (200 mm) surface casing and the 6" (152 mm) steel casing, but there was no mention if a grout seal was installed between the two casings.	
Wellhead completion	The wellhead is located in a pit that is approximately 3 m away from the ATB	
Wellhead stickup	1.2 m bgs (measured on August 17, 2005)	
Well rated capacity	Unknown	
Well GUDI status	Potentially GUDI	Based on well construction
Well Construction Comments:	Well was not constructed to meet Canadian Groundwater Association Well Construction Guidelines.	

5.33.4 Source Water Quality

As part of the SPDWSA review conducted in 2005, Tetra Tech reviewed available groundwater chemistry data and collected an additional sample to test for identified parameters of concern. The key observations and comments noted by Tetra Tech during the 2005/2006 chemical water quality review are summarized as follows (Tetra Tech 2006):

- The water hardness was measured at 349 mg/L (as $CaCO_3$) and the water was considered very hard;
- The turbidity on the dates sampled, ranged from 23.5 NTU to 65.4 NTU. Health Canada recommends that groundwater sources provide water with turbidity less than 1.0 NTU and that water from GUDI sources have appropriate filtration and disinfection. Filtration was expected to achieve a turbidity level of 1.0 NTU for slow sand or diatomaceous earth filtration, 0.3 NTU for conventional direct filtration and 0.1 NTU for membrane filtration in 95% of samples between filter changes or per month with no measurements exceeding 3.0 NTU;
- The water quality results indicated that the water from the well meets the GCDWQ for all the parameters analyzed with the exceptions of turbidity, colour, arsenic, iron and manganese:
  - The colour of the September 2004 sample was greater than 60 CU which exceeds the GCDWQ AO of 15 CU; however, the colour of the August 17, 2005 sample (<5.0 CU) meets the GCDWQ AO;
  - The reported total arsenic concentrations on the dates sampled ranged from 0.0575 mg/L to 0.0756 mg/L and exceed the GCDWQ MAC of 0.01 mg/L. The reported dissolved arsenic concentration was slightly lower, at 0.02 mg/L, but still exceeds the GCDWQ MAC;
  - The reported total iron concentrations on the dates sampled ranged from 2.62 mg/L to 3.77 mg/L and exceed the GCDWQ AO of 0.3 mg/L. The reported dissolved iron concentration was less than the laboratory

detection limit of 0.030 mg/L which was much less than the GCDWQ and also the reported total iron concentrations, indicating that elevated iron was most likely related to elevated turbidity;

- The reported total manganese concentrations on the dates sampled ranged from 0.272 mg/L to 0.289 mg/L and exceed the GCDWQ AO of 0.05 mg/L. The reported dissolved manganese concentration (0.273 mg/L) was similar to the total manganese concentrations and also exceeds GCDWQ; and

- Review of chloride, nitrate and nitrite showed all three to be low and within the normal background ranges, suggesting that the aquifer was not under the influence of anthropogenic surface sources of nutrients or anions such as septic wastes at the time of sampling.

5.33.5 Water Treatment and Distribution

Table 5-88: Mayo ATB Water Treatment and Distribution Details

Item	Details	Source
Owner/Operator	Government of Yukon	Tetra Tech 2006 p.c. Nick Barnett 2017
Water source	Groundwater	
Number of wells serving the system	Mayo ATB well (Well 5653)	
Treatment type	Filtration (5 micron)	
Water users	Airport workers, flight crews and passengers	
Delivery method	Piped connection to the Mayo ATB building	
Age of system/last known update	Unknown	

5.33.6 Source Water Protection Planning

There is no source water protection planning in place for the Mayo ATB Well 5653 and Tetra Tech was not able to find any record of a GUDI assessment for this well. Given the unknown aquifer characteristics, source water protection planning for this groundwater source may provide a valuable tool for identifying, monitoring and managing risks to the well and aquifer

During the 2005 SPDWSA, Tetra Tech identified an AST located approximately 18 m from the well. In addition, there is a cemetery located 63 m south of the well, which does not meet the required setback distance (120 m) for potential contaminant sources in the vicinity of a water supply well (Tetra Tech 2006).

It was reported by EC that four spills occurred between the 1970s and 1991 at the White Pass and Yukon Route tank farm which is approximately 200 m south of the site, and two spills occurred at the North 60 Petroleum Tank Farm in 1997 and 1997 (Tetra Tech 2006). The well serving the Mayo ATB is approximately 200 m from the spill site locations in a direction inferred to up-gradient. It is considered very unlikely that these reported spills or other activities at the bulk fuel sites would impact the deep groundwater in the vicinity of the Mayo ATB well due to both the well depth and the fact that the well is likely up-gradient of these spill sites (Tetra Tech 2006).

5.33.7 Water Supply Information Data Gaps

YG PMD has reviewed this summary and provided comments. To our knowledge, this system is accurate and up to date as of March 2017. Tetra Tech identified the following data gaps:

- Several upgrades on the water system including installation of a disinfection system, were recommended by Tetra Tech in 2006; however, it is our understanding that no updates have been completed to the system since 2006;
- There is no record of source water protection planning or GUDI assessment completed for this groundwater resource.