

### 5.34 Mayo - Wildlife Workshop Water Supply System

The Mayo Wildlife Workshop has water supplied from a drilled well (Well 5653) located in a pit below grade approximately 4 m east of the building (Tetra Tech 2006). 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.

#### 5.34.1 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.

#### 5.34.2 Hydrogeology

No well log was available for review for this well. 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.

Shallow groundwater flow generally occurs in the overlying alluvial deposits in the Village of Mayo area. 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.

#### 5.34.3 Well Summary

The well log for the well is not available for review. In addition, the construction of the wellhead enclosure made the wellhead inaccessible to measurements for depth during the 2005 SPDWSA and no information pertaining to the completion of the well is available.

Well Construction Parameters	Details	Source
Date of construction	1981	Tetra Tech 2006 p.c. Nick Barnett 2017
Total well depth	Unknown	
Casing	6" (152 mm) OD Steel Well Casing	
Casing depth	Unknown	
Well screen	Unknown	
Static water level	Unknown	
Sanitary seal	No records of sanitary seal installation.	

**Table 5-89: Mayo Wildlife Workshop, Well 5650 Summary**

Well Construction Parameters	Details	Source
Wellhead completion	The wellhead is located in a pit that is approximately 4 m away from the building	
Wellhead stickup	Approximately 1.0 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.	

### 5.34.4 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 and groundwater sampling on the well are summarized as follows (Tetra Tech 2006):

- The groundwater source from the well was likely a calcium-magnesium-bicarbonate-sulphate-chloride type water;
- The water hardness (as CaCO<sub>3</sub>), which ranged from 273 mg/L to 280 mg/L on the dates sampled, was considered very hard;
- The turbidity on the dates sampled, was high and ranged from 92.7 NTU to 96.1 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, barium, 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 subsequent sample collected on June 8, 2005 (<5.0 CU) meets the GCDWQ AO;
  - The reported total arsenic concentrations on the dates sampled, which ranged from 0.00828 mg/L to 0.0142 mg/L, either are marginally below or exceed the GCDWQ MAC of 0.01 mg/L. The reported dissolved arsenic concentration, at 0.00177 mg/L, was much less than the GCDWQ and the total arsenic concentrations;
  - The reported total barium concentrations on the dates sampled ranged from 1.38 mg/L to 1.53 mg/L and exceed the GCDWQ MAC of 1 mg/L. The reported dissolved barium concentration, at 1.31 mg/L, which was similar to the total barium concentrations, also exceeds the GCDWQ MAC;

- The reported total iron concentrations on the dates sampled ranged from 4.3 mg/L to 6.53 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 is 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 0.626 mg/L to 0.683 mg/L and exceed the GCDWQ AO of 0.05 mg/L. The reported dissolved manganese concentration, at 0.657 mg/L, was similar to the total manganese concentrations and also exceeds GCDWQ; and
  - Chloride concentrations in water samples collected from this system were slightly higher than expected background concentrations for the Mayo area. It should be noted that the water from the Mayo Grader Station well, which was inferred to be up-gradient of the site, also had higher chloride concentration in the shallow aquifer. Bulk salt storage on the Grader Station site may be the cause of the higher chloride observed in the shallow aquifer in the area; and
- Concentrations of nitrate and nitrite are low and within the normal background ranges for groundwater in the Mayo area. Although impact by septic discharge cannot be definitely ruled out, it does not appear that septic wastes were impacting on water quality in this well at the time of sampling.

### 5.34.5 Water Treatment and Distribution

Table 5-90: Mayo Wildlife Workshop 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 Wildlife Workshop well (Well 5650)	
Treatment type	Filtration	
Water Users	YG employees	
Delivery method	Piped to the workshop building	
Age of system/last known update	Unknown	

### 5.34.6 Source Water Protection Planning

There is no source water protection planning in place for the Mayo Wildlife Workshop Well 5650 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 a number of potential contaminant sources located within 30 m of the wellhead (Tetra Tech 2006):

- A septic tank located at 16 m; the septic field was between 16 m and 28 m from the field;
- An AST located at 7 m; and
- Vehicle parking located at 2m.

It was reported by EC that four spills occurred between the 1970s and 1991 at the White Pass and Yukon Route tank farm which was approximately 200 m south of the site, and two spills occurred at the North 60 Petroleum Tank Farm in 1997 and 1997.

### **5.34.7 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; and
- There is no record of source water protection planning or GUDI assessment completed for this groundwater resource.