

5.17 Carmacks - Airport Terminal Building Water Supply System

The Village of Carmacks is located on the North Klondike Highway approximately 180 km north of Whitehorse, in Yukon. The Carmacks Airport is located off the Robert Campbell Highway about 5 km east of the Village. Carmacks Airport Terminal Building (ATB) water supply system, which is served by a groundwater well located about 17 m south of the ATB, supplies water to workers at the site as well as passengers traveling through the terminal.

This 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.

5.17.1 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.

5.17.2 Hydrogeology

No well log was available for the Carmacks ATB Well 6522, and no other hydrogeology data is available for this area. From the topography and proximity to surface waterbodies, the groundwater flow direction is inferred to be south or southwest towards the Yukon River.

5.17.3 Well Summary

The log for the Carmacks ATB well was not available; however, the following table summarizes available data for the water well.

Table 5-41: Carmacks Airport Terminal Building, Well 6522 Summary

Well Construction Parameters	Details	Source
Date of construction	The well was completed in 1992	Tetra Tech 2006
Total well depth	23.4 m bgs (may be pump depth)	
Casing	6" (152 mm) Steel Well Casing	
Casing depth	Unknown	
Well screen	Unknown	
Static water level	14.9 m bgs (May 13, 2005)	
Sanitary seal	Likely no surface seal	
Wellhead completion	Split gasket cap, well pit	
Wellhead stickup	0.6 m bgs	
Well rated capacity	Unknown	
Well GUDI status	Potentially GUDI	Based on well construction (likely no surface seal)
Well Construction Comments:	Based on the wellhead completion and the lack of a surface seal, the well was not constructed to meet the Canadian Groundwater Association Well Construction Guidelines.	

5.17.4 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 observations made in 2005 are summarized below:

- The water was calcium-bicarbonate type, has a pH of approximately 8.1, and was considered very hard with a measured hardness of 331 mg/L to 336 mg/L (as CaCO₃);
- Turbidity measurements of 2.9 NTU and 17.6 NTU present some concern. 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 is 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;
- Total iron concentration in the sample results reviewed were measured at 0.497 mg/L to 1.44 mg/L and exceeded the GCDWQ AO of 0.3 mg/L. Dissolved iron concentration (<0.03 mg/L) in the sample that Tetra Tech collected was significantly lower than the total iron concentration, indicating that the high total iron concentration can be attributed to the elevated turbidity;
- Total manganese was measured at 0.25 mg/L to 0.255 mg/L and exceeded the GCDWQ AO of 0.05 mg/L. Dissolved manganese concentration in the sample that Tetra Tech collected was 0.296 mg/L, indicating that the manganese is dissolved and filtration to reduce turbidity will not reduce the manganese concentration;
- Water quality met the GCDWQ health-based criteria and aesthetic objectives for all the other parameters analyzed; 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 surface sources of contamination or septic wastes at the time of sampling.

5.17.5 Water Treatment and Distribution

Table 5-42: Carmacks Airport Terminal Building Water Treatment and Distribution Details		
Item	Details	Source
Owner/Operator	Government of Yukon	Tetra Tech 2006 p.c. Nick Barnett 2017
Water source	Groundwater	
Wells serving the system	Carmacks ATB well	
Treatment type	Filtration	
Water users	Airport workers, flight crews and passengers	
Delivery method	Direct piped connection to Carmacks ATB	
Age of system/last known update	Unknown	

5.17.6 Source Water Protection Planning

There is no SWPP in place for the Carmacks ATB Well 6522. Given the lack of data on well completion depth and aquifer characteristics, a SWPP may provide a valuable tool for identifying, monitoring and managing risks to the wells and aquifer; however, as the water use is relatively limited, a SWPP may not be warranted for this system.

Potential sources of contamination in the vicinity of the wellhead that were identified during the 2005 SPDWSA site review, included:

- A septic field located approximately 25 m from the well;
- Aviation fuel drums located at 30 m from the well; and
- A fuel storage trailer was located 20 m from the well (at time of the 2005 assessment).

5.17.7 Water Supply Information Data Gaps

Tetra Tech has obtained review comments from YG PMD regarding the current status of this system and to our knowledge this summary is complete and accurate to March 2017. The following data gaps have been identified:

- There is no source water protection planning for this groundwater resource; however, SWPP may not be warranted due to the limited use of the water;
- In 2006, Tetra Tech recommended a new water well be drilled and a treatment system added, if necessary, to provide potable water to meet the GCDWQ; we understand this work has not been completed; and,
- The well completion details and aquifer vulnerability and hydrogeology are not known.