6.0 BUILDING 1153: CARCROSS GRADER STATION

6.1 Description of Existing Water Supply System

The water supply for the Carcross Grader Station is supplied by a well located on the east side of the Grader Station (see Appendix A6, Figure 1153-A). The coordinates of the wellhead, as measured by a hand held GPS device, were recorded as:

- UTM ZONE 8
- Northing: 6671418
- Easting: 516896

The water supply system consists of a 100 mm diameter submersible pump installed inside a 150 mm diameter steel well casing. The system is equipped with sand filter and canister filtration systems, but there is currently no disinfection of the water supplied by the well. A system schematic is provided as Figure 1153-B in Appendix A6. It was not possible to open the well during the assessment due to the heavy steel drop pipe used to suspend the pump; however, Terry Jackson indicated that the well is approximately 33 m deep.

6.2 Description of Existing Wastewater Systems

The septic tank for the Carcross Grader Station is located on the west side (opposite the well) of the grader station, about 22 m from the well. The septic tank discharges effluent to a field located approximately 34 m from the wellhead.

6.3 Water Quality Results

6.3.1 Water Quality Results from Previous Sampling

The available water chemistry information indicated that the groundwater from the well complies with the current Canadian Drinking Water Guidelines (CDWQG) – Maximum Acceptable Concentrations (MAC) for the parameters analyzed with the exception of turbidity which was above the 1 NTU MAC for both sampling events. The total arsenic concentrations for both sampling events were below the current MAC of 0.025 mg/L, but greater than the proposed MAC of 0.005 mg/L. There were also exceedences of the GCDWQ Aesthetic Objectives (AOs) for color, iron and manganese. The water was also noted to be very hard.

6.3.2 Identification of Additional Analytical Testing Required

Additional analyses performed included dissolved metals, hydrocarbons and UV absorbance. The intent of the dissolved metals analyses was to assess the relationship between the elevated total metal concentrations and turbidity for evaluation of treatment alternatives. The remaining additional analyses were required due to the proximity of the well to potential hydrocarbon sources of contamination and the need for disinfection of the water supply.

The dissolved arsenic concentration was very similar to the total concentration, and there were no indications of hydrocarbon impacts to the well water supply.

6.3.3 Indicators of Potential Contamination

No indicator parameters were elevated above inferred background levels, indicating that the well water supply was not likely impacted by nearby surface sources of contamination including the salt storage and septic disposal on the site at the time of the assessment.

6.4 Conceptual Hydrogeology

The groundwater flow direction in the vicinity of the Carcross Grader Station is inferred to be south to southeasterly, towards Nares Lake. EBA obtained a well log for a well drilled at the Grader Station in Carcross in 1973. Terry Jackson indicated that this was not the same well as the one currently in use; however, he was unaware of the location of this abandoned well, nor the details of its abandonment. A well log for the existing well could not be obtained. The well log for the abandoned well indicates that the well depth is approximately 73.9 m. The sediments encountered during the drilling of the well consisted of sand and silt overlying clay at about 42 m below grade. Till was encountered beneath the clay and overlying weathered bedrock at about 70 m depth. The well is screened within the broken/weathered bedrock. If the same lithology exists at the existing well location, as the abandoned well, a 10 m thick silt layer may protect the aquifer.

6.5 Potential Contaminant Sources

Potential contaminant sources from observations during the site investigation are compiled in Table 1153-4 in Appendix A6. Photos of potential contaminant sources are provided in Appendix A6.

A summary of potential contaminant sources within 30 m of the well is provided below:

- Rock pit – 9 m;
- Vehicle parking within 2 m;
- Waste oil tank at approximately 18 m; and,
- Salt storage within 22 m.

As mentioned previously, due to the proximity of the well to the rock pit, a used oil tank, and to an active industrial type area, EBA included hydrocarbon parameters in the additonal water sampling program. Extractable petroleum hydrocarbons and Polycyclic Aromatic Hydrocarbons were not detected in the sample analyzed.

6.5.1 Spills Records and Contaminated Sites Search Results

Investigation of available spills record information and contaminated sites search results by YTG Environment Branch apparently did not identify any concerns for this site.

6.6 Identified Water System Deficiencies and Associated Risk

6.6.1 High and Medium Risk Deficiencies

High-risk deficiencies identified for the Carcross Grader Station water supply include the lack of disinfection, poor surface completion of the wellhead, and proximity of the well to surface sources of contamination including the wastewater disposal system, rock pit, waste oil tank, vehicle parking lot and salt storage area (assessed as high risk in light of current well construction). By definition of the Draft Yukon GUDI Assessment Guideline, the well is potentially under the direct influence of surface water because it does not meet the requirements of the Guidelines for Water Well Construction.

6.6.2 Low Risk Deficiencies

There was no oil-water separator or grease trap observed within the floor drain system.

6.7 Mitigative Options for Deficiencies

Mitigative options were developed to address the deficiencies identified in the previous section. Deficiencies are categorized by recommended level of priority (with Priority 1 being most critical).

6.7.1 Priority 1

Two options have been presented to mitigate the high risk deficiencies described above.

Option 1: Upgrade existing well system

Installation of a proper disinfection system is recommended for the Carcross Grader Station water supply. The possibilities of using either chlorination or a NSF/ANSI 55 certified UV system may be evaluated for this well. A dual disinfection system (with filtration and disinfection) would mitigate the risk of the proximity to the sewer pipe (22 m). UV treatment is generally less expensive than chlorination; however pre-treatment would be required. An ion exchange system such as a softener used for pretreatment for iron, manganese and hardness in order to ensure proper operation of the UV system may also reduce the content of arsenic in the water depending on the form of arsenic (III or V). If chlorination is the preferred disinfection option, it would be worthwhile considering installation of the water softener system from a cost benefit perspective to increase the lifetime of fixtures and plumbing, while decreasing maintenance and cleaning.

These are conceptual design recommendations based on the information available for the purpose of planning and budgeting. Engineering input will be required for final system specifications.

Option 2: Drill new well at another location

Another option to consider would be to drill a new water supply well and decommission the existing well, versus upgrading the existing well and moving the potential contaminant sources (septic tank, septic field, waste oil tank, rock pit and salt storage area). The benefit of this option is the well could be constructed in compliance with the guidelines, and could

be located with consideration of potential contaminant sources and the inferred groundwater flow direction.

Another attempt should be made to obtain the well log for the existing well as this would provide valuable information regarding how well protected the aquifer is from surface sources of contamination.

6.7.2 Priority 2

If Option 1 is selected for Priority 1 upgrades, then the following Priority 2 upgrades are recommended. The wellhead completion should be improved to prevent the ponding of surfacewater around the well casing. This would involve raising the well casing to a minimum of 500 mm above ground level and retrofitting a proper surface seal to 3 m depth around the well casing. The ground surface should then be graded to promote surface drainage away from the well. The well should be assessed for well depth; depth to water and depth of pump installation to confirm assumed information on the well.

6.7.3 Priority 3

Install an oil-water separator or grease trap within the floor drain system.

As indicated previously, the proposed maximum acceptable concentration for arsenic is likely to change in the near future. If option 1 is chosen, and a softener system is not effective in removing arsenic to the proposed guideline, a point of use (POU) reverse osmosis (RO) system would certainly be effective in reducing arsenic and TDS. RO will also remove protozoa, virus and bacteria. This has been considered a lower risk at this time given that there will most likely be a grace period to give water system owners some time to implement the necessary treatment.

6.8 Cost Estimates for Mitigative Options

Engineering costs for pre-design and preparation of process diagrams and specifications for project tendering for water treatment systems are estimated to be 25% of construction costs. Engineering costs for other upgrades are estimated to be 20% of construction costs, and would include inspection and completion reporting. The costs for materials and labour (not including engineering) are provided in the sections below. An additional contingency allowance of 20% is suggested for budgetary purposes.

6.8.1 Priority 1

Option 1:

- The cost for a pre-treatment and UV disinfection system is estimated to be about $**7,000**, while a chlorine injection system complete with retention tanks would cost in the order of **$10,000** with pretreatment.
- Relocation of the fuel oil AST is estimated at **$500.**
- Construction of a new rock pit, and decommissioning of the existing rock pit is estimated at **$3000**.
- Relocation of salt storage area is estimated at **$1000.**

Therefore, the total cost for this option is estimated at approximately **$11,500** to **$14,500.**

Option 2:

- If a new well is drilled, the cost is estimated to be about **$30,000.** The new well could be located in a safer location, constructed with a proper sanitary seal, and may have better water quality.

6.8.2 Priority 2

Option 1:

- The cost to upgrade the wellhead completion is estimated to be about **$5,000.**
- Installation of a fence around the immediate wellhead is estimated at **$2,000**.

Therefore, the total cost for this option is estimated at approximately **$7,000.**

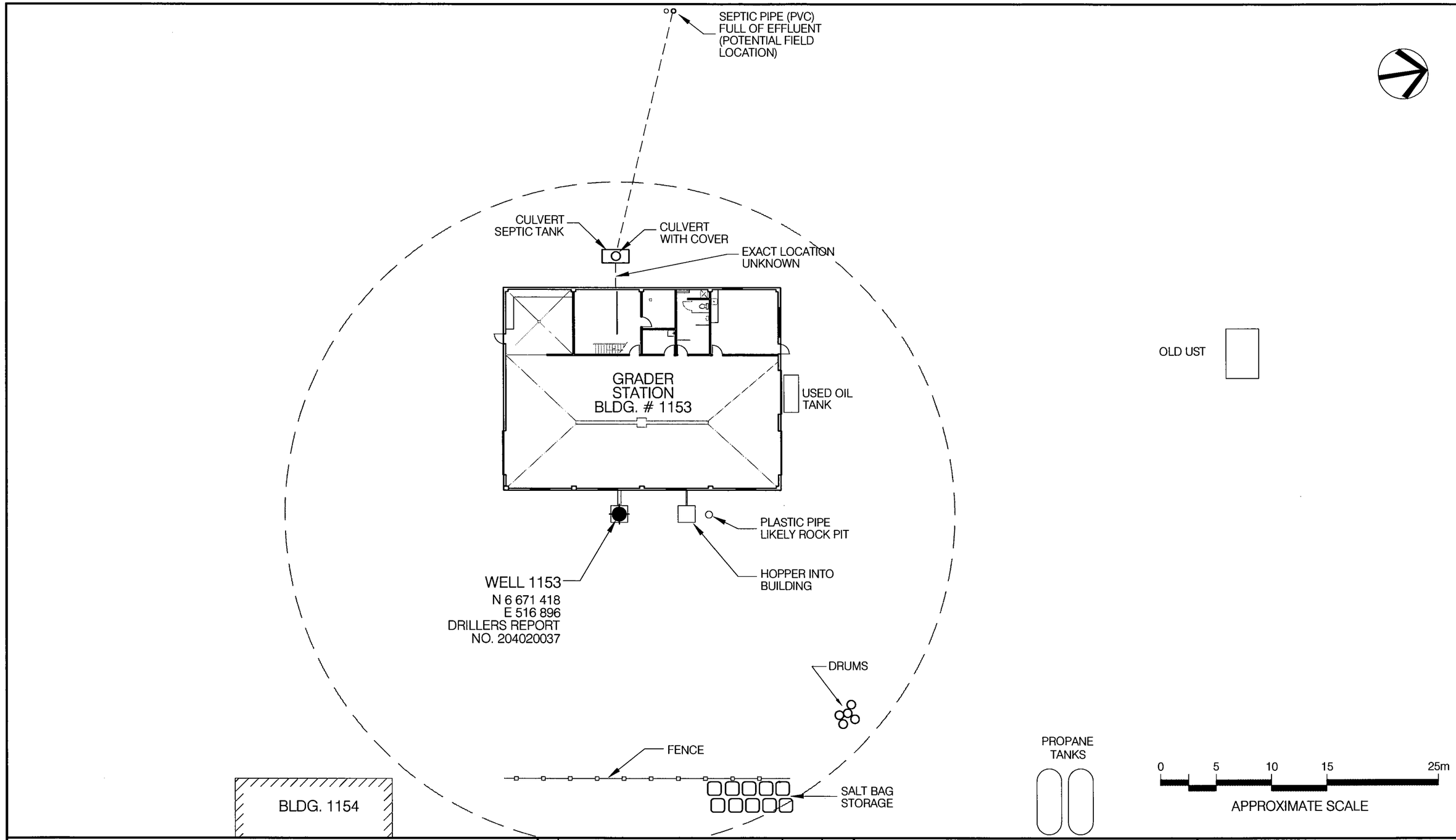
Option 2:

- Given the groundwater chemistry for the area, it is likely; that treatment for hardness, iron and manganese, will also be required. Disinfection may also be recommended. Estimated costs have not been included at this time.

6.8.3 Priority 3

The cost to install an adequate grease trap or oil-water separator is estimated to be about **$3,000.**

In the event that RO is required for point of use removal of arsenic, the cost would be approximately **$700**.



NOTES:

1. UTM COORDINATES OBTAINED WITH A HAND HELD GPS USING NAD83 SYSTEM AND ARE CONSIDERED TO BE ACCURATE TO 10.0 m, APPROXIMATELY.
2. LOCATION OF BUILDINGS & STRUCTURES ON THIS PROPERTY ARE APPROXIMATE ONLY.

30 m RADIUS FROM WATER WELL FOR CONSIDERATION OF PROXIMITY TO POTENTIAL CONTAMINANT SOURCES.

No.	DESCRIPTION	DATE	APPROVED
0	ISSUED FOR CLIENT REVIEW	DD/MM/YY	XXX

REVISION

EBA Engineering Consultants Ltd.

DESIGNED BY:	R. MARTIN
DRAWN BY:	J. BUYCK
DATE:	JUNE 2005
SCALE:	AS SHOWN
PROJECT No.:	1260002.001
ACAD FILENAME:	001-WHITEHORSE REGION

CLIENT: Yukon
Highways and Public Works
Property Management Branch

SMALL PUBLIC WATER SYSTEMS ASSESSMENT
WHITEHORSE REGION

GOVERNMENT OF YUKON
HIGHWAYS & PUBLIC WORKS

CARCROSS YTG GRADER STATION BUILDING 1135 SITE LOCATION DIAGRAM WELL ID: 1153

REVISION ISSUE: 0

DRAWING No.: FIGURE 1153A

Z:\0201Drawings\1260002 Water Assessment YTG\001 - Whitehorse Region\carcross\1260002 Carcross Overall Plan.dwg, 6/10/2005 11:17:52 AM, \\whl-eb-dc001\WHI201COMMON

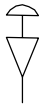
LEGEND


PUMP


PRESSURE GAUGE


GATE VALVE


CHECK VALVE

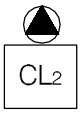

SOLENOID

#2 COMPONENT ID. No.
(SEE TABLE ON FOLLOWING PAGE)

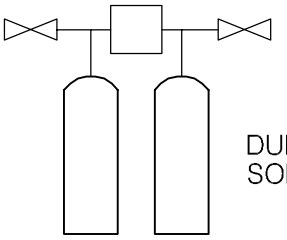
FLOW METER

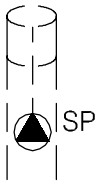
WATER FILTER
(CARTRIDGE TYPE)

PRESSURE TANK

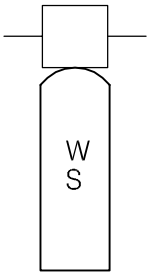


CHLORINE RESERVOIR AND
INJECTION PUMP


DUPLEX WATER
SOFTENER

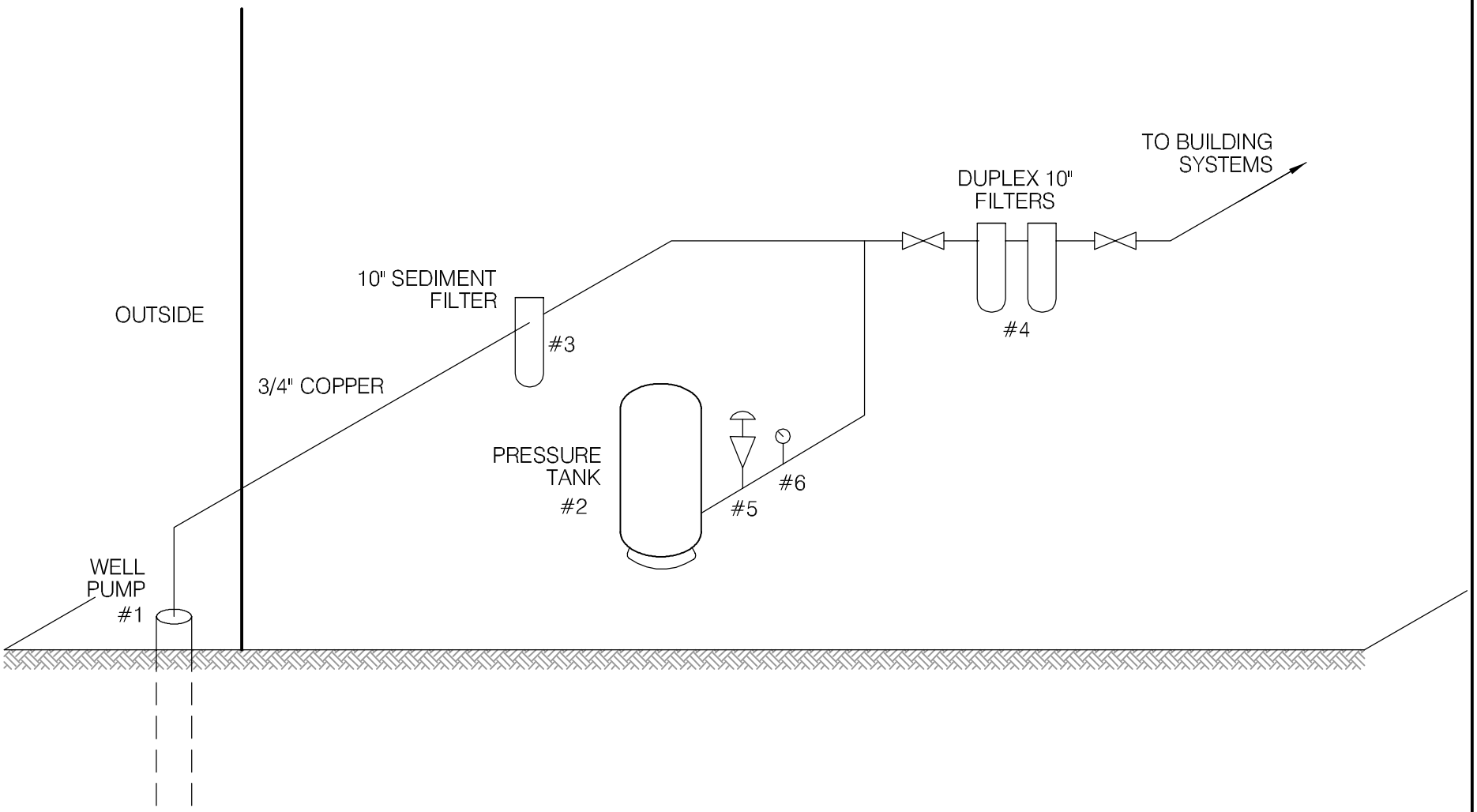


WELL WITH
SUBMERSIBLE PUMP



ACTIVATED
CARBON

EBA Engineering Consultants Ltd.			PROJECT	SMALL PUBLIC WATER SYSTEMS ASSESSMENT WHITEHORSE REGION	
CLIENT Yukon Highways and Public Works Property Management Branch			TITLE	SCHEMATIC SYSTEM LEGEND	
DATE APRIL 2006	DWN. JSB	CHKD. RMM	FILE NO. 1260002		DRWG. LEGEND



SCHEMATIC PRODUCED BY BERT ALBISSER OF AQUA TECH SUPPLIES & SERVICES LTD.

EBA Engineering Consultants Ltd.			PROJECT	SMALL PUBLIC WATER SYSTEMS ASSESSMENT WHITEHORSE REGION	
CLIENT Yukon Highways and Public Works Property Management Branch			TITLE	WATER SYSTEM DISTRIBUTION/TREATMENT SCHEMATIC SYSTEM ID.: 1153 CARCROSS GRADER STATION	
DATE APRIL 2006	DWN. JSB	CHKD. RMM	FILE NO. 1260002.001		DWG.: FIGURE 1153B

Z:\0201Drawings\1260002 Water Assessment YTG\001 - Whitehorse Region\carcross\1260002 Carcross Grader Station 1153 Schematic.dwg, 4/6/2006 10:39:58 AM, Adobe PDF, jbuyck

Whitehorse Region – Carcross Grader Station
Building # 1153

DISTRIBUTION & TREATMENT SYSTEM DATA

Item	Description	Manufacturer	Model	Part No.	Serial No.	Size
1	4" Submersible Pump					
2	Pressure Tank	Challenger	PC66			
3	Sediment Filter	Omni Pure	10"			
4	Duplex Filter	Ametek 10"	10" Clear.	CP5 GAC10		3/4" x 10"
5	Pressure Switch	Pumptrol	FSG2			1/4" Fipt.
6	Pressure Gauge		2 1/2"			0-100PSI
7						
8						
9						
10						

Table 1153-2: Water Quality Results

SOURCE:	Building 1153 - Carcross Grader Station			GCDWQ Criteria		
Location/ Resident	Carcross					
Address	Lot 10101					
Treatment	Filtration					
Source of Water	On-Site Well					
Purpose of Sampling	Baseline	Additional Sampling	Baseline			
Sample Location		Kitchen Tap				
Date Sampled	1-Nov-04	11-May-05	26-Jun-05	**Lower Limit**	**Upper Limit**	
Physical Tests *(ALS)*				**AO**	**MAC**	**AO**
Colour (CU)	**25**		<5			15
Conductivity (uS/cm)	584		610			
Total Dissolved Solids	332		377			500
Hardness CaCO3	294	269	308	AO >200 = poor, > 500 unacceptable[A]		
pH	7.9		8.14	6.5		8.5
Turbidity (NTU)	**1.4**		**17.0**		1	5
UV Absorbance		<0.0010				
Dissolved Anions *(ALS)*						
Alkalinity-Total CaCO3	245		282			
Chloride Cl	2		1.00			250
Fluoride F	0.38		0.317		1.5	
Sulphate SO4	71.0		88.6			500
Nitrate Nitrogen N	<0.1		<0.10		10	
Nitrite Nitrogen N	<0.05		<0.10		1	
Ammonia Nitrogen N						
Total Metals *(ALS)*						
Aluminum T-Al	<0.02		<0.010			
Antimony T-Sb	<0.0004		<0.0005		0.006	
Arsenic T-As	*0.0177*		*0.0158*		0.025	
Barium T-Ba	0.0423		0.035		1	
Boron T-B	<0.02		<0.10		5	
Cadmium T-Cd	<0.0002		<0.0002		0.005	
Calcium T-Ca	57.5		62.8			
Chromium T-Cr	0.001		<0.0020		0.05	
Copper T-Cu	0.003		0.0015		1	
Iron T-Fe	**1.06**		**1.23**			0.3
Lead T-Pb	0.0004		<0.0010		0.01	
Magnesium T-Mg	32.9		36.7			
Manganese T-Mn	**0.068**		**0.0635**			0.05
Mercury T-Hg	<0.0002		<0.0002		0.001	
Potassium T-K	2.8		2.62			
Selenium T-Se	<0.0004		<0.0010		0.01	
Sodium T-Na	14		16.8			200
Uranium T-U	0.0047		0.00457		0.02	
Vanadium T-V						
Zinc T-Zn	0.059		<0.050			5
Dissolved Metals *(ALS)*						
Aluminum D-Al		<0.10			0.1	
Antimony D-Sb		<0.0050			0.006	
Arsenic D-As		*0.0188*			0.025	
Barium D-Ba		<0.20			1.0	
Boron D-B		<1.0			5	
Cadmium D-Cd		<0.0020			0.005	
Calcium D-Ca		59.9				
Chromium D-Cr		<0.020			0.05	
Cobalt D-Co						
Copper D-Cu		<0.010				1.0
Iron D-Fe		**0.526**				0.3
Lead D-Pb		<0.010			0.01	
Lithium D-Li						
Magnesium D-Mg		29.1				
Manganese D-Mn		**0.08**				0.05
Mercury D-Hg		<0.00020			0.001	
Molybdenum D-Mo						
Nickel D-Ni						
Potasium D-K		2.8				
Selenium D-Se		<0.010			0.01	
Silver D-Ag						
Sodium D-Na		11.5				200
Uranium D-U		0.0049			0.02	
Zinc D-Zn		<0.50				5.0
Trihalomethanes						
Bromodichloromethane		-				
Bromoform		-				
Chloroform		-				
Dibromochloromethane		-				
Total Trihalomethanes		-			0.1	
Organic Parameters						
Tannin and Lignin						
Total Organic Carbon C						
Polycyclic Aromatic Hydrocarbons						
Acenaphthene		<0.000050				
Acenaphthylene		<0.000050				
Acridine		<0.000050				
Anthracene		<0.000050				
Benz(a)anthracene		<0.000050				
Benzo(a)pyrene		<0.000010			0.00001	
Benzo(b)fluoranthene		<0.000050				
Benzo(g,h,i)perylene		<0.000050				
Benzo(k)fluoranthene		<0.000050				
Chrysene		<0.000050				
Dibenz(a,h)anthracene		<0.000050				
Fluoranthene		<0.000050				
Fluorene		<0.000050				
Indeno(1,2,3-c,d)pyrene		<0.000050				
Naphthalene		<0.000050				
Phenanthrene		<0.000050				
Pyrene		<0.000050				
Quinoline		<0.000050				
Extractable Hydrocarbons						
EPH10-19		<0.30				
EPH19-32		<1.0				
LEPH		<0.30				
HEPH		<1.0				
Haloacetic Acids						
Bromoacetic Acid		-				
Bromochloroacetic Acid		-				
Chloroacetic Acid		-				
Dibromoacetic Acid		-				
Dichloroacetic Acid		-				
Trichloroacetic Acid (TCA)		-				
Field Chemistry (EBA)						
pH		7.71		6.5		8.5
TDS (ppm)		235				500
EC (uS/cm)		460				
Temperature (deg C)		10.3				
Free Available Chlorine (mg/L)						

Notes:

A. Guidelines indicated for hardness are not CDWQG, rather they are general aesthetic guidelines - exceedences are indicated in yellow highlighting.

Shading indicates exceedence of Proposed MAC guideline (arsenic).

Bold Underline with Yellow shading indicates exceedence of CDWQG MAC

Results are expressed as milligrams per litre except for pH and Colour (CU), Conductivity (umhos/cm),Temperature (°C) and Turbidity (NTU)

< = Less than the detection limit indicated.

AO = Aesthetic Objective

MAC = Maximum Acceptable Concentration (Health Based)

Table 1153-3: Summary of Well Assessment Results
SMALL PUBLIC DRINKING WATER SYSTEMS

Well Identification and Location					
Building #	**Building Name**	**Location**	**Northing (+/- 10 m)**	**Easting (+/- 10 m)**	**Grade Elevation (+/- 10 m)**
1153	**Carcross Grader Station**	**Carcross**	6671418	516896	675

Well Details							
Well Casing Diameter (mm)	**Year Well Installed**	**Well Log?**	**Well Depth (m bg)**	**Reported Low Permeabilty Protective Layer?**	**Pump Setting (m bg)**	**Well Capacity - Tested, or Reported by User**	**Static Water Level Below Ground (m-btwc)**
150	1984	No	?	?	?	?	?

Well Construction Details				
Wellhead Above ground (m)	**Well Cap**	**Well Screen**	**Surface Seal**	**Apron Grading**
Approximately at grade (within 0.01)	Split Cap Gasket	?	Unlikely	Slopes towards wellhead enclosure

Table 1153-4: Potential Contaminant Sources
Building 1153 – Carcross Grader Station:

Potential Contaminant Source	Potential Contaminants	Distance from Water Source	Northing	Easting
Rock Pit	***Organic*** and inorganic chemicals.	**9 m**		
Vehicle Parking	***Biological***[1]**,** inorganic[2] and organic parameters.	**2 m**		
Waste Oil Tank	***Biological,*** inorganic and organic parameters.	**18 m**		
Drums	***Biological,*** inorganic and organic parameters.	30 m to 60 m		
Septic tank	***Biological and Inorganic*** parameters.	**22 m**		
Septic Field	***Biological and Inorganic*** parameters.	34 m	6671388	516858
Salt Storage	***Inorganic*** parameters	**22 m**		
Sewage lines, tanks or lift stations	***Biological,*** inorganic and organic parameters.	Approx. **20 m**		
Above ground storage tanks (ASTs)	***Organic*** *parameters****.***	N/A		
Naturally occurring sources of contamination	***Radionuclides, Bacteria and Viruses from surfacewater sources.***	Well Head in Pit.		

Notes: ***Bold highlighting of distances indicates non-compliance with proposed guidelines***

1- Biological parameters include: bacteria, viruses, protozoa (parasitic organisms), helminthes (intestinal worms), and bio aerosols (inhalable moulds and fungi).

2 – Inorganic contaminants could include arsenic in embalming chemicals (prior to early 1900's), and heavy metals in caskets.

Required Setback Distances Draft Guidelines for Part III – Small Public Drinking Water Systems:

300 m (1,000 ft) from a sewage lagoon or pit and manure heaps
120 m (400 ft) from a solid waste dump or a cemetery
30 m (100 ft) from any other potential source of contamination

EBA Engineering Consultants Ltd.
Creating and Delivering Better Solutions

SMALL PUBLIC WATER SYSTEM ASSESSMENT

PART A: EBA Site Inspection

Inspector: Ryan Martin
Luke Lebel

Date May 11, 2005

WELL ID #	Owner	Location Description
1153	YTG	Carcross Grader Station

1. Well Location and Potential Contaminant Sources

a. General location of well: (Community, Subdivision, etc.)
Carcross

b. Specific location: (Road or street, Building number, name of owner and/, legal description,
Carcross Grader Station, Tagish Road

c. GPS location: 516898 Easting 6671478 Northing 675m ± 6m

d Is there electric power? ☒ Yes ☐ No

e. Does the well system have:

☐ 15 or more service connections to a piped distribution system? If so how many_____
Services carcross maintenance camp

☐ 5 or more delivery sites on a trucked distribution system? If so how many_____

f. Nearest building, specify Carcross Maintenance Camp Garage

g. Distance from well to building 4m

h. If there is an effluent disposal field, is its location known? ☒ Yes ☐ No

i. Distance from well to nearest point of known field: ~34m

j. Well location relative to field: ☐ upslope ☐ downslope ☒ lateral

k. Is there any part of a sewage disposal system(s)or other potential sources of pollution that may pose a health and safety risk within 30 m? ☒ Yes ☐ No
Sewage tank ~22m away, Field 34m away, Rock pit and used oil

l. Is the well located within 300 m from a sewage lagoon or pit? ☐ Yes ☒ No

m. Is the well located within 120 m from a solid waste site or dump, cemetery? ☐ Yes ☒ No

n. Is the infrastructure protecting the wellhead, pumphouse, storage tank and/or water treatment plant designed and secured to prevent:

Unauthorized access by humans? ☐ Yes ☒ No Only painted tin casing and purt plywood unfastened on top
Entrance by animals? ☒ Yes ☐ No There are few signs of animals

o. Is well site subject to flooding? ☒ Yes ☐ No Heavy water stains and dampness, signs of flooding. Still wet after a long period of dry weather.

p. Is the well site well drained? ☐ Yes ☒ No There is little drainage surrounding, ground is level with the height of the well head or slightly above

q. Is there a buried fuel tank on the property? ☐ Yes ☒ No

If yes, is it ☐ in use ☐ abandoned

Is the location known? ☐ Yes ☐ No

Distance from the well to known buried tank _____

r. Are there any other known contaminant sources on the property?

☒ Yes ☐ No Describe _____

If yes, specify the source: ☐ dump ☐ sewage lagoon ☐ cemetery ☐ other
Salt ~22m away

Potential Source 1: Used oil ; Distance from well to Potential Source 1: 18m

Potential Source 2: Vehicle Park ; Distance from well to Potential Source 2: 2m

Potential Source 3: Rock Pit ; Distance from well to Potential Source 3: 9m

Potential Source 4: Metal Parts ; Distance from well to Potential Source 4: Within 10m
- Drums less than 60m but greater than 30m
- Hopper into building - 6m

s. Are there other wells on this property? ☐ Yes ☒ No

How many?_____ ☐ in use ☐ abandoned ☐ require proper sealing

2. Well and Wellhead information:

a. When was well installed? Year _____ Month _____

b. Type: ☒ drilled ☐ dug ☐ sand point ☐ other _____

c. Is there a drillers log for the well: ☐ Yes ☐ No

d. Is there a surface seal to 6 m ☐ Yes ☐ No ☐ unknown ☒ unlikely

e. Surface casing: ☒ Yes Diameter 122 cm ☐ No
pwf wooden enclosure with painted tin casing

f. Well casing: Diameter 15 cm Material: ☒ steel ☐ plastic ☐ concrete

g. Depth of well: _____ ☐ measured (if possible) ☐ reported ☐ from log

h. Static water level below ground: _____

☐ measured (if possible) ☐ reported ☐ from log ☐ flowing

i. (If granular) Is the well completed: ☐ open end casing ☐ with a well screen

☐ with slotted pipe ☐ unknown other _____

j. (If bedrock) Does the well have a liner? ☐ yes ☐ No ☐ steel ☐ plastic

k. If there is a well screen: length _____ slot size(s) _____
Location of screen: from _____ to _____ from log reported

l. Is there a sump below the screen? ☐ Yes ☐ No unlikely

m. Is the well head: ☐ in pumphouse ☒ in pit ☐ pitless adaptor ☐ in a building
A wooden pwf enclosure with a tin casing.

☒ in a wooden enclosure other, describe _____

n. If the well head is located in a wooden enclosure,

i. Is the well head below grade? describe in detail well head is almost exactly at grade level

ii. Are there signs of ponding on the enclosure(e.g. water stains, etc.)? ☒ Yes ☐ No
There are signs of dampness on the pvt studs and on piping insulation. Ponding likely. There is also rust on well head.

iii. Is the wellhead enclosed by fiberglass insulations? ☐ Yes ☒ No
well head is not insulated. Piping has styrofoam insulation and sackcloth blanket to insulate it

iv. Any evidence of rodents? Specify There are some (few). mouse droppings

v. Does the well casing have a proper seal cap? ☒ Yes ☐ No

If no, describe condition split cap with a small electrical open holes for heat trace. Although it is rusty and grimey

3. Water Supplying This Well:

a. By definition is the water from a surface water source or under the direct influence of surface water?

☒ Yes ☐ No ☐ farther investigation required.

If yes is there treatment ☐ Yes ☒ No

Explain (filtration, disinfection etc...) only a 3- inline filters

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4. Aquifer Supplying This Well:

a. The aquifer is: ☐ bedrock ☐ granular sediment ☐ unknown

b. Does water level and/or well capacity show seasonal fluctuation? ☐ Yes ☒ No

5. Pump Installation:

a. Is the well equipped with a pump? ☒ yes ☐ No

b. Type of pump: ☐ hand ☒ electric submersible ☐ jet

☐ shallow well centrifugal ☐ other, _____

c. Description: Manufacturer _____ Model _____

horsepower _____ capacity _____ voltage _____

* d. Date installed: _____ By: _____

* e. For submersible pump, depth of setting below surface _____

f. Drop pipe for submersible pump: ☒ steel ☐ plastic

g. Pump delivers water to: ☐ pressure tank ☒ elevated tank ☐ other

h. Are there automatic pump controls: ☒ Yes ☐ No

i. Is there provision for taking water samples before water reaches storage? ☒ Yes ☐ No

j. Is there a water meter on the system? ☐ Yes ☒ No

k. Is the pump and piping protected from freezing? ☒ Yes ☐ No

If yes, describe: heat trace on all and insulation on above ground piping only

l. Comments on pump installation: _____

6. Conclusions

a. Comments on overall installation:

-There is a major concern with flooding. There is evidence that the well casing and surface casing has been flooded due to rust, stains, ect.

-The well is in very close proximity to many potential contaminates such as salt, metal, used oil, effluent,

b. Recommendations: _____

PART B: EBA Site Inspection

Inspector: BERT ALBISSER Date MAY 11/05

WELL ID #	Owner	Location Description
1153	YTG	CARCROSS MAINTENANCE CAMP

6. Water Treatment

a. Is well water treated? ☑ Yes ☒ No; Type of treatment:

☐ chlorination ☐ iron and or manganese removal ☑ other SEDIMENT

b. Is water entering plumbing or piped distribution system treated with chlorine or another treatment that is as effective as chlorine used to achieve disinfection throughout the system?

☐ Yes ☑ No If so how _____

c. If treated with chlorine, is the free residual chlorine concentration less than 0.2 mg/L

☐ Yes ☐ No _____ reading.

Tested at _____ (location)

d. Is testing for chlorine residual concentration done at the tap (eg. Kitchen faucet) or from representative points in a piped distribution system, including a point from tap at the end line

☐ Yes ☑ No If yes how often? _____

e. If the drinking water is being transported by water delivery truck does it have a minimum chlorine free residual of 0.4 mg/L at the time of fill. ☐ Yes ☑ No

7. Water Quality (observations):

a. Does the water stain plumbing? ☐ yes ☐ No ☐ slight ☑ severe

Type of stain: ☑ brown ☐ red ☐ black

b. Does the water contain sediment? ☐ Yes ☐ No ☑ occasional ☐ constant

c. Is there an unpleasant odour? ☐ Yes ☑ No ☐ H_2S ☐ Other _____

d. Is there an unpleasant taste? ☑ Yes ☐ No ☐ brackish ☐ Other _____

e. Is there a history of bad bacterial analyses? ☐ Yes ☑ No

f. Is there a chemical analysis? ☐ Yes ☑ No ☐ adequate ☐ incomplete

g. Is there analysis of trihalomethanes (THMs) where the water source is a surface water supply or a well under the direct influence of surface water? ☐ Yes ☑ No

h. Is the drinking water tested daily with an accurate reading chlorine test kit capable of reading in the range 0 to 3.5 mg/L of free chlorine residual in increments of 0.1mg/L? ☐ Yes ☐ No ☑ unknown

i. If yes is the test performed in accordance with manufactures directions? ☐ Yes ☐ No ☐ unknown

j. Is a record of the date, time,name of person performing the test and results of the drinking water sample kept? ☐ Yes ☑ No

TANK AND PIPING DETAILS

Tank Room

Is there a water tank? Yes (No) Details:

Where is it located?
Comments: _____

Is the room in which the water tank is located heated to maintain an optimum temperature of 4°C for stored water?
YES NO
Comments: _____

Are there windows in the add-on that may allow direct sunlight onto the water holding tank? YES NO

Comments: _____

Are there other heat sources near the tank? YES NO
Comments: _____

Is there waterproof flooring with a sealed base to contain spills? YES NO
Comments: _____

Overall Tank

What are the tank size and dimensions?

_____

What material is the tank constructed of? _____

Is tank and associated piping constructed of safe materials (i.e. CSA approved and material that does not affect the taste of the water)? YES NO

Comments: _____

Tank Inlet, Outlet and Lid

Is there adequate access on the tank for cleaning (i.e. min 15" access lid)? YES NO

Does the lid have a tight seal and is it watertight when closed? YES NO

Does the tank have an overflow or high level whistle? YES NO

Is the water tank drain accessible? YES NO

WATER TANK AND WATER QUALITY CONDITION

Are there signs of staining or biofouling? YES NO
Comments:_____

Is there any sediment or scum in bottom of tank? YES NO
Comments: _____

Is there any odour associated with the water or tank? YES NO

Have there been any bacteriological analyses conducted previously? YES NO

Does the tank appear that it has been cleaned recently? YES NO

Are the tanks easily assessed for the purpose of cleaning and disinfection? YES NO

8. Conclusions

a. Comments on overall installation:

SYSTEM IS NOT UP TO NEW STANDARDS.

b. Recommendations:

INSTALL CHLORINATION SYSTEM WITH PROPER RETENTION FACILITY. IMPROVE FILTRATION SYSTEM TO COMMERCIAL QUALITY FILTERS.
RAISE WELL CASING TO 18" ABOVE GRADE AND INSTALL PROPER SURFACE SEAL.
INITIATE CHLORINE RESIDUAL TESTING PROCEDURE.

PART C: Property Manager/ System Operator Questionnaire

Inspector: Terry Jackson Date May 10 05

Property manager: YTG Carcross Corader station

1) Water Source:

a. Is the well water the major source of drinking water? ☐ Yes ☐ No

b. Is the well water used for other non-drinking purposes? ☑ Yes ☐ No

2) Well information:

a. When was your well installed? Year 1984 Month _____

b. Type: ☑ drilled ☐ dug ☐ sand point ☐ other _____

c. Is there a driller's log for the well?: ☐ Yes ☐ No

d. Do you know the depth of your well? If so, please indicate: 110' ½ hp pump.

e. Who was the well constructed by?

Indicate contractor's name: _____

f. Are you, the owner ☐ Yes or other: _____

g. Who maintains the well? Y.T.G

h. Are there other wells on this property? ☐ Yes ☑ No

How many? ____; Are they: ☐ in use ☐ abandoned ☐ require proper sealing

i. Is there a buried fuel tank on the property? ☐ Yes ☑ No

If yes, is it ☐ in use ☐ abandoned

Is the location known? _____

How was it abandoned? _____

3) Pump Installation

a. Who installed your pump, and when did they install it? _____

b. What type of pump do you have? _____

c. Pump delivers water to: ☑ pressure tank ☐ elevated tank ☐ other _____

4) **Water Treatment**

a. Is your well water treated? ☐ Yes ☑ No

Type of treatment: ☐ chlorination ☑ iron and or manganese removal
other fitters

5) **Well Capacity:**

a. Well capacity: User's opinion ☑ adequate ☐ inadequate

b. Are there any times of year when your well goes dry, or does not produce enough water?

c. Has well capacity decreased since it was installed? ☐ Yes ☑ No

6) **Water Quality:**

a. In general, do you like your water?: ☐ yes ☑ no

b. Does the water stain household plumbing? ☑ yes ☐ No ☐ slight ☐ severe

Type of stain: ☑ brown ☐ red ☐ black

c. Does the water contain sediment? ☑ Yes ☐ No ☐ occasional ☐ constant

d. Is there an unpleasant odour? ☑ Yes ☐ No

☑ Sulpher (rotten egg smell) ☐ Other _____

e. Is there an unpleasant taste? ☑ Yes ☐ No ☐ brackish ☐ Other _____

f. Hardness: Is it hard to lather with soap?: ☑ yes, very ☐ moderate ☐ no

g. Is water softener being used? ☐ Yes ☑ No

h. Are samples for bacterial analysis (coliforms) taken regularly? ☐ Yes ☑ No
If so, at what time intervals? _____
Who takes them? _____

i. Is there a history of bad bacterial analyses? ☑ Yes ☐ No

j. Is there a chemical analysis? ☐ Yes ☐ No ☐ adequate ☐ incomplete

7) Do you have any overall comments or complaints about your water well system?
should only be used for non potable situations

Photo 0131: 1153 Well Head

Photo 0134: Floor Drain System

Photo 0135: Water Tanks/Brine Tanks

Photo 0136: Pressure Tank and Three In-Line Filters