14.0 BUILDING 1953: TAGISH FIRE HALL

14.1 Description of Existing Water Supply System

The well source serving the Tagish Fire hall also provides a community water supply for local residents to obtain potable water. The well is located beside the Tagish Fire hall, which is on the east side of the Taku Subdivision access road. The 168 mm diameter well is reported to be 49.2 m deep and was installed by Midnight Sun Drilling in 1990. The wellhead is located in an above ground PWF wooden enclosure that is approximately 2 m away from the pump house and 27 m away from the fire hall. A site diagram is provided as Figure 1953-1 in Appendix A14. The coordinates of the wellhead, as measured by a hand held GPS device, were recorded as:

- UTM ZONE 8
- Northing: 6681131
- Easting: 538646

Water from the well is chlorinated for disinfection and then further treated to remove excess iron before entering an elevated storage tank in the fire hall. Water for pick-up at the public truck fill station passes directly from the iron removal duplexing unit to the outside hose bib and overhead truck fill. A system schematic is shown by Figure 1953-2 in Appendix A14.

14.2 Description of Existing Wastewater Systems

There is septic tank that discharges effluent to an in-ground disposal field located about 40 m to the east of the well. A site diagram showing the location of the septic system is provided as Figure 1953-1 in Appendix A14. Note that all parts of the sewage system are greater than 30 m from the wellhead.

14.3 Water Quality Results

Bacteriological

Bacteriological sampling of water from the Tagish Fire hall water system has previously been completed on a number of occasions by EBA for the Property Management Agency as part of a separate contract. EBA was provided access to the YTG database in order to review the results of this previous bacteriological sampling. Nine samples were collected

from this system between September 2004 and March 2005 and were tested for total coliform and *E. coli* by Yukon Environmental Health Services using the presence/absence test method. Results are tabulated in Table 1953-1 in Appendix A14.

According to the YTG database, *E. coli* and Total Coliform Bacteria were reported as absent in each of the nine samples for which results were provided.

Detailed Potability Analyses

Two water samples were previously collected from the Tagish Fire Hall water system on May 31, 2004 and October 4, 2004. Both samples were submitted to ALS Environmental in Vancouver BC for detailed potability analyses. The results of both these analyses are summarized in Table 1953-2 and are included in Appendix A14.

- The water quality for the samples obtained from both dates indicated that the groundwater source was calcium-bicarbonate type water with very high hardness (263 mg/L and 228 mg/L as $CaCO_3$ for each respective date).
- At 0.637 mg/L, the iron concentration for the sample obtained on May 31, 2004 exceeded the CDWQG aesthetic objective of 0.3 mg/L. The subsequent sampling event (October 4, 2004) had a much lower iron concentration, so it is expected that the iron softener was not operation at the time that this first sample was collected, or it was collected pre-treatment (raw water sample).
- The water quality results indicated that all other health based and aesthetic objectives were met for the parameters analyzed. The elevated hardness is considered to be generally poor for aesthetic purposes.

14.3.1 Identification of Additional Analytical Testing Required

Additional analytical for the Tagish Fire Hall that was identified for inclusion during the water system assessment is detailed below:

- Trihalomethane parameters (THM) were analyzed as there is an existing chlorine disinfection system. These include (bromodichloromethane, bromoform, chloroform, dibromochloromethane). THMs and other disinfection by-products are formed when disinfectants such as chlorine reacts with naturally occurring organic matter in the source water. Some studies have linked THMs to increased risk of cancer.
- Haloacetic Acid (HAA) analysis was included as well due to the presence of the chlorination system. Similar to THMs, HAA can be present in chlorinated drinking water as a chlorinated water disinfectant byproduct formed when the chlorine reacts with natural organic matter in raw water supplies.

- Measurements in the field for total dissolved solids, conductivity, pH, and temperature were completed at the time of collecting.

Additional Analytical Results

A water sample was obtained during the water system assessment on May 9, 2005, and was submitted for analysis to ALS Environmental in Vancouver BC for THM and HAA analysis. The results are summarized in Table 1953-2 in Appendix A14 and the laboratory reports are included in Appendix B.

At the time of the assessment, the residual chlorine concentration from a sample collected within the Fire hall was found to be 0.02 mg/L. The chlorine injector was also noted to be damaged, and has reportedly since been repaired. The observed residual chlorine concentration is significantly less than the required concentration of 0.2 mg/L at the point of consumption.

Property Management Agency retained EBA to complete a follow-up chlorine monitoring event prior to completion of this final report. Katherine Johnston, E.I.T. of EBA collected samples for residual chlorine testing using a Hach Colorimeter on March 23rd 2006. Samples were obtained from the public fill station, and from two locations within the Fire hall. Residual chlorine was observed to be 0.03 mg/L at the public fill, and 0.0 mg/L at both locations within the Fire Hall. The observed residual chlorine concentrations are significantly less than the required concentration of 0.2 mg/L at the point of consumption within the fire hall, and less than the 0.4 mg/L required for a bulk water fill station.

The additional analysis completed at the time of the assessment indicated that there were detectable concentrations of THMs, specifically bromodichloromethane, which had a concentration of 0.0023 mg/L, and chloroform, which had a concentration of 0.0054 mg/L. These parameters do not have an associated CDWQG; however, there is a MAC for total Trihalomethanes of 0.1 mg/L. The total trihalomethanes concentration for the sample collected on May 9 was 0.0078 mg/L, which is more than 10 times lower than the MAC. It was recommended that THM analysis be completed again in the near future when residual chlorine concentrations are in the normal operational range.

During the follow-up monitoring event completed by EBA in March 2006, the residual chlorine concentrations were observed to be lower than the previous sampling event. As such, THM analyses would not be representative of potential THM formation in this system during proper operation. Therefore, a sample was collected and submitted to ALS Environmental in Vancouver for THM formation potential. In a formation potential test, chlorine is added to the sample at the laboratory, and the sample is allowed to stand for 7

days so that potential chlorination byproducts (if any) would have adequate time to form. The THM formation potential (FP) test indicated that under lab conditions, the source water when subjected to a residual chlorine concentration of 3-5 mg/L had a total trihalomethanes concentration of 0.0147 mg/L, which is significantly less than the CDWQG MAC of 0.1 mg/L.

At 0.002 mg/L, dichloroacetic acid, a HAA was also found at a measurable concentration above the analytical detection limit. There are currently no CDWQG guidelines for HAAs; however, the EPA has set a MCLG (maximum concentration level goal) of zero mg/L for this parameter, and has a maximum concentration level of 0.06 mg/L for the sum of the concentrations of five Haloacetic Acids. Retesting for HAA concentrations at a higher chlorine concentration was also recommended in the draft report. In March 2006, EBA collected additional sample to be analyzed for HAA formation potential. Similar to the THMFP test, the sample was chlorinated and HAA concentrations were tested after 7 days. Similar to previous results, dichloroacetic acid was detected above the laboratory detection limit at 0.0039 mg/L, and total HAA's were below the EPA MCLG of 0.06 mg/L.

14.3.2 Indicators of Potential Contamination

Chloride, nitrate and nitrite concentrations can indicate impacts from surfacewater sources or septic waste. The chloride concentration for the sample obtained on October 4, 2004 is low and can be considered to be within the normal background range for groundwater in the Tagish region. Nitrate and nitrite concentrations for this sample are also low and within the normal background range for the area. Therefore, these water quality results do not suggest that the aquifer from which the groundwater is obtained for the Tagish Fire Hall is under the influence of surfacewater sources or septic wastes.

14.4 Conceptual Hydrogeology

The groundwater flow direction in the vicinity of the Tagish Fire Hall is inferred to be in a south to southeasterly direction, towards Tagish Lake. The static groundwater level in the well was indicated to be about 7.6 m below ground at the time of drilling, and the total well depth is approximately 49 m. The well is screened within a coarser sand unit encountered below about 43 m of finer-grained silty sediments.

14.5 Potential Contaminant Sources

Potential contaminant sources from observations during the site investigation are compiled in Table 1953-4 in Appendix A14. Photos of potential contaminant sources are provided in Appendix A14.

14.5.1 Spills Records and Contaminated Sites Search Results

The Government of Yukon Environment Branch did not identify any recorded spill events nor contaminant issues for this site or neighbouring sites.

14.6 Identified Water System Deficiencies and Associated Risk

14.6.1 High and Medium Risk Deficiencies

Several high priority deficiencies were identified for the Tagish Fire Hall water supply system including:

- Evidence of mice in the well enclosure;
- Lack of a surface seal around the well casing;
- Inadequate casing stick-up;
- 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;
- Lack of backflow prevention on the 50 mm line inside pumphouse;
- Low residual chlorine concentrations observed during both sampling events;
- The need for tank cleaning in Fire hall; and,
- Domestic water for the Fire hall currently comes from the truck fill fire storage tank, which is only used sporadically, and as mentioned previously, is not routinely cleaned.

14.6.2 Low Risk Deficiencies

- Low risk deficiencies identified included the need for the overflow piping to extend outside of the fire hall building.

14.7 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).

14.7.1 Priority 1

To mitigate the high priority deficiencies identified for the Tagish Fire Hall water supply system, the following upgrades are recommended:

- Clean the tank in the fire hall and undertake a regular cleaning program (every 6-12 months).
- Extend the well casing to a minimum of 500 mm above grade;
- Retrofit a surface seal around the well casing extending a minimum of 3 m below grade;
- Adjust site drainage to promote surface runoff away from the well;
- To address the issue of domestic water coming from the fire storage tanks, it is recommended that the solenoid control valve for fire water storage be moved from the pumphouse to the vicinity of the tank, and plumb the domestic water take off upstream of the solenoid valve to feed treated, chlorinated water to the jet pump that supplies potable water to the building. We understand that Community Development plans to move the chlorination system downstream of the iron softener system. This will result in inadequate retention time within the piping system to Fire hall.
- Install a backflow prevention device on the 50 mm line inside the pumphouse; and,
- Initiate a residual chlorine-monitoring program and adjust chlorination system as required to maintain residual chlorine concentration above 0.2 mg/L at the fire hall, and above 4 mg/L at the truck fill.

14.7.2 Priority 3

- To mitigate the low risk deficiencies identified, extend the overflow piping to the outside of the building.
- Technically, a well without a sanitary surface seal to 6 m in depth around the casing is considered by the draft regulations to be under the direct influence of surfacewater and therefore, necessitate filtration for protozoa. Based on the hydrogeological conditions (deep confined aquifer, driven well casing in a tight formation), it is considered that there is very limited risk that this aquifer is under

the direct influence of surfacewater, and hence it has been designated as a low risk in this assessment. It is likely that EHSS will allow some leniency on this definition and subsequent requirement for filtration if a qualified Hydrogeologist can, based on the hydrogeological conditions, support the fact that a well or aquifer is not under the direct influence of groundwater.

14.8 Cost Estimates for Mitigative Options

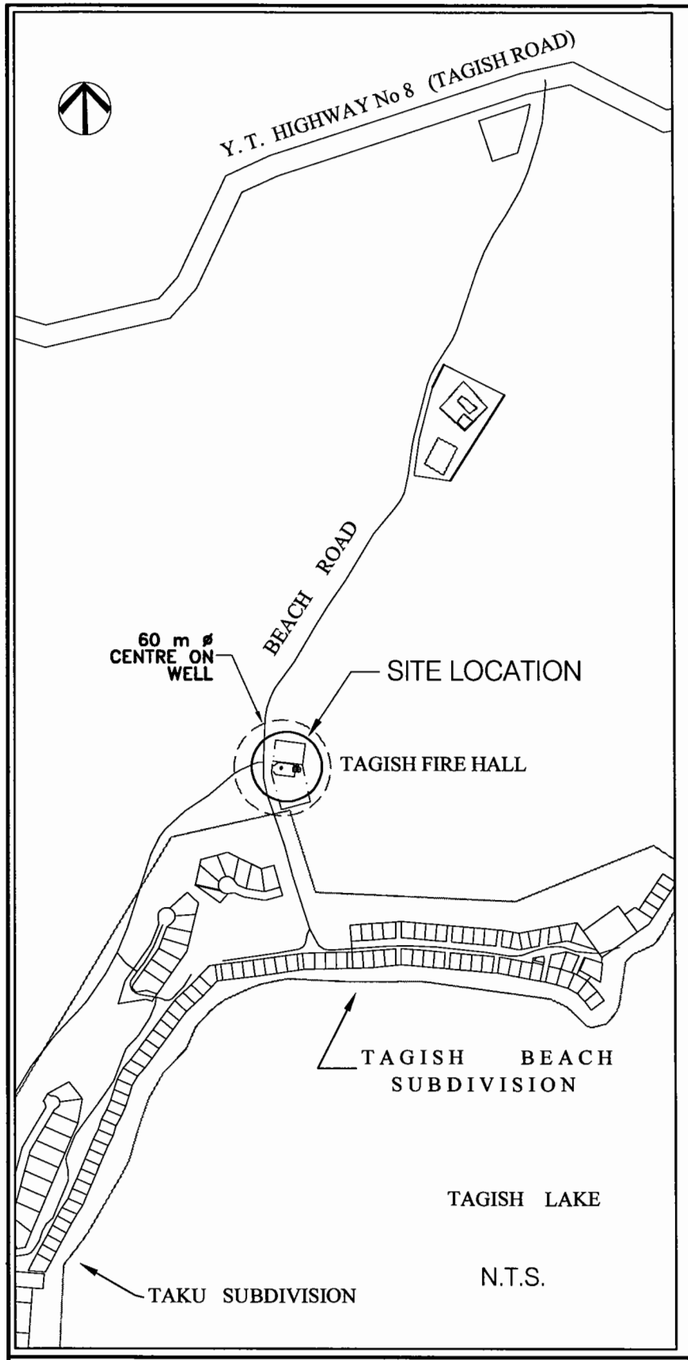
Engineering costs for pre-design and preparation of process diagrams and specifications for project tendering for water treatment systems are estimated to be 25% of construction costs. Engineering costs for other mitigative options are estimated to be 20% of construction costs, and would include inspection 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.

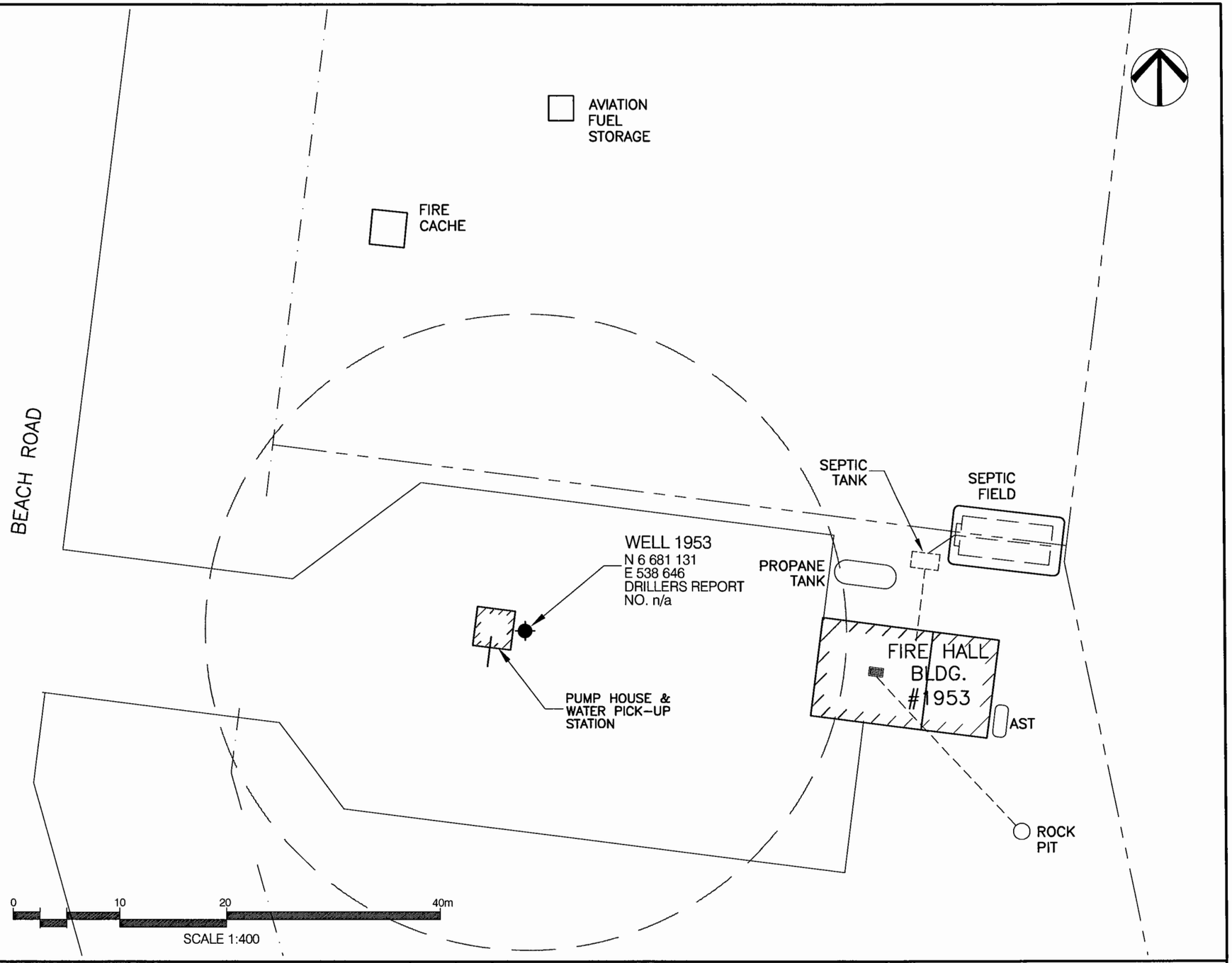
14.8.1 Priority 1

- The cost to upgrade the wellhead completion is estimated to be about **$5,000**.
- The cost to move the solenoid valve and adjust the plumbing is estimated to be about **$1000.**
- The cost to install a backflow prevention device is estimated to be about **$500.**
- The cost to initiate and conduct a residual chlorine-monitoring program should be completed under an operation and maintenance budget.
- The cost to upgrade the chlorination system by adding a 120 US gal retention tank and flow restrictor is estimated at approximately **$ 1100.**

14.8.2 Priority 3

- The cost to extend the overflow piping to the outside of the building would be about **$300**.
- The cost to clean the tank in the fire hall and undertake a regular cleaning program (every 6-12 months) is estimated to be about **$300** per cleaning event, and should be included in regular operation and maintenance.
- In the event that filtration for protozoa is required, it would cost in the order of **$2500** to install; however, as mentioned previously, if the well is retrofitted with a surface seal, and given that the well is deep, and has been completed through thick sequences of silt and clay, it is likely that EHSS would agree with the opinion of a Hydrogeologist that this well is not under the direct influence of surfacewater. In this case, filtration for protozoa would not be required, and the existing disinfection would be deemed adequate.





NOTES:
1. UTM COORDINATES OBTAINED WITH A HAND HELD GPS USING NAD83 SYSTEM AND ARE CONSIDERED TO BE ACCURATE TO 10.0 m, APPROXIMATELY.

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

TAGISH FIRE HALL
BUILDING 1953
SITE LOCATION DIAGRAM
WELL ID: 1953

REVISION ISSUE: 0

DRAWING No.: FIGURE 1953A

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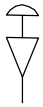
LEGEND


PUMP


PRESSURE GAUGE


GATE VALVE


CHECK VALVE

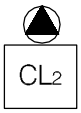

SOLENOID

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

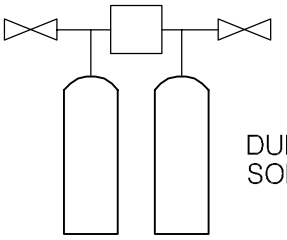
FLOW METER

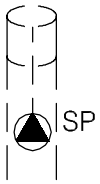
WATER FILTER
(CARTRIDGE TYPE)

PRESSURE TANK

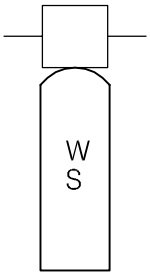


CHLORINE RESERVOIR AND
INJECTION PUMP


DUPLEX WATER
SOFTENER

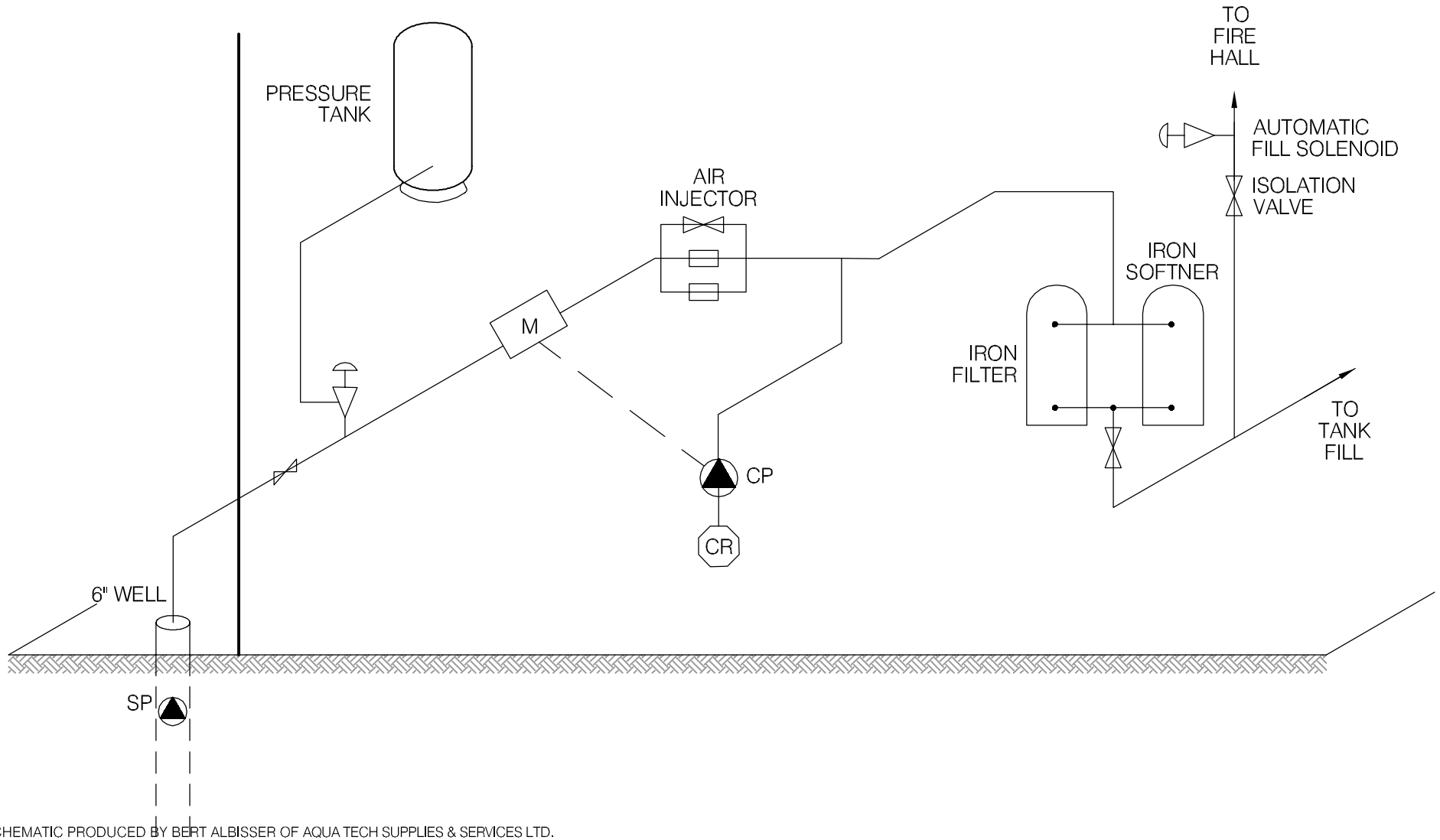


WELL WITH
SUBMERSIBLE PUMP



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.: 1953 TAGISH FIRE HALL	
DATE APRIL 2006	DWN. JSB	CHKD. RMM	FILE NO. 1260002.001		DWG.: FIGURE 1953B

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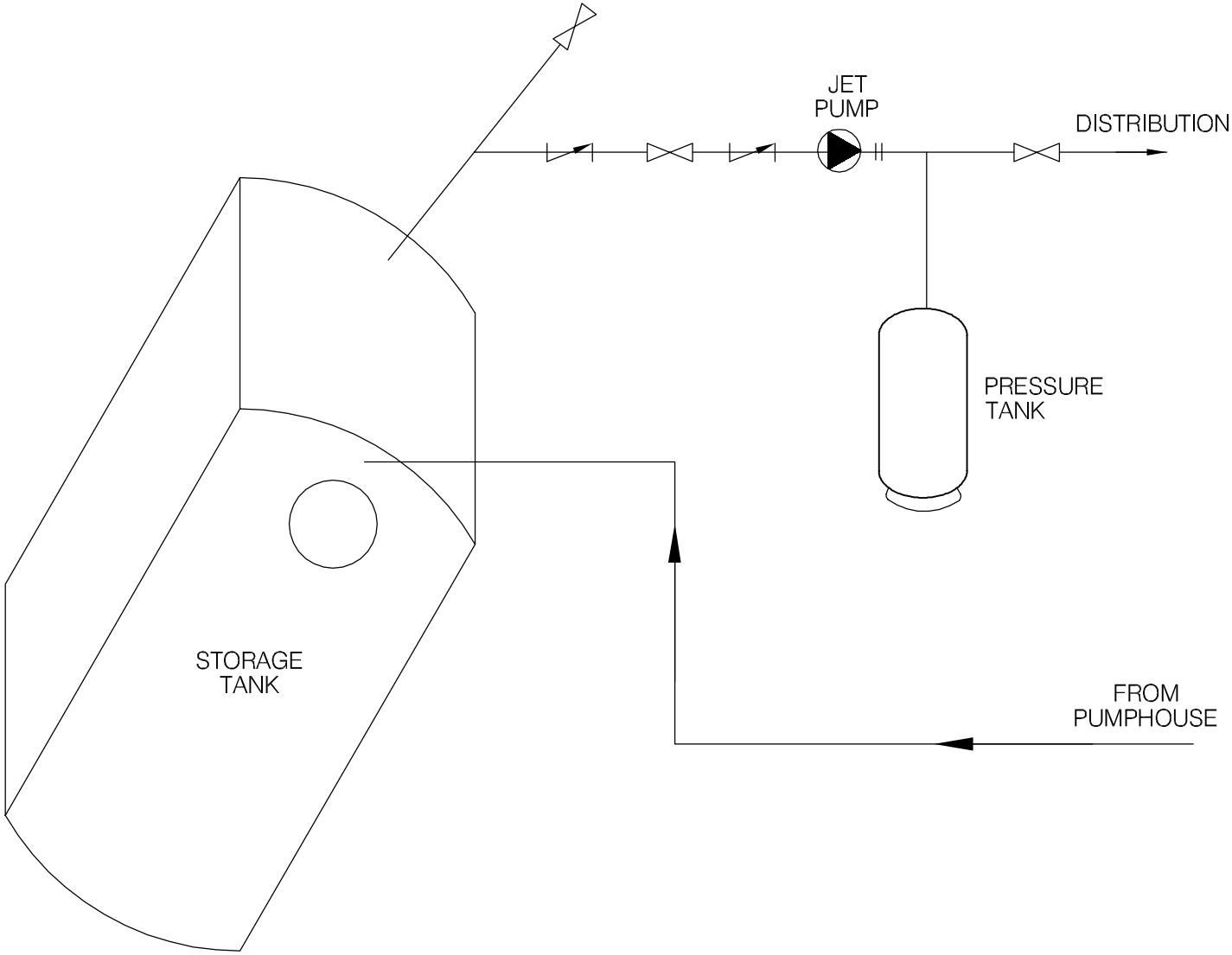

SCHEMATIC PRODUCED BY BERT ALBISSER OF AQUA TECH SUPPLIES & SERVICES LTD.

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.: 1953 TAGISH FIRE HALL	
DATE APRIL 2006	DWN. JSB	CHKD. RMM	FILE NO. 1260002.001		DWG.: FIGURE 1953C

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Whitehorse Region – Tagish Firehall
Building # 1953

DISTRIBUTION & TREATMENT SYSTEM DATA

Item	Description	Manufacturer	Model	Part No.	Serial No.	Size
1	4" SUBMERSIBLE	RED JACKET	8FC (75530 GF 1996.)			3/4 P0 2"
2	PRESSURE CONTROL	RED JACKET	HYDROSENSANT			2"
3	FLOW METER PULSER	LMI	RFP-020			2"
4	CHLORINE INJECTION	GRUNDFOS	DME 8-10	96472847		
5	IRON FILTERS	WATERTECH	~~BTW-30 DUPLEX~~ ~~REF 3072~~			TANK 30X72 PIPING 1½"
6	WATER METER	NEPTUNE	2" TRIDENT IO			2" FLANGED.
7	PRESSURE TANK	AMTROL	WX-302			
8	SOL. FILL VALVE	ASCO	2" BRONZE			2" FIPT
9	PRESS CONTROL	WATTS	45BLP.			½" FIPT
10	AIR CHARGER	WATERTECH	30" DUPLEX			2X1" HYDRO CHARGER

TABLE 1953 - 1: SUMMARY OF BACTERIOLOGICAL RESULTS

Building #	Building Name	Number of Sampling Events	Time Period over which Sampling was Done	Any Positive Total Coliform Results? (yes or no)	Fraction of Positive Total Coliform Results vs. Total Sampling Events	Any positive E.Coli results? (yes or no)	Most Recent Sampling Event Available for EBA Review
1953	Tagish Firehall (Fill Station)	9	Sept-04 to Mar-05	no	0/9	no	2-Mar-05

Table 1953-2: Water Quality Results

SOURCE:	Building 1953 - Tagish Firehall (Fill Station)			GCDWQ Criteria		
Location/ Resident	Tagish					
Address						
Treatment	Chlorination					
Source of Water	On-Site Well					
Purpose of Sampling	Baseline	Baseline	Additional Sampling			
Sample Location			Kitchen Tap			
Date Sampled	15-Jun-04	4-Oct-04	9-May-05	**Lower Limit**	**Upper Limit**	
Physical Tests *(ALS)*				**AO**	**MAC**	**AO**
Colour (CU)	<5.0	<3				15
Conductivity (uS/cm)	533	335				
Total Dissolved Solids	309	242				500
Hardness CaCO3	263	228		AO >200 = poor, > 500 unacceptable[A]		
pH	8.23	8.1		6.5		8.5
Turbidity (NTU)	0.69	0.3			1	5
Dissolved Anions *(ALS)*						
Alkalinity-Total CaCO3	280	217				
Chloride Cl	3.36	1				250
Fluoride F	0.167	0.17			1.5	
Sulphate SO4	23.8	24.6				500
Nitrate Nitrogen N	<0.10	<0.1			10	
Nitrite Nitrogen N	<0.10	<0.05			1	
Total Metals *(ALS)*						
Aluminum T-Al	<0.010	<0.02				
Antimony T-Sb	<0.00050	0.0007			0.006	
Arsenic T-As	0.0017	0.0006			0.025	
Barium T-Ba	0.071	0.0646			1	
Boron T-B	<0.10	<0.02			5	
Cadmium T-Cd	<0.00020	<0.0002			0.005	
Calcium T-Ca	72.1	51.2				
Chromium T-Cr	<0.0020	<0.0008			0.05	
Copper T-Cu	<0.010	0.024			1	
Iron T-Fe	**0.637**	0.016				0.3
Lead T-Pb	<0.0010	0.0011			0.01	
Magnesium T-Mg	20.2	21.8				
Manganese T-Mn	0.0218	0.003				0.05
Mercury T-Hg	<0.00020	<0.0002			0.001	
Potassium T-K	2.69	2.6				
Selenium T-Se	<0.0010	<0.0004			0.01	
Sodium T-Na	8.5	7				200
Uranium T-U	0.00646	0.0065			0.02	
Zinc T-Zn	0.141	0.02				5
Trihalomethanes						
Bromodichloromethane			0.0023			
Bromoform			<0.0010			
Chloroform			0.0054			
Dibromochloromethane			<0.0010			
Total Trihalomethanes			0.0078		0.1	
Haloacetic Acids						
Bromoacetic Acid			<0.0020			
Bromochloroacetic Acid			<0.0020			
Chloroacetic Acid			<0.020			
Dibromoacetic Acid			<0.0020			
Dichloroacetic Acid			**0.002**			
Trichloroacetic Acid (TCA)			<0.0020			
Field Chemistry (EBA)						
pH			7.73	6.5		8.5
TDS			440			500
EC (uS/cm)			480			
Temperature						
Free Available Chlorine			0.02			250

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 (^{o}C) and Turbidity (NTU)

< = Less than the detection limit indicated.

AO = Aesthetic Objective

MAC = Maximum Acceptable Concentration (Health Based)

Table 1953-3: 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)**
1953	**Tagish Firehall**	**Tagish**	6681131	538646	670

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	1990	Yes	48.8	Silt and Clay - 0m to 43m	?	3hp submersible pump Size of pump meets needs	7.8

Well Construction Details				
Wellhead Above ground (m)	**Well Cap**	**Well Screen**	**Surface Seal**	**Apron Grading**
0.20 above grade	Split Cap Gasket	Yes 0.9m	Unlikely	No, but slopes away from pit

Table 1953-4: Potential Contaminant Sources: Building 1953 – Tagish Fire Hall

Potential Contaminant Source	Potential Contaminants	Distance from Water Source	Northing	Easting
Dump or Landfill	***Organic*** and inorganic chemicals.	>120 m		
Cemetery	***Biological***[1]***,*** inorganic[2] and organic parameters.	Approximately 800 m		
Sewage lagoon	***Biological,*** inorganic and organic parameters.	>300 m		
Sewage lines, tanks and lift stations	***Biological,*** inorganic and organic parameters.	36 m		
Septic fields	***Biological and Inorganic*** parameters.	40 m		
Gas stations	***Organic and Inorganic*** parameters.	>30 m		
Undergrounds Fuel Storage Tanks (USTs)	***Organic*** parameters.	>30 m		
Above ground storage tanks (ASTs)	***Organic*** *parameters.*	N/A	6681117	538692
Aviation Fuel Drums	***Organic*** *parameters*	48 m	6621185	538644
Naturally occurring sources of contamination	***Radionuclides, Bacteria and Viruses from surfacewater sources.***	>150 m		

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

SMALL PUBLIC WATER SYSTEM ASSESSMENT

PART A: EBA Site Inspection

Inspector: Ryan Martin, Luke Lebel Date May 9, 2005

WELL ID #	Owner	Location Description
1953	YTG	Tagish Fire Hall

1. Well Location and Potential Contaminant Sources

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

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

c. GPS location: 0538646 Easting ; 6681131 Northing 670m elevation accuracy ±8m

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 ____

☒ 5 or more delivery sites on a trucked distribution system? If so how many ?

f. Nearest building, specify : 1.7m to pump house.
27 m to fire hall garage

g. Distance from well to building ____

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

i. Distance from well to nearest point of known field: 40 m to tank, start field.

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

Septic N-0538683 E 6681145 Elev 670

Rock pit

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

rock pit on west side bldg, septic system on east side bldg (53m) (~40m)

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
↳ cemetary is at start of road

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 Entrance by animals? ☐ Yes ☒ No
Buildings + well head all lockable
Evidence of mice in well enclosure

o. Is well site subject to flooding? ☐ Yes ☒ No

p. Is the well site well drained? ☒ Yes ☐ No

q. Is there a buried fuel tank on the property? ☐ Yes ☐ No No evidence of UST

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

Potential Source 1: Fire equip. cache; Distance from well to Potential Source 1: 38m

Potential Source 2: Av. gas; Distance from well to Potential Source 2: 48m

Potential Source 3: _____; Distance from well to Potential Source 3: _____

Potential Source 4: _____; Distance from well to Potential Source 4: _____

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 1990 Month July

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 _____ ☒ No

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

g. Depth of well: 160 ft ☐ measured (if possible) ☐ reported ☐ from log

h. Static water level below ground: 25 ft at time of drilling

☐ 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 N/A

k. If there is a well screen: length 3' slot size(s) 20 slot

Location of screen: from 157' to 160' from log reported

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

m. Is the well head: ☐ in pumphouse ☐ in pit ☐ pitless adaptor ☐ in a building

☒ 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 Above grade (0.2 m)

ii. Are there signs of ponding on the enclosure(e.g. water stains, etc.)? ☐ Yes ☒ No

iii. Is the wellhead enclosed by fiberglass insulations? ☐ Yes ☒ No – styrofoam SM.

iv. Any evidence of rodents? Specify Yes, mouse droppings.

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

If no, describe condition SPLIT GASKET CAP – NOTE MOUSE DROPPINGS ON TOP OF CAP

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...) Chlorination

---

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
→ IN WELL PUMPHOUSE

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: INSULATED & HEAT TRACE

l. Comments on pump installation: _____

6. Conclusions

a. Comments on overall installation:

- well enclosure accessible to rodents

b. Recommendations:

- design enclosure that is MOUSE proof
- consider raising casing slightly

PART B: EBA Site Inspection

Inspector: _____ Date _____

WELL ID #	Owner	Location Description
1953	YTG	TAGISH FIREHALL

6. Water Treatment

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

☑ chlorination ☐ iron and or manganese removal ☐ other _____

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 PROPORTIONAL CHLORINE FEED (LIQUID)

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: FIREHALL

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: _____
OVERFLOW NOT PRACTICAL

Overall Tank

What are the tank size and dimensions?

AG 1500 OVAL TANK.

What material is the tank constructed of? FIBRE GLASS

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: SLIGHT

Is there any sediment or scum in bottom of tank? YES NO
Comments: SOME RUST SEDIMENT

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:

INSTALLATION IS OF GOOD QUALITY & WORKMANSHIP.

b. Recommendations:

MOVE SOLENOID CONTROL VALVE FOR FIRE WATER STORAGE FROM PUMP HOUSE TO VICINTY OF TANK. PLUMB DOMESTIC WATER TAKE OFF UPSTREAM OF SOLENOID VALVE. THIS WILL FEED TREATED, CHLORINATED WATER TO THE JET PUMP SUPPLYING POTABLE WATER TO THE BUILDING.

PART C: Property Manager/ System Operator Questionnaire

Inspector: TERRY JACKSON Date APRIL 9/05

Property manager: Y.T.G.

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 1990 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: 160' galvinized pipe

e. Who was the well constructed by?
Indicate contractor's name: Midnight sun Drilling

f. Are you, the owner ☑ Yes or other: Y.T.G.

g. Who maintains the well? Community Services YTG.

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? Midnight sun 1990

b. What type of pump do you have? 3 hp. Red Jacket.

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 _____

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? 2 weeks
Who takes them? Community Services

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?
The tank that feeds the water truck tank should be cleaned The piping should be changed, that feeds the domestic water to the fireball

Field Report

MIDNIGHT SUN DRILLING CO. LTD. WHITEHORSE Y.T.
PH. 633-3070 TELEX 036-8496
P.O. BOX 4391
WHITEHORSE, YUKON

Started July 30 19 90
Completed July 31 19 90

NAME AND ADDRESS OF CLIENT	DESCRIPTION OF WORK	LOCATION OF WORK
Comm. Transportation	W / W	Taku subdiv.
Box 2703		Tagish.
Whitehorse / Yukon	90-1A-27	

TAGISH

FORMATION LOG FROM	TO	FORMATION
0	18	silt
18	120	silt
120	142	silt
142	147	fine
147	158	Gr.
158	160	sand

DESCRIPTION OF WORK	DATE	TIME FROM	TO	HOURS
MOVE				
Loading	July 30	8:00	9:30	1.5
Crew Travel	"	9:30	11:00	1.5
change over	"	11:00	1:00	2.
fine sand.	"	1:00	7:00	6
Clay				
Crew Travel	"	7:00	8:00	1
Loading	July 31	8:00	8:30	0.5
Crew Travel	"	8:30	10:00	1.5
Clay	"	10:00	1:30	3.5
sand				
sand				
some silt				
set screen	"	1:30	2:30	1
Develop	"	2:30	4:30	2.
Trip out move off.	"	4:30	5:30	1
move Rig to well	"	5:30	7:00	1.5
crew T. To shop				

Casing & Pipe Size	Type	Size	Type
6			
Feet	Inch	Feet	Inch
157'			

Remarks:
1 - odex shoe Screen Set 160 Bos
5 7/8" bit pi
20 slot
K Packer
30 GPM

Static Level		Total Rig Time	hrs.
Ground Level	25'	Total Standby	hrs.
Top Of Casing		Drilling Mud	sacks

SIGNATURES

MIDNIGHT SUN..... CLIENT.....

TITLE..... TITLE.....

ew Printers

Photo 0062: 1953 Well Enclosure (right) and Pumphouse

Photo 0059: 1953 Well Head

Photo 0061: 1953 45 gal. Aviation Fuel Drums (front), Pumphouse (back right), and Firehall (back left)

Photo 0060: 1953 Fire Equipment Cache (front), Pumphouse (back left)

Photo 0063: 1953 Fill Station

Photo 0067: 1953 Pipe Hangar – Potential Location for Solenoid

Photo 0068: 1953 Water Supply System, Presure Tank (left), Iron Revoval Tanks (right)

Photo 0066: 1953 Firehall 1250gal Water Storage Tank

Photo 0069: 1953 Grundfos DME Chlorinator

Photo 0070: 1953 Pumphouse Iron Duplex Injection Chlorine System