

12.0 BUILDING 1924 GOLDEN HORN FIRE HALL

12.1 Description of Existing Water Supply System

Building 1924, the Golden Horn Fire Hall, is currently serviced with a water supply system connected to a well. A site plan is included as Figure 1924-A in Appendix A12. The wellhead is located in an above ground tin enclosure that is 2 m away from the fire hall. The coordinates of the wellhead, as measured by a hand held GPS device, were recorded as:

- UTM ZONE 8
- Northing: 6718089
- Easting: 506919

Water from the well supplies a pressure tank and the domestic system, and also provides water to a large water storage tank that services both the fire fighting equipment and domestic usage within the fire hall. There is no treatment or disinfection system anywhere on the water supply system. A system schematic is shown by Figure 1924-2 and is located in Appendix A12.

12.2 Description of Existing Wastewater Systems

The septic tank for the Golden Horn Fire Hall is located on the northwest side (well is on the northeast side) of the fire hall. The location of the wastewater system is shown in a site plan included as Figure 1924-A in Appendix A12. The septic tank is approximately 19 m from the well and it discharges effluent to a field located on the northwest side of the tank that is within 40 m of the wellhead. The sewage discharge pipe that exits the building and runs to the septic tank is estimated to be approximately 20 m from the well.

12.3 Water Quality Results

12.3.1 Water Quality Results from Previous Sampling

Bacteriological

Bacteriological sampling of water from the Golden Horn 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. Seven samples were collected from this system between October 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 1924-1 in Appendix A12. According to the YTG database, *E. coli* and Total Coliform Bacteria were reported as absent in each of the six samples for which results were provided.

Detailed Potability Analyses

A water sample was previously collected from the Golden Horn Fire Hall water system on October 24, 2004. The sample was collected from the kitchen tap. There is no treatment or disinfection on the water system, and so the water sample is considered to be representative of raw groundwater quality. The sample was submitted to ETL EnviroTest in Surrey BC for detailed potability analyses. The results of these analyses are summarized in Table 1924-2 and are included in Appendix A12. EBA reviewed the analytical results to compare them with the Canadian Drinking Water Quality Guidelines (CDWQG) and to observe general water quality, identify and recommend additional sampling and analytical, and to identify potential indicators of contamination.

- The raw water quality for the sample obtained on October 24, 2004 indicated that the groundwater source was magnesium-bicarbonate type with a pH of approximately 8.2 and very high hardness (348 mg/L as CaCO₃).
- At 0.0345 mg/L, the arsenic concentration for the sample obtained on October 24 exceeded the Canadian Drinking Water Quality Guideline (CDWQG) maximum acceptable concentration (MAC) of 0.025 mg/L. A sample collected on June 25th, 2005 also had arsenic concentrations above the MAC. It is anticipated that the maximum allowable concentration of arsenic will soon be lowered to 0.005 mg/L.
- For the sample obtained on June 25th, 2005, the turbidity at 1.21 mg/L was higher than the MAC of 1 mg/L.
- 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.

12.3.2 Identification of Additional Analytical Testing Required

Additional analytical for the Golden Horn Fire Hall that was identified to be included during the water system assessments is detailed below:

-
- Since the total arsenic concentration had previously exceeded the MAC, an analysis for both total and dissolved arsenic was recommended in order to assist in determining potential treatment or rehabilitation measures.
 - UV absorbance, to determine potential for UV treatment as a disinfection option.

Additional Analytical Results

A water sample was obtained during the water system assessment on May 10, 2005, and was submitted for analysis to ALS Environmental in Vancouver BC for total and dissolved arsenic, as well as UV absorbance. These results are summarized in Table 1924-2 in Appendix A12 and the laboratory reports are included in Appendix B.

The additional analysis indicated that the total arsenic concentration in the sample collected on May 10 was 0.0207 mg/L, which is less than the current CDWQG MAC, however, it is greater than the proposed MAC of 0.005 mg/L. The dissolved arsenic concentration for this sample was 0.0185 mg/L. Although this value is also lower than the current guidelines for arsenic in drinking water, it is greater than the proposed future guideline. The significance of the dissolved concentration relative to the total arsenic concentration is that the arsenic cannot be attributed to suspended particles. Therefore, well rehabilitation to decrease turbidity, and/or filtration to remove arsenic associated with suspended particles would not be sufficient to meet the future Health Canada guidelines.

The sample obtained on June 25th, 2006 had arsenic concentrations above the MAC.

12.3.3 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 4th 2004 was low and can be considered to be within the normal background ranges for groundwater in the Whitehorse area. Nitrate and nitrite concentrations for this sample were also low and within the normal background range for the Whitehorse area. Therefore, these water quality results do not suggest that the aquifer from which the groundwater is obtained for the Golden Horn Fire Hall is under the influence of surfacewater sources or septic wastes.

12.4 Conceptual Hydrogeology

The water well record indicates that it is a 33 m deep bedrock well underlying silt and clay. The aquifer is well protected from surface sources of contamination because of the thick sequence of silt and clay overlying the bedrock. The inferred groundwater flow direction based on topography and proximity to surfacewater sources is northeast or easterly direction towards the Yukon River.

12.5 Potential Contaminant Sources

Potential contaminant sources from observations during the site investigation are compiled in Table 1924-4 in Appendix A12. Photos of potential contaminant sources are also provided in Appendix A12.

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

- Above ground fuel storage tank at 22 m.

12.5.1 Spills Records and Contaminated Sites Search Results

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

12.6 Identified Water System Deficiencies and Associated Risk

12.6.1 High and Medium Risk Deficiencies

The following high-risk deficiencies have been observed for the Golden Horn Fire Hall water supply system:

- The arsenic content of the water was above the MAC and proposed MAC for two out of three sampling events.
- There is no locking mechanism on the well enclosure and it is likely accessible to unauthorized persons.
- There is evidence of insects in the well enclosure and it is likely accessible to entrance by animals.
- There is no surface sanitary seal (grout or bentonite seal as required by the Canadian Groundwater Association's Well Construction Guidelines) and parts of

the septic system for the fire hall is located within 30 m of the well. It is unclear if the effluent field begins at a distance greater than 30 m.

- 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.

12.6.2 Low Risk Deficiencies

- There is an above ground fuel storage tank for the Golden Horn Fire Hall that is located 22 m from the well. Although this is within the 30 m regulation set by the Guidelines for Part III: Small Public Drinking Water Systems, the nature of the ground and a reported low permeability layer of soil above the aquifer makes this a low risk rather than a high risk deficiency.
- It was noted during the system inspection that the well capacity could be inadequate to meet peak water consumption demand of the fire hall.
- The water tank has been subject to biofouling and there was reported to be sediment on the bottom of the tank. There is no routine cleaning schedule for the water storage tank that services both the domestic supply for the building and the overhead fill for fire protection.
- In addition to the above ground fuel storage tank, it was observed during the site investigation that there were jerry cans containing gasoline 10 m away from the wellhead. This suggests that some activities around the wellhead may be unsuitable for proper wellhead protection.

12.7 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).

The arsenic concentrations in this water system have been documented at levels above the CDWQG MAC, and therefore, this well should not be utilized as a potable water supply until upgrades have been completed to reduce the arsenic concentrations to below the MAC. PMA should consult with YTG Environmental Health and Social Services regarding posting of appropriate advisories. A bottled water station should be provided in the interim until this issue is mitigated.

12.7.1 Priority 1

Option 1:

Considering all of the known deficiencies with the current well, and the fact that it may be inadequate to meet the current demand of a fire hall (anecdotal information) it is an option that a new well could be drilled. The new well could be used as the main well and the current well would either be decommissioned or used as a backup well. Drilling a new well may also solve issues with the reported problems with water quantity. Ideally, the new well would have a maximum yield of at least 20 Igpm, and the pump system designed and installed to satisfy this pumping rate. The new well would have to satisfy the following conditions:

- The well must be equipped with a surface seal to 6 m and the casing must be extended above grade and kept in a locked enclosure that is inaccessible to animals and unauthorized personnel;
- The well must be located at a distance greater than 30 m from any potential source of contamination, including the above ground storage tank;
- If the new well still has arsenic content above the current or the proposed CDWQG guidelines, then a point of entry (POE) treatment system for arsenic removal should be installed. It is recommended that a suitable POE system be designed through small scale pilot testing, and that the system be installed in advance of the potable water storage tank. Arsenic removal to below the proposed new CDWQG guideline will be necessary to utilize this water source as a drinking water supply.

Option 2:

If it is decided that a new well will not be drilled to supply water for this system, then the following upgrades are recommended to mitigate risk:

- A surface seal to 3 m below ground level should be installed around the well casing;
- A point of entry (POE) treatment system for arsenic removal should be installed. It is recommended that a suitable POE system be designed through small scale pilot testing, and that the system be installed in advance of the potable water storage tank. Arsenic removal to below the proposed new CDWQG guideline will be necessary to utilize this water source as a drinking water supply;
- The wellhead enclosure should be upgraded with a lock and revamped to prevent access by animals and by unauthorized personnel.
- It is recommended that a NSF 61 certified commercial filtration system (10 micron and 1 micron absolute) followed by a chlorine disinfection system or NSF/ANSI 55 certified UV disinfection system be installed at the POE.

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. If a new well were located in consideration of potential contaminant sources, and constructed properly, the filtration system might not be necessary according to the proposed guidelines. Disinfection is still recommended, however, for a publicly accessible water system. Further study would have to be done on the new well before recommendations on treatment could be made.

12.7.2 Priority 2

- The above ground storage tank should be moved so that it is no longer within 30 m of the well; alternatively, secondary containment and flexible hosing could be installed to mitigate risk of leaking, overfilling or rupture of transfer piping.

12.7.3 Priority 3

- If a back-up well is not drilled, further investigation of the reported water quantity problems under peak demand should be evaluated. This would involve assessment of the actual demand versus the capabilities of the existing system. Modifications to the pump and/or tank sizes should be made as required, provided the well is capable of supplying water at the increased rate. The sustainable well yield may also have to be assessed.
- Fire hall personnel should also be instructed to store potential contaminants such as jerry cans a safe distance away from the well. A fence should also be placed around the well to prevent access for animals and people.
- A regular cleaning schedule for the water storage tank would effectively eliminate significant biofouling in the water storage tanks. It is recommended that the storage tanks be properly cleaned and disinfected every 6 months.

12.8 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.

12.8.1 Priority 1

- Posting appropriate advisories and providing a bottled water station is expected to cost in the order of **\$500**.
- A point of entry (POE) treatment system for arsenic removal is anticipated to cost in the order of **\$5000** for materials and labour.
- The filtration system is expected to cost in the order of **\$3,000** for materials and labour. Filtration may not be necessary if a new well were drilled and constructed properly (pending water quality results).
- A suitable disinfection system would cost between **\$4,000** and **\$9,500**.

Option 1:

- If a new well is to be installed with a proper surface seal and wellhead enclosure, assuming overburden to 30 m and a total depth of approximately 200 m, would likely cost in the order of **\$35,000** this includes the cost of materials and labour, as well as decommissioning the old well;

Option 2:

- If a new well will not be installed, the cost to complete standard upgrades (sanitary seal, well enclosure, freeze protection, and re-plumbing and electrical) would cost approximately **\$4000** to **\$5000** depending on the preferred option.

12.8.2 Priority 2

- The cost to relocate the above ground fuel storage tank, or to retrofit it with secondary containment and flex hose would be approximately **\$1,000** for materials and labour.

12.8.3 Priority 3

An assessment of the actual water demands and detailed evaluation of the existing system capabilities (not including a well yield evaluation) is estimated to be about **\$2,000**.

LEGEND



PUMP



PRESSURE GAUGE



GATE VALVE



CHECK VALVE



SOLENOID

#2

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



FLOW METER



WATER FILTER
(CARTRIDGE TYPE)

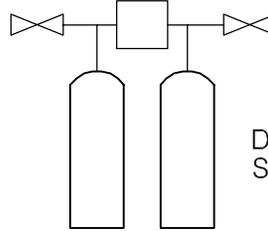


PRESSURE TANK

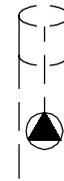


CL₂

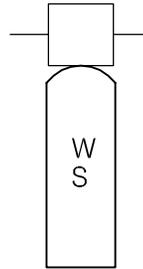
CHLORINE RESERVOIR AND
INJECTION PUMP



DUPLEX WATER
SOFTENER



WELL WITH
SUBMERSIBLE PUMP



ACTIVATED
CARBON

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EBA Engineering Consultants Ltd.

PROJECT SMALL PUBLIC WATER SYSTEMS ASSESSMENT
WHITEHORSE REGION

CLIENT



TITLE

**SCHEMATIC SYSTEM
LEGEND**

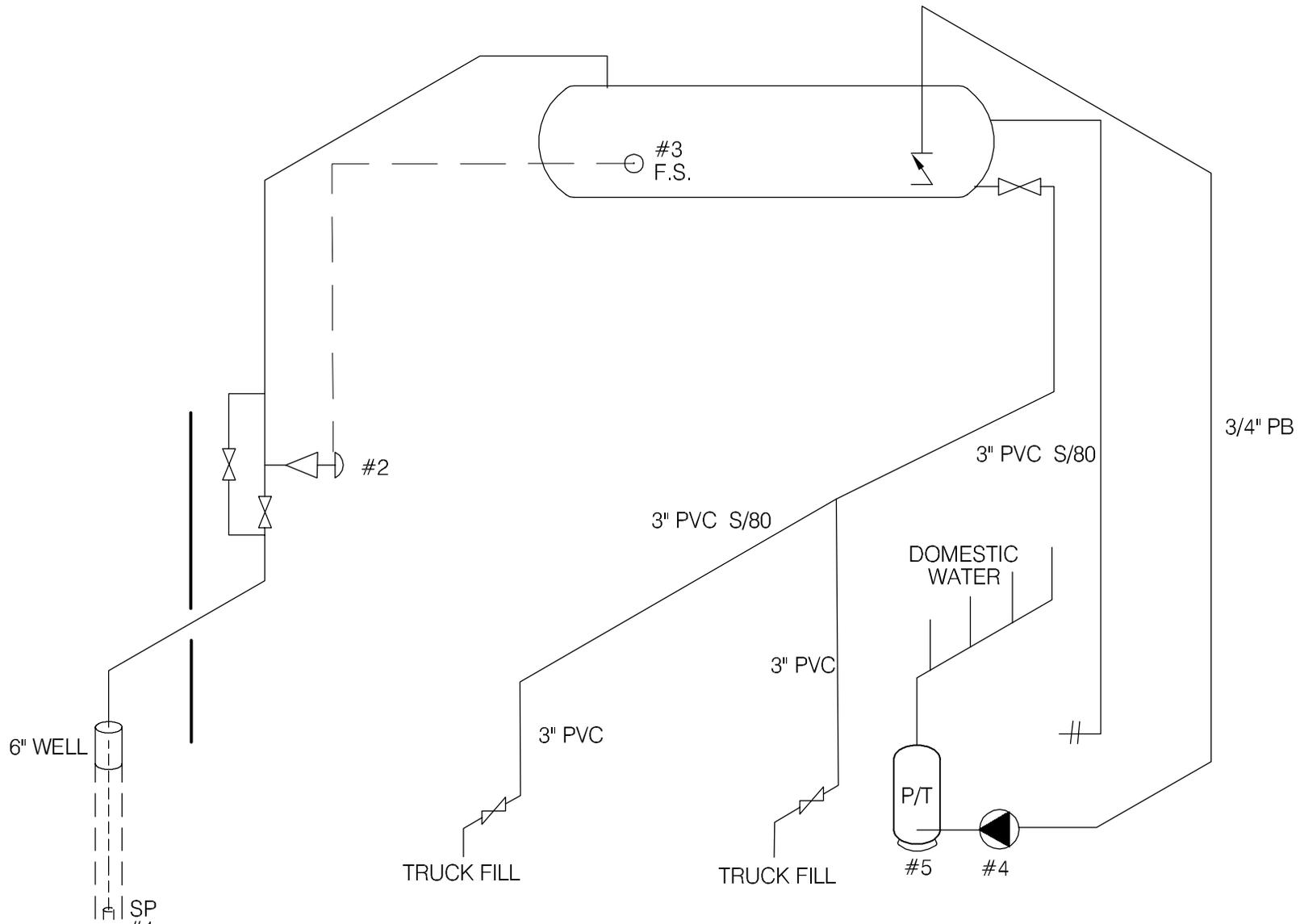
DATE APRIL 2006

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 		TITLE WATER SYSTEM DISTRIBUTION/TREATMENT SCHEMATIC SYSTEM ID.: 1924 GOLDEN HORN FIRE HALL	
DATE	APRIL 2006	DWN.	JSB
CHKD.	FMM	FILE NO.	1260002.001
		DWG.:	FIGURE 1924B

**Whitehorse Region – Golden Horn Firehall
Building # 1924**

DISTRIBUTION & TREATMENT SYSTEM DATA

Item	Description	Manufacturer	Model	Part No.	Serial No.	Size
1	4" SUB. PUMP	JACUZZI	35459P-52/c			4" x 1"
2	PUMP CONTROL VALVE	ASCO	8210G100		474225	2" FIPT
3	FLOAT CONTROL.	N/A	N/A			
4	DOMESTIC PUMP	S/R	SPLC-2		10935	1/2 HP.
5	PRESSURE TANK	FULCON	JR255'			8.5 GAL
6	F.G. TANK.	N/A	N/A.			36" x 72 x 102"
7						
8						
9						
10						

TABLE 1924 - 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	Is Most Recent Result Positive?
1924	Golden Horn Firehall	6	Sept-04 to Mar-05	no	0/6	no	2-Feb-05	no



Table 1924-2: Water Quality Results

SOURCE: Building 1924 - Golden Horn Firehall					GCDWQ Criteria				
Location/ Resident	Golden Horn								
Address	Lot 189								
Treatment	No								
Source of Water	On-Site Well								
Purpose of Sampling	Baseline	Additional Sampling							
Sample Location									
Date Sampled	4-Oct-04	10-May-05	25-Jun-06	Lower Limit	Upper Limit				
Physical Tests (ALS)				AO	MAC	AO			
Colour (CU)	5		<5			15			
Conductivity (uS/cm)	567		640						
Total Dissolved Solids	389		412			500			
Hardness CaCO3	348		337	AO >200 = poor, > 500 unacceptable ^A					
pH	8.3		8.17	6.5		8.5			
Turbidity (NTU)	0.25		1.21		1	5			
UV Absorbance		<0.0010							
Dissolved Anions (ALS)									
Alkalinity-Total CaCO3	271		294						
Chloride Cl	2		1.27			250			
Fluoride F	0.47		0.406		1.5				
Sulphate SO4	98.5		101			500			
Nitrate Nitrogen N	0.1		0.11		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	0.0007		<0.0005		0.006				
Arsenic T-As	0.0345	0.0207	0.0290		0.025				
Barium T-Ba	0.0169		<0.020		1				
Boron T-B	0.04		<0.10		5				
Cadmium T-Cd	<0.0002		<0.0002		0.005				
Calcium T-Ca	45.9		49.1						
Chromium T-Cr	0.0016		<0.0020		0.05				
Copper T-Cu	0.04		0.0311		1				
Iron T-Fe	0.007		0.142			0.3			
Lead T-Pb	0.0013		0.0014		0.01				
Magnesium T-Mg	46.6		52.2						
Manganese T-Mn	0.005		0.036			0.05			
Mercury T-Hg	<0.0002		<0.0002		0.001				
Potassium T-K	3		2.93						
Selenium T-Se	<0.0004		<0.0010		0.01				
Sodium T-Na	17		18.6			200			
Uranium T-U	0.0024		0.00210		0.02				
Zinc T-Zn	0.066		<0.10			5			
Trihalomethanes									
Bromodichloromethane		-							
Bromofom		-							
Chlorofom		-							
Dibromochloromethane		-							
Total Trihalomethanes		-			0.1				
Haloacetic Acids									
Bromoacetic Acid		-							
Bromochloroacetic Acid		-							
Chloroacetic Acid		-							
Dibromoacetic Acid		-							
Dichloroacetic Acid		-							
Trichloroacetic Acid (TCA)		-							
Field Chemistry (EBA)									
pH				6.5		8.5			
TDS						500			
EC (uS/cm)									
Temperature									
Free Available Chlorine									

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 1924-3: 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)
1924	Golden Horn Fire Hall	Golden Horn	6718089	506919	738

Well Details							
Well Casing Diameter (mm)	Year Well Installed	Well Log?	Well Depth (m bg)	Reported Low Permeability Protective Layer?	Pump Setting (m bg)	Well Capacity - Tested, or Reported by User	Static Water Level Below Ground (m-btwc)
150	?	Yes	32.9	Silt and Clay - 4m to 29m Bedrock - 30m to 33m	?	Complaints about the well capacity - too slow for fire hall	?

Well Construction Details				
Wellhead Above ground (m)	Well Cap	Well Screen	Surface Seal	Apron Grading
0.46 above grade	Split Cap Gasket	Yes 1.5m	Unlikely	No, ground is even



**Table 1924-4: Potential Contaminant Sources
Building 1924 – Golden Horn Fire Hall**

Potential Contaminant Source	Potential Contaminants	Distance from Water Source	Northing	Easting
Dump or Landfill	<i>Organic</i> and inorganic chemicals.	>>120 m		
Cemetery	<i>Biological</i> ¹ , inorganic ² and organic parameters.	>>120 m		
Sewage lagoon	<i>Biological</i> , inorganic and organic parameters.	>>300 m		
Sewage lines, tanks and lift stations	<i>Biological</i> , inorganic and organic parameters.	Approx. 20 m		
Septic fields	<i>Biological and Inorganic</i> parameters.	Unknown, Approx. 19 m to 40 m	6718071	506916
Gas stations	<i>Organic and Inorganic</i> parameters.	~400 m		
Underground Fuel Storage Tanks (USTs)	<i>Organic</i> parameters.	>>30 m		
Above ground storage tanks (ASTs)	<i>Organic parameters.</i>	22 m	6718073	506932
Naturally occurring sources of contamination	<i>Radionuclides, Bacteria and Viruses from surfacewater sources.</i>	>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

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SMALL PUBLIC WATER SYSTEM ASSESSMENT

PART A: EBA Site Inspection

Inspector: Ryan Martin
Luke Lebel

Date May 10, 2005

WELL ID #	Owner	Location Description
1924	YTG	Golden Horn Fire Hall

1. Well Location and Potential Contaminant Sources

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

Golden Horn

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

Golden Horn Fire Hall

c. GPS location: 6718089 Northing; 0506919 Easting; 738 elevation ± 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 _____

Fills only one elevated tank in the fire hall

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

f. Nearest building, specify Golden Horn Fire Hall

g. Distance from well to building 2.1 m

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

i. Distance from well to nearest point of known field: Tank @ 19m, end of field ~ 40m
Field likely starts at 3m

j. Well location relative to field: upslope downslope lateral

GPS of septic:
0506916 Easting
6718071 Northing ± 6m

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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

Tank @ 19 m, end of field @ ~40m, field may start before 30m, likely starts within 30m

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
There are only screws in place not locked

Entrance by animals? Yes No
There is only evidence of a few ants, no more evidence

o. Is well site subject to flooding? Yes No

p. Is the well site well drained? Yes No

-relatively flat

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

Potential Source 1: Floating Oil Tank; Distance from well to Potential Source 1: 22m

photo

Potential Source 2: Alaska Highway; Distance from well to Potential Source 2: 70m

Potential Source 3: 2 Jerry Cans; Distance from well to Potential Source 3: ~10m

photo

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

0506932
6718073

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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 25cm No
↳ TIN ENCLOSURE
- f. Well casing: Diameter 15 cm Material: steel plastic concrete
(6")
- g. Depth of well: 108ft measured (if possible) reported from log
- h. Static water level below ground: cannot access/unknown
 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 5ft slot size(s) 30 slot
Location of screen: from 103ft to 108ft 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
 in a wooden enclosure other, describe In a tin enclosure
- n. If the well head is located in a wooden enclosure,

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- i. Is the well head below grade? describe in detail no, it is 0.56m above grade
- 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
- iv. Any evidence of rodents? Specify no evidence of rodents
- v. Does the well casing have a proper seal cap? Yes No

If no, describe condition _____

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...) _____

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 _____

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d. Date installed: _____ By: _____

e. For submersible pump, depth of setting below surface 108 ft

f. Drop pipe for submersible pump: steel plastic

1 inch (by Terry)

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

h. Are there automatic pump controls: Yes No

The pump, however, is presently shut down

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: There is heat trace and both styrofoam and fiberglass insulation

l. Comments on pump installation: _____

6. Conclusions

a. Comments on overall installation:

b. Recommendations: _____

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PART B: EBA Site Inspection

Inspector: BERT ALBISSER

Date MAY 10/05

WELL ID #	Owner	Location Description
<u>1924</u>	<u>YTG.</u>	<u>GOLDEN HORN FIRE HALL</u>

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 _____
- 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 H₂S Other _____

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- 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: FIBREGLASS TANK

Where is it located?

Comments: INSIDE - ON ELEVATED PLATFORM

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: OVERHEAD ELECTRIC HEATER

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

Comments: _____

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Overall Tank

What are the tank size and dimensions?

30" x 72" x 102

What material is the tank constructed of? FIBREGUSS

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

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8. Conclusions

a. Comments on overall installation:

OVERALL INSTALLATION IS ACCEPTABLE IN ALL ASPECTS (MATERIAL & WORKMANSHIP) EXCEPT THE DRAIN DOES NOT GO TO A PROPER DISPOSAL SITE.

DOMESTIC WATER SUPPLY IS UNTREATED. THE WATER SUPPLY IS INADEQUATE FOR FIRE FIGHTING PURPOSES.

b. Recommendations:

DRILL A NEW WELL WITH A YIELD OF AT LEAST 25 GPM.

INSTALL A PUMP SYSTEM TO SUIT.

REVAMP DOMESTIC WATER SYSTEM TO FACILITATE PROPER TREATMENT TO MEET CDWG. PARAMETERS.

INITIATE TESTING PROCEDURE AS REQUIRED.

MODIFY TANK TO ALLOW ACCESS FOR CLEANING.

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PART C: Property Manager/ System Operator Questionnaire

Inspector: TERRY JACKSON Date 10/05
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 1991 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: 102 ft
- e. Who was the well constructed by?
Indicate contractor's name: TOM BURKE
- f. Are you, the owner Yes or other: Y.T.G.
- 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? TOM BURKE. 1991
- b. What type of pump do you have? JACUZZI PUMP 1/2 hp.
- c. Pump delivers water to: pressure tank elevated tank other _____

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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

Sulphur (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?

*In a high demand situation pumps would not be
big enough. No protection from drinking water
and fire tank water*



Driller's Report 204100474

Location: Golden Horn Firehall Well Lot 189, Golden Horn GOLD

NAD 83 Zone 8 Easting 506931 Northing 6718080 Elevation ASL 2401.6 ft.

Location Accuracy: Horizontal 30-100 (topo)
Vertical 3.05 metres (10ft)

Purpose of well: Domestic - household needs

Permafrost encountered? No

LOG OF OVERBURDEN AND BEDROCK MATERIALS

Layer	From	To	General Colour	Most Common Material	Secondary Material	General Description
1	0	5	ft.	SAND with Gravel and Silt		
2	5	14	ft.	FINE SAND		
3	14	28	ft.	SILT		
4	28	96	ft.	CLAY with Silt		
5	96	98	ft.	GRAVEL with Fine Sand and Silt		
6	98	350	ft.	BEDROCK		

WELL CONSTRUCTION

Well No. 2041004741 Completion date [] Drilling method [] Well type []

Casing: OS Diameter 6 in. Material [] Wall thickness [] in. Depth to [] ft.

Comments []

Surface/Env'l seal: Material [] Diameter [] in. Depth from [] to [] ft. Volume [] cu. ft.

Gravel Pack ? Material [] Diameter [] in. Depth from [] to []

Well Screen Information

OS Diameter	Material	Screen Type	Comments
[]	30 Slot Screen	Continuous Wire Wrap	30 Slot Screen

Screen Sections

Section	From	to	Slot size/ perforation diameter
1	103	108	ft. 30 Thou.

WELL DEVELOPMENT AND STATUS

Well ID 2041004741 Developed by [] Wellhead completion [] Adapter depth [] ft. Static water level [] ft. Yield Estimate [] gpm Estimate method []

Final Status New, in use for intended purpose

No



Driller's Report 204100458

Location: Golden Horn_Well Dunkin Street WHSE

NAD 83 Zone 8 Easting 507002 Northing 6718754 Elevation ASL 1 m.

Location Accuracy: Horizontal 30-100 (topo) Purpose of well: Commercial - not fabrication or manufacturing
Vertical unknown or unreliable

Permafrost encountered? No

LOG OF OVERBURDEN AND BEDROCK MATERIALS

Layer	From	To	General Colour	Most Common Material	Secondary Material	General Description
1	0	1.4 m.		GRAVEL, silt cobbles		
2	1.4	137.19 m.		BEDROCK		

WELL CONSTRUCTION

Well No. 2041004582 Completion date [] Drilling method [] Well type []

Casing: OS Diameter 15.24 mm. Material [] Wall thickness [] mm. Depth to [] m.

Comments []

Surface/Env'l seal: Material [] Diameter [] mm. Depth from [] to [] m. Volume [] cu. m.

Gravel Pack ? Material [] Diameter [] mm. Depth from [] to []

Well Screen Information

OS Diameter	Material	Screen Type	Comments
[]	[]	[]	[]

Screen Sections

Section	From	to	Slot size/ perforation diameter
1	[]	[]	[]

WELL DEVELOPMENT AND STATUS

Well ID 2041004582 Developed by [] Wellhead completion [] Adapter depth [] m. Static water level [] m. Yield Estimate [] Lps Estimate method []

Final Status Unknown

No

GROUNDWATER QUALITY

Well No. 2041004581 Field Measurement Date 25-Mar-03

Electrical Conductivity [] μ S
pH []
Temperature [] $^{\circ}$ C
Groundwater Type []
Turbidity/sand content []

Well disinfection
Was the well disinfected on completion of pump installation?

Bacterial testing done? Lab [] Date []
Chemical testing done? Lab [] Date []

Select Borehole

204100474

Add Borehole

Select Monitor

2041004741

Add Monitor

Go
Wa

Borehole Data

204100474	All units for this borehole are		Imperial	NB: the system will determine units for ALL related fields as specified on the manual input form, consistent with this selection. Convert numbers as required before entry.	
A1 Well Name	Golden Horn Firehall Well				
A2 Drilled for	UMA/YTG				
A3 Address	Lot 189, Golden Horn				
A4 Town	GOLD - Golden Horn	Add Town	NTS 105D/10		
A5	83	8	506931	6718080	30-100 (topo)
NAD	Zone	Easting	Northing	Method	Horizontal Accuracy
A6	2400	3.05 metres (10ft)		Good - Complete well data.	
Well elevn.	Vertical Accuracy		Data quality		
A8 Purpose	Domestic - household needs			Add Purpose	
B8	<input type="checkbox"/> Permafrost?	From		to	
H1 Driller	Midnight Sun Drilling Comp	Add Driller	H2 Name(s)		
H3 Driller Add					
I1 Cons.		I2 Cons. Add			
I3 Ref.		Add Reference	Date Submitted		

Dov



Photo 0078: 1924 Wellhead (front), Golden Horn Firehall (left) and Septic Field (back)



Photo 0079: 1924 Wellhead



Photo 0080: 1924 Septic Field (fron), Golden Horn Firehall (back)



Photo 0077: Above Ground Fuel Storage Tank



Photo 0469: 1924 Pump System



Photo 0470: 1924 Water Storage Tank



Photo 0465: 1924 Tank Fill Solenoid Valve and Bypass