18.0 BUILDING 2592: KLONDIKE VALLEY FIRE HALL

18.1 Description of Existing Water Supply System

The Klondike Valley Fire Hall (Building 2592) at Rock Creek is located approximately 22 km east of Dawson City on the North side of the Klondike Highway. The water system sources water from an approximately 12.2 m deep drilled well. The well is located in a pit below grade approximately 13 m northwest of the fire hall. A site plan is provided as Figure 2592-A in Appendix A18. The coordinates of the wellhead, as measured by a handheld GPS device, were recorded as:

- UTM ZONE 7
- Northing: 7104220
- Easting: 592363

Well 2592 supplies the domestic system at the fire hall, the water storage tanks for fire fighting use and a public water fill station where local residents can obtain drinking water. It is estimated that approximately 20 to 30 people obtain water from the facility on a regular basis.

This system is equipped with a proportional feed chlorine injection system, and the residual chlorine concentration at the time of the assessment was determined to be in compliance with requirements at 0.42 mg/L. According to Niels Jacobsen (Jacobsen, May 2002), a contract was established in early 2002 for routing residual chlorine testing for this system, and prior to that time, the volunteer fire department were maintaining records of free available chlorine concentrations. The data is reportedly stored at the Property Management Agency office in Dawson.

There are two 4500 L water storage tanks used for fire fighting purposes and another 4500 L water storage tank is used to serve the domestic system in the fire hall and the public water fill station. A domestic pump and pressure system serve the fixtures in the building, as well as an outside hose bib, which is located below the overhead truck fill. The domestic water storage is of fiberglass construction with an approximately 600 mm (24 inch) diameter access hatch with a watertight bolt on lid. A schematic detailing the water supply system is provided as Figure 2592-B in Appendix A18. Photos of the well and water system are also included at the back of this appendix.

18.2 Description of Existing Wastewater Systems

Wastewater from this building is discharged to a septic tank located off the southeast corner of the fire hall and then discharged to an in-ground disposal field south of the tank. The septic tank is located approximately 36 m from the well, and the closest point of the effluent discharge is approximately 40 m upgradient from the well. The septic system is shown on Figure 2592-A in Appendix A18.

18.3 Water Quality Results

18.3.1 Water Quality Results from Previous Sampling

Bacteriological

Ten samples were collected from the Klondike Fire Hall water system between October 2004 and June 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 2592-1 in Appendix A18. The most recent sample results for which results were provided (June 9th 2005) had total coliform bacteria present.

Potability

YTG representatives collected water samples from the Klondike Valley Fire Hall water system on June 2, 2005. The samples were submitted to ALS Environmental in Vancouver BC for potability analyses. Results are summarized in Table 2592-2 in Appendix A18. EBA reviewed the analytical results to compare them with the Canadian Drinking Water Quality Guidelines (CDWQG) to observe general water quality, identify and recommend additional sampling and analytical and identify potential indicators of contamination. Details are summarized below:

- The water quality results indicated that all health based and aesthetic objectives were met for the parameters analyzed;
- The water quality results indicated that the groundwater from which this system receives its water supply is a calcium bi-carbonate type with a pH of approximately 7.8 water; and,
- The hardness (as $CaCO_3$) was 152 mg/L, and is moderately hard.

18.3.2 Identification of Additional Analytical Testing Required

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

- Trihalomethanes (THMs) and Haloacetic Acids (HAAs) are formed when organic matter reacts with chlorine during the disinfection process. Recent research has found that in some cases, when found elevated in drinking water, these chlorination byproducts may be associated with a higher risk of cancer;
- Total organic carbon (TOC);
- Measurements in the field for total dissolved solids, conductivity, pH, and temperature.

Additional Analytical Results

A water sample was obtained by EBA during the water system assessment on August 19, 2005, and was submitted to ALS Environmental in Vancouver BC for analysis of selected parameters indicated above. These results are summarized in Table 2592-2 in Appendix A18 and the laboratory reports are included in Appendix B. Relevant details are discussed below:

- Laboratory results indicated that HAAs did not exist at concentrations above analytical detection.
- The results indicated that with the exception of chloroform, no other THMs were formed at concentrations above analytical detection. Chloroform was observed at a concentration of 0.0012 mg/L. Chloroform does not have an associated CDWQG; however, there is a MAC for total Trihalomethanes of 0.1 mg/L. The total THM concentration for the sample collected during the assessment was less than 0.004 mg/L, which is more than 25 times lower than the MAC of 0.1 mg/L.

18.3.3 Indicators of Potential Contamination

Chloride, nitrate and nitrite concentrations can indicate impacts from surface water sources or septic waste. Chloride concentrations were low and are within the normal background ranges for groundwater in the area. Nitrate and nitrite concentrations for this sample are also low and within the normal background range for this area.

18.4 Conceptual Hydrogeology

The driller's log for this well indicates that the well is completed at a depth of 12.2 m within a gravel aquifer underlain by bedrock. The log indicates that the static water level was 1.2 m below ground at the time of drilling and that no significant fine-grained sediments were encountered. This well is located southeast of the Klondike River, and is most likely completed within alluvial floodplain sediments deposited by the River. Discontinuous lenses of permafrost are also known to exist in the area. Water levels in the aquifer are most likely strongly connected to water levels in the Klondike River. The shallow depth of this aquifer combined with the absence of fine-grained material leaves this aquifer vulnerable to surficial sources of contamination.

The expected direction of groundwater flow is westerly to northwesterly along the Klondike River valley with a component of flow towards the Klondike River.

18.5 Potential Contaminant Sources

Details and photographs of potential contaminant sources observed during the site investigation are compiled in Appendix A18.

The only potential contaminant source within 30 m of the well identified at the time of the assessment was the adjacent road which passes approximately 12 m from the well.

As mentioned previously, the closest point of the on-site sewage disposal system (septic field) is approximately 40 m southeast and upgradient from the well. As this water system is used for public water pick-up and delivery, by definition, it is both a "Public Drinking Water System" and a "Small Public Drinking Water System. The septic system should be at least 60 m from the well according to the proposed Public Drinking Water System Regulation. As well, considering the vulnerability of the aquifer and the proximity of the septic system to the well, it was recommended in the draft report (EBA, November 2005) that further hydrogeological assessment be completed for this site.

18.5.1 Spills Records and Contaminated Sites Search Results

The Government of Yukon Environmental Programs Branch and Environment Canada Environmental Protection Branch did not identify any recorded spill events or contaminated sites issues for this site or neighbouring sites.

18.6 Identified Water System Deficiencies and Associated Risk

18.6.1 High and Medium Risk Deficiencies

High and medium risk deficiencies for this water system that were identified during this study include:

- The well has poor surface completion (located in a pit below grade) and likely below the highest flood level on record.
- The well may be downgradient from the on-site sewage disposal system (septic field), which is only 40 m away from the well at its closest point. Given the very thin unsaturated zone, and the fact that no fine-grained soils are indicated on the log, there could potentially be rapid transport of effluent from the field to the well.
- There is no surface sanitary seal (grout or bentonite seal as required by the Canadian Groundwater Association's Guidelines for Water Well Construction.
- The well is completed at a depth of only 12.2 m within a shallow, unconfined aquifer that is vulnerable to surficial sources of contamination.
- By definition of the Draft Yukon GUDI Assessment Guideline, the well is potentially under the direct influence of surface water because it is a vulnerable type (unconfined aquifer) and does not meet the requirements of the Guidelines for Water Well Construction.

- The most recent sample result available to EBA for review (June 9th 2005) had total coliform bacteria present.

18.6.2 Low Risk Deficiencies

- The well is located within 12 m of a road.
- The outside hose bib water pick-up is located approximately 12 inches off of the ground, and may be subject to contamination.

18.7 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).

18.7.1 Priority 1

The following mitigative options are recommended to address the immediate risk deficiencies associated with the water system at the Klondike Valley Fire Hall. A detailed hydrogeological assessment was completed by EBA in November 2005 to establish the groundwater flow regime in the vicinity of the site. The results of this assessment are summarized in a letter report to PMA (EBA 2006) and the following mitigative recommendations incorporate the results of the additional assessment.

The additional assessment confirmed that the septic field is upgradient of the well. Given the topography and subsurface conditions of the site, re-locating the water supply well will not be sufficient for risk mitigation. A new well would still be completed at a shallow depth within an unconfined, highly vulnerable aquifer. The following mitigative options are provided to reduce the risk posed by the existing septic effluent field, and other upgradient contaminant sources:

Option 1: Upgrade existing well and convert building to sewage eduction.

- Install filtration system (to 1 micron absolute) in advance of the existing proportional feed chlorination system;
- Complete standard wellhead upgrades consisting of pitless unit installation, casing extension, and retrofitting of a bentonite/ grout surface sanitary seal, casing insulation and installation of a lockable stick-up casing protector

should be completed. The casing should extend to at least 600 mm above the highest flood level on record. Retrofit well with near surface low permeability sanitary surface seal;

- Convert building from in-ground sewage disposal to sewage eduction system.
- The well and water system should be superchlorinated; and,
- The 4-inch PVC check valve assembly between the fire fighting supply and the domestic supply should be replaced with a double check valve assembly.

Option 2: Upgrade existing well and re-locate septic effluent system to a location downgradient of the existing well. The only possible way to be both downgradient of the well and > 60 m away, is to re-locate the system off-site from the Fire Hall building. In addition to the potential purchase of land, the system may require a lift pump.

- Complete standard wellhead upgrades consisting of pitless unit installation, casing extension, and retrofitting of a bentonite/ grout surface sanitary seal, casing insulation and installation of a lockable stick-up casing protector should be completed. The casing should extend to at least 600 mm above the highest flood level on record. Retrofit well with near surface low permeability sanitary surface seal;
- Install filtration system (to 1 micron absolute) in advance of the existing proportional feed chlorination system;
- Relocate septic system relocated to an area that is at least 60 m from the well and hydraulically downgradient from the well capture zone (EBA 2006);
- The well and water system should be superchlorinated; and,
- The 4-inch PVC check valve assembly between the fire fighting supply and the domestic supply should be replaced with a double check valve assembly.

18.7.2 Priority 2

The outside hose bib should be raised to about 1.0 m above grade. This should include rerouting of the interior piping so that it is accessible for maintenance. If there is no backflow prevention device to this outside hose bib, it should be installed at the same time as these upgrades.

18.7.3 Priority 3

No Priority 3 upgrades have been identified for this site at this time.

18.8 Cost Estimates for Mitigative Options

Engineering costs for 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.

18.8.1 Priority 1

Option 1: Upgrade existing well and convert building to sewage eduction

- Standard wellhead upgrades with a pitless unit would cost in the order of $5,000.
- A commercial stainless steel duplex filtration system (to 1 micron absolute) would cost approximately $2,200 for materials and labour.
- Conversion to sewage eduction would cost in the order of $6,000.
- Installation of a second 4-inch check valve for backflow prevention would cost approximately $200.
- Superchlorination of the well and water system would cost in the order of $200.

Therefore the total cost for materials and labour for Option 1 is **$13,600.**

Option 2: Upgrade existing well and re-locate septic effluent system to a location downgradient of the existing well

- Standard wellhead upgrades with a pitless unit would cost in the order of $5,000.
- A commercial stainless steel duplex filtration system (to 1 micron absolute) would cost approximately $2,200 for materials and labour.
- Relocation of the septic effluent system with a lift pump would cost approximately $30,000 not including any land that would potentially have to be purchased.
- Installation of a second 4-inch check valve for backflow prevention would cost approximately $200.
- Superchlorination of the well and water system would cost in the order of $200.

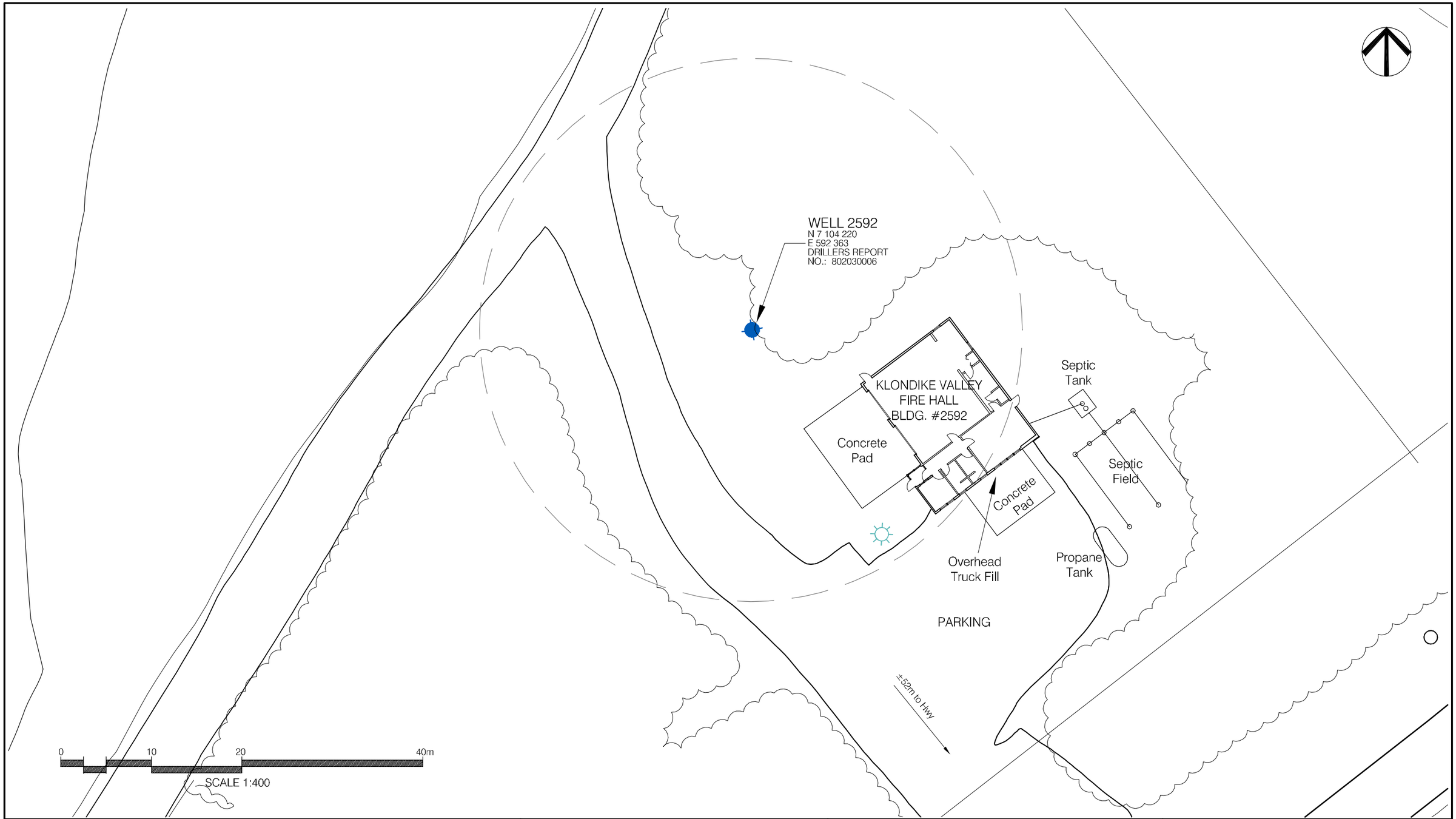
Therefore the total cost for materials and labour for Option 2 is **$37,600.**

18.8.2 Priority 2:

It is estimated that the recommended re-plumbing of the outside hose-bib and installation of a double check valve assembly could be completed for **$500** including materials and labour.

18.8.3 Priority 3

There are no Priority 3 upgrades recommended at this time.



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:	SEPT. 2005
SCALE:	AS SHOWN
PROJECT No.:	1260002.004
ACAD FILENAME:	004–NORTHERN REGION

CLIENT: Yukon
Highways and Public Works
Property Management Branch

SMALL PUBLIC WATER SYSTEMS ASSESSMENT
NORTHERN REGION

GOVERNMENT OF YUKON
HIGHWAYS & PUBLIC WORKS

KLONDIKE VALLEY FIRE HALL
BUILDING # 2592
SITE LOCATION DIAGRAM
WELL ID: 2592

REVISION ISSUE 0

FIGURE No. FIGURE 2592–A

Z:\0201Drawings\1260002 Water Assessment YTG\004 - Northern Region\dawson\1260002004 Klondike Valley Fire Hall_2592A Site Plan.dwg, 4/5/2006 5:09:04 PM, Adobe PDF, jbuyck

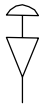
LEGEND


PUMP


PRESSURE GAUGE


GATE VALVE


CHECK VALVE

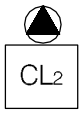

SOLENOID

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

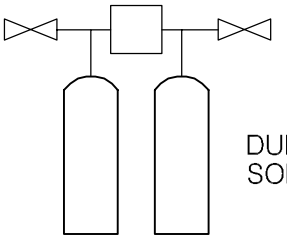
FLOW METER

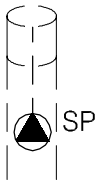
WATER FILTER
(CARTRIDGE TYPE)

PRESSURE TANK

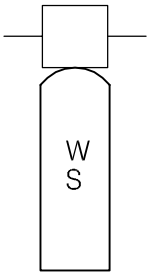


CHLORINE RESERVOIR AND
INJECTION PUMP


DUPLEX WATER
SOFTENER

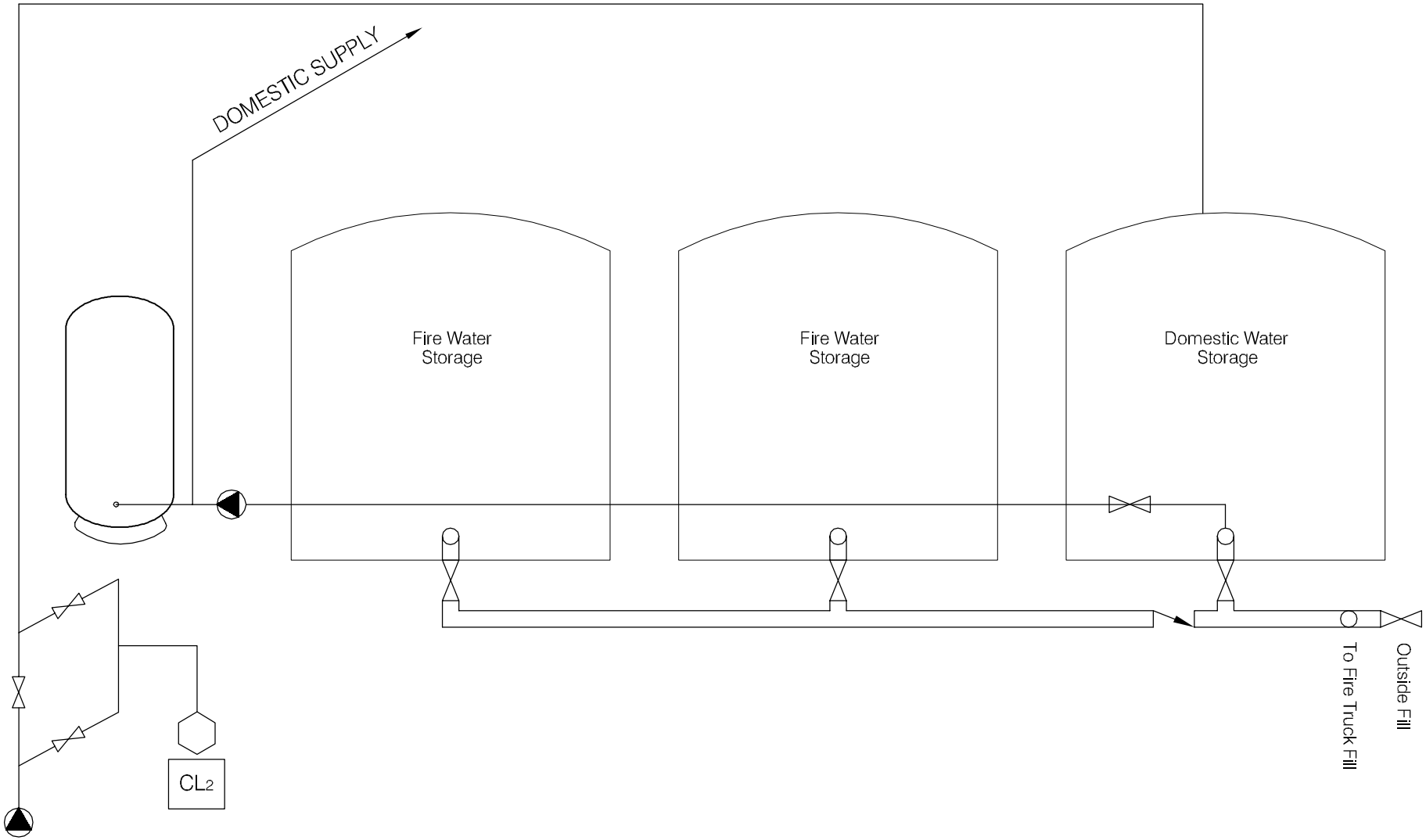


WELL WITH
SUBMERSIBLE PUMP



ACTIVATED
CARBON

EBA Engineering Consultants Ltd.			PROJECT	SMALL PUBLIC WATER SYSTEMS ASSESSMENT WESTERN 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



DRAWING IS BASED UPON SCHEMATIC PROVIDED BY BERT ALBISSER OF AQUA TECH SUPPLIES AND SERVICES LTD.

EBA Engineering Consultants Ltd.			PROJECT	SMALL PUBLIC WATER SYSTEMS ASSESSMENT NORTHERN REGION	
CLIENT Yukon Highways and Public Works Property Management Branch			TITLE	WATER SYSTEM DISTRIBUTION/TREATMENT SCHEMATIC SYSTEM ID.: 2592 KLONDIKE VALLEY FIRE HALL - DAWSON, YT.	
DATE SEPT. 2005	DWN. JSB	CHKD. RMM	FILE NO. 1260002.004		DWG.: FIGURE 2592-B

Z:\0201Drawings\1260002 Water Assessment YTG\004 - Northern Region\dawson\1260002004 Klondike Valley Fire Hall_2592B Schematic.dwg, 4/4/2006 5:35:42 PM, Adobe PDF, jbuyck

Northern Region – Klondike Valley Firehall
Building # 2592

DISTRIBUTION & TREATMENT SYSTEM DATA

Item	Description	Manufacturer	Model	Part No.	Serial No.	Size
1	SUB PUMP	MONARCH	1/2 HP			4" —
2	STORAGE TANKS	N/A	1000 GALLON ROUND			6'6 x 5'
3	JET PUMP	MYERS	HJ50S			1/2 HP
4	PRESSURE TANK	CHALLENGER	PC 66			20 GALLON
5	CHLORINATOR	GRUNDFOS	DME8-10			
6						
7						
8						
9						
10						

TABLE 2592 - 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?
2592	Klondike Valley Fire Hall	10	Oct-04 to Jun-05	**yes**	1/10	no	9-Jun-05	**yes**

Table 2592 - 2: Water Quality Results

SOURCE:	Building - 2592 Klondike Valley Fire Hall		GCDWQ Criteria		
Location/ Resident	Dawson City				
Address					
Treatment	None				
Disinfection	Chlorination				
Source of Water	On-site well				
Purpose of Sampling	Base Line	Additional Sampling			
Sample Location					
Date Sampled	2-Jun-04	19-Aug-05	**Lower**	**Upper Limit**	
Physical Tests *(ALS)*			**AO**	**MAC**	**AO**
Colour (CU)	<5.0				15
Conductivity (uS/cm)	312				
Total Dissolved Solids	162				500
Hardness CaCO3	152		AO >200 = poor, > 500 unacceptable [A]		
pH	7.79		6.5		8.5
Turbidity (NTU)	<0.10			1	5
UV Absorbance					
% UV Transmittance					
Dissolved Anions *(ALS)*					
Alkalinity-Total CaCO3	85.5				
Chloride Cl	1.95				250
Fluoride F	0.062			1.5	
Silicate SiO4					
Sulphate SO4	61.8				500
Nitrate Nitrogen N	0.21			10	
Nitrite Nitrogen N	<0.10			3.4	
Ammonia Nitrogen N					
Total Phosphate PO4					
Total Metals *(ALS)*					
Aluminum T-Al	<0.010			0.1	
Antimony T-Sb	<0.00050			0.006	
Arsenic T-As	<0.0010			0.025	
Barium T-Ba	0.076			1	
Boron T-B	<0.10			5	
Cadmium T-Cd	<0.00020			0.005	
Calcium T-Ca	42.5				
Chromium T-Cr	<0.0020			0.05	
Copper T-Cu	0.039			1	
Iron T-Fe	<0.030				0.3
Lead T-Pb	<0.0010			0.01	
Magnesium T-Mg	11.1				
Manganese T-Mn	<0.0020				0.05
Mercury T-Hg	<0.00020			0.001	
Potassium T-K	0.61				
Selenium T-Se	<0.0010			0.01	
Sodium T-Na	3.1				200
Uranium T-U	0.00028			0.02	
Vanadium T-V					
Zinc T-Zn	<0.050				5
Trihalomethanes					
Bromodichloromethane		<0.0010			
Bromoform		<0.0010			
Chloroform		0.0012			
Dibromochloromethane		<0.0010			
Total Trihalomethanes		<0.0040			
Organic Parameters					
Tannin and Lignin					
Total Organic Carbon C		1.25			
Haloacetic Acids					
Bromoacetic Acid		<0.0020			
Bromochloroacetic Acid		<0.0020			
Chloroacetic Acid		<0.020			
Dibromoacetic Acid		<0.0020			
Dichloroacetic Acid		<0.0020			
Trichloroacetic Acid (TCA)		<0.0020			
Field Chemistry (EBA)					
pH		7.81	6.5		8.5
TDS (ppm)		142			500
EC (uS/cm)		286			
Temperature (^{o}C)		6.3			
Free Available Chlorine		0.42			

Notes:

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

Italics and underline indicates exceedence of proposed MAC (ie. arsenic)

Bold with Yellow highlighting indicates exceedence of CDWQG Aesthetic Objective (AO)

Bold Underline with Yellow highlighting 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)

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 August 19, 2005

WELL ID #	Owner	Location Description
2592	YTG	Klondike Valley Fire Hall

1. Well Location and Potential Contaminant Sources

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

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

c. GPS location: N 7104220 E592363 elv 379m ± 11m

d Is there electric power? ☒ Yes ☐ No

e Is there outside water access? ☒ Yes ☐ No public fill

f. Does the well system have:

☐ 15 or more service connections to a piped distribution system ? If so how many_____
Fire Hall and public fill
☐ 5 or more delivery sites on a trucked distribution system? If so how many_____

g. Nearest building, specify fire hall

h. Distance from well to building ~13 m

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

j. Distance from well to nearest point of known field: 40 m (36m to tank)

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

l. 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

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

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

o. 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 Unlocked enclosure

Entrance by animals? ☐ Yes ☒ No Access possible

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

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

r. 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 _____

s. 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: Road ; Distance from well to Potential Source 1: 12m

Potential Source 2: Highway ; Distance from well to Potential Source 2: 80m

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

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

t. 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 1992 Month June

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: 41 ft ☐ measured (if possible) ☐ reported ☒ from log

h. Static water level below ground: 4 ft

☐ 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 5 ft slot size(s) 18 slot
Location of screen: from 36 ft to 41 ft (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 ~0.7 m below 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 styrofoam insulation

iv. Any evidence of rodents? Specify Access possible

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

If no, describe condition split gasket 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 or disinfection ☒ 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: Nov 1992 By: _____

e. For submersible pump, depth of setting below surface 34 Ft

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

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 + insulation

l. Comments on pump installation: _____

6. Conclusions

a. Comments on overall installation:

b. Recommendations:

PART B: EBA Site Inspection

Inspector: BERT ALBISSER Date AUG 19/05

WELL ID #	Owner	Location Description
2592	YTG	KLONDIKE VALLEY 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 _____

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: ON 2ND FLOOR OF THE BUILDING

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?

3 x 6' 6" Ø x 5' APPROX 1000 GALLONS

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: TANKS ARE CLOSED

Is there any sediment or scum in bottom of tank? YES NO
Comments: NOT AVAILABLE

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:

THIS IS AN ACCEPTABLE INSTALLATION, WITH THE EXCEPTION OF A DOUBLE CHECK VALVE ASSEMBLY BETWEEN THE DOMESTIC SUPPLY AND THE FIRE WATER STORAGE TANK

b. Recommendations:

INSTALL A DOUBLE CHECK VALVE ASSEMBLY IN PLACE OF THE 4" PVC CHECK VALVE. INITIATE A FREE CHLORINE RESIDUAL TESTING PROGRAM AT REGULAR INTERVALS. ASSURE FREE CHLORINE RESIDUAL IS MAINTAINED AT A MINIMUM OF 0.4 MG/L

Field Report

13 MacDONALD ROAD
WHITEHORSE, YUKON
Y1A 4L1

PHONE (403) 633-3070
TELEX 036-8496

Started. June 27 19 92

Completed. June 27 19 92

E AND ADDRESS OF CLIENT	DESCRIPTION OF WORK	LOCATION OF WORK
xphy Construction	W / W	Fire Hall at Rock Creek
	92-IA-20	

ORMATION LOG			DESCRIPTION OF WORK	TIME			
	TO	FORMATION		DATE	FROM	TO	HOURS
			MOVE				
			move on set up	June 27	11:30	12:30	1
	37	Gr	sand cobs silt	"	12:30	2:00	1.5
	40	Gr.	sand some silt				
	41	BR					
			set screen	"	2:00	2:30	0.5
			Develop	"	2:30	4:30	2
			move off to Dawson	"	4:30	6:00	1.5

of Casing & Pipe			
e	Type	Size	Type
8			
t	Inch	Feet	Inch

Remarks: 20 GPM
1-oder shoe
18-slot screen
K Packer
4 7/8" bit Pin

Static Level		Total Rig Time	hrs.
Ground Level	4'	Total Standby	hrs.
Top Of Casing		Drilling Mud	sacks

SIGNATURES

MIDNIGHT SUN..... CLIENT... E. G. Murphy.....

TITLE..... TITLE... Contractor.....

Midnight Sun Drilling Co. Ltd.
13 MacDonald Rd.
Whitehorse, Yukon Y1A 4L1
Phone: (403) 633-3070
Fax: (403) 633-5758

FAX TRANSMITTAL

TO: ED MURPHY DATE: Nov 4/93 TIME: _____

COMPANY: MURPHY CONSTR. ADDRESS: _____

FROM: DAVID JAMIESON FAX #: 993-5076

# of pages including cover: _____

NOTE: if the transmission is incomplete or if you have any questions please contact the writer via Fax or Phone.

MESSAGE:

ED: ENCLOSED

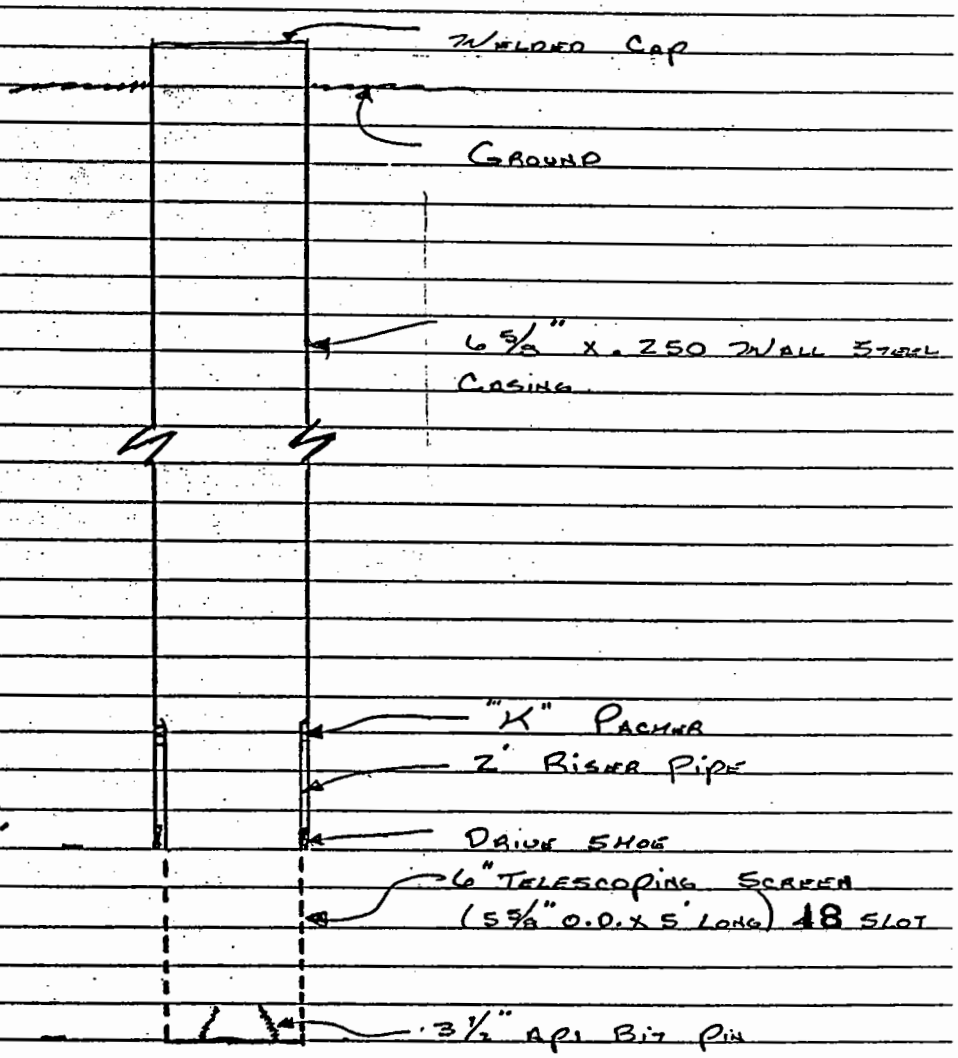
① SKETCH OF WELL
② DAILY LOG OF HOLE
③ PUMP MODEL
④ ENVIRONMENTAL HEALTH REPORT
⑤ CHEMICAL ANALYSIS OF WATER
⑥ WELL YIELD TEST
⑦ RECOVERY TEST
⑧ GRAPH OF ⑥ AND ⑦

Midnight Sun Drilling Co. Ltd.

E Nov 3/92

PAGE NO

JECT Water Well Rock Cavern Fire Hall



Midnight Sun Drilling Co. Ltd.

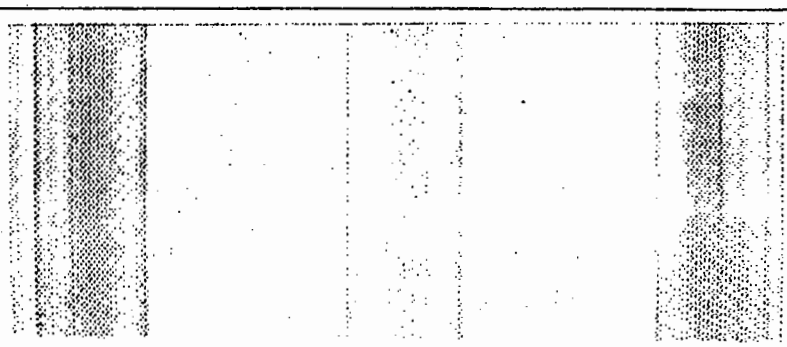
DATE Nov 3/92

PAGE NO

PROJECT Murphy Construction Bosh Creek Firehall

Pump

- 1/2 H.P. 230 Volt 5K10B5E-5P Monarch
  Pump Suction 5m/m At 34'



Health and Welfare Canada | Santé et Bien-être social Canada

ENVIRONMENTAL HEALTH SERVICES
MEDICAL SERVICES BRANCH
100, 300 MAIN STREET
WHITEHORSE, YUKON Y1A 2B5

TELEPHONE 667-3938
FAX 668-5726

Your file Votre référence

Our file Notre référence

Aqua Tech Supplies & Serv.
123 Copper Rd
Whitehorse, Y.T.
Y1A 2Z7

Sept 16, 1992

Dear Sir:

An analysis of your water sample has been completed to assess the microbiological safety in accordance with the "Guidelines for Canadian Drinking Water Quality". The indicator organisms tested for are total coliforms and faecal coliforms. Total coliform (TC) bacteria are common in the environment; whereas, faecal coliform (FC) bacteria are only present in the gastrointestinal tract and faeces of warm blooded animals and humans.

RESULTS	DATE OF SAMPLE	LOCATION	TOTAL	FAECAL
	Sep 13/92	Rock Creek Fire Hall	Nil	Nil

EXPLANATION OF RESULTS - "X" indicates the category of your water.

Coliform Count	Interpretation
Less than 2 TC & NIL FC	The sample satisfied the criteria as outlined in the above mentioned Guidelines.

Information on disinfection is attached ____ Yes ✓ No.

Please contact us with any questions regarding these results or any other concerns.

Technician: D Stutz

Canada

WESTERN INDUSTRIAL LABORATORIES LIMITED

LABORATORY REPORT

Telephone
(403) 439-7969
433-6362

8109 - 102 Street
Edmonton, Alberta
T6E 4A4

CHEMICAL ANALYSIS OF WATER

Submitted by Aquatech Supplies & Services Ltd. Date 14 October 1992

Sample Rock Creek Fire Hall Report No. 500-81

Received: 15 September 1992 Lab No. 92-2848

Constituent	mg/L	Constituent	mg/L
Total Dissolved Solids	176	Sulfate SO_4	46
Fixed Dissolved Solids	118	Chloride Cl	4
Sodium	2.3	Iron Fe Dissolved.	<0.05
Calcium Ca	37	Fluoride F	0.10
Magnesium Mg	9	Nitrate + Nitrite N	<0.2
Total Hardness as $CaCO_3$	129	Manganese Mn	0.034
Carbonate CO_3	nil	Total Kjeldahl Nitrogen	0.1
Bicarbonate HCO_3	104	Ammonia Nitrogen	<0.1
Total Alkalinity as $CaCO_3$	85	Total Phosphate	<0.5

pH 7.18 Conductivity 264 micromhos/cm Turbidity 4.6 N.T.U.

Remarks Colour (TCU) < 5 Zinc (Zn) 0.012 mg/L Lead (Pb) < 0.010 mg/L

Phenol < 0.001 mg/L Total Sulphide < 0.05 mg/L Copper (Cu) 0.005 mg/L

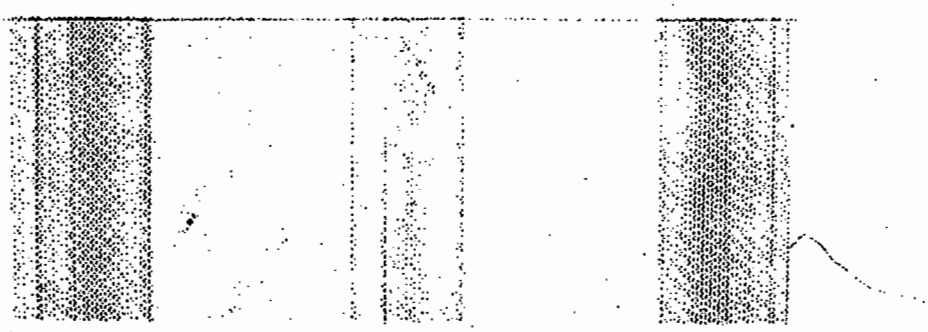
Arsenic (As) < 0.0002 mg/L Mercury (Hg) < 0.0001 mg/L

Iron Bacteria: A microscopic slide was prepared and stained for iron bacteria. There were no iron bacteria observed when examined under the microscope.

NOTE: The Dissolved Iron was run on a portion of sample that had been passed through a 0.45 micron millipore filter.

WESTERN INDUSTRIAL LABORATORIES LIMITED

F. D. Haz

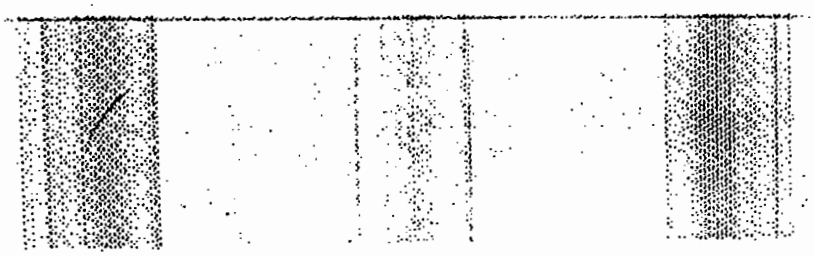


murphy construction

Well Yield Test Data Rockcreek Firehall Water Well 1-92
Rockcreek , Yukon

Time Test Started: Aug. 1, 1992 11:00AM

Time (min)	Flow (igpm)	DTW (m)	Total Flow	Drawdown (m)
0	10.3	1.75	0	
1	10.1	2.5	10	-0.75
2	10.2	2.535	20	-0.785
3	10.3	2.55	31	-0.8
4	10.2	2.56	41	-0.81
6	10.2	2.565	61	-0.815
8	10.2	2.565	82	-0.815
10	10.3	2.565	102	-0.815
13	10.3	2.565	133	-0.815
16	10.1	2.575	164	-0.825
20	10.2	2.58	204	-0.83
25	10.3	2.585	256	-0.835
32	10.4	2.59	328	-0.84
40	10.5	2.59	410	-0.84
50	10.5	2.59	514	-0.84
64	10.4	2.59	658	-0.84
80	10.5	2.595	824	-0.845
100	10.5	2.595	1031	-0.845
120	10.6	2.595	1239	-0.845
150	10.4	2.595	1549	-0.845
180	10.5	2.595	1860	-0.845
210	10.5	2.6	2172	-0.85
240	10.5	2.6	2483	-0.85
300	10.5	2.6	3107	-0.85
360	10.5	2.6	3735	-0.85



ROCKCREEK FIREHALL WELL TEST

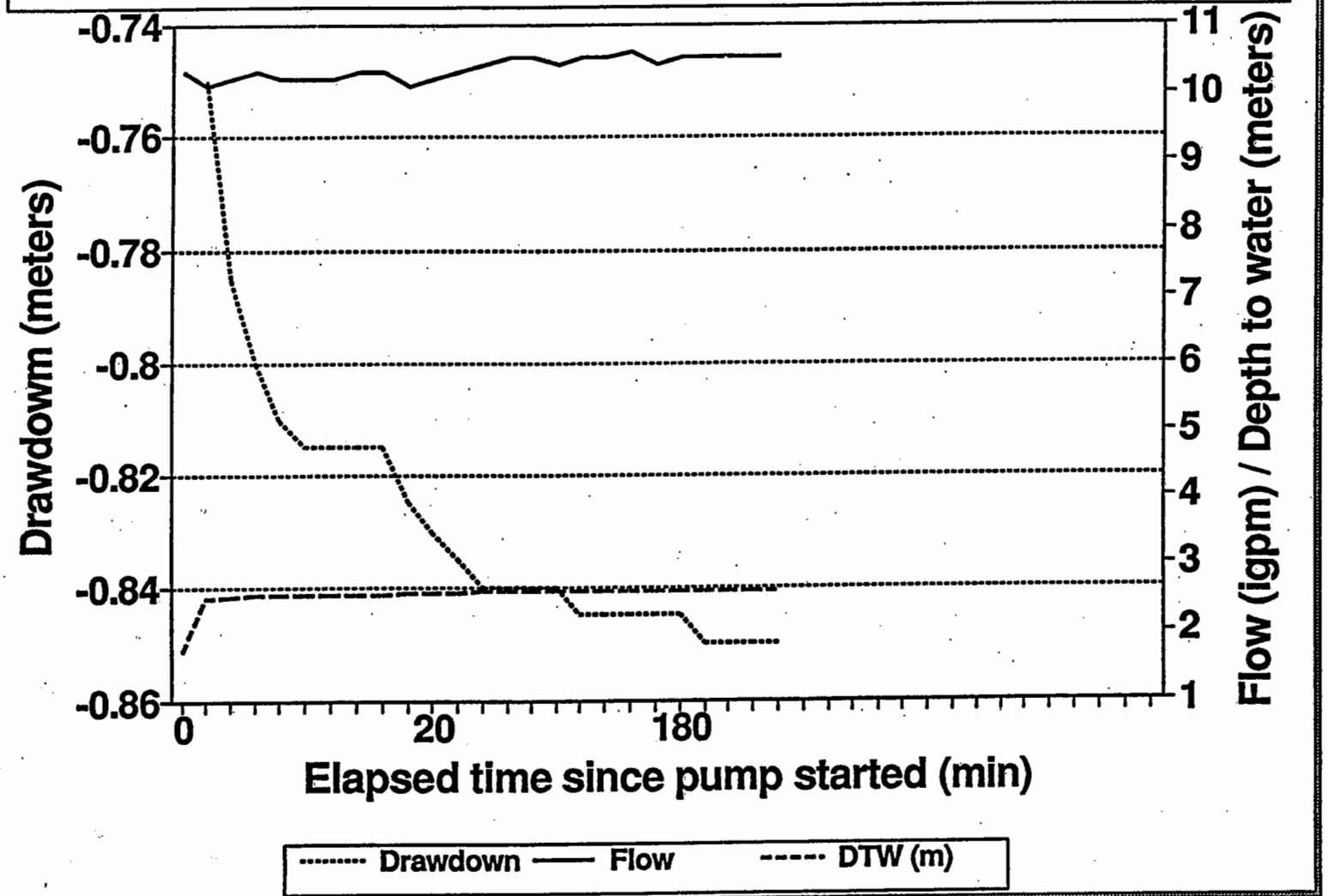


Photo 093: 2592 Klondike Valley Fire Hall

Photo 096: 2592 Water filling station.

Photo 236: 2592 Chlorination system, flow meter, and associated plumbing.

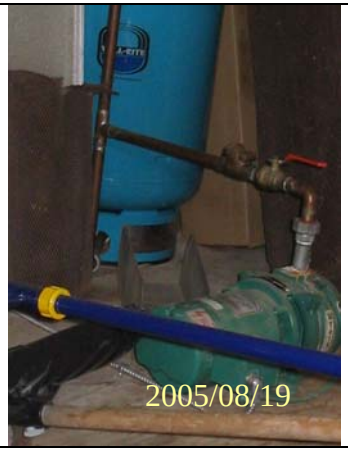


Photo 237: 2592 Jet pump and pressure tank.