21.0 BUILDING 4851: WATSON LAKE AIRPORT PUMPHOUSE

21.1 Description of Existing Water system

The Watson Lake Airport Terminal Building, Maintenance Garage, and Camping Area are supplied water from a 33.4 m deep well located the Pumphouse Building 4851. Although the well casing is below grade, the building is equipped with a sump, sump pump, float controls, and alarm system to prevent flooding. The well location and other site details are provided in Figure 4851-A, provided in Appendix A21. The coordinates of the wellhead, as measured by a handheld GPS device, were recorded as:

- UTM ZONE 9
- Northing: 6664005
- Easting: 509800

Currently there is no treatment system present on this water supply. In addition to servicing the two airport buildings, the well also supplies an underground water reservoir for emergency fire fighting use. A schematic detailing the water system is provided as Figure 4851-B in Appendix A21.

21.2 Description of Existing Wastewater Systems

The septic tank for both the Watson Lake Airport Terminal Building and Maintenance Garage is located approximately 35 m from the pumphouse. A site plan is included as Figure 4851-A in Appendix A21, and gives details on the location of the sewage system. The septic tank discharges effluent to a field located east of the tank. Effluent is discharged approximately 130 m east of the pumphouse well. The sewer discharge pipe that runs to the septic is located approximately 20 m from the well.

21.3 Water Quality Results

21.3.1 Water Quality Results from Previous Sampling

Bacteriological

Seven samples were collected from the Watson Lake Airport Pumphouse water 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 4851-1 in Appendix A21. Coliform bacteria and *E. coli* were reported as absent in four of the seven samples for which results were provided, and the remaining three were rejected due to high turbidity.

Potability

A water sample was collected by YTG representatives from the Watson Lake Airport Pumphouse water system on September 13, 2004. The sample was submitted to Northwest Labs in Surrey, BC for detailed potability analyses. Additional baseline sampling results were provided by YTG for a sample collected on June 22, 2005. The results of these analyses are summarized in Table 4851-2 in Appendix A21. 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 to identify potential indicators of contamination.

- At 142 and 30.8 NTU, turbidity greatly exceeded both CDWQG health based upper limit of 1.0 NTU and aesthetic objective of 5.0 NTU;
- At a level of greater than 60 CU, the colour exceeded the CDWQG aesthetic objective of 15 CU on September 13, 2005.
- At 1.28 mg/L and 3.14 mg/L, the iron concentrations exceeded the CDWQG aesthetic objective of 0.3 mg/L;
- At 1.84 and 2.26 mg/L, the manganese concentrations greatly exceeded the CDWQG aesthetic objective of 0.05 mg/L; and,
- All other health based and aesthetic objectives were met for the parameters analyzed. The hardness (as $CaCO_3$) was 112 and 114 mg/L, and is considered moderately hard.

21.3.2 Identification of Additional Analytical Testing Required

Additional analytical for the Watson Lake Airport Pumphouse that was included in the water system assessments is detailed below:

- UV absorbance, as well as tannins and lignin, to determine potential for UV treatment as a disinfection;
- Previous sampling had shown very high turbidity, and as such a sample was again taken in order to retest for turbidity;
- Analysis for total and dissolved iron and manganese to determine the amount of each associated with suspended or dissolved particles;
- Total organic carbon (TOC) to assist with treatment system selection;
- Analysis for EPH and PAH to determine if the water supply shows signs of hydrocarbon contamination; and,
- Measurements in the field for total dissolved solids, conductivity, pH, and temperature.

Additional Analytical Results

A water sample was obtained by EBA during the field program on June 20, 2005, and was submitted to ALS Environmental in Vancouver, BC for analysis. These results are summarized in Table 4851-2 in Appendix A21 and the laboratory reports are included in Appendix B. Results from the additional analytical are summarized below:

- At 23.2 NTU, turbidity exceeded the CDWQG MAC of 1.0 NTU;
- The total iron concentration was 2.69 mg/L. Additionally, the dissolved iron concentration was reportedly 1.25 mg/L, showing that the iron content can be attributed to both suspended solids and dissolved particles;
- The total manganese concentration was 2.69 mg/L, while the dissolved manganese concentration was reported at 2.65 mg/L, signifying that the manganese content can be mainly attributed to dissolved particles; and,
- EPH and PAH parameters were below analytical detection and CDWQG for each parameter tested.

21.3.3 Indicators of Potential Contamination

No elevated concentrations of indicator parameters were observed in the sample results reviewed.

21.4 Conceptual Hydrogeology

The log for this well indicates that the well is completed at a depth of 33.4 m in a sand and gravel aquifer. The lithology for this well indicates a silt and sandy silt layer existing from 17.8 to 21.1 m depth. The static water level in this well at the time of drilling was reported to be 5.4 m below grade. The presence of a 3.3 m layer of fine grained material above the aquifer zone provides a minimal degree of protection from surficial contamination sources. This well is located approximately 120 m north of Watson Lake. Groundwater flow in the vicinity is southerly towards Watson Lake.

21.5 Potential Contaminant Sources

Potential contaminant sources observed during the site investigation are provided in field notes in Appendix A21. Photos of potential contaminant sources are provided at the end of this appendix.

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

- Sewer service lines at approximately 20 m; and,
- Reported hydrocarbon contaminants in soil and groundwater as close as 5 m from the well.

21.5.1 Spills Records and Contaminated Sites Search Results

Based on a review of environmental reports for the Watson Lake Airport, it has been identified that hydrocarbon contaminated soil and groundwater exist to the northwest of the Airport pumphouse (Well 4851). The contamination is thought to be a result of leaks from a former diesel generating station. The inferred extent of soil contamination is indicated on Figure 4851-A in Appendix A21. EBA completed some assessment of soil and groundwater hydrocarbon concentrations on behalf of Public Works and Government Services Canada in 2004. Concentrations of benzo(a)pyrene in groundwater in excess of the Government of Yukon Contaminated Sites Regulations (CSR) Drinking Water (DW) standards, and the CDWQG, were identified at two monitoring wells within 20 m of Well 4851. The

groundwater contaminant plume defined with respect to the DW standards has not been delineated to the southwest, nor has it been delineated vertically.

Based on the log for Well 4851, the well obtains groundwater from a confined or semi-confined aquifer. The 3 m thick low permeability silt from 18 to 21 m below grade may provide some protection from hydrocarbon contamination observed in the upper aquifer. There is, however, some risk of contamination of this lower aquifer from the contaminant source identified in the upper unconfined aquifer and induced vertical gradients from the pumping of the well from the lower aquifer.

EBA reviewed water quality results from two previous sampling events for hydrocarbon parameters within the water supply. The water samples collected from the Air Terminal Building were below detection and met with CSR drinking water standards and CDWQG at the time of sampling for the parameters analyzed.

We understand that PWGSC and Transport Canada intend to excavate contaminated soil from this area in 2006 and that the excavated soil will be remediated at an on-site land treatment unit that is over 500 m from the well. Following remediation of as much of the contaminant source area as is practical, groundwater contamination would likely remain. EBA recommends installation of an activated carbon filtration system to remove hydrocarbons from the drinking water supply in the event that groundwater from the upper aquifer migrates into the lower aquifer, which supplies water to this well. This hydrocarbon removal measure is recommended along with routine monitoring (every 3 months) of raw water and treated water to ensure safe drinking water.

21.6 Identified Water System Deficiencies and Associated Risk

21.6.1 High and Medium Risk Deficiencies

The following deficiencies were identified as high-risk for the Watson Lake Airport Pumphouse water system:

- There is a hydrocarbon contaminant plume located upgradient of the pumphouse;
- There is no surface sanitary seal (grout or bentonite seal as required by the Canadian Groundwater Association's Well Construction Guidelines);

- By definition of the Draft Yukon GUDI Assessment Guideline, the well is potentially under the direct influence of surface water (because does not meet the requirements of the Guidelines for Water Well Construction;
- There has been a history of high turbidity reported for this system. The most recent water quality analysis reported turbidity to be 30.8 NTU, significantly above the CDWQG MAC. Turbidity has been as high as 142 NTU. Because of the high turbidity, three out of the seven bacteriological samples were rejected; and.
- This water system is not equipped with disinfection treatment.

21.6.2 Low Risk Deficiencies

The following deficiencies were identified as low-risk for the Watson Lake Airport Pumphouse:

- The total and dissolved iron concentrations in the water are in exceedence of CDWQG aesthetic objectives;
- The total and dissolved manganese concentrations in the water are in exceedence of CDWQG aesthetic objectives;
- Water quality results indicated exceedences in CDWQG aesthetic objectives for colour.

21.7 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).

21.7.1 Priority 1

Treatment should be installed on the water for domestic use and is outlined below:

- A NSF-61 certified filtration system (to 1 micron absolute) should be installed (it is likely that a series of filters will be required such as 10 micron, 5 micron and then 1 micron);
- A potassium permanganate green sand filtration system, as well as an activated carbon filtration system should be installed in order to reduce the high concentrations of iron, manganese and turbidity and to remove any potential hydrocarbon contamination;
- Backflow prevention should be installed on both the waterline leading to the domestic water system and the fire protection system; and

- Frequent monitoring of extractable petroleum hydrocarbons, polycyclic aromatic hydrocarbons, and volatile organic carbon should be completed to ensure that the hydrocarbon plume has not migrated into the aquifer from which this system obtains its groundwater supply.

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

There are two proposed options available for disinfection systems, and are outlined below:

Option 1:

- This option would involve installation of an NSF/ANSI 55 certified UV disinfection system for the domestic water supply (not fire protection). This is a conceptual design recommendation based on the information available, and is intended to be used for planning and budgeting purposes. Engineering input will be required for final system specifications or design.

Option 2:

- This option would involve the installation of a chlorine disinfection system with suitable retention for the domestic water supply (not fire protection).

Unfortunately it would be too difficult to install a proper surface sanitary seal to a depth of 6 m. With a proper treatment and disinfection system and regular water quality monitoring, however, this deficiency and the deficiencies associated with proximity to potential contaminant sources would likely be mitigated.

21.7.2 Priority 2

There are no Priority 2 recommendations for this site.

21.7.3 Priority 3

There are no Priority 3 recommendations for this site.

21.8 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.

21.8.1 Priority 1

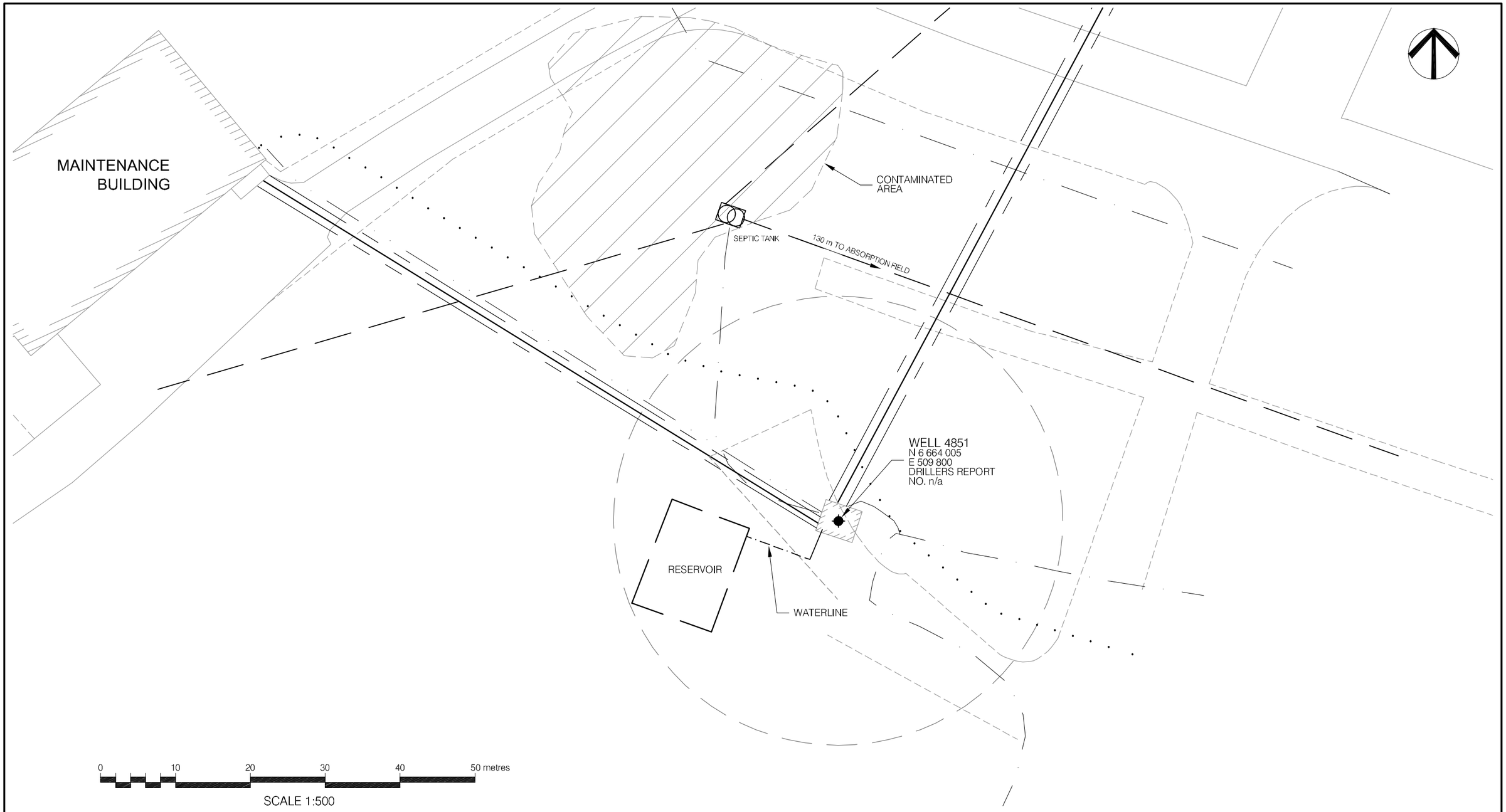
- The cost for a potassium permanganate green sand filter would be in the order of **$4,000**;
- An activated carbon filter system would cost approximately **$7,000**;
- To install a backflow preventer would cost approximately **$700** for materials and labour; and,
- Routine monitoring of EPH, PAH, and VOC should fall under normal operations and maintenance costs (estimated at **$1,000** per year).

Option 1:

- The proposed UV disinfection with 1-micron absolute prefiltration would cost in the order of **$5,000**.

Option 2:

- The proposed chlorine disinfection with 5 micron prefiltration would cost in the order of **$9,000**.



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:	JULY 2005
SCALE:	AS SHOWN
PROJECT No.:	1260002.002
ACAD FILENAME:	002-EASTERN REGION

CLIENT: Yukon Highways and Public Works Property Management Branch

SMALL PUBLIC WATER SYSTEMS ASSESSMENT
EASTERN REGION

GOVERNMENT OF YUKON
HIGHWAYS & PUBLIC WORKS

WATSON LAKE AIRPORT MAIN PUMPHOUSE BUILDING # 4851 SITE LOCATION DIAGRAM WELL ID: 4851-A

REVISION ISSUE: 0

FIGURE No.: 4851-A

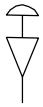
LEGEND


PUMP


PRESSURE GAUGE


GATE VALVE


CHECK VALVE

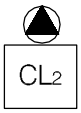

SOLENOID

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

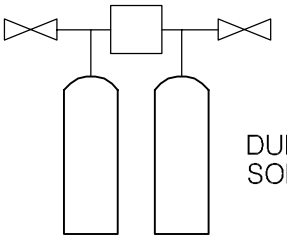
FLOW METER

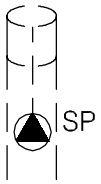
WATER FILTER
(CARTRIDGE TYPE)

PRESSURE TANK

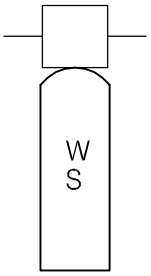


CHLORINE RESERVOIR AND
INJECTION PUMP


DUPLEX WATER
SOFTENER

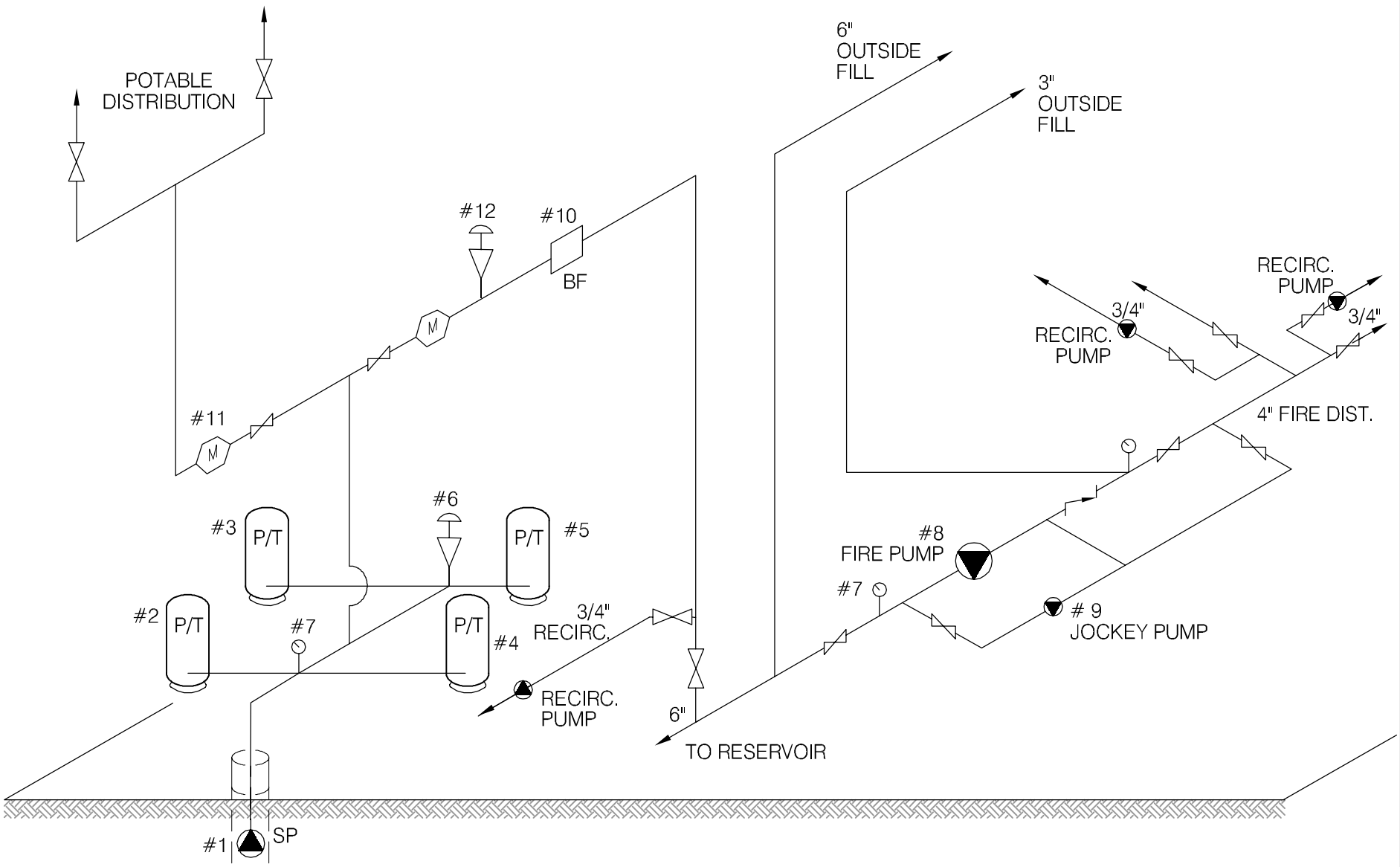


WELL WITH
SUBMERSIBLE PUMP



ACTIVATED
CARBON

EBA Engineering Consultants Ltd.			PROJECT	SMALL PUBLIC WATER SYSTEMS ASSESSMENT EASTERN 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 ALBI$SER OF AQUA TECH SUPPLIES & SERVICES LTD.

EBA Engineering Consultants Ltd.			PROJECT	SMALL PUBLIC WATER SYSTEMS ASSESSMENT EASTERN REGION	
CLIENT Yukon Highways and Public Works Property Management Branch			TITLE	WATER SYSTEM DISTRIBUTION/TREATMENT SCHEMATIC SYSTEM ID.: 4851 WATSON LAKE AIRPORT PUMP HOUSE	
DATE JULY 2005	DWN. JSB	CHKD. RMM	FILE NO. 1260002.002		DWG.: FIGURE 4851-B

Z:\0201Drawings\1260002 Water Assessment YTG\002 - Eastern Region\watson\Schematics\1260002 Airport Pump House_4851 Schematic.dwg, 7/21/2005 1:50:46 PM, Adobe PDF

Eastern Region – Airport Pumphouse
Building # 4851

DISTRIBUTION & TREATMENT SYSTEM DATA

Item	Description	Manufacturer	Model	Part No.	Serial No.	Size
1	SUB. PUMP	MYERS	CB5573		795	5HP.
2	PRESSURE TANK 1	FLEXCON	WR360R		02-21-98	
3	PRESSURE TANK 2	FLEX CON	WR360R		04-17 98	
4	PRESSURE TANK 3	FLEX CON	WR360R		04-17-98	
5	PRESSURE TANK 4	FLEX CON	WR360R		04 17 98R	
6	PRESSURE SWITCH	SQ. D	FSG-2			1/4 FIPT
7	PRESSURE GAUGE	WEKSLER	0-100			4 1/2" FACE
8	FIRE PUMP	ARMSTRONG.	43MF		C-9056	3x3x8
9	JOCKEY PUMP	WEBTROL	ES B/2-3PHN			1" x 1"
10	BACKFLOW DEVICE	WATTS	2" 007 DCA.			2"
11	WATER METER	NEPTUNE	2" HP DIRECT READ			
12	SOLENOID VALVE	ASCO	2" SOLENOID VALVE			

TABLE 4851- 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?
4851	Airport Pumphouse	7	Sept-04 to Mar-05	no	0/7 *	no	8-Mar-05	no

* Three out of seven samples were rejected due to high turbidity

eba

Table 4851-2: Water Quality Results

SOURCE:	Building 4851 Airport Pumphouse			GCDWQ Criteria		
Location/ Resident	Watson Lake					
Address						
Treatment	No					
Disinfection	No					
Source of Water	On-Site Well					
Purpose of Sampling	Baseline	Additional Sampling	Baseline			
Sample Location		Washroom				
Date Sampled	13-Sep-04	20-Jun-05	22-Jun-05	**Limit**	**Upper Limit**	
Physical Tests *(ALS)*				**AO**	**MAC**	**AO**
Colour (CU)	**>60**		<5			15
Conductivity (uS/cm)			228			
Total Dissolved Solids	124		133			500
Hardness CaCO3	112		114	AO >200 = poor, > 500 unacceptable[A]		
pH	7.39		7.41	6.5		8.5
Turbidity (NTU)	**142**	**23.4**	**30.8**		1	5
UV Absorbance		0.031				
% Transmittance						
Dissolved Anions *(ALS)*						
Alkalinity-Total CaCO3	126		141			
Chloride Cl	1.0		0.60			250
Fluoride F	<0.05		<0.040		1.5	
Silicate SiO4						
Sulphate SO4	3.25		3.39			500
Nitrate Nitrogen N	0.2		<0.10		10	
Nitrite Nitrogen N	<0.05		<0.10		1	
Ammonia Nitrogen N						
Total Phosphate PO4						
Total Metals *(ALS)*						
Aluminum T-Al	<0.005		<0.010			
Antimony T-Sb	<0.0002		<0.0005		0.006	
Arsenic T-As	0.0017		0.00142		0.025	
Barium T-Ba	0.378		0.328		1	
Boron T-B	0.009		<0.10		5	
Cadmium T-Cd	0.00007		<0.0002		0.005	
Calcium T-Ca			35.4			
Chromium T-Cr	<0.0005		<0.0020		0.05	
Copper T-Cu	0.002		0.0037		1	
Iron T-Fe	**1.28**	**3.01**	**3.14**			0.3
Lead T-Pb	0.0047		0.00016		0.01	
Magnesium T-Mg			6.14			
Manganese T-Mn	**1.84**	**2.69**	**2.26**			0.05
Mercury T-Hg			<0.0002		0.001	
Potassium T-K			0.84			
Selenium T-Se			<0.0010		0.01	
Sodium T-Na	2.5		2.6			200
Uranium T-U	<0.0005		<0.00010		0.02	
Vanadium T-V						
Zinc T-Zn	0.15		<0.050			5
Dissolved Metals *(ALS)*						
Aluminum D-Al					0.1	
Antimony D-Sb					0.006	
Arsenic D-As					0.025	
Barium D-Ba					1.0	
Boron D-B					5	
Cadmium D-Cd					0.005	
Calcium D-Ca						
Chromium D-Cr					0.05	
Copper D-Cu						1.0
Iron D-Fe		**1.25**				0.3
Lead D-Pb					0.01	
Magnesium D-Mg						
Manganese D-Mn		**2.65**				0.05
Mercury D-Hg					0.001	
Potasium D-K						
Selenium D-Se					0.01	
Sodium D-Na						200
Uranium D-U					0.02	
Vanadium D-V						
Zinc D-Zn						5.0
Trihalomethanes						
Bromodichloromethane						
Bromoform						
Chloroform						
Dibromochloromethane						
Total Trihalomethanes					0.1	
Organic Parameters						
Tannin and Lignin		0.38				
Total Organic Carbon C		1.62				
Haloacetic Acids						
Bromoacetic Acid						
Bromochloroacetic Acid						
Chloroacetic Acid						
Dibromoacetic Acid						
Dichloroacetic Acid						
Trichloroacetic Acid (TCA)						
Polycyclic Aromatic Hydrocarbons						
Acenaphthene		<0.000050				
Acenaphthylene		<0.000050				
Acridine		<0.000050				
Anthracene		<0.000050				
Benz(a)anthracene		<0.000050				
Benzo(a)pyrene		<0.000010			0.00001	
Benzo(b)fluoranthene		<0.000050				
Benzo(g,h,i)perylene		<0.000050				
Benzo(k)fluoranthene		<0.000050				
Chrysene		<0.000050				
Dibenz(a,h)anthracene		<0.000050				
Fluoranthene		<0.000050				
Fluorene		<0.000050				
Indeno(1,2,3-c,d)pyrene		<0.000050				
Naphthalene		<0.000050				
Phenanthrene		<0.000050				
Pyrene		<0.000050				
Quinoline		<0.000050				
Extractable Hydrocarbons						
EPH10-19		<0.30				
EPH19-32		<1.0				
LEPH		<0.30				
HEPH		<1.0				
Field Chemistry (EBA)						
pH		7.48				8.5
TDS (ppm)		118				500
EC (uS/cm)		235				
Temperature (°C)		10.6				
Free Available Chlorine						

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 (°C) and Turbidity (NTU)

< = Less than the detection limit indicated.

AO = Aesthetic Objective

MAC = Maximum Acceptable Concentration (Health Based)

Table 4851-3: Summary of Well Assessment Results
SMALL PUBLIC DRINKING WATER SYSTEMS

Well Identification			GPS Coordinates		
Building #	**Building Name**	**Location**	**Northing (+/- 10 m)**	**Easting (+/- 10 m)**	**Grade Elevation (+/- 10 m)**
4851	**Watson Lake Airport Pumphouse**	**Watson Lake Airport**	6664005	509800	690

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)**
200	1991	Yes	33.4	Silt from 17.8 m to 21.2 m		150 gpm	5.4 m below grade at time of drilling

Potential Contaminant Sources					
Distance from well to nearest point of septic field (m)	**Distance from well to nearest building (m)**	**Distance to surface water body (m)**	**AST present on property?**	**Distance from well to AST (m)**	**Other potential sources of contamination observed on property, and distance to well**
130 (35 to tank and 20 to sewage line)	Located inside basement of pumphouse	Approximately 175 m to Watson Lake	AST	Greater than 80 m	Contaminated site starting at 5 m from the well

Well Construction Details					
Wellhead Above ground (m)	**Well Cap**	**Well Screen**	**Surface Seal**	**Apron Grading**	**Comments**
2.75 m below grade	Split seal gasket cap	80 slot from 29.8 m to 31.3 m and 100 slot from 31.3 m to 32.8 m	Unlikely	Yes	The well services the airport terminal as well as the airport maintenance garage.

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 June 20, 2005

WELL ID #	Owner	Location Description
4851	YTG	Watson Lake Airport Pumphouse

1. Well Location and Potential Contaminant Sources

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

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

c. GPS location: N 6664005 E 509800 690m ±10m

d Is there electric power? ☒ Yes ☐ No

e Is there outside water access? ☐ Yes ☒ No

f. Does the well system have:

☐ 15 or more service connections to a piped distribution system ? If so how many_____
Maintenance Garage + Terminal building

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

g. Nearest building, specify Pumphouse

h. Distance from well to building located inside basement

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

j. Distance from well to nearest point of known field: 130 m, 35m to tank, 20m to sewage line

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

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

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

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 locked pumphouse
Entrance by animals? ☒ Yes ☐ No No signs - Access possible but unlikely

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

q. Is the well site well drained? ☒ Yes ☐ No Apron Grading around building

r. Is there a buried fuel tank on the property? ☐ Yes ☒ No unknown, but would be >80m

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 Hydrocarbon contaminated site @ 5m and greater from well Monitoring wells in place.

If yes, specify the source: ☐ dump ☐ sewage lagoon ☐ cemetery ☐ other

Potential Source 1: Terminal A57 ; Distance from well to Potential Source 1: >80m
Potential Source 2: Watson Lake ; Distance from well to Potential Source 2: >80m
Potential Source 3: Contaminated Site ; Distance from well to Potential Source 3: 5m and greater
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
Monitoring wells for contaminated site

2. Well and Wellhead information:

a. When was well installed? Year 1991 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 20 cm Material: ☒ steel ☐ plastic ☐ concrete

g. Depth of well: 109 ft ☐ measured (if possible) ☐ reported ☒ from log

h. Static water level below ground: 17.5 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 5ft, 5ft slot size(s) 80 slot, 100 slot
Location of screen: from 97ft to 102ft ~~to~~ 102ft to 107ft (from log) reported

l. Is there a sump below the screen? ☒ Yes ☐ No
Sump in the building to prevent flooding

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

☐ 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 2.75 m below apron grading

ii. Are there signs of ponding on the enclosure(e.g. water stains, etc.)? ☒ Yes ☐ No
Minor - some leakage from pipes above

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

iv. Any evidence of rodents? Specify No

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 ☐ 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
unlikely

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
likely

g. Pump delivers water to: ☒ pressure tank ☐ elevated tank ☒ other
water resevoir for fire use

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

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

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: Inside heated building

l. Comments on pump installation: _____

_____

6. Conclusions

a. Comments on overall installation:

_____

_____

_____

_____

_____

_____

_____

b.Recommendations: _____

_____

_____

_____

_____

_____

_____

_____

PART B: EBA Site Inspection

Inspector: BERT ALBASSER Date JUNE 20/05

WELL ID #	Owner	Location Description
4851	YTG.	WATSON LAKE AIRPORT PUMPHOUSE

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: PRESSURE TANKS 4x WR360R

Where is it located?
Comments: LOWER LEVEL – PUMPHOUSE

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?

WR360R.

What material is the tank constructed of? STEEL POLYBUT BLADDER

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

Comments: _____

Tank Inlet, Outlet and Lid

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

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

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

Is the water tank drain accessible? YES NO

WATER TANK AND WATER QUALITY CONDITION

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

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

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

Have there been any bacteriological analyses conducted previously? YES NO

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

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

8. Conclusions

a. Comments on overall installation:

THIS IS A PROFESSIONAL INSTALLATION. THERE IS NO TREATMENT AT THE SOURCE A SILENT CHECK VALVE SHOULD BE INSTALLED TO PREVENT WATER HAMMER OBSERVED DURING INSPECTION

b. Recommendations:

INSTALL SILENT CHECK ON SUB. PUMP DISCHARGE. INSTALL CHLORINATION SYSTEM ON POTABLE WATER SUPPLY. SYSTEM MUST BE PROPORTIONAL FEED FOR PROPER RESIDUAL CONTROL. INSTITUTE CHLORINE RESIDUAL TESTING AT REGULAR INTERVALS.

Field Report

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

Started June 13 19 91.

Completed June 18 19 91.

NAME AND ADDRESS OF CLIENT	DESCRIPTION OF WORK	LOCATION OF WORK
UMA	~~water well~~ 8" 91-10-10	B.C.T. Wit. Lk.

FORMATION LOG FROM	TO	FORMATION
0	29	Gr.
29	51	Gr.
51	58	Fine
58	69	silt
69	108	sand
108	109	fine

DESCRIPTION OF WORK	DATE	TIME FROM	TO	HOURS
MOVE				
Move set up	June 13	6:30	[illegible]	[illegible]
Sand	June 14	7:00	2:00	7
Sand some silt				
Sand silt				
Gr.				
Sand Gr sand.				
Travel to Whse	June 14	2:30	8:30	6.
Loading	June 15	9:00	12:00	3
Travel to Watson	June 17	6:00	12:00	6
set screens	"	1:00	4:00	3
Develop	"	4:00	8:00	4
Develop	June 18	7:30	5:30	10
Move off.	"	5:30	6:30	1

Casing & Pipe Size	Type	Size	Type
Feet	Inch	Feet	Inch
17'	6		

Remarks: 150 GPM
1-odex shoe
1-80 slot
1-100 slot
2" riser pipe.
K Packer
5 7/8" bit pin
107' screen bottom

Static Level		Total Rig Time	hrs.
Ground Level	17' 6"	Total Standby	hrs.
Top Of Casing		Drilling Mud	sacks

SIGNATURES

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

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

ow Printers

Environment Canada Environnement Canada

Enforcement and Emergencies Section
91782 Alaska Highway, Whitehorse, YT Y1A 5B7
PH: 867.667.3400 FAX: 867.667.7962

Spill Report Information

Spill #	8519
Jurisdiction	Yukon
Community	Watson Lake
Address	
Highway	
Milepost	
Feature	Watson Lake
Location and Cause	Airport - hose burst at coupling while refueling
Latitude	60.1166666666667
Longitude	-128.833055555556
Incident Date	5/6/1985 3:27:00 PM
Lead Agency	
Other Agency	
Company(s)	Yukon Aviation
Amount	15
Units	Litres
Quantity	Estimate
Release Description	Spilled
Additional Quanitit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Aviation Fuel (Jet A Or B)
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	happened on tarmac - absorbant laid down and later picked up

Environment Canada Environnement Canada

Enforcement and Emergencies Section
91782 Alaska Highway, Whitehorse, YT Y1A 5B7
PH: 867.667.3400 FAX: 867.667.7962

Spill Report Information

Spill #	9107
Jurisdiction	Yukon
Community	Watson Lake
Address	
Highway	
Milepost	
Feature	Watson Lake
Location and Cause	Airport - Fire Training Area - contents of storage tank leaked - valve not properly closed due to ice in fuel
Latitude	60.118888
Longitude	-128.828042
Incident Date	4/1/1991 8:00:00 AM
Lead Agency	Transport Canada
Other Agency	Environment Canada - Environmental Protection Service
Company(s)	Transport Canada
Amount	6800
Units	Litres
Quantity	Actual
Release Description	Leaked
Additional Quanitit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Gasoline
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	test pits excavated - plume determined - contaminated water pumped out - evaporation and sorbents used to clean - monitoring well dug

Photo 0255: 4851 Watson Lake Airport Pumphouse (right), airport terminal building (back), contaminated site (centre right)

Photo 0250: 4851 Wellhead in pumphouse basement (centre) and pressure tanks (back)

Photo 0251: 4851 Fire pump (right) and pumphouse sump (left)

Photo 0254: 4851 Underground water reservoir for fire fighting