

EBA ENGINEERING CONSULTANTS LTD.



SMALL PUBLIC WATER SYSTEM ASSESSMENT NORTHERN REGION



"CREATING AND DELIVERING BETTER SOLUTIONS"



**Small Public Water System Assessments
Yukon Government Maintained Buildings**

***NORTHERN REGION
DRAFT REPORT***

EBA Project No. 1260002.004

March 2006

**Small Public Water System Assessments
Yukon Government Maintained Buildings
*NORTHERN REGION
DRAFT REPORT***

Submitted To:

Property Management Agency
Government of Yukon

Prepared by:

**EBA ENGINEERING CONSULTANTS LTD.
WHITEHORSE, YUKON TERRITORY**

EBA Project No. 1260002.004

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1.0 INTRODUCTION

1.1 Scope of Work and Terms of Reference

The scope of work for this project was to conduct professional assessments of the wells, water systems and water sources for Government of Yukon maintained buildings in the “Northern Region” as defined in the Request for Proposal (RFP) “Small Public Water Drinking Water System Assessment – Yukon Government Maintained Buildings – 2005”. The RFP, and the EBA project team’s proposal (EBA, February 2005) formed the Terms of Reference (TOR) for this study. In accordance with the TOR, the assessments were comprehensive and the reporting includes information, observations, comments, recommendations and plans/sketches for the water sources, infrastructure and distribution systems. The recommendations include Class D cost estimates to upgrade water systems to meet the new draft regulations - ***Draft Guidelines for Part III – Small Public Drinking Water Systems***. Comparison of well construction with the ***Canadian Groundwater Association Guidelines for Water Well Construction***, and comparison of water quality results with the ***Guidelines for Canadian Drinking Water Quality*** are included for each system. This report provides a summary of the assessment results and recommendations and costs for the Northern Region.

1.2 Authorization

The project team consisting of EBA Engineering Consultants Ltd. (EBA), Dayton and Knight Ltd. (D&K) and Aqua Tech Service and Supply (ATSS) was authorized to complete the work program in accordance with the TOR. EBA, as the consulting team representative, signed a contract (GN04556521-40319) with the Property Management Agency (PMA) of the Government of Yukon (YTG) on March 8th 2005 to provide consulting services to conduct the Small Public Drinking Water Assessments as per the submitted proposal, fees and disbursements.

1.3 Public Drinking Water System Regulations and Guidelines

Since the tragedy of the Walkerton water supply contamination issue, jurisdictions across Canada have adopted the “Source to Tap, Multi-barrier” approach in assessing, planning and designing water supply systems. The Yukon has followed in step with the rest of Canada in the development of several key guidelines that are intended to become regulation. The following two draft drinking water guidelines for regulation to be enacted under the ***Public Health and Safety Act*** (Yukon), were released in April 2004:

- ***Public Drinking Water Systems Regulations***; and,
- ***Bulk Delivery of Drinking Water Regulations***.

As well, the Yukon Government has recently developed ***Draft Guidelines for Part III – Small Public Drinking Water Systems***, which are referenced in this report. We understand that these draft guidelines are still under review.

Each of these draft regulations specify requirements in the areas of source protection, training, permitting, engineering assessments, equipment, disinfection and treatment, operation and maintenance, sampling and analysis, record-keeping, and emergency planning. All remedial measures and feasibility assessments completed in this study are consistent with the requirements of Yukon legislation.

The ***Canadian Drinking Water Quality Guidelines*** (CDWQG) are referenced to in our analysis of water quality data. These guidelines are amended periodically, and the most recent version (April 2004) was used for this study.

1.4 Methodology

The following sections describe the methodology used for completing the scope of work in accordance with the Terms of Reference.

1.1.1 Meeting #1: Project Kick-off

A project “Kick-Off” meeting was held on March 16th, 2005 following award of the contract to introduce the project team members and discuss the Terms of Reference. EBA representatives Ryan Martin and Matt Pye, ATSS representative Bert Albisser, and YTG representatives Tom Renwick and Nick Barnett attended the meeting. The civil/mechanical engineering representatives of the team (D&K) attended by teleconference. Project team introductions, access to background information (water quality results, well records), proposed mapping, schedule and billing was discussed.

1.1.2 Information Collection and Review

The assessment began with the compilation and review of all relevant information including previous reports, site plans, air photos, well logs, pump testing results and water quality data.

An evaluation of all existing water quality information available from a previous study (***Collection of Water Samples for Bacteriological Testing, Chemical and Physical Parameter Testing – Various Locations, Yukon – YTG Contract 2004***) was undertaken prior to the field program. The purpose of this review was to identify wells that may be impacted by various potential sources of contamination in order to determine the additional water quality parameters necessary to evaluate treatment/disinfection options. The available water quality information was assessed for compliance with the ***Guidelines for Canadian Drinking Water Quality criteria***. EBA prepared a letter dated April 7th, 2005 for YTG Property Management Agency titled ***Recommendations for Additional Analytical – Small Public Drinking Water System Assessments – Government of Yukon Maintained Buildings – 2005***. The letter provided recommendations and estimated costs for additional sampling, field chemistry and laboratory analyses.

1.1.3 Meeting #2: Pre-Assessment

Following the collection and review of available information pertaining to the subject water systems, a meeting was held in Whitehorse with YTG, EBA and ATSS representatives on May 5, 2005. Each of the YTG regional managers attended.

The findings of the analytical review were discussed, with particular attention given to the recommendations for additional water quality sampling. Laboratory and courier cost estimates for the additional analyses were presented at the meeting, along with contact information for personnel involved in the project.

Specific aspects of the field program were discussed including site access and the standardized reporting format for each system. Also, the sequence of regions to be evaluated was determined based on priority of expected high-risk deficiency upgrades and level of risk. It was decided that the first region to be assessed would be the Whitehorse Region, followed by the Eastern Region, Western Region and the Northern Region.

1.1.4 Assessment Team

For system assessment, a project field team consisting of an EBA hydrogeologist (Ryan Martin, P.Eng.), an EBA Field Technician (Luke Lebel) and one senior Aqua Tech personnel (Bert Albisser) was utilized. The primary responsibility of EBA personnel during the field assessments was the evaluation of well construction and location. All potential sources of contamination within 150 m of subject wells with specific attention to the 30 m surrounding the well were identified during the system assessments.

The primary responsibility of Aqua Tech personnel (Bert Albisser) during the field assessments was the accurate documentation of the distribution and treatment/disinfection systems, including general condition and maintenance requirements. Aqua Tech personnel provided a preliminary evaluation of the system to EBA and D&K and assisted with detailed evaluation and development of recommendations.

D&K personnel provided technical advice by correspondence, as needed during the water system assessments, and were not required to visit the sites.

1.1.5 Wellhead Inspections and Water Supply Source Evaluations

For each of the subject wells, the field investigation began with a site reconnaissance to assess general site conditions, topography, surface drainage patterns and exposed sediments. The major focus of the reconnaissance was identification of potential sources of contamination that may not have been previously identified through research prior to the field assessment. Separation distances were measured to all potential sources of contamination within 150 m of the well, including septic fields, sewage lagoons, cemeteries, landfills, buildings, roads, fuel storage tanks and other sources of potential contamination. This information is presented in the individual sections for each water system on digital, scaled site plans developed for the subject sites. Groundwater flow directions are inferred where possible within the report based on topography and proximity to surface water bodies, as well as previous work.

Following the site reconnaissance, a detailed inspection of the water supply system was undertaken. Where possible, the following information was obtained for each well:

- Wellhead construction, enclosure, piping, cleanliness and the buildings served;
- GPS coordinates at each wellhead;

- GPS coordinates for septic fields or other potential contaminant sources within 150 m of each wellhead;
- Digital photographs of wellheads and any potential contaminant sources;
- Surface completion details relevant to the security and operation of the well;
- Assessment of all well enclosures;
- Completion of wellhead check lists for each well incorporating the following items:
 - o Compliance with the **Canadian Groundwater Association Guidelines for Water Well Construction**, including existence of casing seals (if possible) and height of casing above ground surface;
 - o Casing type and diameter;
 - o Type and condition of well cap;
 - o Potential for ponding of surface drainage at wellhead;
 - o Qualitative description of water quality concerns if possible (e.g. staining, odours);
 - o Description of system deficiencies and digital photographs illustrating deficiencies;
 - o Wellhead accessibility for rehabilitation, pump removal, inspections, etc.;
 - o Site sketch illustrating location of well in relation to buildings and nearby potential contaminant sources within 150 m (as described above, information will be transferred to a digital site plan modified from an air photo base plan); and,
 - o Water level measurements, and the depth of the well measured where possible.

During the well inspections, water quality samples were collected as required, to augment existing water quality information available for the subject systems.

1.1.6 Distribution and Treatment System Evaluations

Aqua Tech personnel documented the existing water supply distribution and treatment/disinfection systems. Where possible, the following information was collected for each system:

- Type and condition of pump, including make and model;
- Type and condition of controls;
- Type and condition of distribution piping, fittings and connections;
- Type and condition of water treatment systems, including make and model;
- Type and condition of disinfection systems, including make and model;
- Type and condition of freeze protection; and,
- Digital photographs illustrating piping, controls and treatment/disinfection systems, including deficiencies and general layout.

This information is presented on system schematics of the complete water supply systems, along with supporting tables that include all pertinent information related to the water

supply source, well, distribution and treatment/disinfection systems. This information is presented in an individual appendix assigned for each site.

In addition to the above information, on-site water testing was performed for systems with operational chlorine disinfection systems. This was done using a chlorine test kit capable of reading in the range of 0.0-to 3.5 mg/L free chlorine. Chlorinated systems were assessed for compliance with the ***Draft Guidelines for Part III – Small Public Drinking Water Systems***, which requires a free chlorine residual of 0.4 mg/L for bulk water delivery, and a minimum of 0.2 mg/L for piped water distribution systems servicing five or more connections. Field parameters such as pH, electrical conductivity (EC), Total Dissolved Solids (TDS) and temperature were also obtained at all sites.

1.1.7 Report Format and Cost Estimates for Northern Region

This report includes the assessment results and recommendations for upgrades to address deficiencies in a prioritized manner as requested in the Terms of Reference. Deficiencies are identified with respect to the requirements stipulated in the ***Canadian Groundwater Association Guidelines for Water Well Construction*** and the ***Draft Guidelines for Part III – Small Public Drinking Water Systems***. Upgrades are recommended to address these deficiencies, in addition to other improvements that may be warranted. Where appropriate, alternative upgrade options are provided. All recommendations include Class D cost estimates, and are classified according to the following three categories:

- Priority 1: Recommended upgrades and estimated costs to address potential immediate risk deficiencies (high hazards);
- Priority 2: Recommended upgrades and estimated costs to address remaining potential medium and high risk deficiencies (medium and high hazards); and,
- Priority 3: Recommended upgrades for typically low risk issues (low hazards), or recommended mechanical and functional upgrades and estimated costs.

The water system deficiencies identified during this study are typically hazard conditions, where risk could exist if there is exposure. For simplicity within the document, a “high risk”, implies that there is a high hazard condition (e.g. no cap on casing) that could pose a high risk if there was an exposure event (e.g. surfacewater or vermin entering casing). Likewise, other levels of risk and exposure are also referred to in the same manor.

The Draft Report for the Northern Region Assessments was submitted to PMA in November 2005. This final report has been updated to make it relevant to the revised draft

SPDWSR, to include some additional assessment work that has been completed since the draft reports were submitted, and editorial and formatting changes where required. In accordance with the TOR, 3 copies of this final report have been prepared for PMA. One copy is also maintained at the EBA Whitehorse office. PDF copies of the report in its entirety have also been provided on compact disk to PMA.

1.1.8 Nomenclature and Report Format

This study involved collecting, compiling and reviewing a large amount of data. In labelling the data, EBA used the YTG building numbering classification for system, well and sample names. Where a well served more than one building, the sample name consisted of the both building numbers that the well serves.

The Northern Region includes the communities on the North Klondike Highway north of Carmacks (Pelly Crossing, Stewart Crossing, Dawson) as well as YTG maintained sites in Mayo, Keno and the Dempster Highway. Originally there were to be 19 water systems to be assessed in the Northern Region. During the work program, three additional systems in Mayo (Mayo YTG Property Management Shop, Mayo ATB Day Use building and Mayo Airport Terminal) were added. This report includes water systems servicing 23 buildings, which are reported in 19 independent sections (Section 4 through Section 22). Drawings provided in this report are based on field measurements and a compilation of available baseline drawings. They are not intended to be for design or legal purposes.

The Property Management Agency has a number of individual clients, and therefore, the report was structured so that individual reports could be extracted and compiled for each client to maintain privacy and efficiency. The systems assessed included fire halls, schools, grader stations, administrative offices, various living quarters for YTG employees, and an RCMP detachment. The report is structured such that there is a separate section for each system. Supporting assessment data was tabulated and provided in a separate appendix for each system. Appendix numbers correspond to the section of the report for each of the systems (e.g. Section 4 has supporting data provided in Appendix A4). Supporting tables were named after the system for which they provide data. Each summary table has the building number followed by the table number and each figure has the building number followed by the figure number. The report is also provided as PDF digital files for each site including the report section and appendix for each system.

2.0 DISCUSSION OF PROPOSED AND EXISTING GUIDELINES

The proposed *Guidelines for Part III – Small Public Drinking Water Systems* are currently under development by YTG Environmental Health and Social Services (EHSS). In accordance with the Terms of Reference, these proposed guidelines (November 23, 2004) were used to determine compliance issues with respect to the systems assessed under this program. Since the completion of the draft reports for each Region, these guidelines were amended to a draft dated December 22nd, 2005. Accordingly, the final reports were also amended to reflect the latest draft of these guidelines. The most relevant sections of these draft Guidelines (December 22nd, 2005) as well as the Canadian Groundwater Association Guidelines for Water Well Construction pertaining to this study are summarized below:

- “Small public drinking water system” means a drinking water system which has:
 - a) less than 15 direct service connections to a piped distribution system; or
 - b) less than 5 delivery sites on a trucked distribution system.
- GUDI is an acronym for well water or groundwater under the direct influence of surface water.
- Well water under the direct influence of surface water means the water source for a well has been determined to be GUDI, using the Yukon’s Assessment for Well Water or Groundwater under the Direct Influence of Surface Water (GUDI), published by Queen’s Printer (Draft, December 22nd, 2005).
- According to Draft guidelines initial screening protocol, if a water source does not meet any one of the below criteria, the source shall be either identified as GUDI, or as potentially GUDI with further confirmatory assessment to be carried out:
 - Vulnerable location or type – the water system shall not be:
 - a) A spring, infiltration gallery, shallow collector system or artificial recharge system;
 - b) A well with a production zone less than 15m below the ground surface;
 - c) A well in an unconfined aquifer; or
 - d) A well completed in fractured or karst bedrock exposed at or near the land surface.
 - Proximity to surface water – the water source shall not be located within 60 m of any permanent, or intermittent or seasonal surface water body, including ponds, slough, lakes, rivers, streams, canals, lagoons, or any other surface water feature.
 - Well Construction – At a minimum, the well shall meet the requirements of the most recent version of the *Guidelines for Water Well Construction*, published by the Canadian Ground Water Association.

- Water quality – The raw water from the source shall not exhibit evidence of contamination by or from surface water (i.e., significant occurrence of insects, insect parts, microorganisms such as *E. coli*, algae, *Giardia*, *Cryptosporidium*, or viruses; or significant and rapid shifts in water characteristics such as turbidity, temperature, conductivity, temperature, conductivity, pH or chemistry that closely correlate to weather or surface water conditions).
- An owner is responsible for the supply and delivery of safe drinking water to the users.
- The owner is responsible for the maintenance and upgrade of the small public drinking water system, as necessary, for the purpose of providing safe drinking water to its users.
- An owner of a small water system that obtains drinking water from a groundwater source shall:
 - a) Unless otherwise determined based on results of a comprehensive hydrogeological study, ensure that the drinking water well is located a minimum distance of:
 - i. 15 metres from a septic tank, sewage holding tank or contained privy;
 - ii. 30 metres from a soil absorption system, pit privy, or other potential sources of pollution that may pose a health and safety risk;
 - iii. 120 metres from a solid waste site, dump, or cemetery; and,
 - iv. 300 metres from a sewage lagoon or pit.
 - b) Use a well, located and constructed in accordance with criteria that meets or exceeds those outlined in the Canadian Groundwater Association Guidelines for Water Well Construction.
- The owner of a small public water system that obtains water from a surface water source, or uses a well under the direct influence of surface water, shall ensure provision of treatment consisting of filtration and disinfection, or other treatment capable of producing a safe drinking water.
- An owner upon selecting a drinking water source shall consider a source that is
 - a) most likely to produce drinking water of a quality that meets the Guidelines for Canadian Drinking Water Quality, and
 - b) is least likely to be subject to municipal, industrial and agricultural contamination, and/or other types of contamination resulting from human activities within the watershed.
- If Chlorine disinfection of the small public drinking water system is required, the owner shall ensure that the free chlorine residual concentration throughout the plumbing or piped distribution system is no less than 0.2 mg/L.

- An owner of a small public water system shall ensure that the infrastructure protecting the wellhead, pumphouse, storage tank and/or water treatment plant is designed and secured so as to prevent the unauthorized access by humans or entrance of animals.
- Particularly relevant requirements of the Canadian Groundwater Association Guidelines for Water Well Construction are provided below:
 - a) Section 3.7: The casing of any drilled well shall project not less than 500 mm above the established ground surface; and,
 - b) Section 4.1 and 4.2: The Guidelines for Water Well Construction consider that properly installed water tight casing must have a 50 mm (2") thick bentonite, or bentonite grout seal to effectively prevent the entrance of surface water into an aquifer, and to prevent the intermixing of formation water.

There are many other pertinent requirements involving permitting, application, system operators, seasonal facility start up procedures, well decommissioning, water holding tank cleaning, bulk water delivery, approvals to construct or modify etc. with the draft ***Part 3 – Small Public Drinking Water Systems Regulations (SPDWSR)***. PMA should ensure that all water systems serving YTG maintained buildings that fall under this regulation are in compliance with the final version in it's entirety.

A meeting to discuss the implications of the draft regulations on the assessment of these systems was arranged between Ryan Martin, and an Environmental Health Officer from YTG Environmental Health and Social Services (EHSS) on Thursday June 9th. Key points discussed in the meeting are provided below:

- 1) It is the intent of the draft SPDWSR that all wells that do not have a surface casing complete with a sanitary surface seal (grout or bentonite seal) and intact casing to 6 m may be under the direct influence of surface water, which would necessitate further assessment (as per the GUDI guidelines) or adequate disinfection.
- 2) The maximum acceptable concentration (MAC) for arsenic within the Canadian Drinking Water Quality Guidelines is currently under review by Health Canada. The proposed guideline is low (0.005 mg/L) compared with the existing MAC (0.025 mg/L). The EHSS health officer felt that there was a very high probability of the lower guideline being passed at any time in the near future. She indicated that there would likely be a grace period of at least one year for systems to come into compliance. This will have an impact on the treatment requirements for many water supply systems in the Yukon.

3.0 APPROACH TO WATER TREATMENT/ DISINFECTION

Drinking Water Officers in some jurisdictions in BC are adopting the “4,3,2,1,0, Dual Treatment” approach. This “multi-barrier” approach for water treatment requires 4-log (99.99%) removal of bacteria and viruses, 3-log (99.9%) removal/inactivation of *Giardia*, 2-log (99%) removal/inactivation of *Cryptosporidium*, turbidity less than 1 NTU, no total and fecal coliform and dual treatment (filtration and disinfection for example). This is the approach that the project team recommends for treatment system design for upgrades to the Yukon Small Water Systems. We understand that there is insufficient budget to implement all suggested upgrades immediately. Consequently, we recommend that a phased approach to treatment should also be implemented, by mitigating the highest risk with the best value as described below.

According to Dayton and Knight, Health Authorities in BC understand the realities of limited financial resources faced by small water systems. In such cases, the Health Authorities in BC may accept a multi-phase treatment approach starting with some type of primary disinfection initially, followed by additional upgrades as funds become available until full treatment (if required) is achieved. This report has been prepared with the assumption that YTG Environmental Health and Social Service would be amenable to this phased approach. For example, where a water system requires wellhead upgrades and disinfection treatment, and the suggested disinfection is filtration followed by UV (based on water quality and system characteristics), we have typically recommended a phased approach with an assigned level of priority as described previously. For this example, the Priority 1 upgrades may include shock chlorination (disinfection) of the well and water system, installing a properly sealed well cap and installing a NSF/ANSI 55- certified UV system. These UV systems (with appropriate raw water quality that in some cases may require pretreatment) are certified to provide 4-log (99.99%) inactivation of *E. coli*, and 2-log (99%) inactivation of cryptosporidium and *Giardia*. This interim Priority 1 upgrade measure would mitigate most risk, however, would not provide 3-log inactivation of *Giardia*, nor dual treatment. During subsequent Priority 2 upgrades for the example system above (which would happen at a later date as funds become available), the filtration system (to 1 micron - absolute) would be installed in advance of the filter, and the wellhead would be upgraded (e.g., casing extension, surface seal installation). This is a practical approach to mitigate the highest risks with the funding available on a priority basis.

Input from drinking water authorities in the Yukon regarding this proposed approach is recommended. For example, on a case-by-case basis, drinking water authorities may agree to treatment without the requirement for filtration to 1 micron (absolute), which would enable 3-log inactivation of *Giardia*. For comparison, the City of Whitehorse does not currently provide filtration to the 3-log level, even though it obtains water from a surface water source.

The installation of water treatment systems are not entirely regulated in Canada and the last word relies with the Health authorities. Health Canada recommends that water treatment systems be NSF certified. The NSF designation for UV systems is ANSI/NSF 55, while filtration is ANSI/NSF 61, and RO systems conform to NSF/ANSI 58. It was not within the scope of this project to design water treatment systems, but rather to identify deficiencies, and to provide class level cost estimates for upgrade alternatives. Where treatments system suggestions are provided herein, they are conceptual based on preliminary information available at this time, and to be used for estimating cost of upgrade alternatives. For all treatment system upgrades, it would be prudent to involve a water treatment engineer in system component selection, and to consult with the local health authorities in the process of system design. For all upgrade options, it has been recommended to budget for a 20% engineering cost for final system design.

4.0 BUILDINGS M0026, M0227: PELLY CROSSING RCMP RESIDENCES

4.1 Description of Existing Water Supply System

Water systems for Building M0026 and Building M0227, Pelly Crossing RCMP Residences are supplied by a central well located in a pit below grade approximately 4 m east of residence M0026. A site plan is provided as Figure M0026-A in Appendix A4. The coordinates of the wellhead, as measured by a handheld GPS device, were recorded as:

- UTM ZONE 8
- Northing: 6966865
- Easting: 419665

Water from the well is split at the wellhead and provided to each residence through underground freeze-protected piping. There is a water softener in residence M0026, however, it was not functioning at the time of the water system assessment. Schematics detailing the water supply systems are provided as Figures M0026-B and M0227-B in Appendix A4.

4.2 Description of Existing Wastewater Systems

Each residence is served by in-ground septic disposal systems. As shown on Figure M0026-A, the septic system for residence M0227 is located greater than 30 m east of the building and likely crossgradient from the well. The septic system for residence M0026 is located on the west side of the building and septic effluent discharge likely begins approximately 25 m away and crossgradient from the well.

4.3 Water Quality Results

4.3.1 Water Quality Results from Previous Sampling

Bacteriological

A total of 18 samples were collected from each of the two residences served by well M0026/M0227 between October 2004 and June 2005 and were tested for total coliform and *E. coli* by Yukon Environmental Health Services. Results are tabulated in Table M0026/M0227-1 in Appendix A4. Coliform bacteria and *E. coli* were reported as absent in each of the nine samples for which results are provided for the M0026 residence. One of the nine samples collected from the M0227 residence tested positive for total coliform, however, the most recent sampling event was negative.

Potability

YTG representatives collected water samples from both residences on September 29, 2004 and June 8, 2005. The samples were submitted to Northwest Labs in Surrey BC, and ALS Environmental in Vancouver BC for potability analyses. The results of these analyses are summarized in Table M0026/M0227-2 in Appendix A4. EBA reviewed the analytical results for comparison with the Canadian Drinking Water Quality Guidelines (CDWQG) to observe general water quality, to identify and recommend additional sampling and analytical and to identify potential indicators of contamination. Details are summarized below:

- The water quality results indicated that all health based and aesthetic objectives for both residences were met for the parameters analyzed;
- The water quality results indicated that the groundwater is calcium-bicarbonate type with a pH of 8; and,
- The hardness (as CaCO_3) of the water from this system was 205 mg/L, and is considered very hard.

4.3.2 Identification of Additional Analytical Testing Required

Additional analytical for the Pelly Crossing RCMP Residences M0026 and M0227 completed during the water system assessments is detailed below:

- UV absorbance and UV transmissivity, as well as tannin and lignin, to determine potential for UV treatment as a disinfection option for this water system;
- Total organic carbon (TOC); and
- Field measurements of total dissolved solids, conductivity, pH, and temperature.

These parameters are useful in disinfection system selection.

Additional Analytical Results

A water sample was obtained by EBA during the assessment on August 23, 2005, and was submitted to ALS Environmental in Vancouver for analysis of selected parameters. These results are summarized in Table 3440-2 in Appendix A4 and the laboratory reports are included in Appendix B.

4.3.3 Indicators of Potential Contamination

Chloride, nitrate and nitrite concentrations can indicate impacts from surface water sources or septic waste. Chloride concentrations were low and within the normal background ranges for groundwater in the area. Nitrate and nitrite concentrations were also low and within the normal background range. These water quality results indicate that the groundwater sample obtained from M0026/M0227 was not under the influence of anthropogenic sources of nutrients or anions that may be derived from septic wastes.

4.4 Conceptual Hydrogeology

The well log for this well indicates that it is approximately 17.5 m deep with the screen interval beginning at 16.5 m below grade. The expected direction of groundwater flow is north to northwesterly towards the Pelly River (EBA 2004). Most wells in the Pelly Crossing Main village area are completed at depths of between 10 m to 18 m below ground within an unconfined sand and gravel aquifer consisting of floodplain alluvial sand and gravel deposits. The relatively shallow depth of the aquifer combined with the absence of confining material leaves this aquifer vulnerable to surficial sources of contamination.

4.5 Potential Contaminant Sources

Details and photographs of potential contaminant sources observed during the site investigation are compiled in Appendix A4.

Potential contaminant sources within 30 m of the wellhead are:

- On-site sewage disposal system (septic field) for the M0026 residence at 25 m;
- On-site sewage disposal system (septic field) for a neighboring house at 27 m;
- A possible former septic tank at 28 m; and
- Indoor heating oil fuel storage tanks within 30 m.

4.5.1 Spills Records and Contaminated Sites Search Results

It was reported by Environment Canada that a spill occurred in 1986, approximately 700 m upgradient from the well location due to an overturned residential fuel tank owned by the Selkirk First Nation. Removal of contaminated soil was recommended, however it is unknown if this remedial work was completed. It is unlikely that this spill would impact on the water quality of the well due to its distance upgradient from the well.

Another reported fuel spill of an unknown quantity occurred approximately 200 m east of the school location in 1998 due to an open valve on the heating fuel tank at the Eliza Van Bibber School. Removal of contaminated soil was recommended by Environment Canada, however it is unknown if this was completed. Since the spill location is cross-gradient from the well, and may have been cleaned up, it is unlikely that this would impact the water quality at this well.

4.6 Identified Water System Deficiencies and Associated Risk

4.6.1 High and Medium Risk Deficiencies

High and Medium Risk deficiencies associated with the M0026/M0227 water system that were identified during the assessment are summarized below:

- Poor surface completion of the wellhead (located in a pit below grade);
- There is no surface sanitary seal (grout or bentonite seal as required by the Canadian Groundwater Association's Guidelines for Water Well Construction);
- The wellhead enclosure is subject to flooding (there was sediment covering the wellhead at time of water system assessment);
- The well is within 30 m of potential contaminant sources including on-site sewage disposal systems (septic fields);
- The well is completed within a relatively shallow, unconfined aquifer in a relatively densely developed area;
- 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; and,
- There is no treatment or disinfection system.

4.6.2 Low Risk Deficiencies

- The well is located within 30 m of indoor fuel storage tanks. However, since residence M0026 has a concrete floor, and residence M0227 has secondary containment trays, the risk is considered to be very low. Most risk would be associated with potential leaks during filling;
- One of seventeen samples taken for bacteriological analysis from this system tested positive for total coliform bacteria; and,
- The water softener at M0026 was not functioning at the time of the field inspection.

4.7 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).

Recommendations are made in consideration of the fact that a piped distribution system with water sourced from a community well located in Willow Creek area of Pelly Crossing will likely be installed by the Selkirk First Nation in 2006 or 2007. In the interim, however, some water system upgrades are recommended to mitigate risk, and are detailed in the following sections.

4.7.1 Priority 1

The following recommendations are provided in order to mitigate deficiencies that are of immediate concern for the RCMP residences. Priority 1 remedial recommendations include:

- The casing should be extended to at least 500 mm above the base of the well pit, and a localized near surface bentonite seal installed immediately around the wellhead.
- The well and water system should be super-chlorinated (disinfected with a high concentration of chlorine solution).
- Disinfection treatment consisting of filtration to 1 micron (absolute), and a UV system that is NSF/ANSI-certified (or equivalent) should be installed at each residence. Pretreatment consisting of a water softener would likely decrease the maintenance requirements for UV performance; however, it is not considered imperative, for a Priority 1 mitigation. These are conceptual design recommendations based on the information available for planning and budgeting purposes. Engineering input will be required for final system specifications.

4.7.2 Priority 2

The recommended solution to mitigate long-term risk (Priority 2) to the RCMP residences would be to connect these residences to the proposed piped distribution system as soon as this system is available. The community well that will be the source of water for the piped distribution system is constructed in accordance with applicable guidelines offers better wellhead protection and is completed within a deeper aquifer that is less vulnerable to surficial source of contamination. Furthermore, the community well and piped distribution system will be operated and maintained by others as a Public Drinking Water Supply with chlorine disinfection and routine monitoring and sampling as required by regulation.

We understand that there would be a monthly service fee charged by the Selkirk First Nation for providing, operating and maintaining the piped water supply.

4.7.3 Priority 3

It is recommended that once the residences are connected to the community water system, the abandoned well be properly decommissioned shortly following connection of residences to community water supply system.

4.8 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.

4.8.1 Priority 1

The estimated costs for the recommended Priority 2 upgrades are detailed below:

- It would cost approximately **\$800** for materials and labour to complete the recommended interim wellhead upgrades, and well and water system superchlorination.
- Disinfection treatment (filtration and UV) would cost approximately **\$3,000** per residence including materials and labour.

Therefore, it would likely cost approximately **\$3,400** per building (wellhead upgrade cost split between residences), and a total of **\$6,800** to complete the recommended Priority 1 upgrades for both residences.

4.8.2 Priority 2

It would cost approximately **\$4,000** for materials and labour assuming a 30 m service connection (freeze-protected underground service piping) and some inside plumbing modifications. Since there is buried piping that exists between the two buildings already, consideration could be given to obtaining a service connection to one residence only and using the existing piping to supply the second residence.

4.8.3 Priority 3

The estimated cost to decommission the existing well once it is no longer needed, would be approximately **\$1000**. This would result in a cost of approximately **\$500** per residence.

5.0 BUILDINGS M0156, M0226: PELLY CROSSING RCMP DETACHMENT AND RESIDENCE

5.1 Description of Existing Water Supply System

Building M0156, the Pelly Crossing RCMP Detachment, and building M0226, a Pelly Crossing RCMP Residence, are currently serviced by a water supply system that delivers water from a 12.5 m deep well. The well is located in a pit below grade approximately 3 m west of residence M0226. A site plan is provided as Figure M0156/M0226-A in Appendix A5. The coordinates of the wellhead, as measured by a handheld GPS device, were recorded as:

- UTM ZONE 8
- Northing: 6966925
- Easting: 419610

Water is piped from the well to residence M0226 and then it is piped underground to the detachment. The system is equipped with a water softener that was not functioning at the time of system assessment. A schematic detailing the water supply system is provided as Figure M0156/M0226-B in Appendix A5. Photos of the well and water system are also included at the back of this appendix.

5.2 Description of Existing Wastewater Systems

Each building is equipped with its own septic system located as shown on Figure M0226-A in Appendix A5. Effluent from the RCMP detachment is discharged in a field to the east of the building greater than 30 m and likely crossgradient from the well. Wastewater from the residence is discharged in a field to the west of the building greater than 30 m and likely crossgradient from the well.

5.3 Water Quality Results

5.3.1 Water Quality Results from Previous Sampling

Bacteriological

A total of 17 samples were collected from this 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 M0156/0226-1 in Appendix A5. Bacteria were reported as absent in each of the 17 samples for which results are provided.

Potability

Water samples were collected from each building on September 29, 2004 and June 8, 2005. The samples were submitted to Northwest Labs in Surrey BC and ALS Environmental in Vancouver for potability analyses. The results of these analyses are summarized in Table M0156/M0226-2 in Appendix A5. EBA reviewed the analytical results for comparison with Canadian Drinking Water Quality Guidelines (CDWQG), to observe general water quality, to identify and recommend additional sampling and analytical, and to identify potential indicators of contamination. Details are summarized below:

- The first sample collected from RCMP detachment (M0156) reported the copper concentration to be 2.37 mg/L, which was in exceedence of the CDWQG MAC of 1.0 mg/L. A sample taken at the same time from the residence (M0226) had a copper concentration of 0.154 mg/L, signifying that the elevated copper in the detachment is unlikely attributed to the source water. Subsequent sampling from both buildings reported the copper concentration to be less than the CDWQG MAC;
- The water quality results indicated that all other health based and aesthetic objectives were met for the parameters analyzed;
- Chloride concentrations from the first sampling event were reported as 0.8 mg/L (M0156) and 1.1 mg/L (M0226), the second sampling event reported chloride concentrations of 39.4 mg/L (M0156) and 36.9 mg/L (M0226). This indicates a significant increase in chloride concentrations from September 2004 to June 2005, and elevated chloride compared to background conditions in the area.
- From June 2004 to September 2005 nitrate concentrations increased from 0.1 mg/L (M0156 and M0226) to 1.41 mg/L (M0156) and 1.32 mg/L (M0226). The reported nitrate concentrations from the second sampling events are elevated above background concentrations for the area;
- The water quality results indicated that the groundwater is calcium-bicarbonate type with a pH slightly above 8; and,
- The hardness (as CaCO_3) was around 240 mg/L, and is considered very hard.

5.3.2 Identification of Additional Analytical Testing Required

Additional analytical for the RCMP Detachment M0156 and RCMP Residence M0226 completed during the water system assessments is detailed below:

- UV absorbance and UV transmissivity, as well as tannin and lignin, to determine potential for UV treatment as a disinfection option for this water system;
- Total and dissolved copper to confirm concentrations below CDWQ MAC;
- Chloride and Nitrate to evaluate observed trend of increasing concentrations;
- Total organic carbon (TOC); and
- Field measurements of total dissolved solids, conductivity, pH, and temperature.

Additional Analytical Results

A water sample was obtained during the water system assessment on August 23, 2005, and was submitted to ALS Environmental in Vancouver for analysis. These results are summarized in Table 3440-2 in Appendix A4 and the laboratory reports are included in Appendix B. Significant observations are detailed below:

- Total and dissolved copper at concentrations of 0.197 mg/L (M0156) and 0.186 mg/L (M0226) respectively were below the CDWQG of 1 mg/L; and
- Although elevated compared to the sample analysis completed in September 2004, chloride and nitrate concentrations were significantly reduced from sample analysis completed in June 2005.

5.3.3 Indicators of Potential Contamination

Chloride, nitrate and nitrite concentrations can indicate impacts from surface water sources or septic waste. There was a significant increase in both nitrate and chloride concentrations between the 2004 sampling events and the 2005 sampling events. Chloride and nitrate analysis completed during this assessment showed concentrations significantly reduced from results of June 2005 although still elevated compared to results from September 2004. Chloride and nitrate concentrations were above both the normal background ranges for groundwater in the area as well as above historical concentrations for this system. These water

quality results, and the variability of these observed concentrations suggest that septic effluent or other anthropogenic sources of nutrients are impacting the aquifer.

5.4 Conceptual Hydrogeology

The log for this well indicates that the well is completed at a depth of 12.5 m within a gravel and sand aquifer. The well log shows the static water level of 7.3 m below ground with trace fine grained material overlying the aquifer. The Pelly Crossing Village area is situated on the inside bend of the Pelly River, most wells in the Pelly Crossing Village area obtain their water from an unconfined aquifer consisting of floodplain alluvial sand and gravel deposits. The relatively shallow depth of the aquifer combined with the absence of confining material leaves this aquifer vulnerable to surficial sources of contamination. The expected direction of groundwater flow is north to northwesterly (EBA 2004).

5.5 Potential Contaminant Sources

Potential contaminant sources observed during the site investigation are compiled in field notes and photos provided in Appendix A5. Potential contaminant sources within 30 m of the wellhead are:

- An above ground fuel storage tank (AST) at 17 m; and
- Indoor fuel storage tanks.

It should be noted that there are several on-site sewage disposal systems within 60 m of the well, however, none appear to have in-ground disposal within 30 m.

5.5.1 Spills Records and Contaminated Sites Search Results

It was reported that a spill occurred in 1986 due to a overturned residential fuel tank owned by Selkirk First Nation resulting in a spill of approximately 2000 L of furnace oil. Removal of contaminated soil was recommended by Environment Canada, however, it is unclear whether this was completed. The spill site is located approximately 500 m upgradient of the subject well, and is considered to pose a low risk to the water provided by this well.

In 1998 of an unknown quantity of heating fuel was spilled due to an open valve on the tank at the Eliza Van Bibber School, removal of contaminated soil was recommended, however it is unknown if this was completed. Since the spill location is cross-gradient from the well, and may have been cleaned up, it is unlikely that this would impact the water quality at this well.

5.6 Identified Water System Deficiencies and Associated Risk

5.6.1 High and Medium Risk Deficiencies

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

- Poor surface completion of the well (located in well pit below grade);
- There is no surface sanitary seal (grout or bentonite seal as required by the Canadian Groundwater Association's Guidelines for Water Well Construction;
- Completed at a depth of only 12.5 m, this well is considered a shallow well, and is likely completed within an unconfined aquifer;
- Elevated and variable chloride and nitrate concentrations may indicate that the aquifer is being impacted by septic effluent or surfacewater;
- By definition of the Draft Yukon GUDI Assessment Guideline, the well is potentially under the direct influence of surfacewater because it is a vulnerable type (unconfined aquifer), has a production zone less than 15 m below grade, and does not meet the requirements of the Guidelines for Water Well Construction; and,
- There is no treatment or disinfection for this water system.

5.6.2 Low Risk Deficiencies

- The well is located within 30 m of an indoor fuel storage tank;
- There was a previous CDWQG MAC exceedence of copper, however two subsequent sampling events had copper below CDWQG concentrations; and,
- The water softener was not functioning at the time of the water system assessment.

5.7 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).

Recommendations are made in consideration of the fact that a piped distribution system with water sourced from a community well located in Willow Creek area of Pelly Crossing will likely be installed by the Selkirk First Nation in 2006 or 2007. In the interim, however, some upgrades are recommended to mitigate immediate risk as detailed in the following section.

5.7.1 Priority 1

The following recommendations are provided in order to mitigate deficiencies that are of immediate concern for the RCMP detachment and residence. Priority 1 remedial recommendations include:

- The casing should be extended to at least 500 mm above the base of the well pit, and a localized near surface bentonite seal installed immediately around the wellhead;
- The well and water system should be super-chlorinated (disinfected with a 200 mg/L chlorine solution); and,
- Disinfection treatment consisting of filtration to 1 micron (absolute), and a UV system that is NSF/ANSI certified (or equivalent) should be installed within the M0226 to ensure disinfection of the water supplied to this residence and the detachment. Pretreatment consisting of a water softener would likely be necessary for optimum UV performance; the existing softener system should be serviced and brought back into operation. These are conceptual design recommendations based on the information available for planning and budgeting purposes. Engineering input will be required for final system specifications.

5.7.2 Priority 2

The recommended solution to mitigate long-term risk (Priority 2) to the RCMP residence and detachment would be to connect these building to the proposed piped distribution system as soon as this system is available. The community well that will be the source of water for the piped distribution system is constructed in accordance with applicable guidelines; offers better wellhead protection; and is

completed within a deeper aquifer that is less vulnerable to surficial sources of contamination. Furthermore, the community well and piped distribution system will be operated and maintained by others as a Public Drinking Water Supply with chlorine disinfection and routine monitoring and sampling as required by regulation.

We understand that there would be a monthly service fee charged by the Selkirk First Nation for providing, operating and maintaining the piped water supply.

5.7.3 Priority 3

It is recommended that once the residences are connected to the community water system, the abandoned well be properly decommissioned shortly following connection of residences to community water supply system.

5.8 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.

5.8.1 Priority 1

The estimated costs for the recommended Priority 1 upgrades are detailed below:

- It would cost approximately **\$800** for materials and labour to complete the recommended interim wellhead upgrades and well and water system superchlorination.
- Disinfection treatment (filtration and UV) would cost approximately **\$3,000** including materials and labour.

Therefore, it would likely cost approximately **\$1,900** per building, and a total of **\$3,800** to complete the recommended Priority 1 upgrades for buildings.

5.8.2 Priority 2

It would cost approximately **\$4,000** for materials and labour to connect the water system to the proposed piped system, assuming a 30 m service connection (freeze-protected underground service piping) and some inside plumbing modifications. Since there is buried piping that exists between the two buildings already, consideration could be given to obtaining a service connection to one residence only and using the existing piping to supply the second residence.

5.8.3 Priority 3

The estimated cost to decommission the existing well following connection of the water system to the proposed community system would be approximately **\$1,000**. This would result in a cost of approximately **\$500** per residence.

6.0 BUILDING 5672: PELLY CROSSING SWIMMING POOL

6.1 Description of Existing Water Supply System

Building 5672, the Pelly Crossing Swimming Pool, is currently serviced by a water supply system that delivers water from a well located in a pit below grade and approximately 3 m north of the building. A site plan is provided as Figure 5672-A in Appendix A6. The coordinates of the wellhead, as measured by a handheld GPS device, were recorded as:

- UTM ZONE 8
- Northing: 6966887
- Easting: 419787

The water system is not equipped with any treatment or disinfection. A schematic detailing the water system is provided as Figure 5672-B in Appendix A6. Photos of the well and water system are also included at the back of this appendix.

6.2 Description of Existing Wastewater Systems

The septic system could not be located during the water system assessment, but likely exists to the west of the building. Two potential septic clean-outs were observed near each corner of the west side of the building as indicated on Figure 5672-A. The exact type (in-ground disposal, or sewage education tank) and location of the septic system relative to the well should be confirmed.

6.3 Water Quality Results

6.3.1 Water Quality Results from Previous Sampling

Bacteriological

One sample was collected from the Pelly Crossing Swimming Pool water system in June 2005 and was tested for total coliform and *E. coli* by Yukon Environmental Health Services using the presence/absence test method. Coliform bacteria and *E. coli* were reported as absent as indicated in Table 5672-1 in Appendix A6.

Potability

YTG representatives collected a water sample from the Pelly Crossing Swimming Pool water system on June 8, 2005. The sample was submitted to ALS Environmental in Vancouver for potability analyses, and results are summarized in Table 5672-2 in Appendix A6. EBA reviewed the analytical results for comparison with Canadian Drinking Water Quality Guidelines (CDWQG), to observe general water quality, to identify and recommend additional sampling and analytical, and to identify potential indicators of contamination. Details are summarized below:

- At 4.07 NTU, turbidity was above of the CDWQG MAC of 1.0 NTU;
- At 0.945 mg/L, the reported iron concentration was above of the CDWQG AO of 0.3 mg/L;
- At 0.5 mg/L, the manganese concentration was above the CDWQG AO of 0.05 mg/L;
- The water quality results indicated that all other health based and aesthetic objectives were met for the parameters analyzed;
- The water quality results indicated that the groundwater is calcium bicarbonate type with a pH of approximately 8.2; and,
- The hardness (as CaCO₃) was 181 mg/L, and is considered very hard.

6.3.2 Identification of Additional Analytical Testing Required

Additional analytical for the Pelly Crossing Swimming Pool that was identified to be included during the water system assessments is detailed below:

- Turbidity to confirm the exceedence of CDWQG MAC;
- Total and dissolved iron and manganese to determine if exceedences could be attributed to the elevated turbidity;
- UV absorbance and UV transmissivity, and tannins and lignin, to determine potential for UV treatment as a disinfection option for this water system;
- Total organic carbon (TOC) to aid in water treatment system design;
- 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 23, 2005, and was submitted to ALS Environmental in Vancouver for analysis of selected additional parameters. Results are summarized in Table 3440-2 in Appendix A6 and laboratory reports are included in Appendix B. Details are as follows:

- At 1.29 NTU, the turbidity of the water, though it was lower than the previous result, was still above the CDWQG MAC of 1.0;
- Total iron and dissolved iron concentrations at 0.748 and 0.104 mg/L respectively indicate that most of the iron can be attributed to suspended solids, however, the concentration of dissolved iron is also higher than the aesthetic objective;
- Total and dissolved manganese concentrations at 0.452 and 0.437 mg/L respectively indicate that the elevated manganese concentration is not a result of elevated turbidity; and
- The results indicate that all other health based and aesthetic objectives were met for the parameters analyzed.

6.3.3 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 were also low and within the normal background range for this area. These water quality results do not suggest that the groundwater is under the influence of anthropogenic sources of nutrients or septic wastes.

6.4 Conceptual Hydrogeology

A driller's well log was not available for review for this well. Most wells in the Pelly Crossing Main Village area are completed at depths of 10 m to 17 m below ground within an unconfined sand and gravel aquifer consisting of floodplain alluvial sand and gravel deposits. The relatively shallow depth of the aquifer combined with the absence of confining material leaves this aquifer vulnerable to

surficial sources of contamination. The expected direction of groundwater flow is north to northwesterly (EBA 2004).

6.5 Potential Contaminant Sources

With the exception of an above ground storage tank located in a building to the north of the pool, there were no potential contaminant sources identified for this site. The septic system serving this building, however, could not be located during the water system assessment, but likely exists somewhere on the property and may be within 30 m of the well.

6.5.1 Spills Records and Contaminated Sites Search Results

It was reported by Environment Canada that an overturned residential fuel tank owned by Selkirk First Nation was overturned and approximately 2000 L of furnace oil was spilled. Removal of contaminated soil was recommended, however, it is unclear whether this was completed. The spill site is located approximately 500 m upgradient of the subject well, and is considered to be a low risk.

Another reported spill of an unknown quantity occurred in 1998 due to an open valve on the heating fuel tank located at the Eliza Van Bibber School. Removal of contaminated soil was recommended by Environment Canada, however it is unknown if this was completed. Since the spill location is inferred to be downgradient from the well it is unlikely that this would impact the water quality at this well.

6.6 Identified Water System Deficiencies and Associated Risk

6.6.1 High and Medium Risk Deficiencies

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

- Well head construction is inadequate (located in a pit below grade, wellhead enclosure is damaged);
- There is no surface sanitary seal (grout or bentonite seal as required by the Canadian Groundwater Association's Guidelines for Water Well Construction;

- There is no driller's log available to review well construction and lithology;
- The septic system that serves the swimming pool was not located during the water system assessment, but is likely on the property and may be within 30 m of the well;
- There have been CDWQG MAC exceedences of turbidity;
- 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; and,
- There is no treatment or disinfection system.

6.6.2 Low Risk Deficiencies

- Iron and manganese concentrations have been reported above CDWQG aesthetic objectives; and,
- The water system and plumbing requires upgrading.

6.7 Mitigative Options for Deficiencies

Mitigative options were developed to address the deficiencies identified in the previous section. Deficiencies are categorized by recommended level of priority (with Priority 1 being most critical). Recommendations are made in consideration of the fact that a piped distribution system with water sourced from a community well located in Willow Creek area of Pelly Crossing will likely be installed by the Selkirk First Nation in 2006 or 2007. In the interim, however, some upgrade options are presented to mitigate existing risk. Both options involve interim use of the existing well with disinfection treatment and interim well upgrading. Option 1 proposes UV disinfection while Option 2 proposes proportional feed chlorine injection with retention tanks and other appurtenances. Each option is outlined in the following sections.

6.7.1 Priority 1

An attempt should be made to locate the well log for this well, and to identify the location and construction of the septic system.

It is recommended that the pool be connected to the community piped water system as soon as it becomes available. As mentioned previously, however, it is

considered prudent that interim upgrades be completed to ensure a safe water supply in the interim. These recommended interim upgrades are summarized below:

- The casing should be extended to at least 500 mm above the base of the well pit, and a localized near surface bentonite seal should be installed immediately around the wellhead.
- The well and water system should be super-chlorinated.

In addition to this interim upgrade, disinfection is also recommended. Two disinfection options are presented below:

- *Option 1:* Disinfection treatment consisting of filtration to 1 micron (absolute), and a UV system that is NSF/ANSI certified (or equivalent) could be installed. Pretreatment consisting of a duplex water softener would be necessary for optimum UV performance. UV transmittance is less than 85% at present, and iron and manganese exceed recommended levels for UV without pre-treatment).
- *Option 2:* A proportional feed chlorine injection system with retention tanks and necessary appurtenances (chlorine reservoir, drip tray, ventilation, flow meter) could be installed. The benefit of the chlorine system is that it could be used for back-up to the pool chlorinator once the pool is connected to the proposed community piped system.

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

6.7.2 Priority 2

The recommended solution to mitigate long-term risk (Priority 2) to the Pelly Crossing Pool water system would be to connect to the proposed piped distribution system as soon as this system is available. The community well that will be the source of water for the piped distribution system is constructed in accordance with applicable guidelines; offers better wellhead protection; and is completed within a deeper aquifer that is less vulnerable to surficial sources of contamination. Furthermore, the community well and piped distribution system will be operated and maintained by others as a Public Drinking Water Supply with chlorine disinfection and routine monitoring and sampling as required by regulation.

We understand that there would be a monthly service fee charged by the Selkirk First Nation for providing, operating and maintaining the piped water supply.

6.7.3 Priority 3

All deficiencies will have been mitigated by Priority 1 and 2 upgrades.

6.8 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.

6.8.1 Priority 1

The estimated costs for the recommended Priority 1 upgrades are detailed below:

- It would cost approximately **\$800** for materials and labour to complete the recommended interim wellhead upgrades and well and water system superchlorination.

Disinfection options are presented below:

- *Option 1:* UV disinfection treatment (filtration and UV) with pretreatment (duplex softener to remove iron and manganese) would cost approximately **\$7,000** including materials and labour.
- *Option 2:* A proportional feed chlorination system with retention tanks and other appurtenances would cost approximately **\$8,000** installed.

Therefore, it would cost between **\$7,800** and **\$8,800** for recommended Priority 1 upgrades for this water system.

6.8.2 Priority 2

It would cost approximately **\$4,000** for materials and labour to connect this water system to a community water main, assuming a 30 m service connection (freeze-protected underground service piping) and some inside plumbing modifications.

6.8.3 Priority 3

The estimated cost to decommission the existing well once it is no longer needed, would be approximately **\$1000**.

7.0 BUILDING 5676: ELIZA VAN BIBBER SCHOOL

7.1 Description of Existing Water Supply System

Building 5676, the Eliza Van Bibber School, is currently serviced by a water supply system that delivers water from an approximately 15 m deep well. The well is located below grade in the mechanical room of the school. A site plan is provided as Figure 5676-A in Appendix A7. The coordinates of the wellhead, as measured by a handheld GPS device, were recorded as:

- UTM ZONE 8
- Northing: 6966932
- Easting: 419859

There is no treatment or disinfection for this system. A schematic detailing the water supply system is provided as Figure 5676-B in Appendix A7. Photos of the well and water system are also included at the back of this appendix.

7.2 Description of Existing Wastewater Systems

The septic system that serves the school is located on the east side of the building. The closest point of a on-site sewage disposal system (septic field) is approximately 35 m east of the well. A site plan showing the septic system is given by Figure 5676-A in Appendix A7.

There is also an on-site sewage disposal system on the adjacent teacherage property (Lot 1001). The in-ground septic disposal is approximately 24 m downgradient from the school's drinking water well, however, since it is less than 30 m from the well, it is contravention of the proposed Regulations.

7.3 Water Quality Results

7.3.1 Water Quality Results from Previous Sampling

Bacteriological

Ten samples were collected from the Eliza Van Bibber water system between June 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 5676-1 in Appendix A7. One sample out of the ten reported the

presence of total coliform bacteria; the most recent sample that was available for review (9th June 2005) was positive for total coliform bacteria. Follow up sampling should be completed immediately if it has not already been completed.

Potability

Water samples were collected from the Eliza Van Bibber School water system by YTG representatives on September 29, 2004 and June 8, 2005. The samples were submitted to Northwest Labs in Surrey BC and ALS Environmental in Vancouver BC for potability analyses. The results of these analyses are summarized in Table 5676-2 in Appendix A7. EBA reviewed the analytical results for comparison with 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.

- The first sampling event reported turbidity to be 1.0 NTU, which is equal to the CDWQG MAC. Subsequent sampling showed the turbidity below the MAC;
- The first sampling event reported the total iron concentration to be 0.35 mg/L, which is above the CDWQG aesthetic objective (AO) of 0.3 mg/L. The second sampling event, however, reported the iron concentration to be under 0.3 mg/L (the elevated iron in the previous sample was most likely due to elevated turbidity);
- At 0.611 mg/L during the first sampling event and 0.535 mg/L during the second sampling event, the manganese concentration was in exceedence of the CDWQG AO of 0.05 mg/L;
- The water quality results indicated that all other health based and aesthetic objectives were met for the parameters analyzed;
- The water quality results indicated that the groundwater is calcium-bicarbonate type with a pH of approximately 8.1; and,
- The hardness (as CaCO₃) was 191 mg/L during the first sampling event and 177 mg/L during the second sampling event, and is considered very hard.

7.3.2 Identification of Additional Analytical Testing Required

Additional analytical for the Eliza Van Bibber School that was identified to be included during the water system assessments is detailed below:

- Total and dissolved manganese to determine if previously reported manganese concentrations could be attributed to turbidity;
- UV absorbance and UV transmissivity, as well as tannins and lignin, to determine potential for UV treatment as a disinfection option for this water system;
- Total organic carbon (TOC);
- Extractable Petroleum Hydrocarbon (EPH) to determine any impacts from a reported fuel spill in the vicinity of the wellhead; and,
- Measurements in the field for total dissolved solids, conductivity, pH, and temperature.

Additional Analytical Results

A water sample was obtained during the water system assessment on August 23 2005, and was submitted to ALS Environmental in Vancouver BC for analysis. These results are summarized in Table 3440-2 in Appendix A7 and the laboratory reports are included in Appendix B. Significant observations are detailed below:

- Analytic results for Extractable Petroleum Hydrocarbons (EPH) were below laboratory detection limits;
- Total and dissolved manganese at 0.595 and 0.588 mg/L respectively are in exceedence of CDWQG aesthetic objectives. Similar total and dissolved concentrations indicate that the elevated manganese is not attributed to turbidity; and
- Water quality analysis indicated no other exceedences of CDWQG MACs or aesthetic objectives.

7.3.3 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. These water quality results do not suggest that septic effluent indicators such as chloride, nitrate or nitrite are impacting the aquifer.

7.4 Conceptual Hydrogeology

The log for this well indicates that the well is completed at a depth of about 15.2 m within a sand and gravel aquifer. The well log shows the static water level to be approximately 6.7 m below ground with no fine-grained soils overlying the aquifer. The Pelly Crossing Village area is situated on the inside bend of the Pelly River, most wells in the Pelly Crossing Village area obtain their water from an unconfined aquifer consisting of floodplain alluvial sand and gravel deposits. The relatively shallow depth of the aquifer combined with the absence of confining material leaves this aquifer vulnerable to surficial sources of contamination. The expected direction of groundwater flow is north to northwesterly (EBA 2004).

7.5 Potential Contaminant Sources

Details and photographs of potential contaminant sources observed during the site investigation are compiled in Appendix A7. Potential contaminant sources within 30 m of the wellhead are:

- A septic field at 25 m;
- An indoor fuel storage tank at 5 m;
- An above ground double walled fuel storage tank (AST) at 8 m; and,
- A roof drain and possible sump discharge area approximately 10 m northwest of well.

7.5.1 Spills Records and Contaminated Sites Search Results

It was reported by Environment Canada that a fuel spill occurred in 1986 due to a overturned residential fuel tank owned by Selkirk First Nation resulting in the release of 2000 L of furnace oil to the subsurface. Removal of contaminated soil was recommended, however, it is unclear whether this was completed. The spill site is located approximately 500 m upgradient of the subject well, and is considered to be a low risk.

Another reported spill occurred in 1998 when an unknown quantity of heating oil leaked from an open valve on the heating fuel tank located at the Eliza Van Bibber School. Removal of contaminated soil was recommended by Environment Canada, however, it is unknown if this was completed. Screening for Extractable Petroleum

Hydrocarbons (EPH) during this assessment did not identify detectable concentrations.

7.6 Identified Water System Deficiencies and Associated Risk

7.6.1 High and Medium Risk Deficiencies

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

- 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 within an unconfined aquifer;
- The well is located within 30 m of potential contaminant sources including an on-site sewage disposal system (septic field) and an above ground fuel storage tank (AST), and spill reports detail a fuel spill at the site of unknown quantity at the AST in 1998;
- A recent sample taken for bacteriological analysis tested positive for total coliform bacteria;
- 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 with a production zone that is less than 15 m below grade and does not meet the requirements of the Guidelines for Water Well Construction; and,
- There is no treatment or disinfection system present.

7.6.2 Low Risk Deficiencies

- Poor surface completion of the wellhead (does not extend above grade, though it does extend approximately 800 mm above the floor of the school's basement and there is a sump in the basement);
- The well is located within 30 m of an indoor fuel storage tank;
- The manganese concentration has consistently been in exceedence of the CDWQG aesthetic objective; and,
- The iron concentration has previously been in exceedence of the CDWQG aesthetic objective.

7.7 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).

Recommendations are made in consideration of the fact that a piped distribution system with water sourced from a community well located in Willow Creek area of Pelly Crossing will likely be installed by the Selkirk First Nation in 2006 or 2007. In the interim, however, some water system upgrades are recommended to mitigate risk and are detailed in the following sections.

7.7.1 Priority 1

Follow-up sampling for total coliform and *E. coli* should be completed immediately if it has not already been completed.

The following recommendations are provided in order to mitigate deficiencies that are of immediate concern for the School's water system. Priority 1 remedial recommendations include:

- The well and water system should be super-chlorinated.
- Disinfection treatment consisting of filtration to 1 micron (absolute), and a proportional feed chlorination system with retention tanks and appurtenances (or equivalent disinfection system) should be installed to ensure disinfection of the water supplied to the school. The benefit of the chlorination system is that it would provide residual capacity within the piped system to inactivate viruses and bacteria. These are conceptual design recommendations based on the information available for planning and budgeting purposes. Engineering input will be required for final system specifications.

7.7.2 Priority 2

The recommended solution to mitigate long-term risk (Priority 2) to the Eliza Van Bibber School would be to connect to the proposed piped distribution system as soon as this system is available. The community well that will be the source of water for the piped distribution system is constructed in accordance with applicable guidelines; offers better wellhead protection; and is completed within a deeper aquifer that is less vulnerable to surficial sources of contamination. Furthermore, the community well and piped distribution system will be operated and maintained by others as a Public Drinking Water Supply with chlorine disinfection and routine monitoring and sampling as required by regulation.



We understand that there would be a monthly service fee charged by the Selkirk First Nation for providing, operating and maintaining the piped water supply.

The proposed piped system will be a low flow and low pressure and will not provide sufficient capacity for fire protection. It is therefore, recommended that consideration be given to utilizing the well for fire protection only, upon connection to a community water supply.

7.7.3 Priority 3

No Priority 3 upgrades are required, as Priority 1 and 2 upgrades would mitigate all observed risks.

7.8 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.

7.8.1 Priority 1

The estimated costs for the recommended Priority 1 upgrades are detailed below:

- It would cost approximately **\$200** for materials and labour to complete the recommended well and water system superchlorination.
- A commercial duplex filtration system (NSF 61) with stainless steel filter canisters would cost in the order of **\$2,500** installed.
- A proportional feed chlorination system with retention tanks and other appurtenances would cost approximately **\$9,000** installed.

7.8.2 Priority 2

It would cost approximately **\$4,000** for materials and labour to connect the school to the proposed community water main, assuming a 30 m service connection (freeze-protected underground service piping) and some inside plumbing modifications.

8.0 BUILDING 5678: PELLY CROSSING FIRE HALL

8.1 Description of Existing Water Supply System

Building 5678, the Pelly Crossing Fire Hall, is currently serviced by a water supply system that delivers water from a 13.7 m deep well. The well is located in pit below grade approximately 2.5 m east of the fire hall. A site plan is provided as Figure 5678-A in Appendix A8. The coordinates of the wellhead, as measured by a handheld GPS device, were recorded as:

- UTM ZONE 8
- Northing: 6967043
- Easting: 420103

There is currently no treatment or disinfection of water supplying this system. There is a water storage tank present that is used for fire protection storage to facilitate fire truck filling, however, this tank is very difficult to access and was inaccessible during the water system assessment. A schematic detailing the water supply system is provided as Figure 5678-B in Appendix A8. Photos of the well and water system are also included at the back of this appendix.

8.2 Description of Existing Wastewater Systems

There is an on-site sewage disposal system located off of the northwest corner of the building approximately 40 m from the well as indicated on Figure 5678-A.

8.3 Water Quality Results

8.3.1 Water Quality Results from Previous Sampling

Bacteriological

Nine samples were collected from the Pelly Crossing 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 5678-1 in Appendix A8. One of nine samples for which results are provided tested positive for total coliform bacteria.

Potability

Water samples were collected by YTG representatives from the Pelly Crossing Fire Hall water system on September 29, 2004 and June 8, 2005. The samples were submitted to Northwest Labs in Surrey BC and ALS Environmental in Vancouver BC for potability analyses and results are summarized in Table 5678-2 in Appendix A8. EBA reviewed the analytical results for comparison with Canadian Drinking Water Quality Guidelines (CDWQG), to observe general water quality, to identify and recommend additional sampling and analytical, and to identify potential indicators of contamination.

- Turbidity at 3.1 NTU and 1.39 NTU was in both cases above the CDWQG MAC of 1.0 NTU;
- At 1.23 mg/L, the total iron concentration during the second sampling event was in exceedence of the CDWQG aesthetic objective of 0.3 mg/L;
- The water quality results indicated that all other 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 calcium-bicarbonate type with a pH of approximately 8.2; and,
- The hardness (as CaCO₃) was 209 mg/L during the first sampling event and 189 mg/L during the second sampling event, and is considered very hard.

8.3.2 Identification of Additional Analytical Testing Required

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

- As turbidity had previously been in exceedence of CDWQG MAC, a sample was obtained to analyze for turbidity;
- Samples were collected for total and dissolved iron analysis to determine if elevated total iron could be attributed to elevated turbidity;
- UV absorbance and UV transmissivity, as well as tannins, to determine the potential for UV treatment as a disinfection option for this water system;
- Total organic carbon (TOC); and
- Measurements in the field for total dissolved solids, conductivity, pH, and temperature.

Additional Analytical Results

A water sample obtained during the water system assessment on August 23 2005 was submitted to ALS Environmental in Vancouver BC for analysis of selected parameters. These results are summarized in Table 3440-2 in Appendix A8 and the laboratory reports are included in Appendix B. Significant observations are detailed below:

- Turbidity at 4.94 NTU was above the CDWQG MAC of 1.0 NTU;
- Total iron at 1.51 mg/L was above the CDWQG AO of 0.03 mg/L, however, the dissolved iron concentration was below the laboratory detection limit of 0.030 mg/L indicating that elevated iron can be attributed to elevated turbidity; and,
- Water quality results indicated no other exceedences of CDWQG MACs or aesthetic objectives.

8.3.3 Indicators of Potential Contamination

Chloride, nitrate and nitrite concentrations can indicate impacts from surface water sources or septic waste. Chloride concentrations were low at the time of sampling and were within the normal background ranges for groundwater in the area. Nitrate and nitrite concentrations for this sample were also low and within the normal background range. These water quality results suggest that groundwater from this well was not being impacted by anthropogenic sources of nutrients or anions such as septic effluent at the time of sampling.

8.4 Conceptual Hydrogeology

The log for this well indicates that the well is completed at a depth of 13.7 m within an unconfined sand and gravel aquifer, a thin silt horizon is shown to exist from ground surface to 2.1 m below ground. The well log shows the static water level to be 10.4 m below ground. Most wells in the Pelly Crossing Village area obtain their water from an unconfined aquifer consisting of floodplain alluvial sand and gravel deposits. The relatively shallow depth of the aquifer combined with the limited presence of fine-grained material leaves this aquifer vulnerable to surficial sources of contamination. The expected direction of groundwater flow is northerly parallel to the Pelly River (EBA 2004).

8.5 Potential Contaminant Sources

Aside from an above ground storage tank which is located approximately 14 m from the well, no other potential contaminant sources within 30 m of the well were identified during the water system assessment.

8.5.1 Spills Records and Contaminated Sites Search Results

It was reported that approximately 2000 L of furnace oil was spilled in 1986 due to a overturned residential fuel tank owned by Selkirk First Nation. Removal of contaminated soil was recommended by Environment Canada, however, it is unclear whether this was completed. The spill site is located approximately 500 m upgradient of the subject well, and is a low risk.

Another reported spill in 1998 occurred due to an open valve on a heating oil tank located at the Eliza Van Bibber School. Removal of contaminated soil was recommended by Environment Canada, however it is unknown if this was completed. Since the spill location is crossgradient from and a significant distance from the fire hall well, it is considered very unlikely that this would impact the water quality at this well.

8.6 Identified Water System Deficiencies and Associated Risk

8.6.1 High and Medium Risk Deficiencies

High and medium risk deficiencies observed during the site assessments and or through review of the available information for this water system are detailed below:

- Poor surface completion of the wellhead (located in a pit below grade, significant signs of mice and rodents in wellhead enclosure);
- There is no surface sanitary seal (grout or bentonite seal as required by the Canadian Groundwater Association's Guidelines for Water Well Construction;
- Completed at 13.7 m below grade, the well is considered a shallow well and is completed in a shallow unconfined aquifer making it vulnerable to surficial sources of contamination;
- The turbidity has been above the CDWQG MAC;

- 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 with a production zone less than 15 m below grade) and does not meet the requirements of the Guidelines for Water Well Construction.
- The water storage tank and water system is not accessible for cleaning and maintenance; and,
- There is no treatment or disinfection system present.

8.6.2 Low Risk Deficiencies

- The iron concentration has been reported above the CDWQG aesthetic objective;
- One out of nine samples collected for bacteriological analysis tested positive for total coliform bacteria, however, the most recent sample was negative.
- At the time of the water system assessment the pressure tank was waterlogged, causing the water pump to rapid cycle.

8.7 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).

Recommendations are made in consideration of the fact that a piped distribution system with water sourced from a community well located in Willow Creek area of Pelly Crossing will likely be installed by the Selkirk First Nation in 2006 or 2007. In the interim, however, some upgrades are recommended to mitigate immediate risk which are detailed below:

8.7.1 Priority 1

The following recommendations are provided in order to mitigate deficiencies that are of immediate concern for the Pelly Crossing Fire Hall. Priority 1 remedial recommendations include:

- The well enclosure should be cleaned and disinfected (remove all fiberglass insulation, and mice excrement - use HEPA vacuum and proper protection to ensure that workers are not exposed to Hantavirus).
- A pitless adapter should be installed and the casing extended to at least 500 mm above the base of the well pit. Casing insulation could then be

installed and a localized near surface bentonite seal should be installed immediately around the wellhead.

- The well and water system should be super-chlorinated.
- Disinfection treatment consisting of filtration to 1 micron (absolute), and a UV system that is NSF/ANSI certified (or equivalent) should be installed for the domestic side of the system.
- A backflow preventer should be installed to inhibit backflow from the overhead fire storage tank to the domestic side of the water system. These are conceptual design recommendations based on the information available for planning and budgeting purposes. Engineering input will be required for final system specifications.

8.7.2 Priority 2

The recommended solution to mitigate long-term risk (Priority 2) to the fire hall would be to connect the domestic water system to the proposed piped distribution system as soon as this system is available. The community well that will be the source of water for the piped distribution system is constructed in accordance with applicable guidelines, offers better wellhead protection and is completed within a deeper aquifer that is less vulnerable to surficial sources of contamination. Furthermore, the community well and piped distribution system will be operated and maintained by others as a Public Drinking Water Supply with chlorine disinfection and routine monitoring and sampling as required by regulation.

The well system could be used as the primary water supply for fire protection, with the piped distribution system as the back-up supply. The system should be re-plumbed to separate the domestic water for the fire hall from the well-supplied fire protection water.

8.7.3 Priority 3

If the existing well is maintained as a back-up firefighting supply, the pressure tank should be replaced during plumbing upgrades. Depending on the length of time until the piped system is available, this may be required sooner.

8.8 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.

8.8.1 Priority 1

The estimated costs for the recommended Priority 1 upgrades are detailed below:

- It would cost approximately **\$1,200** for materials and labour to complete the recommended well enclosure cleaning, interim wellhead upgrades and well and water system superchlorination.
- Disinfection treatment (filtration and UV) would cost approximately **\$3,000** including materials and labour.
- Supply and installation of a backflow prevention device between the fire fighting supply and the domestic supply would cost approximately **\$200** for materials and labour.

Therefore, it would likely cost approximately **\$4,400** to complete the recommended Priority 1 upgrades for the Pelly Crossing Fire Hall.

8.8.2 Priority 2

It would cost approximately **\$4,000** for materials and labour assuming a 30 m service connection (freeze-protected underground service piping) and some inside plumbing modifications.

8.8.3 Priority 3

A replacement pressure tank would cost in the order of **\$600** installed.

9.0 BUILDING 5987: PELLY CROSSING HEALTH CENTRE

9.1 Description of Existing Water Supply System

Building 5987, the Pelly Crossing Health Centre, is currently serviced by a water supply system that delivers water from a 12.8 m deep well. The well is located in a pit below grade approximately 4 m from the Health Centre building. A site plan is provided as Figure 5987-A in Appendix A9. The coordinates of the wellhead, as measured by a handheld GPS device, were recorded as:

- UTM ZONE 8
- Northing: 6966993
- Easting: 419798

There is no treatment or disinfection for the water supplying this facility. A schematic detailing the water supply system is provided as Figure 5987-B in Appendix A9. Photos of the well and water system are also included at the back of this appendix.

9.2 Description of Existing Wastewater Systems

Wastewater from the health centre is discharged to an in-ground septic disposal system on the east side of the building and likely crossgradient from the well. The septic tank is located approximately 28 m from the well and the effluent discharge field is located approximately 40 m from the well. A site plan showing the septic system is given by Figure 5987-A in Appendix A9.

9.3 Water Quality Results

9.3.1 Water Quality Results from Previous Sampling

Bacteriological

Nine samples were collected from the Pelly Crossing Health Centre 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 5987-1 in Appendix A9. Coliform bacteria and *E. coli* were reported as absent in each of the nine samples for which results are provided.

Potability

Water samples were collected from the Pelly Crossing Health Centre water system on September 29, 2004 and June 8, 2005 by YTG representatives and were submitted to Northwest Labs in Surrey BC and ALS Environmental in Vancouver BC for potability analyses. The results of these analyses are summarized in Table 5987-2 in Appendix A9. EBA reviewed the analytical results for comparison 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. 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 is calcium bi-carbonate type with a pH of approximately; and,
- The hardness (as CaCO_3) was 198 mg/L during the first sampling event and 192 mg/L during the second sampling event, and is considered very hard.

9.3.2 Identification of Additional Analytical Testing Required

Additional analytical for the Pelly Crossing Health Centre that was identified to be included during the water system assessments is detailed below:

- UV absorbance and UV transmissivity, as well as tannins and lignin, to determine potential for UV treatment as a disinfection option for this water system;
- Total organic carbon (TOC) for water treatment system specification; 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 water system assessment on August 23, 2005, and was submitted to ALS Environmental in Vancouver BC for analysis of selected additional parameters. Laboratory results are summarized in Table 3440-2 in Appendix A9 and the laboratory reports are included in Appendix B.

Additional assessment recommended in the Draft report (EBA, November 2005) for this system-included collection of a water sample and coordinating laboratory analysis for potential contaminants of concern (PCOC) associated with a documented fuel spill in the vicinity of the wellhead. A sample was collected on November 22, 2005 by Ryan Martin, P.Eng of EBA. The samples were analyzed for the following PCOC associated with furnace oil and heating fuel including:

- Benzene, ethylbenzene, toluene and xylenes (BTEX);
- Volatile Petroleum Hydrocarbons (VPH);
- Polycyclic Aromatic Hydrocarbons (PAH); and
- Extractable Petroleum Hydrocarbons (EPH).

The results of the additional assessment completed do not indicate any evidence of impacts from fuel spills on well water quality for the parameters analyzed on the date sampled. More detailed results were provided in a Letter report dated March 26, 2006.

9.3.3 Indicators of Potential Contamination

Chloride, nitrate and nitrite concentrations can indicate impacts from anthropogenic sources such as 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 were also low and within the normal background range for this area. These water quality results suggest that the aquifer is not under the influence of septic wastes.

9.4 Conceptual Hydrogeology

The log for this well indicates that the well is completed at a depth of 12.8 m within a sand and gravel aquifer. The well log shows the static water level to be 6.7 m below ground, and displays alternating sand and gravel overlying the aquifer with trace fine-grained material. Most wells in the Pelly Crossing Village area obtain their water from an unconfined aquifer consisting of floodplain alluvial sand and gravel deposits. The relatively shallow depth of the aquifer combined with the absence of confining material leaves this aquifer vulnerable to surficial sources of

contamination. The expected direction of groundwater flow in the vicinity of the site is north to northwesterly (EBA 2004).

9.5 Potential Contaminant Sources

Details and photographs of potential contaminant sources observed during the site investigation are compiled in Appendix A9.

Potential contaminant sources within 30 m of the wellhead are:

- An abandoned well at 2 m;
- A septic tank at 28 m; and
- An above ground fuel storage tank (AST) at 30 m.

9.5.1 Spills Records and Contaminated Sites Search Results

It was reported by Environment Canada that in 1986 a fuel spill occurred due to a overturned residential fuel tank owned by Selkirk First Nation and approximately 2000 L of furnace oil was discharged to the ground. Removal of contaminated soil was recommended by the Environment Canada spill report, however, it is unclear whether this was completed. The spill site is located approximately 500 m upgradient of the subject well, and is a low risk.

In 1998 of an unknown quantity of heating fuel was discharged due to an open valve on a fuel tank located at the Eliza Van Bibber School. Removal of contaminated soil was recommended, however it is unknown if this was completed. The spill location is approximately 50 m in an upgradient direction from the well. Spills records were provided after the assessments were completed and therefore hydrocarbon parameters were not identified for additional sampling at the time of the assessment. As recommended previously, however, follow up sampling was completed November 2005 and did not indicate impact from hydrocarbon parameters on the date sampled.

9.6 Identified Water System Deficiencies and Associated Risk

9.6.1 High and Medium Risk Deficiencies

High and medium risk deficiencies observed during the assessment and review of background information for this water system include:

- Poor surface completion of the well (located in a pit below grade);
- 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 within a shallow, unconfined aquifer, and at a depth of 12.8 m, and is considered to be a shallow well;
- The well is located within 30 m of potential contaminant sources, including an abandoned well and an above ground fuel storage tank;
- The well site is downgradient from a reported hydrocarbon spill area,
- 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 with a production zone less than 15 m below ground surface) and does not meet the requirements of the Guidelines for Water Well Construction and,
- There is no treatment or disinfection system present.

9.6.2 Low Risk Deficiencies

There were no low-risk deficiencies identified for this site. All deficiencies are considered either high or medium risk.

9.7 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).

Recommendations are made in consideration of the fact that a piped distribution system with water sourced from a community well located in Willow Creek area of Pelly Crossing will likely be installed by the Selkirk First Nation in 2006 or 2007. In the interim, however, some upgrades are recommended to mitigate risk as detailed in the following sections.

9.7.1 Priority 1

The following recommendations are provided in order to mitigate deficiencies that are of immediate concern (Priority 1) for the Pelly Crossing Health Centre:

- Interim wellhead upgrades consisting of extending the casing to at least 500 mm above the base of the well pit, and installation of a localized near surface bentonite seal immediately around the wellhead should be completed.
- The well and water system should be super-chlorinated.
- Disinfection treatment consisting of filtration to 1 micron (absolute), and a UV system that is NSF/ANSI certified (or equivalent) should be installed to ensure disinfection of the water supplied to this building. These are conceptual design recommendations based on the information available for planning and budgeting purposes. Engineering input will be required for final system specifications.
- Backflow prevention should be installed to ensure that potentially contaminated water can't flow from taps back to the water system.
- The abandoned well that is 2 m from the existing well in use should be properly decommissioned.

9.7.2 Priority 2

The recommended solution to mitigate long-term risk (Priority 2) to the Pelly Crossing Health Centre would be to connect to the proposed piped distribution system as soon as this system is available. The community well that will be the source of water for the piped distribution system is constructed in accordance with applicable guidelines; offers better wellhead protection; and is completed within a deeper aquifer that is less vulnerable to surficial sources of contamination. Furthermore, the community well and piped distribution system will be operated and maintained by others as a Public Drinking Water Supply with chlorine disinfection and routine monitoring and sampling as required by regulation.

We understand that there would be a monthly service fee charged by the Selkirk First Nation for providing, operating and maintaining the piped water supply.

9.7.3 Priority 3

It is recommended that once the residences are connected to the community water system, the well be properly decommissioned.

9.8 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.

9.8.1 Priority 1

The estimated costs for the recommended Priority 1 upgrades are detailed below:

- It would cost approximately **\$800** for materials and labour to complete the recommended interim wellhead upgrades and well and water system superchlorination.
- Disinfection treatment (filtration and UV) would cost approximately **\$3,000** including materials and labour.
- A double check valve assembly to provide backflow prevention would cost approximately **\$200** installed.
- Decommissioning of the abandoned well would cost in the order of **\$1,000**.

Therefore, it would cost approximately **\$5,000** to complete the recommended Priority 1 upgrades for buildings.

9.8.2 Priority 2

It would cost approximately **\$4,000** for materials and labour to connect to the proposed piped distribution system assuming a 30 m service connection (freeze-protected underground service piping) and some inside plumbing modifications.

9.8.3 Priority 3

The estimated cost to decommission the existing well once it is no longer needed, would be approximately **\$1000**.



10.0 BUILDING 5681: STEWART CROSSING GRADER STATION

10.1 Description of Existing Water Supply System

Building 5681, the Stewart Crossing Grader Station and Building 5682, the Stewart Crossing Living Complex, are serviced by a water supply system that sources water from a 177.4 m deep well. Water is delivered to each building from the pumphouse storage building by way of underground recirculating piping. The well is located adjacent to the pumphouse storage building (Building 5690) approximately 50 m east of the maintenance garage. A public fill station is also located at the pumphouse where residents of Stewart Crossing can obtain water. A site plan is provided as Figure 5681-A in Appendix A10. The coordinates of the wellhead, as measured by a handheld GPS device, were recorded as:

- UTM ZONE 8
- Northing: 7028437
- Easting: 416194

The pumphouse storage building houses water treatment and distribution equipment consisting of an inline filter, pressure tank, water softener and a proportional feed LMI chlorine injection system. The piping for the public water fill station leaves the main system after filtration and disinfection but before the water softener. Neither the chlorination nor the softening system was operating at the time of the water system assessment. A schematic detailing the water supply system is provided as Figure 5681-B in Appendix A10. Photos of the well and water system are also included at the back of this appendix.

Additionally, there is an abandoned dug well on site located in a pumphouse just outside from the southeast corner of the property and approximately 110 m south of the deep well. This well has not been properly decommissioned, and could pose a safety risk in its current condition. The dug well enclosure, although it has a ladder, is not locked, and could be easily accessed by children.

10.2 Description of Existing Wastewater Systems

Wastewater from the maintenance garage is discharged to a leach pit located east of the building approximately 33 m to the west of the deep well. The Living Complex

is served by a septic system with tank and in-ground disposal system on the east side of the building and is greater than 60 m from the well. Septic systems are shown on Figure 5681-A in Appendix A10.

10.3 Water Quality Results

10.3.1 Water Quality Results from Previous Sampling

Bacteriological

A total of 17 samples were collected from the Stewart Crossing Grader Station 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. Samples were collected from the Grader Station as well as the Living Complex. Results are tabulated in Table 5681-1 in Appendix A10. Coliform bacteria and *E. coli* were reported as absent in each of the 17 samples for which results are provided.

Potability

YTG representatives collected water samples from this system on September 29, 2004 and June 8, 2005. A sample was also collected from the Living Complex on September 29, 2004. The samples were submitted to Northwest Labs in Surrey BC and ALS Environmental in Vancouver BC for potability analyses. The results of these analyses are summarized in Table 5681-2 in Appendix A10. EBA reviewed the analytical results for comparison 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 10.3 NTU during the first sampling event and 17.7 NTU during the second sampling event, the turbidity in samples collected from the Grader Station were above the Canadian Drinking Water Quality Guideline – Maximum Acceptable Concentration (CDWQG MAC) of 1.0 NTU and aesthetic objective (AO) of 5.0 NTU. The sample collected from the Living Complex also marginally exceeded this MAC;
- Each of the samples collected have had arsenic concentrations below the existing CDWQG MAC of 0.025 mg/L but above the proposed MAC of 0.005 mg/L;

- At 0.6 mg/L during the first sampling event and 1.48 mg/L during the second sampling event, the total iron concentration was in exceedence of the CDWQG AO of 0.3 mg/L;
- At 0.136 mg/L during the first sampling event and 0.134 mg/L during the second sampling event, the total manganese concentration was in exceedence of the CDWQG AO of 0.05 mg/L;
- Colour was reported to be 27 CU, which was in exceedence of the CDWQG AO of 15 CU;
- The water quality results indicated that all other health based and aesthetic objectives were met for the parameters analyzed;
- The water quality results indicated that the groundwater is calcium bi-carbonate type water with a pH of approximately 8.1; and,
- The hardness (as CaCO_3) was approximately 170 mg/L and is considered hard. The high hardness indicates that the water softening system was not functioning when the water samples were taken.

10.3.2 Identification of Additional Analytical Testing Required

Additional analytical for the Stewart Crossing Grader Station water system that was identified to be included during the water system assessments is detailed below:

- Total and dissolved iron, manganese, and arsenic;
- Turbidity;
- Phosphate, silicate, and total vanadium to determine the potential for an arsenic removal treatment system;
- Total organic carbon (TOC);
- Measurements in the field for total dissolved solids, conductivity, pH, and temperature.

Analytical results for these additional parameters can be used in treatment system design.

A water sample was obtained by EBA during the water system assessment on August 16 2005, and was submitted to ALS Environmental in Vancouver BC for analysis of additional parameters. These results are summarized in Table 3440-2 in Appendix A10 and the laboratory reports are included in Appendix B. Significant observations are detailed below:

- Turbidity at 8.02 NTU though lower than previous sampling events, was still above the CDWQG health based upper limit;

- Total and dissolved arsenic at 0.0108 and 0.00697 mg/L were above the proposed CDWQG MAC of 0.005 mg/L;
- Total iron at 0.923 mg/L was in exceedence of the CDWQ AO of 0.3 mg/L, however dissolved iron was below the laboratory detection limit (0.03 mg/L) indicating that the elevated total iron concentration was likely attributed to elevated turbidity;
- Total and dissolved manganese concentrations were in exceedence of CDWQG AO's at 0.14 and 0.135 mg/L respectively, indicating that elevated manganese concentrations were not related to elevated turbidity;
- Water quality results indicated no other exceedences of CDWQG MACs or AOs.

10.3.3 Indicators of Potential Contamination

Chloride, nitrate and nitrite concentrations can indicate impacts from surface water sources or septic waste. The chloride concentration was low and is within the normal background range for groundwater in the area. Nitrate and nitrite concentrations for this sample were also low and within the normal background range for this area. These water quality results indicate that the Stewart Crossing Grader Station water system was not under the influence of septic wastes or other anthropogenic sources of nutrients or anions at the time of sampling.

10.4 Conceptual Hydrogeology

The log for this well indicates that the well is completed at a depth of 177.4 m within a confined gravel aquifer. Drilling encountered mostly silt from ground surface to 100.6 m with interbedded fine and coarse-grained material to a depth of 177.4 m. The presence of a thick sequence of fine-grained material overlying the aquifer provides significant protection from surficial sources of contamination.

10.5 Potential Contaminant Sources

Details and photographs of potential contaminant sources observed during the site investigation are compiled in Appendix A10.

Potential contaminant sources within 30 m of the wellhead include:

- Various drums containing paint, toluene, and other unknown chemicals within 15 m of the well;
- Creosote treated timbers at 15 m; and
- Various industrial activities occurring around the well.

In addition, a tar storage tank is located 45 m away from the wellhead. There is an underground fuel storage tank (UST) located approximately 40 m from the well. The closest portion of a septic system to the wellhead is a septic leach pit located 33 m away.

10.5.1 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.

10.6 Identified Water System Deficiencies and Associated Risk

10.6.1 High and Medium Risk Deficiencies

High and medium risk deficiencies observed during this study include:

- Poor surface completion of the well. Due to insulation surrounding the wellhead it was not possible to determine the exact stick up of the well casing, however it is unlikely that the casing extends the required 500 mm above grade, and as such, could potentially be subjected to flooding and is in contravention of the regulation;
- The well is located within 30 m of potential contaminant sources including various chemical storage drums, creosote timbers, and industrial activities;
- Turbidity has been in exceedence of the both the CDWQG MAC and AO;
- The chlorine disinfection system was not in operation at the time of water system assessment;
- There is no backflow prevention between the system and on the public fill station; and,
- The pumphouse door is normally left unlocked which could pose a security issue.

10.6.2 Low Risk Deficiencies

- There is no surface sanitary seal (grout or bentonite seal as required by the Canadian Groundwater Association's Guidelines for Water Well

Construction, however as mentioned previously, there is likely a tight bond between the casing and the soil formation based on the well record and drilling method;

- The arsenic concentration, although not in exceedence of the current CDWQG MAC, is above the proposed MAC of 0.005 mg/L;
- The total iron concentration has been in exceedence of the CDWQG AO;
- The manganese concentration has been in exceedence of the CDWQG AO;
- The colour has previously been reported above the CDWQG AO; and,
- The public water fill comes off of the water system prior to the softening system, and the softening system was not operating at the time of water system assessment.

The Niels Jacobsen report titled “Community Water Systems in the Yukon – Stewart Crossing” (February, 2003) also noted that there are features that are normally found in a pumphouse for a community water supply system that are lacking in this one which relate to construction materials, floor type, plumbing and security. When the water system requires treatment upgrades to remove arsenic to below the proposed MAC, more space will be required than currently available and it would be worthwhile to consider constructing a new building that is complete with a concrete floor and more suitable plumbing to house the water system equipment.

10.7 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).

10.7.1 Priority 1

The following recommendations are provided in order to mitigate deficiencies that are of immediate concern for the Stewart Crossing Grader Station. Priority 1 remedial recommendations include:

- Standard wellhead including installation of a pitless unit and near surface sanitary seal should be completed. With a near surface sanitary seal, this well would considered to be non-GUDI.
- A chlorine tap should be installed on the wellhead and the well and water system should be super-chlorinated.

- Primary disinfection treatment consisting of a duplex commercial filtration system (NSF 61) to filter to 1 micron (absolute) should be considered and the proportional feed chlorination system should be upgraded to ensure disinfection of the water supplied to this building. It is recommended that a digital dosing proportional feed chlorination system (or equivalent) be installed to replace the existing LMI system, as it would be more reliable and require less maintenance. The LMI system could be maintained as a back-up chlorination system (a back-up chlorination system was recommended by Niels Jacobsen in February 2003). The digital dosing type of chlorine injection system has recently been installed in most other community wells in the Yukon and would lend itself to better preparedness for equipment maintenance and replacement as well as operator training. These are conceptual design recommendations based on the information available for planning and budgeting purposes. Engineering input will be required for final system specifications.
- All chemical storage and creosoted timber piles should be relocated to at least 30 m from the wellhead. Activities within 30 m of the wellhead should be regulated to ensure that hazardous chemicals are not handled or stored in proximity to the wellhead.
- Backflow prevention should be installed to ensure that water can not flow from the public access point back to the water system.

10.7.2 Priority 2

The softener system should be reconditioned and brought back into operation. Once the softener system is brought back into operation, arsenic concentrations should be monitored to determine whether future arsenic removal treatment will be required (see Priority 3).

All other high and medium risk deficiencies would be mitigated through completion of Priority 1 upgrades.

10.7.3 Priority 3

Although standard softener systems are not designed for arsenic removal, they do often effect some arsenic removal. The arsenic concentrations should be monitored following reconditioning of the softener system. In the event that arsenic concentrations are still above the proposed MAC, an arsenic removal treatment system would be required. A new building to house all treatment equipment should be considered at this time.

10.8 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.

10.8.1 Priority 1

The estimated costs for the recommended Priority 1 upgrades are detailed below:

- It would cost approximately **\$5,000** for materials and labour to complete the recommended pitless unit wellhead upgrade and well and water system superchlorination.
- Commercial stainless steel duplex filtration canisters and filters (NSF 61-1 micron -absolute) would cost approximately **\$2,500** installed.
- Upgrades to a new digital dosing chlorine feed system with suction lines and reservoir would be approximately **\$2,100** installed.
- A suitable backflow prevention device could be supplied and installed for approximately **\$400**.

Therefore, it would cost approximately **\$10,000** to complete the recommended Priority 1 upgrades for this system.

10.8.2 Priority 2

Reconditioning and the softener system would cost approximately **\$500**.

10.8.3 Priority 3

An arsenic removal treatment system would cost in the order of **\$4,000**, while a new building to house the treatment systems with a concrete floor and appropriate construction would cost in the order of **\$20,000**.

11.0 BUILDING 5629: MAYO GRADER STATION

11.1 Description of Existing Water Supply System

The Mayo Grader Station (Building 5629) is currently serviced by a water supply system that delivers water from an approximately 12.5 m deep well. The well is located in an enclosure off from the southwest corner of the maintenance garage. There was no well cap present at the time of water system assessment. A site plan is provided as Figure 5629-A in Appendix A11. The coordinates of the wellhead, as measured by a handheld GPS device, were recorded as:

- UTM ZONE 8
- Northing: 7054099
- Easting: 456418

There is no treatment or disinfection system for this water system. A bottled drinking water station is present in the kitchen of the building and it is unlikely that water from the well system is used for drinking water. Signs indicating that the water is not suitable for drinking were not evident at the time of the assessment. A schematic detailing the water supply system is provided as Figure 5629-B in Appendix A11. Photos of the well and water system are also included at the back of this appendix.

11.2 Description of Existing Wastewater Systems

Wastewater from the Grader Station building is discharged to an in-ground septic disposal system located south of the maintenance garage. The septic tank is located approximately 14 m east of the well. The effluent field may begin as close as 15 m from the well; however, it appears that there is leach pit style culvert for sewage disposal that is approximately 26 m from the well. A site plan showing the location of the septic system is given by Figure 5629-A in Appendix A11.

11.3 Water Quality Results

11.3.1 Water Quality Results from Previous Sampling

Bacteriological

Nine samples were collected from the Mayo Grader Station 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 5629-1 in Appendix A11. One sample of nine for which results were provided tested positive for total coliform. *E. coli* was not present in any of the samples during this period.

Potability

YTG representatives collected water samples from the Mayo Grader Station water system on September 29, 2004 and June 8, 2005. Results are summarized in Table 5629-2 in Appendix A11. EBA reviewed the analytical results for comparison with the Canadian Drinking Water Quality Guidelines (CDWQG) to observe general water quality; to identify and recommend additional sampling and analytical; and to identify potential indicators of contamination. Details are as follows:

- The first sampling event reported turbidity to be 1.5 NTU, which is above the CDWQG MAC of 1.0 NTU;
- At 79.8 mg/L during the first sampling event and 100 mg/L during the second sampling event, the chloride concentrations, although not in exceedence of the CDWQG AO of 250 mg/L, were significantly elevated above the normal background concentrations for the Mayo region;
- The water quality results indicated that all other health based and aesthetic objectives were met for the parameters analyzed;
- The water quality results indicated that the groundwater is calcium bi-carbonate type with a pH of approximately 8; and,
- The hardness (as CaCO₃) at approximately 365 mg/L is considered very hard.

11.3.2 Identification of Additional Analytical Testing Required

Additional analytical for the Mayo Grader Station that was identified to be included during the water system assessments is detailed below:

- UV absorbance and UV transmissivity, as well as tannins and lignin, to determine potential for UV treatment as a disinfection option for this water system;
- Chloride, nitrate, nitrite, and ammonia to determine if the well is potentially under the influence of surficial sources of contamination;
- Total organic carbon (TOC);
- Extractable Petroleum Hydrocarbons (EPH) and Polycyclic Aromatic Hydrocarbons (PAH) to evaluate potential impacts of hydrocarbon contamination; and,
- Measurements in the field for total dissolved solids, conductivity, pH, and temperature.

Additional Analytical Results

EBA collected a water sample during the water system assessment on August 17 2005. The sample was submitted to ALS Environmental in Vancouver BC for analysis of additional analytical parameters included as part of the assessment. These results are summarized in Table 3440-2 in Appendix A11 and the laboratory reports are included in Appendix B. The following points regarding the water quality results are of significance:

- Results indicated that EPH and PAH parameters were below laboratory detection limits;
- At 112 and 0.261 mg/L respectively, the chloride and nitrate concentrations were higher than previously reported; and,
- Water quality analysis reported no exceedences of CDWQG MACs or AOs.

11.3.3 Indicators of Potential Contamination

Chloride, nitrate and nitrite concentrations can indicate impacts from surface sources or septic waste. Chloride concentrations appear to be extremely elevated with respect to normal background ranges for groundwater in the area. Samples from this water system reported chloride concentrations as high as 112 mg/L. A well upgradient from this system had chloride concentration below the detection

limit, and a well downgradient had a chloride concentration of approximately 13 mg/L. Nitrate and nitrite concentrations for this sample were low, but may still be elevated above the normal background range for this area. Nitrate was 0.261 mg/L, and it should be noted that both chloride and nitrate concentrations have shown an increase over the past three sampling events. These water quality results suggest that the Mayo Grader Station well was being impacted from a surficial source of contamination such as road salt and/or septic wastes at the time of sampling.

11.4 Conceptual Hydrogeology

The Grader Station well is completed at a depth of 12.5 m with a static water level of 7.4 m below ground. A driller's well log was not available for review for this well.

Examination of well logs in the Mayo area indicates that well completion depths and lithology in the area is highly variable. Wells are completed at various depths, ranging from shallow dug wells to drilled wells greater than 150 m deep. The Mayo area has been affected by one or more glaciations. Sediments in the Mayo area tend to consist of recent alluvium overlying fine-grained silts with varying interbedded sand and gravel. Sediment deposits are generally underlain by metamorphic bedrock, which is exposed in much of the upland areas. Widespread discontinuous permafrost is known to exist in the Mayo area and has been noted in several of the well logs examined.

Shallow groundwater flow generally occurs within the overlying alluvial deposits in the Village of Mayo area, this groundwater flow system tends to be perched on underlying silts and permafrost. Based on topography and proximity to surface water sources, the groundwater flow direction is inferred to be in the range of south to west towards the Mayo and/or Stewart River.

11.5 Potential Contaminant Sources

Details and photographs of potential contaminant sources observed during the site investigation are compiled in Appendix A11.

Potential contaminant sources within 30 m of the wellhead include:

- A septic leach pit is located within 26 m;
- A septic tank is located 14 m from the well (this is in contravention of the SPDWSR);
- An above ground waste oil storage tank at 22 m;
- An underground fuel storage tank at 7 m; and
- Industrial activities within 30 m.

It should be noted that at the time of the assessment, a large salt storage pile existed approximately 70 m northwest and in the direction inferred to be upgradient of the well. In addition there are bulk fuel storage facilities on the lots directly north of the site; the closest bulk fuel facility is approximately 100 m from the well.

11.5.1 Spills Records and Contaminated Sites Search Results

It was reported by Environment Canada that three spills occurred in the 1970's at the White Pass and Yukon Route tank farm (WPYR) which is immediately north of the Grader Station site. The first spill resulted in approximately 1600 L of furnace oil being discharged due to a mechanical failure. Reportedly the spill was contained and hydrocarbon impacted soils were disposed of off-site. Later in the decade two other spills resulted in discharges of 3700 L of fuel oil and 1600 L of gasoline respectively. Spill records are included in Appendix A11.

Another spill was reported in 1991 at the WPYR site when an unknown quantity of fuel caught fire and a truck exploded. 756, 000 L of water was used to control the fire and reportedly, runoff was contained.

Two reported spills also occurred at the North 60 Petroleum Tank Farm in 1997 and 1999 due to the overfilling of a storage tank. Approximately 1000 L of diesel was spilled, however no record of remediation was reported.

These bulk fuel facilities are located immediately northwest of the existing Grader Station site. As mentioned in Section 11.4, the groundwater flow direction in the vicinity of the site is inferred to be southwesterly based on topography and proximity to surface water bodies. These reported spills are significant because they may have impacted on shallow groundwater quality in the vicinity of this site, or could potentially impact on the quality of the groundwater in this shallow aquifer at some point in the future.

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

11.6 Identified Water System Deficiencies and Associated Risk

11.6.1 High and Medium Risk Deficiencies

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

- Poor surface completion of the well (there was no well cap on the casing at the time of the assessment and the casing does not extend the required 500 mm above grade). We understand that a well cap has been installed since the assessment;
- There is no surface sanitary seal (grout or bentonite seal as required by the Canadian Groundwater Association's Guidelines for Water Well Construction;
- There is no driller's log available to review lithology and well construction, however, the well is completed at a depth of only 12.5 m, likely within a shallow, unconfined aquifer that is potentially under the direct influence of surface water (GUDI);
- The well is located within 30 m of potential contaminant sources including an underground fuel storage tank, an above ground waste oil storage tank, a on-site sewage disposal system (septic field), and industrial activities;
- The site is downgradient from bulk fuel facilities where documented fuel spills have occurred;
- Chloride concentrations are elevated above the normal background concentrations for the Mayo region which indicates contamination from a surficial anthropogenic source;
- A water sample collected for bacteriological analysis tested positive for total coliform bacteria;
- The turbidity has previously been reported above the CDWQG MAC; and,
- There is no treatment or disinfection system present.
- There are no posted signs in the Grader station building indicating that the water from the taps should not be used for drinking water.

11.6.2 Low Risk Deficiencies

There were no low-risk deficiencies identified for this site. All deficiencies are considered either high or medium risk.

11.7 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 existing well is not considered suitable for a drinking water source based on the depth of the well, water quality, and proximity to contaminant sources. The options presented below include construction of a replacement water well that is properly constructed and located in consideration of potential contaminant sources, or water delivery from a treated source at the Village of Mayo are presented below for comparison.

11.7.1 Priority 1

Regardless of which option is ultimately chosen, water from this well should not be used for human consumption until Priority 1 upgrades are completed. In the interim, until one of the options presented below is selected and implemented, YTG should provide bottled water and post suitable advisories.

Option 1:

The first option presented involves drilling a new well that would be located and constructed in consideration of the following:

- The well should be equipped with a surface seal to at least 6 m and a pitless unit should be installed with the casing raised above grade (500 mm);
- The well must be located at a distance greater than 30 m and upgradient from any potential source of contamination;
- The well should be at least 15 m in depth; and,
- The water from the new well must meet all CDWQG health based guidelines. If there are any exceedences in the CDWQG health-based guidelines then a treatment system must be designed and installed as necessary. A treatment/disinfection system would likely consist of a NSF

61 certified filtration system (to 1 micron (absolute)) followed by a UV disinfection system. Pretreatment would likely be required.

A shallow well at this site is not considered to be a safe option given the land on adjacent properties and at the Grader Station. It should be noted that groundwater obtained from deep wells in this area is typically highly mineralized and generally has aesthetically poor water quality. Water from a deep well in this vicinity would likely require treatment for hardness and possibly arsenic, iron and manganese.

Option 2:

The second option would involve disconnecting the existing well from the domestic system and converting to bulk water delivery with UV disinfection (NSF 55) and filtration (NSF 61). This option would involve the least risk, and the least capital cost, but would result in higher operation and maintenance costs. It should be noted that there is already water delivery to the PMA shop at the southwest corner of the site. For this option, the existing well could be maintained for equipment cleaning and non-potable use. Appropriate advisories, signs and precautions would be necessary to ensure that the non-potable water would not be accessible to the public.

Water treatment options presented herein are for project planning and budgeting purposes. Some engineering will be required for final system design/specification.

11.7.2 Priority 2 and 3

There are no Priority 2 or 3 mitigative options associated with this site.

11.8 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.



11.8.1 Priority 1

Option 1:

- A new well, assuming approximately 50 m of overburden, would likely cost in the order of **\$40,000** to drill, test, and connect (including pump, drop pipe, freeze-protected underground piping etc.); and,
- The materials and labour costs for a treatment/disinfection system (based on water quality from other deep wells in the area) would likely cost in the order of **\$7,700**; assuming **\$600** for the NSF 61 duplex filtration system, **\$4,000** for a duplex softening system, **\$2,400** for the proposed NSF/ANSI 55 certified UV disinfection system, and **\$700** for a point of use Reverse Osmosis system.
- Freeze protected piping installed below grade would cost in the order of **\$5,000** depending on the depth of bury and the distance required.

Option 2:

To supply and install a water storage tank, new jet pump and hook to existing plumbing would likely cost in the order of **\$3,000**. A certified filtration and UV system (to ensure adequate disinfection of delivered water) would also cost in the order of **\$3,000** installed. Therefore, the capital cost for this option would be approximately **\$6,000**. The Na Cho Nyak Dun First Nation delivers water from a treated source operated by the Village of Mayo, and could be retained to provide water delivery to the Grader Station. Delivery costs should be considered when comparing life cycle costs of this option with Option 1.

12.0 BUILDING 5636: MAYO AIR TANKER BASE DAY USE BUILDING

12.1 Description of Existing Water Supply System

The Mayo Air Tanker Base Day Use Building (Building 5636) is currently serviced by a typical “camp” style seasonal water system that sources water from bulk water delivery. Water is delivered to a 3700 L polyethylene water storage tank located outside on the north side of the building. The water source is presumed to be from the Village of Mayo operated well with delivery by the Na Cho Nyak Dun First Nation. The coordinates of the water storage tank, as measured by a handheld GPS device, were recorded as:

- UTM ZONE 8
- Northing: 7054867
- Easting: 456503

There is a sign posted at each point of use in the building stating “ Do not Drink the Water – it will make you really sick”. A schematic detailing the water supply system is provided as Figure 5636-B in Appendix A12. Photos of the well and water system are also included at the back of this appendix.

12.2 Water Quality Results

12.2.1 Water Quality Results from Previous Sampling

There are no bacteriological or water quality results from previous sampling available.

12.2.2 Identification of Additional Analytical Testing Required

It is presumed that the water source is the Village of Mayo well which is a shallow well system operated by the Village of Mayo that is treated through chlorination at the source. Delivery is likely from the Na Cho Nyak Dun operated water delivery truck. Field chemistry done at the time of the water system assessment indicated that the residual concentration was 0.02 mg/L, which is below the required 0.2 mg/L required at a point of use.

12.3 Identified Water System Deficiencies and Associated Risk

12.3.1 High and Medium Risk Deficiencies

As the water in this system is not used for drinking water, all deficiencies are considered low-risk for this system at present. PMA should consult with Environmental Health and Social Services (EHSS) to ensure that the advisories are adequate and appropriate. Low risk deficiencies are detailed in the following section.

12.3.2 Low Risk Deficiencies

- The water storage tank is located outside the building, is exposed to direct sunlight, and is not secure;
- There was some sediment in the bottom of the tank and it appeared that the tank may not be cleaned regularly;
- The residual chlorine concentration was measured at the time of assessment was below the required 0.2 mg/L at a point of use; and,
- There are no records of bacteriological analyses taken from this system.

12.4 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).

12.4.1 Priority 1 and 2

No Priority 1 and 2 upgrades were identified because the water supply is not currently used to provide drinking water.

12.4.2 Priority 3

The following recommendations are made to ensure safe drinking water should the existing water delivery system be relied on for a drinking water supply at some time in the future:

- Install a disinfection consisting of duplex filtration (NSF 61) and a NSF/ANSI 55 certified UV system. These are conceptual design recommendations based on the information available for planning and budgeting purposes. Engineering input will be required for final system specifications.
- Secure the storage tank by constructing an add-on enclosure to ensure that it cannot be tampered with and is not exposed to direct sunlight;
- Ensure that the tank is cleaned and disinfected on a regular schedule (once per year is considered adequate in consideration of the seasonal use); and,
- Initiate routine bacteriological testing.

12.5 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.

12.5.1 Priority 3

- The recommended duplex filtration and UV system (NSF/ANSI approved) would cost approximately **\$3,000** installed.
- An add-on enclosure to house the water storage tank would cost approximately **\$5,000** (assuming that heating is not required because the building is only used seasonally).

Consideration could be given to drilling a cluster type water well to serve both the ATB day use building and the adjacent crew quarters which currently has a similar “camp” style seasonal use system.

13.0 BUILDING 5640: MAYO PROPERTY MANAGEMENT AGENCY SHOP

13.1 Description of Existing Water Supply System

Building 5640, the Mayo PMA Shop, is currently serviced by water delivery. Delivered water is stored in a 1100 L polyethylene water storage tank located in the building. The water source is presumed to be from the Village of Mayo operated well and treatment system with delivery by the Na Cho Nyak Dun First Nation. A site plan is included as Figure 5640-A in Appendix A13. The coordinates of the water storage tank, as measured by a handheld GPS device were recorded as:

- UTM ZONE 8
- Northing: 7054007
- Easting: 456481

A schematic detailing the water supply system is provided as Figure 5640-B in Appendix A13. Photos of the well and water system are also included at the back of this appendix.

13.2 Water Quality Results

13.2.1 Water Quality Results from Previous Sampling

There are no bacteriological or water quality results from previous sampling available.

13.2.2 Identification of Additional Analytical Testing Required

It is presumed that the water source is the Village of Mayo well which is a shallow well system operated by the Village of Mayo that is chlorinated at the source. Field chemistry done at the time of the water system assessment indicated that the residual concentration was 0.01 mg/L, which is below the required 0.2 mg/L required at a point of use.

13.3 Identified Water System Deficiencies and Associated Risk

13.3.1 High and Medium Risk Deficiencies

The deficiencies observed that may result in a medium to high health risk are summarized below:

- Field chemistry determined that the residual chlorine concentration was below the required 0.2 mg/L at the point of use;
- There are no records of bacteriological analyses taken from this system and the tank may not be cleaned routinely; and,
- There is no vermin proof screen on the overflow/vent.

13.3.2 Low Risk Deficiencies

No low risk deficiencies were identified.

13.4 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).

13.4.1 Priority 1

The following recommendations are made to mitigate immediate risk to the water system:

- Install disinfection consisting of NSF 61 certified duplex filtration and a NSF/ANSI 55 certified UV system (or equivalent). These are conceptual design recommendations based on the information available for planning and budgeting purposes. Engineering input will be required for final system specifications.
- Install a vermin proof screen on the overflow/vent.
- Ensure that the tank is cleaned and disinfected on a regular schedule (every 6 months); and,
- Initiate a routine bacteriological testing program.

13.4.2 Priority 2 and 3

No Priority 2 or 3 upgrades are recommended at this time. All health risks should be mitigated through Priority 1 upgrades.

13.5 Cost Estimates for Mitigative Options

13.5.1 Priority 1

Estimated costs for materials and labour for recommended Priority 1 upgrades are provided below. An additional contingency allowance of 20% is suggested for budgetary purposes.

- Duplex filtration and UV system (NSF/ANSI approved) would cost approximately **\$3,000** installed.
- A vermin proof screen on the vent/overflow would be negligible and could be installed at the same time as the previous work.

14.0 BUILDING 5650: MAYO WILDLIFE WORKSHOP

14.1 Description of Existing Water Supply System

The Mayo Wildlife Workshop (Building 5650) water system is supplied by a well located in a pit below grade approximately 4 m east of the wildlife workshop. A site plan is provided as Figure 5650-A in Appendix A14. The coordinates of the wellhead, as measured by a handheld GPS device, were recorded as:

- UTM ZONE 8
- Northing: 7053891
- Easting: 456556

This system is equipped with an inline filter; however, there is no other treatment and no disinfection for the system. A schematic detailing the water supply system is provided as Figure 5650-B in Appendix A14. Photos of the well and water system are also included at the back of this appendix.

14.2 Description of Existing Wastewater Systems

There is a septic tank located on the west side of the wildlife workshop, and septic effluent is discharged to the west of the tank. The septic tank is located approximately 16 m west of the well and the in-ground effluent disposal field is located between approximately 16 m and 28 m from the well. The location of the septic system is indicated on Figure 5650-A.

14.3 Water Quality Results

14.3.1 Water Quality Results from Previous Sampling

Bacteriological

Eight samples were collected from the Mayo Wildlife Workshop water system between October 2004 and June 2005, which were tested for total coliform and *E. coli* by Yukon Environmental Health Services using the presence/absence test method. Results are tabulated in Table 5650-1 in Appendix A14. Two of the eight samples were rejected due to high turbidity, and coliform bacteria and *E. coli* were reported as absent in each of the other six samples.

Potability

YTG representatives for detailed potability analysis collected water samples on September 27, 2004 and June 8, 2005. The samples were submitted to Northwest Labs in Surrey BC and ALS Environmental in Vancouver BC. Results are summarized in Table 5650-2 in Appendix A14. EBA reviewed the analytical results for comparison with the Canadian Drinking Water Quality Guidelines (CDWQG) to observe general water quality; to identify and recommend additional sampling and analytical; and to identify potential indicators of contamination. Details are summarized below:

- At 96.1 NTU during the first sampling event and 92.7 NTU during the second sampling event, the turbidity exceeded both the CDWQG MAC of 1.0 NTU and aesthetic objective (AO) of 5.0 NTU;
- The barium concentration of 1.53 mg/L during the first sampling event and 1.38 mg/L during the second sampling event exceeded the CDWQG MAC of 1.0 mg/L;
- At 0.0087 mg/L during the first sampling event and 0.0142 mg/L during the second sampling event, the arsenic concentration was below the current CDWQG MAC of 0.025 mg/L, but above the proposed MAC of 0.005 mg/L;
- At 6.53 mg/L during the first sampling event and 4.3 mg/L during the second sampling event, the total iron concentrations exceeded the CDWQG AO of 0.3 mg/L;
- At 0.683 mg/L during the first sampling event and 0.626 mg/L during the second sampling event, the total manganese concentrations exceeded the CDWQG AO of 0.05 mg/L;
- The first sampling event reported colour to be greater than 60 CU, which is above the CDWQG AO of 15 CU;
- The water quality results indicated that all other health based and AOs were met for the parameters analyzed;
- The water quality results indicated that the groundwater from which this system receives its water supply is likely a calcium magnesium bi-carbonate sulphate chloride type water; and,
- The hardness (as CaCO_3) was 273 mg/L during the first sampling event and 280 mg/L during the second sampling event, and is considered very hard.

14.3.2 Identification of Additional Analytical Testing Required

Additional analytical for the Mayo Wildlife Workshop that was identified to be included during the water system assessments is detailed below:

- UV absorbance and UV transmissivity, as well as tannins and lignin, to determine potential for UV treatment as a disinfection option for this water system;
- Total and dissolved metals;
- Phosphate, silica, to determine the potential for a point of entry arsenic removal system;
- Total organic carbon (TOC); 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 water system assessment on August 17 2005 and was submitted to ALS Environmental in Vancouver BC for analysis of the selected parameters indicated above. These results are summarized in Table 3440-2 in Appendix A14 and the laboratory reports are included in Appendix B. The following points regarding the water quality results are of significance:

- Total and dissolved barium concentrations were in exceedence of CDWQG MACs at 1.44 and 1.31 mg/L respectively;
- Total iron (5.5 mg/L) were above the CDWQG AO of 0.3 mg/L while dissolved iron was below the laboratory detection limit of 0.03 mg/L indicating that the elevated iron concentration is most likely attributed to elevated turbidity;
- Total and dissolved manganese concentrations at 0.677 and 0.657 mg/L respectively were in exceedence of CDWQG AOs; and
- The total arsenic concentration at 0.00828 mg/L was above the proposed MAC of 0.005 mg/L while the dissolved arsenic concentration (0.00177 mg/L) is below the proposed MAC indicating that elevated arsenic can be partially attributed to elevated turbidity.

14.3.3 Indicators of Potential Contamination

Chloride, nitrate and nitrite concentrations can indicate impacts from surficial sources of contamination such as septic waste. Chloride concentrations in water samples collected from this system were slightly higher than expected background concentrations for the Mayo area. It should be noted that the Grader Station property, which is inferred to be upgradient of the site, also had elevated chloride concentrations in the shallow aquifer. Bulk salt storage on the Grader Station site may be the cause of the elevated chloride observed in the shallow aquifer in this area. Nitrate and nitrite concentrations are low and are within the normal background ranges for groundwater in the area. Although impact by septic discharge cannot be definitively ruled out, based on bacteriological results and low nitrate and nitrite, it does not appear that septic wastes were impacting on water quality in this well at the time of sampling.

14.4 Conceptual Hydrogeology

A driller's well log was not available for review for this well. Examination of well logs in the Mayo area show that well completion depths and lithology in the area is highly variable. Wells are completed at various depths, ranging from shallow dug wells to wells drilled to depths greater than 150 m. The Mayo area has been affected by one or more glaciations, sediments in the Village of Mayo area tend to consist of recent alluvium overlying fine-grained silts with varying interbedded sand and gravel. Sediment deposits are generally underlain by metamorphic bedrock, which is exposed in much of the upland areas. Widespread discontinuous permafrost is known to exist in the Mayo area and has been noted in several of the well logs examined.

Shallow groundwater flow generally occurs in the overlying alluvial deposits in the Village of Mayo area. Based on topography and proximity to surface water sources, the groundwater flow direction is inferred to be in the range of south to west towards the Mayo and/or Stewart River. The construction of the wellhead enclosure made the wellhead inaccessible to measurements for depth, and no information pertaining to the completion of the well is available.

14.5 Potential Contaminant Sources

Details and photographs of potential contaminant sources observed during the site investigation are compiled in Appendix A14.

Potential contaminant sources within 30 m of the wellhead are:

- A septic tank at 16 m; the septic field is between 16 m and 28 m;
- An above ground fuel storage tank (AST) at 7 m; and
- Vehicle parking at 2 m.

14.5.1 Spills Records and Contaminated Sites Search Results

It was reported by Environment Canada that three spills occurred in the 1970's at the White Pass and Yukon Route tank farm (WPYR) which is approximately 350 m northwest of the site. The first spill resulted in approximately 1600 L of furnace oil being discharged due to a mechanical failure. Reportedly the spill was contained and hydrocarbon impacted soils were disposed of off-site. Later in the decade two other spills resulted in discharges of 3700 L of fuel oil and 1600 L of gasoline respectively. Spill records are included in Appendix A11.

Another spill was reported in 1991 at the WPYR site when an unknown quantity of fuel caught fire and a truck exploded. 756, 000 L of water was used during fire suppression and reportedly, runoff was contained.

Two reported spills also occurred at the North 60 Petroleum Tank Farm in 1997 and 1999 due to the overfilling of a storage tank. Approximately 1000 L of diesel was spilled, however no record of remediation was reported.

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

14.6 Identified Water System Deficiencies and Associated Risk

14.6.1 High and Medium Risk Deficiencies

High and medium risk deficiencies identified during this study include:

- Poor surface completion of the wellhead (located in a pit below grade, evidence of sediment build-up on the base of the enclosure due to flooding);
- There is no surface sanitary seal (grout or bentonite seal as required by the Canadian Groundwater Association's Guidelines for Water Well Construction;
- There is no well log available to review well construction and lithology;
- 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;
- The well is located within 30 m of potential contaminant sources, including a septic field, an AST, and vehicle parking;
- The barium concentration is above the CDWQG MAC;
- The turbidity is above both the CDWQG MAC and AO; and
- There is no disinfection system present.

14.6.2 Low Risk Deficiencies

- The arsenic concentration, although not in exceedence of the current CDWQG MAC, has been reported above the proposed MAC of 0.005 mg/L;
- The iron concentration has been in exceedence of the CDWQG AO;
- The manganese concentration has been in exceedence of the CDWQG AO; and,
- The colour has been previously been in exceedence of the CDWQG AO.

14.7 Mitigative Options for Deficiencies

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

The existing well is not considered suitable for a drinking water source based on the water quality, and proximity to contaminant sources. The options of a replacement water well at a safe location on the site with respect to potential contaminant sources, or water delivery from a treated source at the Village of Mayo are presented below for comparison.

14.7.1 Priority 1

Regardless of which option is ultimately chosen, water from this well should not be used for human consumption until Priority 2 upgrades are completed. In the interim, until one of the options presented below is selected and implemented, YTG should provide bottled water and post suitable advisories. PMA should consult with Environmental Health and Social Services (EHSS) regarding appropriate advisories.

14.7.2 Priority 2

Option 1:

The first option presented involves drilling a new well that would be sited and constructed in consideration of the following:

- The well should be equipped with a surface seal to at least 6 m and a pitless unit should be installed with the casing raised above grade (500 mm);
- The well must be located at a distance greater than 30 m and upgradient from any potential source of contamination;
- The well should be at least 15 m in depth;
- The water from the new well must meet all CDWQG health based guidelines. If there are any exceedences in the CDWQG health-based guidelines then a treatment system must be designed and installed as necessary. A treatment/disinfection system would likely consist of a NSF certified filtration system (to 1 micron absolute) followed by a UV disinfection system. Pretreatment would likely be required.

A shallow well at this site is not considered to be a safe option given the land-use on adjacent properties and at the Grader Station. It should be noted that groundwater obtained from deep wells in this area is typically highly mineralized and generally has aesthetically poor water quality. Water from a deep well in this vicinity would likely require treatment for hardness and possibly arsenic, iron and manganese.

Option 2:

The second option would involve disconnecting the existing well from the domestic system and converting to bulk water delivery with UV disinfection and filtration. This option would involve the least risk, and the least capital cost, but would result in higher operation and maintenance costs for the long-term.

14.7.3 Priority 3:

Following Priority 2 upgrades, the existing well should be properly decommissioned. It is anticipated that Priority 1 and 2 upgrades would mitigate all health risks.

14.8 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.

14.8.1 Priority 1

- A bottled water station would cost in the order of **\$250** and bottled water would cost approximately \$10 per 20 L bottle.

14.8.2 Priority 2

Option 1:

- A new well, assuming that it is drilled to approximately 50 m in depth through overburden deposits, would likely cost in the order of **\$40,000** to drill, test, and connect (including pump, drop pipe and freeze-protected underground piping);
- The materials and labour costs for a treatment/disinfection system (based on water quality from other deep wells in the area) would likely cost in the order of **\$7,700**; assuming **\$600** for the duplex filtration (NSF 61) system, **\$4,000** for a duplex softening system, **\$2,400** for the NSF/ANSI 55 certified UV disinfection, and **\$700** for a dedicated Reverse Osmosis system.

Option 2:

To supply and install a water storage tank, new jet pump and connect to existing plumbing would likely cost in the order of **\$3,450**. A filtration and NSF/ANSI certified UV system would also cost in the order of **\$3,000** installed. Therefore, the capital cost for this option would be approximately **\$6,450**. The Na Cho Nyak Dun First Nation currently provides water delivery in the area from a treated source operated by the Village of Mayo. Delivery costs should be considered when comparing life cycle costs of this option with Option 1.

14.8.3 Priority 3

Decommissioning of the existing well would cost approximately **\$1,000**. Consideration should be given to completing this work at the same time as Priority 2 work to save on mobilization/demobilization costs.

In consideration of Priority 1, 2 and 3 recommended upgrades for both options, the total cost for a replacement well and required treatment would likely be in the order of **\$44,350** for materials and labour. Reconfiguring the water system for water delivery and back-up treatment (in consideration of low residual chlorine concentrations being observed at other buildings on water delivery) would cost in the order of **\$7,700** for materials and labour. Delivery charges should be considered when evaluating life cycle costs to compare each of these options.

15.0 BUILDING 5653: MAYO AIRPORT TERMINAL BUILDING

15.1 Description of Existing Water Supply System

The Mayo Airport Terminal Building (Building 5653) is currently serviced by a water supply system that delivers water from a 38 m deep well located in a pit below grade. At the time of water system assessment there was no cap on the wellhead, however, it is understood that a cap was installed when Aqua Tech completed well cleaning, downhole video camera inspection and redevelopment work on this well in October 2005. A site plan is provided as Figure 5653-A in Appendix A15. The coordinates of the wellhead, as measured by a handheld GPS device, were recorded as:

- UTM ZONE 8
- Northing: 7054513
- Easting: 456406

This system is equipped with a 5-micron filter however; there is no other treatment or disinfection for this system. A schematic detailing the water system is provided as Figure 5653-B in Appendix A15. Photos of the well and water system are also included at the back of this appendix.

15.2 Description of Existing Wastewater Systems

Wastewater from the terminal building is discharged into a septic system located to the southeast of the building. The tank is approximately 34 m southeast of the well. It is unknown whether the septic system uses a holding tank and sewage education, or an effluent disposal field, however due to the location of the tank it can likely be inferred that a septic field (if present) would be located greater than the required 30 m from the well. A site plan showing the location of the septic tank is given by Figure 5653-A in Appendix A15.

15.3 Water Quality Results

15.3.1 Water Quality Results from Previous Sampling

Bacteriological

Nine samples were collected from the Mayo Airport Terminal Building 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 5653-1 in Appendix A15. One sample out of nine reported the presence of total coliform bacteria. The most recent sample results provided, however, reported that coliform bacteria were not present. *E. coli* was reported as not present in all samples for which results were provided.

Potability

YTG representatives collected water samples from the Mayo Airport Terminal Building water system on September 27, 2004. The samples were submitted to Northwest Labs in Surrey BC for potability analyses. Results are summarized in Table 5653-2 in Appendix A15. EBA reviewed the analytical results to compare them with the Canadian Drinking Water Quality Guidelines (CDWQG) to observe general water quality; to identify and recommend additional sampling and analytical; and to identify potential indicators of contamination. Relevant details are as follows:

- At 0.0756 mg/L, the arsenic concentration was above the CDWQG MAC of 0.025 mg/L;
- At 23.5 NTU, turbidity was above both the CDWQG MAC of 1.0 NTU and aesthetic objective (AO) of 5.0 NTU;
- At 2.62 mg/L, the total iron concentration was in exceedence of the CDWQG AO of 0.3 mg/L;
- At 0.272 mg/L, the total manganese concentration was in exceedence of the CDWQG AO of 0.05 mg/L;
- The colour was greater than 60 CU, which is above the CDWQG AO of 15 CU;
- The water quality results indicated that all other health based and AOs were met for the parameters analyzed; and,
- The hardness (as CaCO₃) was 349 mg/L, and is considered very hard.

15.3.2 Identification of Additional Analytical Testing Required

Additional analytical for the Mayo Airport Terminal building that was identified to be included during the water system assessment is detailed below:

- UV absorbance and UV transmissivity, as well as tannins and lignin, to determine potential for UV treatment as a disinfection option for this water system;
- Detailed potability analyses including metals, anions and nutrients;
- Silica and phosphate, to determine the potential for a point of entry arsenic removal system;
- Total organic carbon (TOC); and
- Measurements in the field for total dissolved solids, conductivity, pH, and temperature.

Additional Analytical Results

EBA collected a water sample during the field program on August 17 2005, and shipped it under chain of custody to ALS Environmental in Vancouver BC for analysis of selected parameters as indicated above. The results are summarized in Table 3440-2 in Appendix A15 and the laboratory reports are included in Appendix B. The following points regarding the water quality results are of significance:

- At 65.4 NTU, the turbidity of the water exceeded the CDWQG health based MAC of 5.0 NTU;
- Total arsenic at 0.0575 mg/L was above the CDWQG MAC of 0.025 mg/L, dissolved arsenic at 0.0200 mg/L was below the current MAC, but above the proposed MAC of 0.005 mg/L;
- Total iron at 3.77 mg/L was in exceedence of the CDWQG AO of 0.3 mg/L, dissolved iron concentration was below the laboratory detection limit of 0.03 mg/L indicating that elevated iron is most likely related to elevated turbidity; and
- Total and dissolved manganese at 0.289 and 0.273 mg/L respectively were both above the CDWQG AO of 0.05 mg/L.

15.3.3 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 were also low and within the normal background range for this area. These water quality results indicate that the groundwater sample obtained from W-5653 was not under the influence of anthropogenic sources of nutrients or anions that may be derived from septic wastes.

15.4 Conceptual Hydrogeology

A driller's well log was not available for review for this well. Examination of well logs in the Mayo area show that well completion depths and lithology in the area is highly variable. Wells are completed at various depths, ranging from shallow dug wells to drilled wells greater than 150 m deep. The Mayo area has been affected by one or more glaciations, sediments in the Village of Mayo area tend to consist of recent alluvium overlying fine-grained silts with varying interbedded sand and gravel. Sediment deposits are generally underlain by metamorphic bedrock, which is exposed in much of the upland areas. Widespread discontinuous permafrost is known to exist in the Mayo area and has been noted in several of the well logs examined.

The Airport well is completed at a depth of approximately 56 m below grade with a static water level of 7.70 m below ground. Based on topography and proximity to surface water sources, the groundwater flow direction is inferred to be in the range of south to west towards the Mayo and/or Stewart River. Given the depth of the well, and based on the surficial geology of the area, it is likely that the well is completed in a confined aquifer and may have thick sequences of fine grained soils overlying the aquifer.

15.5 Potential Contaminant Sources

Details and photographs of potential contaminant sources observed during the site investigation are compiled in Appendix A15.

Potential contaminant sources within 30 m of the wellhead are:

- An underground fuel storage tank (UST) at 18 m.

In addition, there is a cemetery located 63 m south of the well; the proposed required setback distance from wells to Cemeteries in the proposed Part III - Small Water Systems Regulations is 120 m. As mentioned in the previous section, the well is completed at a depth of 56 m, likely within a confined aquifer and may have thick sequences of fine grained soils overlying the aquifer. Additionally, the well is inferred to be upgradient of the cemetery and the proximity to the cemetery is not considered to be a significant concern.

15.5.1 Spills Records and Contaminated Sites Search Results

It was reported by Environment Canada that three spills occurred in the 1970's at the White Pass and Yukon Route tank farm (WPYR) which is approximately 200 m south of the site. The first spill resulted in approximately 1600 L of furnace oil being discharged due to a mechanical failure. Reportedly the spill was contained and hydrocarbon impacted soils were disposed of off-site. Later in the decade, two other spills resulted in discharges of 3700 L of fuel oil and 1600 L of gasoline respectively. Spill records are included in Appendix A15.

Another spill was reported in 1991 at the WPYR site when an unknown quantity of fuel caught fire and a truck exploded. 756, 000 L of water was used and reportedly, runoff was contained.

Two reported spills also occurred at the North 60 Petroleum Tank Farm in 1997 and 1999 due to the overfilling of a storage tank. Approximately 1000 L of diesel was spilled, however no record of remediation was reported.

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

The well serving this facility is approximately 200 m from the spill site locations in a direction inferred to upgradient. The depth of the well and the fact that it is likely upgradient would provide protection from surficial sources of contamination. It is considered very unlikely that these reported spills or other activities at the bulk fuel sites would have impacted on deep groundwater in the vicinity of the airport well.

15.6 Identified Water System Deficiencies and Associated Risk

15.6.1 High and Medium Risk Deficiencies

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

- Poor surface completion of the wellhead (located in a pit below grade);
- There is no surface sanitary seal (grout or bentonite seal as required by the Canadian Groundwater Association's Guidelines for Water Well Construction;
- There is no driller's log available to review well construction and lithology;
- 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.
- The well is located within 30 m of potential contaminant sources including a UST;
- A water sample collected for bacteriological analysis tested positive for total coliform bacteria;
- The total arsenic concentration was in exceedence of the CDWQG MAC;
- The turbidity was in exceedence of both the CDWQG MAC and AO; and,
- There is no disinfection system present.

We understand that Aqua Tech Services and Supplies Ltd. completed chemical and physical well cleaning and redevelopment in October 2005. It is recommended that a follow-up sample be collected to determine whether well rehabilitation has improved water quality at this well. It is possible that reduced turbidity due to redevelopment will result in lowered iron, manganese and possibly arsenic concentrations. Existing water chemistry will be critical for final treatment system design.

15.6.2 Low Risk Deficiencies

- The Airport's well is located approximately 63 m from the closest property line of the adjacent cemetery, which is less than the proposed 120 m minimum setback distance required within the proposed Part III –Small Water System Regulations. However, based on the inferred groundwater flow direction and depth to well, this is considered a low risk to the drinking water supply serving the Airport;
- The iron concentration was in exceedence of the CDWQG aesthetic objective (AO);
- The manganese concentration was in exceedence of the CDWQG aesthetic objective; and,
- The colour has been reported above the CDWQG AO.

15.7 Mitigative Options for Deficiencies

Without treatment to remove arsenic to below the existing MAC, this water system should not be used for a potable water supply. Advisories and a bottled water station were present on the CARS side of the Terminal at the time of the assessment, however, there were no advisories in the waiting area. Until Priority 1 upgrades are completed, appropriate advisories should be posted on both sides of the airport building.

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).

15.7.1 Priority 1

The following mitigative options should be carried out to address the high-risk deficiencies associated with the water system at the Mayo Airport Terminal Building:

- Standard wellhead upgrades consisting of a pitless unit installation, extension of casing to at least 500 mm above grade, and retrofitting the wellhead with a bentonite/grout surface sanitary seal should be completed.
- A duplex water softener should be installed for UV system pre-treatment and general water quality improvement.

- A NSF/ANSI 55 certified UV system (or equivalent) should be installed to ensure disinfection. These are conceptual design recommendations based on the information available for planning and budgeting purposes. Engineering input will be required for final system specifications.
- A reverse osmosis system should be installed to provide drinking water with arsenic concentrations below the MAC and proposed MAC. The RO would also provide secondary treatment at the dedicated taps because viruses, bacteria and protozoa would not pass through the RO membrane. Dedicated drinking water taps could be plumbed into both sides of the building to provide drinking water to staff and to general public. Signs should be posted indicating that drinking water should be obtained from the dedicated drinking water taps only.
- The well and water system should be shock chlorinated.

15.7.2 Priority 2

The existing UST should be removed and replaced with a double walled tank with “Kamlock” fill connections and flex hosing. Any hydrocarbon-impacted soils should be documented and removed from the site for treatment at a land farm. This work should be completed under the supervision of a qualified environmental consultant.

All other health risks would be mitigated by the proposed Priority 1 upgrades.

15.7.3 Priority 3

The proposed Priority 1 and 2 upgrades should mitigate all health risks associated with this water system. As well, the proposed Priority 1 upgrades should improve aesthetic water quality by reducing hardness, iron and manganese, which would help to reduce fixture staining and plumbing encrustation. The wellhead upgrades, UV treatment and RO system installation in Priority 1 would further reduce any risk to water quality posed by the existing cemetery that is 63 m south of the well.

15.8 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.

15.8.1 Priority 1

Class D cost estimates for mitigative options to address the high-risk deficiencies for this site are as follows:

- To complete the recommended wellhead upgrades consisting of pitless unit installation, well casing extension, piping and heat trace upgrades would cost in the order of **\$5,000** for materials and labour.
- A filtration and UV treatment/disinfection system would likely amount to a total installed cost of about **\$3,000**;
- A duplex softening system of adequate size would cost approximately **\$4,000** installed; and,
- Supply and installation of a reverse osmosis system with a dedicated drinking water tap in the kitchen areas and in the terminal waiting area would cost approximately **\$800**.

Therefore the total estimated cost for all recommended Priority 1 upgrades is approximately **\$12,800**.

15.8.2 Priority 2

Estimated costs for UST removal, tank disposal, removal of any associated hydrocarbon impacted soils, and replacement with a double walled AST with Kamlock fill connection and flex hose would cost in the order of **\$8,000** assuming that there is negligible soil contamination. The costs could be significantly higher if soil contamination is present in the vicinity of the building.

15.8.3 Priority 3

There are no recommended Priority 3 upgrades at this time. Priority 1 and 2 upgrades should mitigate all health risks.

16.0 BUILDING 2544: DAWSON CITY AIRPORT TERMINAL BUILDING

16.1 Description of Existing Water Supply System

The water system for the Dawson City Airport Terminal Building (Building 2544) is supplied by a 12.2 m deep well that is located in pit below grade approximately 4 m east of the terminal building adjacent to the airport apron. A site plan is provided as Figure 2544-A in Appendix A16. The coordinates of the wellhead, as measured by a handheld GPS device, were recorded as:

- UTM ZONE 7
- Northing: 7103361
- Easting: 591523

There are no treatment or disinfection components to this water system. A schematic detailing the water supply system is provided as Figure 2544-B in Appendix A16. An 8.1 m deep abandoned well is located in the crawl space underneath the terminal building approximately 9 m from the well that is in use. Photos of the well and water system are also included at the back of Appendix A16.

16.2 Description of Existing Wastewater Systems

A septic holding tank serving the Airport Terminal is located near the northwest corner of the building, approximately 28 m west of the well. The septic system location is indicated on Figure 2544-A in Appendix A16. It is unclear whether there is an in-ground septic disposal field associated with this tank. If there is a septic field, it may be within 30 m of the well. A steel casing, which may indicate the location of a septic field was observed protruding from the ground to the west of the airport building. The purpose of this casing should be determined.

16.3 Water Quality Results

16.3.1 Water Quality Results from Previous Sampling

Bacteriological

Seven samples were collected from the Dawson City Airport Terminal Building 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 2544-1 in Appendix A16. Coliform bacteria and *E. coli* were reported as absent in each of the seven samples for which results are provided.

Potability

Water samples were collected from the Dawson City Airport Terminal Building water system on September 29, 2004 and June 8, 2005. The samples were submitted to Northwest Labs in Surrey BC and ALS Environmental in Vancouver BC for potability analyses. The results of these analyses are summarized in Table 2544-2 in Appendix A16. 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. Relevant details are as follows:

- 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 is calcium bicarbonate type with a pH of approximately 7.4; and,
- The hardness (as CaCO_3) was in the order of 170 mg/L during both sampling events, and is considered moderately hard.

16.3.2 Identification of Additional Analytical Testing Required

Additional analytical for the Dawson City Airport Terminal Building that was identified to be included during the water system assessments is detailed below:

- UV absorbance and UV transmissivity, as well as tannins and lignin, to determine potential for UV treatment as a disinfection option for this water system;
- Total organic carbon (TOC); 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 water system assessment on August 19 2005, and was submitted to ALS Environmental in Vancouver BC for analysis of the additional parameters indicated above. These results are summarized in Table 2544-2 in Appendix A16 and the laboratory reports are included in Appendix B.

16.3.3 Indicators of Potential Contamination

Chloride, nitrate and nitrite concentrations can indicate impacts from surficial sources of contamination such as septic waste. Chloride concentrations were low and are within the normal background range for groundwater in the area. Nitrate and nitrite concentrations for this sample are also low and within the normal background range for this area. These water quality results indicate that the groundwater sample obtained from W-2544 was not under the influence of anthropogenic sources of nutrients or anions that may be derived from septic wastes.

16.4 Conceptual Hydrogeology

This well is completed at a depth of 12.2 m within a coarse gravel, cobble and boulder aquifer. The well log indicates a static water level of 4.7 m below ground with no fine-grained material overlying the aquifer. The aquifer is very vulnerable to surficial sources of contamination and is likely under the direct influence of surface water.

This well is situated southeast of the Klondike River and is likely completed within the alluvial floodplain deposits. Water levels and groundwater flow direction in the aquifer is most likely closely connected to water levels in the Klondike River. The ambient groundwater flow direction in the vicinity of the well is likely northwesterly down the river valley and towards the river.

16.5 Potential Contaminant Sources

Details and photographs of potential contaminant sources observed during the site investigation are compiled in Appendix A16.

Potential contaminant sources within 30 m of the wellhead are:

- A septic holding tank at 28 m;
- An above ground fuel storage tank (AST) at 30 m; and
- An abandoned well at 9 m.

In addition, an underground fuel storage tank and several spill events have taken place at the site.

16.5.1 Spills Records and Contaminated Sites Search Results

The following spill events were documented by Environment Canada Spills records and included in Appendix A16:

- It was reported that during the month of August 1982, two spills occurred at the airport due to overfilling of fuel tanks.
- During the month of June 1988, two spills occurred on the gravel tarmac behind the airport terminal.
- Various spills of fuel occurred between 1992 and 1994 due to overfilling of the UST resulting in approximately 4500 L of heating fuel being discharged.
- Two other spills of unknown quantities of aviation fuel occurred on the airport property in 1999 and 2001. Little information on cleanup is available.

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

16.6 Identified Water System Deficiencies and Associated Risk

16.6.1 High and Medium Risk Deficiencies

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

- Poor surface completion of the wellhead (located in a pit below grade);
-

- There is no surface sanitary seal (grout or bentonite seal as required by the Canadian Groundwater Association's Guidelines for Water Well Construction;
- At 12.2 m in depth, the well is considered to be a shallow well completed within a shallow - unconfined aquifer. The well is vulnerable to surface sources of contamination including chemical and biological contaminants;
- 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), has a production zone that is less than 15 m below grade, and does not meet the requirements of the Guidelines for Water Well Construction.
- The well is located within 30 m of potential contaminant sources, including an abandoned well and an AST and fueling area;
- There have been several historical spill events on the airport property, some of which were in relatively close proximity to the well; and,
- There is no treatment or disinfection system present.

16.6.2 Low Risk Deficiencies

There were no low-risk deficiencies identified for this site. All deficiencies are considered to be either high or medium risk.

16.7 Mitigative Options for Deficiencies

The following mitigative options are recommended to address the immediate risk deficiencies associated with the water system at the Dawson City Airport Terminal Building. 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). A summary of the results of this study is provided below:

- Potential contaminants of concern including polycyclic aromatic hydrocarbons, extractable petroleum hydrocarbons and glycols were not detected above laboratory detection limits for the sample collected on November 22nd, 2005.
- Several potential contaminants of concern exist within the 50-day zone of travel of the well capture zone.

Deficiencies are categorized by recommended level of priority (with Priority 1 being most critical).

16.7.1 Priority 1

The following Priority 1 mitigative options are recommended to address the high-risk deficiencies associated with the water system at the Dawson City Airport Terminal:

- An adequate disinfection system should be installed due to the vulnerability of this aquifer to potential biological parameters and the absence of a bentonite grout seal. Based on water quality results, it is anticipated that a UV system could be utilized without pre-treatment. Since the well has been flagged as being potentially under the direct influence of surface water (EBA 2006) it is recommended that NSF-16 certified filtration (to 1 micron absolute) followed by an NSF/ANSI 55 certified UV disinfection (or equivalent) system be installed. These are conceptual design recommendations based on the information available for planning and budgeting purposes. Engineering input will be required for final system specifications.
- Recommendations to implement management strategies and contingency planning are outlined in the letter report of March 2006, and include the following:
 - Implementation of a monthly monitoring program for potential contaminants of concern including hydrocarbons (PAH, BTEX/VPH) and glycols.
 - Regulation and management of activities within the well capture zone including the relocation of proposed fuel storage and handling facilities at the Initial Attack Base.
 - Development of contingency plans so that alternate water supply sources can be supplied in the event of a spill or fuel release within the well capture zone.

Given the inherent vulnerability of the aquifer and risk posed by existing potential contaminants of concern within the well capture zone, consideration should be given to converting this system to bulk water delivery. Alternatively, the well could

be re-located to a location upgradient from all potential contaminant sources. Given the size of the site, and the risk posed by the airport runway and fuel handling activities, this new well would have to be located a significant distance away from the airport terminal building (> 400 m) to ensure no high-risk activities are occurring within the capture zone.

16.7.2 Priority 2

The following Priority 2 upgrades are recommended to mitigate remaining health risks to this water system:

- Standard wellhead upgrades consisting of pitless adapter (snappy type), casing extension, retrofitting of a bentonite/grout surface sanitary seal, casing insulation and installation of a high visibility lockable PVC stick-up casing protector.
- Decommissioning of abandoned wells in accordance with proposed regulations.

16.7.3 Priority 3

No low risk deficiencies have been identified for this site.

16.8 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.

16.8.1 Priority 1

Class D estimated costs for Priority 1 recommended upgrades are detailed below:

- A filtration and UV disinfection system would cost approximately **\$3,000** for materials and labour.
- The recommended monthly sampling program would cost approximately **\$500** per month (**\$6,000** per year) and should be included in an operation budget.

- Capital costs for regulation of activities within the well capture zone including the relocation of proposed fuel storage and handling facilities would cost in the order of **\$10,000**. There would be ongoing costs to continue to regulate activities at this are of the site, which are difficult to quantify at this time. Development of contingency plans can be incorporated into the standard spill response plan for airport operations. Depending on contingency measures provided, costs may be variable.

The life cycle costs to convert to water delivery, or to drill a new well that is upgradient of all potential contaminant source should be considered against the recommended monitoring program to decide upon a long-term water supply option. If it is intended to continue using the existing well, it is recommended that Priority 2 upgrades be completed as described below.

16.8.2 Priority 2

- The recommended standard wellhead upgrades would cost approximately **\$3,000** for materials and labour;
- Decommissioning of two abandoned shallow wells would cost approximately **\$500** per well including materials and labour as long as this work is completed at the same time as the wellhead upgrades (e.g. mob/demob costs are shared).

16.8.3 Priority 3

There are no Priority 3 upgrades recommended at this time.



17.0 BUILDING 2575: DAWSON CITY WILDLIFE OFFICE

17.1 Description of Existing Water Supply System

The Dawson City Wildlife Office (Building 2575) is currently supplied by water delivery from a Town of Dawson City municipal water supply that is chlorinated at the source. Field chemistry done at the time of the water system assessment indicated that the residual chlorine concentration was 0.19 mg/L, which is just lower than the minimum required concentration of 0.2 mg/L (but within the range of error of the field equipment).

An approximately 9.4 m deep abandoned well is located in a pit north of the building. There is no well cap on the abandoned well and the well has poor wellhead protection. Anecdotal information indicates that the water from this well was of very poor aesthetic water quality. A site plan is provided as Figure 2575-A in Appendix A17. The coordinates of the abandoned well, as measured by a handheld GPS device, were recorded as:

- UTM ZONE 7
- Northing: 7102116
- Easting: 580298

17.2 Description of Existing Wastewater Systems

Wastewater from this building is discharged to a sewage holding tank that is pumped out regularly by a sewage education truck. The holding tank is located on the west side of the building approximately 15 m from the abandoned well. Figure 2575-A in Appendix A17 indicates the location of the sewage education tank.

17.3 Water Quality Results

17.3.1 Water Quality Results from Previous Sampling

Bacteriological

Eight samples were collected from the Dawson City Wildlife Office 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 2575-1 in Appendix A17. Coliform bacteria and

E. coli were reported as absent in each of the eight samples for which results are provided.

Potability

Water samples were collected from the Dawson City Wildlife Office water system on June 8, 2005. The samples were submitted to ALS Environmental in Vancouver BC for potability analyses. The results of these analyses are summarized in Table 2575-2 in Appendix A17. EBA reviewed the analytical results for comparison 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. Details are as follows:

- The water quality results indicate that all health based and aesthetic objectives were met for the parameters analyzed on the date sampled;
- The water quality results indicate that the groundwater from which this system receives its delivered water supply is calcium bi-carbonate type with a pH of approximately 7.9; and,
- The hardness (as CaCO₃) was 145 mg/L, and is considered hard.

17.3.2 Identification of Additional Analytical Testing Required

As this system is supplied by bulk water delivery that is treated at the source, and previous sampling indicated that there were no exceedences of CDWQG aesthetic objectives (AO) or health based guidelines, no additional analytical testing was identified.

17.3.3 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 the sample collected from this water system are also low and within the normal background range for the Dawson area.

17.4 Conceptual Hydrogeology

The abandoned well located at this site is completed at a depth of 9.4 m, with a static water level of 7.18 m below ground. No well logs were available for the Callison Industrial area, however, based on available well logs for other water wells completed in the Klondike River Valley, and the depth of the well, it is considered very likely that the aquifer in which this well is completed is very vulnerable to potential biological and chemical contamination.

The Town of Dawson City obtains water from pumping wells completed within an unconfined sand and gravel aquifer underlain by bedrock. Most wells in this aquifer are completed at depths ranging between 7.6 m to 20.4 m, with static water levels ranging from 4 m to 5 m below ground. This aquifer consists of floodplain sands and gravels deposited by the Yukon and Klondike Rivers, water levels and groundwater flow directions within the aquifer are closely connected to water levels in both the Rivers. Discontinuous lenses of permafrost have also been encountered in the area. The relatively shallow depth of the aquifer combined with the absence of confining material leaves this aquifer vulnerable to surficial sources of contamination. Well tests completed by Stanley and Associates in 1992 show that the relationship between the Yukon River and the aquifer is virtually 1:1. This implies that ambient groundwater flow direction within the aquifer is most likely north to northeasterly.

17.5 Potential Contaminant Sources

An investigation of potential contaminant sources around the source water supply wells from which water is obtained for bulk water delivery to this site was outside the scope of investigation for this report.

Potential contaminant sources observed during the site investigation surrounding the abandoned well, however, are compiled in field notes in Appendix A17.

Potential contaminant sources within 30 m of the wellhead are:

- A septic holding tank at 15 m; and
- An above ground fuel storage tank (AST) at 9 m.



There are several bulk fuel facilities and industrial operations with 200 m and likely upgradient of the abandoned well.

17.5.1 Spills Records and Contaminated Sites Search Results

Environment Canada has reported several spill events in the Callison Subdivision area that resulted in discharges of hydrocarbon products and industrial chemicals. Spill reports are included in Appendix A17. Given the coarse nature of the soils in the area, and shallow depth to groundwater, these spills may already have impacted on, or may in the future, pose a risk to the quality of groundwater in the abandoned well.

17.6 Identified Water System Deficiencies and Associated Risk

17.6.1 High and Medium Risk Deficiencies

Observed high and medium risk deficiencies are summarized below:

- There is no access port in the water storage tank to make it available for cleaning.
- There is no cap on the fill pipe and no vermin screen on the vent/overflow and insects and vermin could potentially enter the water system.

17.6.2 Low Risk Deficiencies

- The fill pipe and vent are constructed of ABS piping, and are not suitable for drinking water; and,
- The abandoned well has not been properly decommissioned and could potentially provide a conduit for deleterious substances to enter and pose a risk to the aquifer.

17.7 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).

We understand that the City of Dawson is planning to expand the piped drinking water system to include the Callison subdivision. Given the nature of the land use in this area, and the vulnerability of the aquifer that the abandoned well is completed within, it is recommended that the well not be used for a drinking water supply. A preferred option would be to upgrade and maintain the existing water delivery equipment and utilize bulk water delivery until a piped community water system is available.

17.7.1 Priority 1

Recommended upgrades to remedy observed deficiencies that are potentially high or immediate health risks are detailed below:

- Retrofit the water holding tank to make it accessible for routine inspection and cleaning. This may involve reducing the overall height of the tank, or, installing a side access port to facilitate access to the tank;
- Install a cap on the fill pipe and a vermin proof screen on overflow/vent;
- Monitor Free Available Chlorine Concentrations to ensure that they are at least 0.2 mg/L at the point of use; and,
- Institute a routine tank-cleaning program.

17.7.2 Priority 2

No Priority 2 upgrades were identified because all observed medium and high health risks would be mitigated by Priority 1 upgrades.

17.7.3 Priority 3

Recommended upgrades to remediate remaining deficiencies that are considered to be low health risks are:

- Replace ABS piping with PVC.

- Properly decommission abandoned well to prevent contamination of shallow aquifer.

17.8 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.

17.8.1 Priority 1

Class D estimated costs for Priority 1 recommended upgrades are detailed below:

- It is anticipated that the water tank could be altered to install a cleaning access port for approximately **\$1,000**.
- A cap and vermin proof screen could be supplied and installed for approximately **\$50**.
- The routine monitoring and cleaning should fall under an operation and maintenance budget.

17.8.2 Priority 2

There are no Priority 2 upgrades recommended at this time.

17.8.3 Priority 3

Class D estimated costs for Priority 3 recommended upgrades are detailed below:

- Decommissioning of the existing well would likely cost in the order of **\$500**.
- Replacing the ABS piping with PVC piping would cost approximately **\$200**.

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 CaCO₃) 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 education.

- 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 education 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 education

- 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 education 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.

19.0 BUILDING 2599: DAWSON CITY GRADER STATION

19.1 Description of Existing Water Supply System

The water system for Building 2599, the Dawson City Grader Station, is currently supplied by a drilled well located in a pit below grade approximately 6 m north of the grader station. A site plan is provided as Figure 2599-A in Appendix A19. The coordinates of the wellhead, as measured by a handheld GPS device, were recorded as:

- UTM ZONE 7
- Northing: 7102051
- Easting: 583201

Building 2599 is equipped with a dual water treatment system. Raw water from the well is filtered and softened at the point of entry to the building. The softened water is used to supply non-potable (“grey”) water to the grader station toilet fixtures and hose bibs, and some of the softened water is further treated to provide potable water to dedicated drinking water taps. The water supplying drinking water faucets is treated with a high-volume reverse osmosis (RO) treatment system. A schematic detailing the water supply system is provided as Figure 2599-B in Appendix A19. Photos of the well and water system are also included at the back of this appendix.

19.2 Description of Existing Wastewater Systems

All septic effluent from the building is discharged to ground on the west side of the building. Garage sump effluent after passing through an oil/water separator, discharges to a rock pit located approximately 36 m west and likely downgradient from the well. An in-ground septic discharge system is located near the rock pits; the tank is located approximately 42 m west of the well and the closest point of the in-ground sewage disposal system (septic field) is 50 m west and likely downgradient from the well. Figure 2599-A in Appendix A19 shows the locations of these wastewater disposal systems.

19.3 Water Quality Results

19.3.1 Water Quality Results from Previous Sampling

Bacteriological

Eight water samples were collected from the Dawson City Grader Station water system by YTG representatives 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 2599-1 in Appendix A19. Coliform bacteria and *E. coli* were reported as absent in each of the eight samples for which results were provided.

Potability

YTG representatives collected water samples from the Dawson City Grader Station water system on September 29th 2004 and June 8th 2005. The samples were submitted to Northwest Labs in Surrey BC and ALS Environmental in Vancouver BC for potability analyses. The results of these analyses are summarized in Table 2599-2 in Appendix A19. EBA reviewed the analytical results for comparison 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.

Water treatment at this site significantly improves water quality between the point of entry and the point of consumption. Large discrepancies between water quality results from two sampling events for which results are provided indicate that samples were not obtained from the same point on this water system. Results from the first sampling event (Sept 2004) appear to be representative of post-water softener and RO treatment while water quality from the second sampling (June 2005) event appear to be representative of raw water quality.

Water quality results from the first sampling event (post softener and RO) are summarized below:

- At 6.14, the pH was below the CDWQG aesthetic objectives of 6.5. This is likely caused by the treatment system; and,
- The water quality results indicated that all other health based and aesthetic objectives (AO) were met for the parameters analyzed.

Water quality results from the second sampling event, which is considered to be representative of raw water quality, are summarized below:

- At 41.1 NTU, the turbidity was in exceedence of both the CDWQG Maximum Acceptable Concentration (MAC) of 1.0 NTU and AO of 5.0 NTU;
- At 0.0864 mg/L, the total arsenic concentration was above the current CDWQG MAC of 0.025 mg/L;
- At 0.0174 mg/L, the total lead concentration was above the CDWQG MAC of 0.01 mg/L;
- At 8.39 mg/L, the total iron concentration was above the CDWQG AO of 0.3 mg/L;
- At 0.651 mg/L, the total manganese concentration was above the CDWQG AO of 0.05 mg/L;
- The water quality results indicated that all other health based and aesthetic objectives were met for the parameters analyzed;
- The water quality results indicated that the groundwater is calcium bi-carbonate type with a pH of approximately 8; and,
- The hardness (as CaCO_3) was 185 mg/L, and is considered very hard.

As illustrated by the raw water quality results, there are several health based and aesthetic objectives that the raw water quality does not comply with, necessitating the existing treatment system.

19.3.2 Identification of Additional Analytical Testing Required

Water samples for additional analytical testing were obtained at two points on the water system. Additional analytical completed on the sample of softened water (non-potable) collected at the time of the assessment is detailed below:

- UV absorbance and UV transmissivity, as well as tannins and lignin, to determine potential for UV treatment as a disinfection option for this water system;
- Total and dissolved metals;
- Turbidity;
- Phosphate and silicate in order to determine the potential for a point of entry arsenic removal system;
- Total organic carbon (TOC); and,
- Measurements in the field for total dissolved solids, conductivity, pH, and temperature.

A water sample was also collected from the potable water (post softener and RO), and analyzed for total arsenic, as previous sampling indicated the arsenic concentration to be 0.0047 mg/L, which is close to the proposed MAC for arsenic of 0.005 mg/L. The purpose of this sample was to evaluate whether a point of entry arsenic removal system will be required at some point in the future when the proposed MAC is brought into effect.

Additional Analytical Results

Water samples were obtained by EBA during the water system assessment on August 19, 2005 and submitted to ALS Environmental in Vancouver BC for analysis as described above. These results are also summarized in Table 2599-2 in Appendix A19 and the laboratory reports are included in Appendix B. Details are summarized below:

- The post RO sample had turbidity above the CDWQG at 1.22 NTU;
- As expected, the softened water had both total and dissolved iron and manganese concentrations below the CDWQG aesthetic objectives;
- Total and dissolved lead in the softened water are reported below the laboratory detection limit of 0.0020 mg/L;
- Total and dissolved arsenic concentrations (0.047 and 0.0441 mg/L) of the softened water are above the CDWQG MAC of 0.025 mg/L; and
- The total arsenic concentration in potable water collected at the point of consumption (post RO) was 0.00457 mg/L and meets both the current proposed CDWQG MAC.

19.3.3 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 were also low and within the normal background range for this area. These water quality results suggest that the aquifer from which the groundwater is obtained for the Dawson City Grader Station was not under the influence of septic wastes at the time of sampling.

19.4 Conceptual Hydrogeology

A driller's well log was not available for this well. Logs for wells in the area indicate that most wells are completed at depths ranging from 9 m to 20 m and generally draw water from unconfined sand and gravel aquifers. These aquifers are alluvial floodplain sediments deposited by the Klondike River and underlain by bedrock. The water levels and flow directions in these aquifers are generally closely connected to water levels in the Klondike River. This well is likely completed within this unconfined aquifer, which is vulnerable to surficial sources of contamination.

This well is located southeast of the Klondike River; the expected direction of groundwater flow is west with a component of flow that is northwesterly towards the Klondike River.

19.5 Potential Contaminant Sources

Details and photographs of potential contaminant sources observed during the site investigation are compiled in Appendix A19.

Potential contaminant sources within 30 m of the wellhead are:

- Vehicle parking at 2 m; and,
- Industrial activities within 30 m.

Also indicated on the site plan several other potential contaminant sources are within 60 m of the well as indicated below:

- Rock pits;
- Septic Tank;
- Septic Field;
- EnviroTank AST;
- Used solvent and other partially filled drums with unknown contents; and,
- Dredge pond (surface water).

19.5.1 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.

19.6 Identified Water System Deficiencies and Associated Risk

19.6.1 High and Medium Risk Deficiencies

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

- Poor surface completion of the well (located in a pit below grade);
- There is no surface sanitary seal (grout or bentonite seal as required by the Canadian Groundwater Association's Guidelines for Water Well Construction;
- By definition of the Draft Yukon GUDI Assessment Guideline, the well is potentially under the direct influence of surface water because it does not meet the requirements of the Guidelines for Water Well Construction;
- There is no driller's log available to review lithology and well construction;
- The well is located within 30 m of potential contaminant sources, including vehicle parking and industrial activities;
- Water samples taken from raw water have reported elevated arsenic, lead, turbidity, iron, manganese and colour; and,
- There is no disinfection (other than membrane filtration).

19.6.2 Low Risk Deficiencies

- The pH of the reverse osmosis treated water was below the CDWQG AO at the time of analysis.

19.7 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).

19.7.1 Priority 1

Recommended upgrades to remedy observed deficiencies that are potentially high or immediate health risks are detailed below:

- Install a disinfection system such as a NSF/ANSI certified UV treatment system (or equivalent) post softener and in advance of RO system to ensure adequate disinfection of potable water. UV transmittance measured on August 19th was approximately 78 % that is just below the recommended 85% for adequate UV disinfection. Re-sampling for UV transmittance should be completed prior to final system design. Chlorine injection may be required if results are deemed to be not suitable for UV disinfection. These are conceptual design recommendations based on the information available for planning and budgeting purposes. Engineering input will be required for final system specifications; and,
- Superchlorinate well and water system.

19.7.2 Priority 2

The following Priority 2 upgrades are recommended to mitigate remaining health risks:

- Standard wellhead upgrades consisting of pitless adapter installation, casing extension, retrofitting of a bentonite/grout surface sanitary seal, casing insulation and installation of a high visibility lockable PVC stick-up casing protector.
- Ensure that all commercial/industrial activities are restricted to areas on the site that are at least 30 m and preferably downgradient west of the well. It may not be feasible to have all vehicle parking at least 30 m from the well, however, it is recommended that parking areas should be at least 10 m from well.

19.7.3 Priority 3

No low risk deficiencies have been identified for this site.

19.8 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.

19.8.1 Priority 1

The recommended UV system and system superchlorination would cost approximately **\$2,800** for all materials and labour.

19.8.2 Priority 2

Standard wellhead upgrades as proposed (pitless adapter) would cost approximately **\$3,000** for materials and labour.

19.8.3 Priority 3

No Priority 3 upgrades have been identified at this time.

20.0 BUILDING 2600: KLONDIKE GRADER STATION

20.1 Description of Existing Water Supply System

The Klondike Grader Station (Building 2600), located 65 km north on the Dempster Highway is serviced by a water supply that obtains water from an approximately 14.4 m deep well. The wellhead is located in a tin clad plywood utilidor approximately 10 m southeast of the maintenance garage. Water is piped within the insulated and heat traced utilidor to the Residence Building, Grader Station and a Storage Building (Building 2605). The wellhead is approximately 150 mm above grade, but was not equipped with a sanitary cap on the casing at the time of the assessment. A site plan is provided as Figure 2600-A in Appendix A20. The coordinates of the wellhead, as measured by a handheld GPS device, were recorded as:

- UTM ZONE 7
- Northing: 7150453
- Easting: 633968

There is currently no treatment or disinfection for this system. Although there is an in-line filter, it was not in use at the time of the assessment (lid and change-out cluster were missing). A schematic detailing the water supply system is provided as Figure 2600-B in Appendix A20. Photos of the well and water system are also included at the back of this appendix.

20.2 Description of Existing Wastewater Systems

Wastewater from the Grader Station Residence building is piped to an in-ground septic disposal system on the east side of the living complex. The on-site sewage disposal system (septic field) begins approximately 25 m away and likely downgradient from the well. It is unclear whether toilet fixtures and grey water from the other buildings are also connected to this septic system. A site plan showing the septic system is given by Figure 2600-A in Appendix A20. Effluent discharge may be to leach pits located further east and greater than 30 m downgradient from the well.

20.3 Water Quality Results

20.3.1 Water Quality Results from Previous Sampling

Bacteriological

Six water samples were collected from the Klondike Grader Station Living Complex water system by YTG representatives between September 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 2603-1 in Appendix A20. Total Coliform bacteria were reported as present in two of the six samples for which results were provided, and were present in the most recent sample for which results are report (June 9, 2005). *E.coli* were not present in any of these samples.

Potability

Water samples were collected from the Klondike Grader Station water system by a YTG representatives on September 29, 2004 and June 8, 2005. The samples were submitted to Northwest Labs in Surrey BC and ALS Environmental in Vancouver BC for potability analyses. The results of these analyses are summarized in Table 2600-2 in Appendix A20. 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 as follows:

- At 13.0 NTU during the first sampling event and 12.5 NTU during the second sampling event, the reported turbidity was above the CDWQG MAC of 1.0 NTU and aesthetic objective (AO) of 5.0 NTU. Based on these turbidity readings, it is unlikely that the filtration system has been operational in the past year;
- At 0.74 mg/L during the first sampling event and 1.39 mg/L during the second sampling event, the total iron concentration was above the CDWQG AO of 0.3 mg/L;
- At 0.138 mg/L during the first sampling event and 0.142 mg/L during the second sampling event, the total manganese concentration was above the CDWQG AO of 0.05 mg/L;
- At 29 CU, the colour reported from the first sampling event was in exceedence of the CDWQG AO of 15 CU;

- The water quality results indicated that all other health based and AOs were met for the parameters analyzed;
- The water quality results indicated that groundwater is calcium bi-carbonate type with a pH of approximately 8; and,
- The hardness (as CaCO_3) was 201 mg/L during both sampling events, and is considered very hard.

20.3.2 Identification of Additional Analytical Testing Required

Additional analytical for the Klondike Grader Station maintenance building that was identified to be included during the water system assessments is detailed below:

- UV absorbance and UV transmissivity, as well as tannins and lignin, to determine potential for UV treatment as a disinfection option for this water system;
- Turbidity and colour;
- Total and dissolved iron and manganese;
- Total organic carbon (TOC);
- Extractable Petroleum Hydrocarbons (EPH) and Polycyclic Aromatic Hydrocarbons (PAH) to determine if known hydrocarbon contamination in soil and groundwater on the site is impacting on the water supply; 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 water system assessment on August 18 2005, and was submitted to ALS Environmental in Vancouver BC for analysis of the parameters indicated above. These results are summarized in Table 3440-2 in Appendix A20 and the laboratory reports are included in Appendix B. The following points regarding the water quality results are of significance:

- Concentrations of EPH and PAH parameters were below laboratory detection limits;
 - At 18.6 NTU, the turbidity of the water exceeded the CDWQG MAC of 5.0 NTU;
 - Total iron at 1.32 mg/L was above the CDWQG AO of 0.3 mg/L;
 - Dissolved iron was reported below the laboratory detection limit of 0.03 mg/L indicating that the elevated iron concentration is most likely attributed to elevated turbidity;
-

- Total and dissolved manganese at 0.138 and 0.133 mg/L were above the CDWQG AO of 0.05 mg/L; and
- Water quality analysis reported no other exceedences of CDWQG health based or AOs.

20.3.3 Indicators of Potential Contamination

Chloride, nitrate and nitrite concentrations can indicate impacts from septic waste. Chloride concentrations were low and can likely be considered as within the normal background ranges for groundwater in the area. Nitrate and nitrite concentrations for this sample are also low and likely within the normal background range for this area. These water quality results do not suggest that the aquifer from which the groundwater is obtained for the Klondike Grader Station is under the influence of septic wastes.

20.4 Conceptual Hydrogeology

The log for this well indicates that the well is completed at a depth of 14.3 m within a sand and gravel aquifer underlain by bedrock. The static water level measured during the water system assessment was 3.55 m below grade. The shallow depth of this aquifer combined with the absence of a fine-grained material leave this aquifer vulnerable to surficial sources of contamination. The direction of groundwater flow is likely south and parallel to the River with a component of flow towards the North Klondike River. Rapid changes in the river stage level may result in a reversing hydraulic gradient resulting in surface water recharging the aquifer. Due to the shallow nature of the well and the strong connection to the Klondike River, it is possible that this well is under the direct influence of surface water.

20.5 Potential Contaminant Sources

Details and photographs of potential contaminant sources observed during the site investigation are compiled in Appendix A20.

Potential contaminant sources within 30 m of the wellhead are:

- An on-site sewage disposal system (septic field) at 25 m;
- Klondike River at 15 m; and

- Above ground fuel storage tank (ASTs) at 15 m, 20 m, and 30 m.
- Access Consulting Group completed an Environmental Site assessment at the Klondike Maintenance Camp in 2003 (Access, 2004). Soil and groundwater at the Site were observed to have hydrocarbon parameter concentrations above the Yukon Contaminated Site Regulations for drinking water protection. We understand that additional assessment work may have been completed in 2005 by another consultant; however, the results of this additional assessment work were not available for review. Relevant points taken from the Access report are:
 - o There is confirmed hydrocarbon contamination of soil within 40 m of the well;
 - o There is inferred hydrocarbon contamination of shallow groundwater within 10 m of the well; and,
 - o Contaminants include diesel fuel and gasoline.

In addition, there is an abandoned dug well located inside the present maintenance garage that is approximately 35 m upgradient of the well. It appears to have a hydrocarbon absorption pad in it which implies that it is being impacted from the adjacent soil and groundwater contamination.. Various monitoring wells were also observed on the property.

20.5.1 Spills Records and Contaminated Sites Search Results

It was reported by Environment Canada that one documented spill of an unknown quantity of diesel was discharged to ground in 2001 due to a leaking filter on a generator. No further information was available.

The Government of Yukon Environmental Programs Branch and Environment Canada Environmental Protection Branch did not identify any other recorded spill events or contaminated sites issues for this site or neighbouring sites in close proximity. However, as mentioned previously, it is known that environmental assessment of soil and groundwater contamination is underway at this site.

20.6 Identified Water System Deficiencies and Associated Risk

20.6.1 High and Medium Risk Deficiencies

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

- Poor surface completion of the wellhead (was not equipped with a sanitary cap on the casing, there is evidence of rodents in the wellhead enclosure, the casing does not extend the required 500 mm above grade);
- 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 14.4 m within a shallow, unconfined aquifer that is only 15 m from the Klondike River and may be under the direct influence of surface water;
- 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) with a production zone less than 15 m below grade, is within 60 m of a surfacewater body, and does not meet the requirements of the Guidelines for Water Well Construction.
- The well is located within 30 m of potential contaminant sources including a on-site sewage disposal system (possibly septic field or leach pits), and various ASTs;
- The site is known to have been subject to hydrocarbon spills and has documented hydrocarbon contamination of soil and groundwater above Y-CSR standards;
- There have been two positive total coliform test results out of six samples collected from the Living Quarters. The most recent result provided was positive for total coliform bacteria (June 9, 2005);
- Turbidity has been in exceedence of the CDWQG MAC; and,
- There is no treatment or disinfection system present.

20.6.2 Low Risk Deficiencies

- The total iron concentration has been in exceedence of the CDWQG AO;
- The manganese concentration is reportedly in exceedence of the CDWQG AO; and,
- The colour has been reportedly been in exceedence of the CDWQG AO.

20.7 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).

Given the well location, construction, water quality and proximity to known contamination, it is recommended that this well not be used as a long term source of drinking water. Interim Priority 1 upgrades to ensure the safety of this water supply are recommended, while Priority 2 upgrades provide a long term option for a safe water supply. While the existing well is in use (ie. Option 1 - prior to Priority 2 upgrades) it would be prudent to sample routinely for potential contaminants of concern (EPH, PAH, benzene, toluene, ethylbenzene, xylene).

20.7.1 Priority 1

The following recommendations are provided in order to mitigate deficiencies that are of immediate concern. Priority 1 remedial recommendations include:

Option 1:

- The utilidor should be cleaned out and replaced with blown in foam insulation, the well cap replaced (if not completed already) and a localized near surface bentonite seal installed immediately around the wellhead;
- Sampling for EPH, PAH and BTEX should be completed during the spring snow melt and routinely (every 3 months) thereafter;
- The well and water system should be super-chlorinated;
- Disinfection treatment consisting of NSF 61 certified filtration to 1 micron (absolute), and a UV system that is NSF/ANSI certified (or equivalent) should be installed to ensure disinfection. Pretreatment consisting of a water softener may be necessary for optimum UV performance. 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 is insufficient data at present to assess the level of risk posed by the soil and groundwater contamination at this site. Option 1 should only be considered in conjunction with further routine chemical testing. As well, this option should only

be considered with routine bacteriological testing. In order to further reduce risk, a second option is proposed below:

Option 2:

Provide a bottled water station and post advisories (consultation with Environmental Health and Social Services is recommended) that water from taps should not be used for drinking.

20.7.2 Priority 2

Drill a replacement well located and constructed in consideration of the following:

- The well should be equipped with a surface seal to at least 6 m and a pitless adapter should be installed with the casing raised above grade (500 mm);
- The well must be located at a distance greater than 30 m and upgradient from any potential source of contamination;
- The well should be at least 15 m deep;
- The water from the new well must meet all CDWQG health based guidelines. If there are any exceedences in the CDWQG health-based guidelines then a treatment system must be designed and installed as necessary.

20.7.3 Priority 3

Following Priority 2 upgrades, the existing well should be properly decommissioned. It is anticipated that Priority 1 and 2 upgrades would mitigate all health risks.

20.8 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.

20.8.1 Priority 1

Class D cost estimates for recommended Priority 1 upgrades are provided as follows:

Option 1:

- Temporary wellhead upgrades would cost approximately **\$500**.
- A treatment/disinfection system would cost in the order of **\$4,500**; assuming **\$600** for the duplex filtration system, **\$2,400** for the NSF/ANSI 55 certified UV disinfection, and **\$1500** for contactor mobilization/demobilization.
- Well and water system superchlorination would cost approximately **\$200**.

Option 2:

- A bottled water station would cost in the order of **\$250** and bottled water would cost approximately \$10 per 20 L bottle.

20.8.2 Priority 2

Option 1:

- A new well, assuming that it is drilled to approximately 15 m in depth through overburden deposits, would likely cost in the order of **\$36,000** to drill, test, and hook up (including pump, drop pipe and freeze-protected underground piping).

Option 2:

- A new well, assuming that it is drilled to approximately 15 m in depth through overburden deposits, would likely cost in the order of **\$36,000** to drill, test, and hook up (including pump, drop pipe and freeze-protected underground piping); and,
- The materials and labour costs for a treatment/disinfection system would cost in the order of **\$4,500**; assuming **\$600** for the duplex filtration system, **\$2,400** for the NSF/ANSI 55 certified UV disinfection, and **\$1500** for contactor mobilization/demobilization.

20.8.3 Priority 3

Decommissioning of the exiting well would cost approximately **\$1,000**. Consideration should be given to keeping this well as a monitoring well, or to utilize for potential future site remediation. If decided that this well should be decommissioned, consideration should be given to completing this work at the same time as Priority 2 work to save on mobilization/demobilization costs.



21.0 BUILDINGS 2661 AND 2665: OGILVIE GRADER STATION COMPOUND

21.1 Description of Existing Water Supply System

The Ogilvie Grader Station (Building 2661) and Living Complex (Building 2665) are currently serviced by a water supply system that delivers water from a 6.6 m dug well that is located in the basement of the living complex. Piping between the buildings is enclosed in an insulated and heat traced tin clad utilidor. A site plan is provided as Figure 2665-A in Appendix A21. The coordinates of the wellhead, as measured by a handheld GPS device, were recorded as:

- UTM ZONE 7
- Northing: 7251342
- Easting: 655265

At the time of the assessment, the well in the Living Complex was supplying water to both buildings. This water system is not equipped with any treatment or disinfection. A schematic detailing the water supply system is provided as Figure 2665-B in Appendix A21. Photos of the well and water system are also included at the back of Appendix 21.

An abandoned 5.5 m deep dug well is located in the maintenance garage. The system is equipped with a pump and pressure tank, but this side of the system is currently not in use and is separated from the rest of the system by a closed valve. The coordinates of the wellhead, as measured by a handheld GPS device, were recorded as:

- UTM ZONE 7
- Northing: 7251301
- Easting: 625315

21.2 Description of Existing Wastewater Systems

The living complex and maintenance garage are both equipped with in-ground sewage disposal systems. The living complex septic effluent is discharged to septic system located the north of the building; and the tank and discharge field are located

greater than 30 m north and likely crossgradient from the well. The septic system serving the maintenance garage is located on the east side of the building approximately 25 m, and likely downgradient from the abandoned well, and greater than 30 m downgradient from the well that currently serves this system. Septic systems locations are shown on Figure 2665-A in Appendix A21.

21.3 Water Quality Results

21.3.1 Water Quality Results from Previous Sampling

Bacteriological

Six samples were collected from the Ogilvie Grader Station maintenance garage 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. Coliform bacteria and *E. coli* were reported as absent in each of the six samples for which results are provided. Six samples were also collected from the Ogilvie Living Complex water system between September 2004 and June 2005 and were tested for total coliform and *E. coli* by Yukon Environmental Health Services using the presence/absence test method. One out of the six sampling events reported the presence of total coliform bacteria. Because the most recent sampling event for which results are available (June 9, 2005) had total coliform present, it is recommended that re-sampling be completed as soon as possible. Results from bacteriological analyses are included in Table 2661/2665-1 in Appendix A21.

Potability

YTG representatives collected water samples from the Ogilvie Grader Station maintenance garage water system on June 8, 2005. The samples were submitted to ALS Environmental in Vancouver BC for potability analyses. The results of these analyses are summarized in Table 2661/2665-2 in Appendix A21. EBA reviewed the analytical results for comparison 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 (AO) were met for the parameters analyzed;
- The water quality results indicated that the groundwater from which this system receives its water supply is calcium bi-carbonate type with a pH of approximately 8; and,
- The hardness (as CaCO_3) was 126 mg/L, and is considered moderately hard.

YTG representatives collected water samples from the Ogilvie Living Complex water system on September 28, 2004 and July 15, 2005. The following observations were made:

- The water quality results indicated that all health based and AOs were met for the parameters analyzed;
- The water quality results indicated that the groundwater is calcium bi-carbonate type with a pH of approximately 8; and,
- The hardness (as CaCO_3) was 231 mg/L during the first sampling event and 228 mg/L during the second sampling event, and is considered very hard.

There are significant differences in the water quality results for the individual systems; this suggests that the water samples collected on these dates were from different sources. The dug well within the Grader station was not in use at the time of the assessment (the supply valve was closed). The water quality results suggest that the previous analytical data for the maintenance garage was taken when the maintenance garage dug well was still in use.

21.3.2 Identification of Additional Analytical Testing Required

Additional analytical for the Ogilvie Grader Station and Living Complex that was identified to be included during the water system assessments is detailed below:

- UV absorbance and UV transmissivity, as well as tannins and lignin, to determine potential for UV treatment as a disinfection option for this water system;
- Total organic carbon (TOC); and,
- Measurements in the field for total dissolved solids, conductivity, pH, and temperature.

Additional Analytical Results

A water sample was obtained from the Ogilvie Living Complex during the water system assessment on August 18, 2005, and was submitted to ALS Environmental in Vancouver BC for analysis. Since both buildings are now plumbed into this well, water quality results are relevant for both buildings. Results are summarized in Table 2661/2665-2 in Appendix A21 and the laboratory reports are included in Appendix B.

21.3.3 Indicators of Potential Contamination

Chloride, nitrate and nitrite concentrations can indicate impacts from surface water sources or septic waste. The chloride concentrations were relatively low and are likely within the normal background range for groundwater in the area. Nitrate and nitrite concentrations for this sample are also low and likely within the normal background range for this area. Monitoring of these indicator parameters over time for trends is recommended.

21.4 Conceptual Hydrogeology

The well that supplies this system is a shallow dug well. The well completion depth is approximately 5.6 m below grade and the static water level is 3.6 m below grade. Although there is no information available to review lithology, the shallow depth of the well indicates that the aquifer is vulnerable to surficial sources of contamination. The well is most likely completed within an unconfined aquifer with a static water level similar to the Ogilvie River water level. Water levels in the well are most likely connected to water levels in the Ogilvie River. The abandoned well in the grader station maintenance garage has a similar completion depth and static water level. The shallow depth of the well and close proximity to the Ogilvie River indicate that the well is potentially under the direct influence of surface water. The expected direction of groundwater flow is east to northeast towards the Ogilvie River.

21.5 Potential Contaminant Sources

Details and photographs of potential contaminant sources observed during the site investigation are compiled in Appendix A21. No potential contaminant sources were observed within 30 m of the well or within the area inferred to be upgradient of the well.

21.5.1 Spills Records and Contaminated Sites Search Results

Environment Canada spills records indicate that 220 tonnes of calcium chloride was washed from this site and into the Ogilvie River in 1998 due to a heavy rainfall event. No fish kill was observed and no residue was reported down stream. Reportedly, the stock pile was relocated above the new highwater mark.

21.6 Identified Water System Deficiencies and Associated Risk

21.6.1 High and Medium Risk Deficiencies

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

- The well is a shallow dug well likely completed in an unconfined aquifer vulnerable to surficial sources of contamination and potentially under the direct influence of surface water;
- The well in the maintenance garage has not been properly decommissioned;
- A water sample collected for bacteriological analysis tested positive for total coliform bacteria; and,
- There is no treatment or disinfection system present.

21.6.2 Low Risk Deficiencies

- The top of the culvert well does not extend above grade, but is adequately constructed with a tight-fitting lid in the basement of the living complex enclosure, with a low risk of flooding, and is approximately 1.15 m above the basement floor.

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

If not already completed, the water system should be re-sampled for total coliform and *E. coli* bacteria immediately. The following mitigative options are recommended to address the high-risk deficiencies associated with the water system at the Ogilvie Maintenance Camp:

- It would be prudent to install an adequate disinfection system due to the vulnerability of this aquifer to potential biological parameters, and the absence of a bentonite/grout sanitary seal. Based on water quality results, it is anticipated that a UV system could be utilized without pre-treatment. Since the well is potentially under the direct influence of surface water it is recommended that a disinfection system such as filtration (NSF 61 certified to 1 micron absolute) followed by an NSF/ANSI 55 certified UV (or equivalent) be installed. These are conceptual design recommendations based on the information available for planning and budgeting purposes. Engineering input will be required for final system specifications.
- The well and water system should be shock chlorinated.

21.7.2 Priority 2

The following Priority 2 upgrades are recommended to mitigate remaining health risks to this water system:

- Decommissioning of the abandoned well in the Grader Station building in accordance with proposed regulations. Consideration should be given to completing this work at the same time as Priority 1 upgrades to save on mobilization/demobilization costs.

21.7.3 Priority 3

No low risk deficiencies have been identified 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

Estimated costs for Priority 1 recommended upgrades are detailed below:

- An NSF certified filtration and UV disinfection system would cost approximately **\$4,500** for materials, labour and contractor mobilization/demobilization.
- Shock chlorination of the well and water system could be completed for approximately **\$200** for material and labour.

21.8.2 Priority 2

- Decommissioning of the abandoned well would cost approximately **\$1,500** including materials and labour.

21.8.3 Priority 3

There are no Priority 3 upgrades recommended at this time.

22.0 BUILDING 5622: KENO CITY FIRE HALL

22.1 Description of Existing Water Supply System

Building 5622, the Keno City Fire Hall, is currently serviced by a water supply system that delivers water from a 93 m deep drilled well. The well is located in pit below grade approximately 18 m southeast of the fire hall. A site plan is provided as Figure 5622-A in Appendix A22. The coordinates of the wellhead, as measured by a handheld GPS device, were recorded as:

- UTM ZONE 8
- Northing: 7086946
- Easting: 484996

In addition to serving the fire hall, the water system also supplies the nearby community hall and a public bulk water delivery system. An LMI chlorination system was present at the fire hall at the time of the assessment; however, it was not connected or operational. Free available chlorine was not detectable and well below the required 0.2 mg/L. Apparently, chlorine is batch mixed manually by the water truck operator. There is also an elevated water storage tank that is used for storage of water for fire fighting purposes. A schematic detailing the water supply system is provided as Figure 5622-B in Appendix A22. Photos of the well and water system are also included at the back of this appendix.

22.2 Description of Existing Wastewater Systems

Wastewater from the fire hall is discharged to a septic system northwest of the fire hall. The septic tank is located approximately 36 m from the well and the closest point of septic field is 36 m and likely crossgradient. It should be noted that for a Community water system, this setback is required to be greater than 60 m. The location of the septic system is indicated on Figure 5622-A in Appendix A22.

22.3 Water Quality Results

22.3.1 Water Quality Results from Previous Sampling

Bacteriological

Three samples were collected from the Keno City Fire Hall water system between February 2005 and June 2005 by YTG representatives 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 5622-1 in Appendix A22. Coliform bacteria and *E. coli* were reported as absent in each of the three samples for which results are provided.

Potability

YTG representatives also collected water samples on July 2, 2004 and June 8, 2005. The samples were submitted to Northwest Labs in Surrey BC and ALS Environmental in Vancouver BC for potability analyses. The results of these analyses are summarized in Table 5622-2 in Appendix A22. EBA reviewed the analytical results for comparison 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.

- The second sampling event reported the turbidity to be 3.24 NTU, which is above the CDWQG Maximum Acceptable Concentration (MAC) of 1.0 NTU;
- The water quality results indicated that all other health based and CDWQG Aesthetic Objectives (AOs) were met for the parameters analyzed;
- Chloride and Nitrate concentrations, although they are below CDWQG, are likely elevated above background concentrations for this area;
- The water quality results indicated that the groundwater is calcium bi-carbonate type with a pH of approximately 8; and,
- The hardness (as CaCO₃) was 297 mg/L during the first sampling event and 272 mg/L during the second sampling event, and is considered very hard.

22.3.2 Identification of Additional Analytical Testing Required

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

- Total organic carbon (TOC);

- Ammonia nitrogen to determine if the system may be under the influence of surface water or septic sources;
- Measurements in the field for total dissolved solids, conductivity, pH, and temperature.

Additional Analytical Results

A water sample was obtained during the water system assessment on August 17, 2005, and was submitted to ALS Environmental in Vancouver BC for analysis. These results are summarized in Table 5622-2 in Appendix A22 and the laboratory reports are included in Appendix B.

22.3.3 Indicators of Potential Contamination

Chloride, nitrate and nitrite concentrations can indicate impacts from surface water sources or septic waste. Elevated chloride and nitrate concentrations suggest that the aquifer from which the groundwater is obtained for the Keno City Fire Hall may be under the influence of anthropogenic sources of contamination such as septic wastes, but since no other water quality results are available for surrounding wells, this cannot be definitively determined.

22.4 Conceptual Hydrogeology

The log for this well indicates that the well is completed in bedrock at a depth of 92.9 m. The well log indicates alternating silt, sand, till, gravel and cobbles overlying bedrock. A significant silt horizon exists from 23.8 to 33.2 m below grade, and a relatively thick till overlies the bedrock surface from 42.7 to 55.1 m below grade. The static water level measured during the water system assessment was 55 m below grade.

Flow within bedrock aquifers occurs primarily through fractures within the bedrock mass. The effective hydraulic conductivity of these fractures is often very high making it difficult to accurately predict travel times and flow directions. For these reasons, bedrock wells are often more vulnerable to potential contaminant sources than overburden wells completed at similar depths. The depth of this aquifer combined with the presence of variable confining material overlying the bedrock surface provides some protection from surficial sources of contamination. Groundwater flow direction in the vicinity of the well is likely west to southwesterly.

22.5 Potential Contaminant Sources

Details and photographs of potential contaminant sources observed during the site investigation are compiled in Appendix A22.

Potential contaminant sources within 30 m of the wellhead are:

- A drainage ditch at 2 m;
- Empty fuel drums at 10 m; and
- An outhouse at 30 m.

In addition, there is an underground fuel storage tank (UST) located approximately 31 m from the well, and as mentioned previously, the septic field serving the fire hall is located approximately 36 m from the well.

22.5.1 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.

22.6 Identified Water System Deficiencies and Associated Risk

22.6.1 High and Medium Risk Deficiencies

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

- Poor surface completion of the well (located in a pit below grade);
- There is no surface sanitary seal (grout or bentonite seal as required by the Canadian Groundwater Association's Guidelines for Water Well Construction. Furthermore, the water system, although by definition of the proposed regulation is under the direct influence of surface water (lacking surface seal), does not have a filtration system present as required by the regulation.
- The well is located within 30 m of potential contaminant sources including a drainage ditch, fuel drums and an outhouse;
- The turbidity has been reported in exceedence of the CDWQG MAC;
- Elevated chloride and nitrate concentrations indicate that the well may be under the influence of septic sources;
- The chlorination system is not currently in service. Chlorine is currently added manually to the main water storage tank. The residual chlorine concentration

determined from field chemistry at the time of water system assessment was below the required 0.2 mg/L at a point of use.

22.6.2 Low Risk Deficiencies

- The pressure tank is waterlogged, causing the water pump to rapid cycle.

22.7 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).

22.7.1 Priority 1

The following mitigative options are recommended to address the high-risk deficiencies associated with the water system at the Keno Fire Hall:

- Standard wellhead upgrades including installation of a pitless adapter installation, casing extension to at least 500 mm above grade, installation of a surface sanitary seal (as deep as possible), casing insulation, protective cover with lockable lid, and regrading to promote surface water drainage away from the wellhead.
- A suitably sized proportional feed chlorination system with necessary appurtenances should be installed. Major reconfiguration of the existing tank, piping and plumbing is recommended to ensure adequate contact time, residual chlorine concentrations at the point of use, and backflow prevention. We understand that the Government of Yukon Community Services Branch currently has a Request for Proposal out to complete this work. These are conceptual design recommendations based on the information available for planning and budgeting purposes. Engineering input will be required for final system specifications.
- NSF 61 certified filtration to 1 micron absolute.
- The well and water system should be shock chlorinated.

22.7.2 Priority 2

The contents of the partially filled fuel drums should be determined, and if they contain hazardous chemicals, they should be removed and disposed of accordingly. Activities within 30 m of the wellhead should be regulated.

22.7.3 Priority 3

We understand that the pressure tank would be replaced as part of the upgrades that YTG - Community Services is currently making arrangements to have completed. No other low risk deficiencies have been identified for this site.

22.8 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.

22.8.1 Priority 1

Class D estimated costs for Priority 1 recommended upgrades are detailed below:

- The wellhead upgrades as proposed would cost on the order of **\$5,000**.
- The recommended upgrades to the chlorination, plumbing, and pump systems that are currently in the process of being tendered are estimated to cost in the order of **\$50,000**.
- The recommended filtration system (to 1 micron absolute) would cost approximately **\$2,400** for materials, labour and mobilization/demobilization.
- Shock chlorination of the well and water system could be completed for approximately **\$200** for materials and labour.

22.8.2 Priority 2

Removal of drums and regulation of activities around the wellhead should be dealt with under routine operation and maintenance of the facility.

23.0 SUMMARY

The project team assessed the small public drinking water systems for 19 Government of Yukon maintained buildings in the Northern Region in August 2005 in general accordance with the Terms of Reference and the project team's proposal. Key findings of this study are discussed below.

Based on water quality results provided from previous studies or collected during this study, most wells assessed in the Northern Region did not have exceedences of health-based parameters, or indicators of surficial sources of contamination.

For the 19 systems where water quality data was available for review, ten water systems have had turbidity higher than the CDWQG maximum acceptable concentration (MAC) of 1 NTU, and seven of these systems had turbidity greater than 1 NTU during the most recent sampling events. Turbidity should be as low as possible to minimize sites for bacterial growth and adsorption of residual chlorine on the suspended particles. Turbidity should on average be below 1 NTU; however, it can exceed this level occasionally. Follow-up sampling is recommended for the systems where turbidity was above 1 NTU during the most recent sampling events.

Based on the information provided to EBA from past bacteriological sampling events, *E. coli* bacteria (a type of faecal coliform) have not been identified in any of these water systems on the dates sampled.

The presence of total coliform bacteria can be a potential indicator of bacterial and/or viral contamination. In the Northern Region, eight of the water systems have at some time in the past year had total coliform bacteria present in the samples collected. There were no bacteriological results available for review from two of the sites in the Northern Region; however, both of these buildings are supplied by water delivery from a treated source that is routinely tested (Mayo ATB Day Use Building, and the Mayo Property Management Agency Shop). Total coliform bacteria are an indicator of possible contamination from surface waters, but do not necessarily indicate water contamination by faecal waste. However the presence or absence of these bacteria in drinking water is often used to determine whether water disinfection is working properly, or whether treatment is required. We understand that YTG has commissioned monthly sampling at most water systems to detect the presence of total coliform and *E. coli* bacteria. Water systems where total coliform have been detected in the past year should be utilized with caution. We recommend that these systems be sampled for the presence of faecal coliform and *E. coli* in the

near future. Systems that are not regularly used should be sampled monthly when the buildings are in use.

Two sites had concentrations of metals above CDWQG MAC health based guidelines. The barium concentration for water supplied to the Mayo Wildlife Workshop has consistently been above the MAC of 1 mg/L during three sampling events over the past year. The arsenic concentration at the Mayo Airport Terminal Building has also been consistently higher than the existing MAC for arsenic. We understand that water from the Mayo Airport is not currently used for drinking, and bottled water is provided by YTG, however, it is unclear whether water from the Mayo Wildlife Workshop water system is used for drinking. Water from each of these systems should not be used for drinking without proper treatment to remove these metals to concentrations that are below the respective health based guidelines.

In general, well construction for the wells serving the small public drinking water systems for YTG maintained buildings does not meet the current construction standards or the requirements of the proposed guidelines. Each of the wells assessed have not been completed with surface sanitary seals (bentonite or bentonite grout) installed between the well casing and the formation within at least the top 6 m of the well. Additionally, many wells are located in pits below grade, which makes them potentially susceptible to flooding. The proposed guidelines require that all water supplied by wells that do not have properly constructed wells, or wells without grout seals within the top 6 m would either require treatment consisting of both filtration and disinfection, or further GUDI assessment (Phase 2 and/or 3) to ensure that these systems are not at risk. Most of the water systems assessed do not have filtration or disinfection and as such, this has been identified as a high-risk deficiency. In addition, many wells assessed have potential sources of contamination (inground sewage disposal systems and associated piping) located within 30 m of the wells.

Class D estimates of costs to mitigate identified deficiencies are provided in each section, and are summarized in Table 4.

The multi-barrier approach to safe drinking water includes the protection of drinking water at its source, adequate treatment, a clean distribution system operated by competent personnel and comprehensive testing of water quality. During this study, the project team evaluated the well construction and potential contaminant sources in the vicinity of wells to assess the level of protection of the drinking water at its source, additionally the condition and adequacy of the treatment and distribution systems were evaluated. It was not within the scope of work to

evaluate the operations, maintenance and testing programs for these systems, however, these are key to the multi-barrier approach and will be required by the proposed small public drinking water system regulations. It was obvious from this assessment that operator training and routine maintenance of the existing water systems needs improvement. Table 5 provides a summary of the level of risk assessed to each water system in consideration of the identified risk and existing barriers of protection (a “multi-barrier” approach). Risk factors included:

- Any parameter above a CDWQG MAC (not including elevated turbidity or coliform presence);
- Poor water quality indicators such as elevated turbidity, presence of coliform, or elevated chloride, nitrate or nitrite;
- Potential sources of bacteriological and/or viral contaminants within 30 m of the wellhead; and,
- The level of risk due to public accessibility of the well (public buildings, schools, residences, etc.).

Risk mitigating factors that were considered included:

- Favourable hydrogeological conditions;
- Good well construction;
- Primary disinfection treatment (e.g., filtration to less than 1 micron absolute or membrane filtration, etc.); and,
- Secondary disinfection treatment (e.g., chlorination or UV treatment).

Priority was assessed based on the level of public accessibility to the buildings and their water systems. Systems that provide drinking water to publicly accessible buildings and employee residences were assessed as an overall Priority level of 1 (highest priority), while systems that are not publicly accessible were assigned a Priority level of 2 or 3 depending on the amount of use of the building and water system. The priority assessment presented in Table 5 can be used as a tool to assist PMA in prioritizing system upgrades. This prioritization system is illustrated in the following matrix:

Matrix 1: Illustration of “Priority 1 – High Risk Systems”

Overall risk based on multi-barrier approach	Priority Level based on public accessibility		
	Priority 1	Priority 2	Priority 3
High	Priority 1 – High Risk	Priority 2 – High risk	Priority 3 – High risk
Medium	Priority 1 – Medium Risk	Priority 2 – Medium risk	Priority 3 – Medium risk
Low	Priority 1 – Low Risk	Priority 2 – Low risk	Priority 3 – Low risk

As indicated in the matrix provided above, those buildings with water systems that were identified as having an overall high-risk, and serve public buildings or employee residences (Priority 1) should be addressed first from a cost benefit perspective. These systems we refer to as “Priority 1 – High Risk”. All deficiencies (with the exception of some Priority 3 upgrades which are purely mechanical/operational and do not pose a health risk) for each system should ultimately be addressed in order to mitigate health risk. It is suggested that all Priority 1 upgrades for all systems be completed as soon as possible. In general, we recommend that the best approach to mitigate risk would be to install suitable disinfection treatment systems (Priority 1), and to carry out well improvements as soon as possible thereafter (Priority 2).

The Priority 1 High-Risk Sites for the Northern Region include:

- M0026/M0227 – RCMP Residences in Pelly Crossing;
- M0226/M0156 – RCMP Detachment and Residence in Pelly Crossing;
- 5672 – Pelly Crossing Swimming Pool;
- 5676 – Eliza Van Bibber School in Pelly Crossing;
- 5987 – Pelly Crossing Health Centre;
- 5681/5682 – Stewart Crossing Grader Station/ Living Complex;
- 2544 – Dawson City Airport Terminal Building;
- 2592 – Klondike Valley Fire hall
- 2592 – Klondike Grader Station Living Complex;
- 2665 - Ogilvie Maintenance Camp Living Complex; and,
- 5622 – Keno Firehall.

Installation of treatment systems will result in increased operation and maintenance costs for these systems. YTG should consider for budgetary purposes that the equivalent of a full time water system operator, with adequate training, would be required to coordinate the operation, maintenance and routine testing of these systems. Requirements of the proposed Guidelines for Small Public Drinking Water Systems, and any other applicable guideline or regulation should be implemented diligently within the “multi-barrier” approach.

A general recommendation for operation and maintenance for systems where upgrades are not immediately implemented that would mitigate significant risk is to inspect and disinfect (superchlorinate with 200 mg/L chlorine solution) every water well, tank and distribution system on a bi-annual basis (every 6 months).

24.0 RECOMMENDATIONS AND CONCLUSIONS

The recommended upgrade options presented within this report should be evaluated by YTG with regard to risk, preference and cost. Priority 1 upgrades should be completed as soon as possible. All Priority 2 upgrades should also be completed as soon as budget and scheduling permits in the future. Priority 3 conditions should be monitored to check if and when they may worsen to a Priority 2 or 1 situation. In consideration of building priority, YTG PMA should start by commissioning the implementation of Priority 1 upgrades recommended for systems that are identified as “Priority 1-High-risk”. Addressing Priority 1 deficiencies at other systems with an overall “lower risk” should follow based on level of risk until all Priority 1 upgrades are complete.

Three in-use wells were found to be without well caps, and are therefore, very vulnerable to the entrance of vermin, insects, and other foreign objects. This could put them at risk of exposure to bacteria, viruses and/or protozoa. This was brought to the attention of PMA in August, following the assessments. We understand that a well cap was installed at the Mayo Airport well by Aqua Tech in October 2005. If not already completed, PMA should ensure the two remaining wells that were observed to be without well caps at the time of the assessment have properly fitted caps installed as soon as possible (Building 5629 - Mayo Grader Station and Building 2600 - Klondike Grader Station).

It is recommended that interim alternate sources of drinking water be provided for the following buildings, until the Priority 1 upgrades have been implemented:

- 5629: Mayo Grader Station;
- 5636: Mayo ATB Day Use Building (it is understood that advisories are posted and bottled water is currently provided);
- 5650: Mayo Wildlife Workshop;
- 5653: Mayo Airport (it is understood that advisories are posted and bottled water is currently provided);
- 2600: Klondike Grader Station; and,
- 6751: Twin Creeks Grader Station.

For these systems, it is recommended that YTG PMA consult with YTG EHSS to determine the best approach to issuing advisories and implementing interim measures (boiled water advisories or provision of bottled water).

As described previously in this report, additional hydrogeological assessment work has been completed at Building 2592, the Klondike Valley Fire Hall (see Section 18). It is recommended

that PMA complete disinfection treatment and septic system upgrades at this site as soon as possible. PMA should also consult with EHSS to discuss recent bacteriological test results and get their judgment as to whether the water supply should be used in the interim until such time as these recommended upgrades are completed.

It is recommended that the additional assessment outlined below be completed for the following systems as soon as possible:

- 5676: Eliza Van Bibber School – Complete follow-up bacteriological testing;
- 5672: Pelly Crossing Swimming Pool - Attempt to obtain well log and confirm location of septic field;
- 5653: Mayo Airport – resample to determine water quality post chemical and physical cleaning program completed by Aqua Tech in October;
- 2592: Klondike Valley Fire Hall. Complete follow-up bacteriological testing and review all recent bacteriological assessment data.
- 2665: Ogilvie Living Complex. Complete follow-up bacteriological testing.

25.0 LIMITATIONS

Conclusions and recommendations presented in this report are based on the wellhead inspections, water supply source evaluations and distribution and treatment system evaluations as described in the previous sections. The project team attempted to identify all water system deficiencies in the amount of time allocated for each assessment, while working within the constraints of the scope, budget and accessibility. It is possible that some deficiencies or risks have not been identified within the level of effort this project afforded. EBA bears no responsibility for undiscovered deficiencies due to project limitations on level of effort. This report has been prepared for the exclusive use of the Government of Yukon. This report has been prepared in accordance with generally accepted hydrogeological and environmental engineering practices. For further limitations regarding the use of this report, reference should be made to the EBA Environmental Report - General Conditions attached, which form a part of this report.

26.0 CLOSURE

EBA trusts this report meets your present requirements. If you have questions or concerns, please do not hesitate to call the undersigned.

Respectfully submitted;
EBA Consultants Ltd.

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EBA Engineering Consultants Ltd. (EBA)
ENVIRONMENTAL REPORT – GENERAL CONDITIONS

This report incorporates and is subject to these “General Conditions”.

A.1 USE OF REPORT

This report pertains to a specific site, a specific development, and a specific scope of work. It is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site or proposed development would necessitate a supplementary investigation and assessment.

This report and the assessments and recommendations contained in it are intended for the sole use of EBA’s client. EBA does not accept any responsibility for the accuracy of any of the data, the analysis or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than EBA’s client unless otherwise authorized in writing by EBA. Any unauthorized use of the report is at the sole risk of the user.

This report is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of EBA. Additional copies of the report, if required, may be obtained upon request.

A.2 LIMITATIONS OF REPORT

This report is based solely on the conditions which existed on site at the time of EBA’s investigation. The client, and any other parties using this report with the express written consent of the client and EBA, acknowledge that conditions affecting the environmental assessment of the site can vary with time and that the conclusions and recommendations set out in this report are time sensitive.

The client, and any other party using this report with the express written consent of the client and EBA, also acknowledge that the conclusions and recommendations set out in this report are based on limited observations and testing on the subject site and that conditions may vary across the site which, in turn, could affect the conclusions and recommendations made.

The client acknowledges that EBA is neither qualified to, nor is it making, any recommendations with respect to the purchase, sale, investment or development of the property, the decisions on which are the sole responsibility of the client.

A.2.1 Information Provided to EBA by Others

During the performance of the work and the preparation of this report, EBA may have relied on information provided by persons other than the client. While EBA endeavours to verify the accuracy of such information when instructed to do so by the client, EBA accepts no responsibility for the accuracy or the reliability of such information which may affect the report.

A.3 LIMITATION OF LIABILITY

The client recognizes that property containing contaminants and hazardous wastes creates a high risk of claims brought by third parties arising out of the presence of those materials. In consideration of these risks, and in consideration of EBA providing the services requested, the client agrees that EBA’s liability to the client, with respect to any issues relating to contaminants or other hazardous wastes located on the subject site shall be limited as follows:

- (1) With respect to any claims brought against EBA by the client arising out of the provision or failure to provide services hereunder shall be limited to the amount of fees paid by the client to EBA under this Agreement, whether the action is based on breach of contract or tort;
- (2) With respect to claims brought by third parties arising out of the presence of contaminants or hazardous wastes on the subject site, the client agrees to indemnify, defend and hold harmless EBA from and against any and all claim or claims, action or actions, demands, damages, penalties, fines, losses, costs and expenses of every nature and kind whatsoever, including solicitor-client costs, arising or alleged to arise either in whole or part out of services provided by EBA, whether the claim be brought against EBA for breach of contract or tort.

EBA Engineering Consultants Ltd. (EBA)
ENVIRONMENTAL REPORT – GENERAL CONDITIONS

A.4 JOB SITE SAFETY

EBA is only responsible for the activities of its employees on the job site and is not responsible for the supervision of any other persons whatsoever. The presence of EBA personnel on site shall not be construed in any way to relieve the client or any other persons on site from their responsibility for job site safety.

A.5 DISCLOSURE OF INFORMATION BY CLIENT

The client agrees to fully cooperate with EBA with respect to the provision of all available information on the past, present, and proposed conditions on the site, including historical information respecting the use of the site. The client acknowledges that in order for EBA to properly provide the service, EBA is relying upon the full disclosure and accuracy of any such information.

A.6 STANDARD OF CARE

Services performed by EBA for this report have been conducted in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions in the jurisdiction in which the services are provided. Engineering judgement has been applied in developing the conclusions and/or recommendations provided in this report. No warranty or guarantee, express or implied, is made concerning the test results, comments, recommendations, or any other portion of this report.

A.7 EMERGENCY PROCEDURES

The client undertakes to inform EBA of all hazardous conditions, or possible hazardous conditions which are known to it. The client recognizes that the activities of EBA may uncover previously unknown hazardous materials or conditions and that such discovery may result in the necessity to undertake emergency procedures to protect EBA employees, other persons and the environment. These procedures may involve additional costs outside of any budgets previously agreed upon. The client agrees to pay EBA for any expenses incurred as a result of such discoveries and to compensate EBA through payment of additional fees and expenses for time spent by EBA to deal with the consequences of such discoveries.

A.8 NOTIFICATION OF AUTHORITIES

The client acknowledges that in certain instances the discovery of hazardous substances or conditions and materials may require that regulatory agencies and other persons be informed and the client agrees that notification to such bodies or persons as required may be done by EBA in its reasonably exercised discretion.

A.9 OWNERSHIP OF INSTRUMENTS OF SERVICE

The client acknowledges that all reports, plans, and data generated by EBA during the performance of the work and other documents prepared by EBA are considered its professional work product and shall remain the copyright property of EBA.

A.10 ALTERNATE REPORT FORMAT

Where EBA submits both electronic file and hard copy versions of reports, drawings and other project-related documents and deliverables (collectively termed EBA's instruments of professional service), the Client agrees that only the signed and sealed hard copy versions shall be considered final and legally binding. The hard copy versions submitted by EBA shall be the original documents for record and working purposes, and, in the event of a dispute or discrepancies, the hard copy versions shall govern over the electronic versions. Furthermore, the Client agrees and waives all future right of dispute that the original hard copy signed version archived by EBA shall be deemed to be the overall original for the Project.

The Client agrees that both electronic file and hard copy versions of EBA's instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except EBA. The Client warrants that EBA's instruments of professional service will be used only and exactly as submitted by EBA.

The Client recognizes and agrees that electronic files submitted by EBA have been prepared and submitted using specific software and hardware systems. EBA makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

27.0 REFERENCES

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TABLES

TABLE 1: SUMMARY OF HISTORICAL BACTERIOLOGICAL RESULTS

		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?
Building #	Building Name							
Pelly Crossing								
M0026	Pelly Crossing RCMP Residence	9	Oct-04 to Jun-05	no	0/9	no	9-Jun-05	no
M0227	Pelly Crossing RCMP Residence	8	Oct-04 to Jun-05	yes	1/8	no	9-Jun-05	no
M0156	Pelly Crossing RCMP Detachment	8	Oct-04 to Jun-05	no	0/8	no	9-Jun-05	no
M0226	Pelly Crossing RCMP Residence	9	Oct-04 to Jun-05	no	0/9	no	9-Jun-05	no
5672	Pelly Crossing Swimming Pool	1	5-Jun	no	0/1	no	9-Jun-05	no
5676	Eliza Van Bibber School	10	Jun-04 to Jun-05	yes	1/10	no	9-Jun-05	yes
5678	Pelly Crossing Fire Hall	9	Oct-04 to Jun-05	yes	1/9	no	9-Jun-05	no
5987	Pelly Crossing Health Centre	9	Oct-04 to Jun-05	no	0/9	no	9-Jun-05	no
Stewart Crossing								
5681	Stewart Crossing Grader Station	9	Oct-04 to Jun-05	no	0/9	no	9-Jun-05	no
5682	Stewart Crossing Living Complex	8	Oct-04 to Jun-05	no	0/8	no	9-Jun-05	no
5690	Stewart Crossing Well House Storage Building	NO BACTERIOLOGICAL RESULTS ARE AVAILABLE FOR THIS SITE						
Mayo								
5629	Mayo Grader Station	9	Oct-04 to Jun-05	yes	1/9	no	16-Jun-05	no
5636	Mayo A.T.B. Day Use Building	NO BACTERIOLOGICAL RESULTS ARE AVAILABLE FOR THIS SITE						
5640	Mayo Property Management Agency Shop	NO BACTERIOLOGICAL RESULTS ARE AVAILABLE FOR THIS SITE						
5650	Mayo Wildlife Workshop	8	Oct-04 to Jun-05	no	0/8*	no	9-Jun-05	no
5653	Mayo Airport Terminal Building	9	Oct-04 to Jun-05	yes	1/9	no	9-Jun-05	no
Dawson City								
2544	Dawson City Airport Terminal Building	7	Oct-04 to Jun-05	no	0/7	no	9-Jun-05	no
2575	Dawson City Wildlife Office	8	Oct-04 to Jun-05	no	0/8	no	9-Jun-05	no
2592	Klondike Valley Fire Hall	10	Oct-04 to Jun-05	yes	1/10	no	9-Jun-05	yes
2599	Dawson City Grader Station	8	Oct-04 to Jun-05	no	0/8	no	9-Jun-05	no
Dempster Highway								
2603	Klondike Living Complex	6	Sept-04 to Jun-05	yes	2/6	no	9-Jun-05	yes
2661	Ogilvie Grader Station	6	Oct-04 to Jun-05	no	0/6	no	9-Jun-05	no
2665	Ogilvie Living Complex	6	Sept-04 to Jun-05	yes	1/6	no	9-Jun-05	yes
Keno City								
5622	Keno City Fire Hall	3	Feb-05 to Jun-05	no	0/3	no	9-Jun-05	no

* Two out of eight samples were rejected due to high turbidity



Table 2: Water Quality Results													
SOURCE:	Building M0026 - R.C.M.P. Residence			Building M0227 - R.C.M.P. Residence		Building M0156 - R.C.M.P. Detachment			Building M0226 - R.C.M.P. Residence		GCDWQ Criteria		
Location/ Resident Address	Pelly Crossing			Pelly Crossing		Pelly Crossing			Pelly Crossing				
Treatment	Water softener (not in use)			Water softener (not in use)		Water softener (not in use)			Water softener (not in use)				
Disinfection	None			None		None			None				
Source of Water	On-site well (shared with M0227)			On-site well (shared)		On-site well (shared with M0226)			On-site well (shared)				
Purpose of Sampling Sample Location	Base Line	Base Line	Additional Sampling	Base Line	Base Line	Base Line	Base Line	Additional Sampling	Base Line	Base Line			
Date Sampled	29-Sep-04	8-Jun-05	23-Aug-05	29-Sep-04	8-Jun-05	29-Sep-04	8-Jun-05	23-Aug-05	29-Sep-04	8-Jun-05	Lower Limit	Upper Limit	
Physical Tests (ALS)											AO	MAC	AO
Colour (CU)	<5	<5.0		<5	<5.0	<5	<5.0		<5	<5.0			15
Conductivity (uS/cm)		436			437		596			583			
Total Dissolved Solids	233	235		233	238	229	340		234	323			500
Hardness CaCO3	216	203		215	202	219	256		216	261	AO >200 = poor, > 500 unacceptable ^A		
pH	7.98	8.16		8	8.14	8.04	8.12		8.02	8.1	6.5		8.5
Turbidity (NTU)	0.7	0.16		0.3	0.15	0.5	0.17		0.5	0.21		1	5
UV Absorbance			0.0480					0.041					
% Transmittance			89.5					91.0					
Dissolved Anions (ALS)													
Alkalinity-Total CaCO3	200	208		199	205	196	214		207	219			
Chloride Cl	0.9	0.75		0.8	0.76	0.8	39.4	2.32	1.1	36.9			250
Fluoride F	0.1	0.119		0.1	0.121	0.09	0.102		0.09	0.103		1.5	
Silicate SiO4													
Sulphate SO4	28.3	25.7		28.8	25.5	26	28.2		25.3	28.1			500
Nitrate Nitrogen N	0.3	0.13		0.3	0.13	0.1	1.41	0.21	0.1	1.32		10	
Nitrite Nitrogen N	<0.05	<0.10		<0.05	<0.10	<0.05	<0.10	<0.0010	<0.05	<0.10		1	
Ammonia Nitrogen N								<0.020					
Total Phosphate PO4													
Total Metals (ALS)													
Aluminum T-Al	<0.005	<0.010		<0.005	<0.010	<0.005	<0.010		<0.005	<0.010			
Antimony T-Sb	<0.0002	<0.00050		<0.0002	<0.00050	<0.0002	<0.00050		<0.0002	<0.00050		0.006	
Arsenic T-As	0.0003	<0.00010		0.0002	<0.00010	<0.0002	<0.00010		<0.0002	<0.00010		0.025	
Barium T-Ba	0.087	0.075		0.088	0.076	0.082	0.099		0.088	0.1		1	
Boron T-B	0.003	<0.10		0.003	<0.10	0.003	<0.10		0.003	<0.10		5	
Cadmium T-Cd	0.00002	<0.00020		0.00002	<0.00020	0.00002	<0.00020		0.00003	<0.00020		0.005	
Calcium T-Ca		59.5			59.1		74.1			75.8			
Chromium T-Cr	0.0012	<0.0020		0.0012	<0.0020	0.0017	<0.0020		0.0012	<0.0020		0.05	
Copper T-Cu	0.684	0.142		0.388	0.378	2.37	0.522	0.197	0.154	0.123		1	
Iron T-Fe	0.01	<0.030		0.03	0.031	0.02	0.046		0.04	0.037			0.3
Lead T-Pb	0.0002	<0.0010		0.0006	<0.0010	0.0008	<0.0010		0.0003	<0.0010		0.01	
Magnesium T-Mg		13.2			13.1		17.2			17.4			
Manganese T-Mn	<0.005	<0.0020		<0.005	<0.0020	<0.005	<0.0020		<0.005	<0.0020			0.05
Mercury T-Hg		<0.00020			<0.00020		<0.00020			<0.00020		0.001	
Potassium T-K		2.71			2.68		3.19			3.26			
Selenium T-Se		<0.0010			<0.0010		0.0012			<0.0010		0.01	
Sodium T-Na	5.0	5.7		5	5.5	4.8	10		4.8	9.7			200
Uranium T-U	0.0007	0.00071		0.0007	0.00073	0.0007	0.00079		0.0007	0.00084		0.02	
Vanadium T-V													
Zinc T-Zn	0.005	<0.050		0.016	<0.050	0.063	0.057		0.051	<0.050			5
Dissolved Metals													
Aluminum D-Al													
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								0.186					1.0
Iron D-Fe													0.3
Lead D-Pb												0.01	
Magnesium D-Mg													
Manganese D-Mn													0.05
Mercury D-Hg												0.001	
Potassium D-K													
Selenium D-Se												0.01	
Sodium D-Na													200
Uranium D-U												0.02	
Vanadium D-V													
Zinc D-Zn													5.0
Organic Parameters													
Tannin and Lignin			0.2					0.18					
Total Organic Carbon C			2.95					2.76					
Field Chemistry (EBA)													
pH			8.05					8.04			6.5		8.5
TDS (ppm)			189					198					500
EC (uS/cm)			375					396					
Temperature (°C)			9.6					16.7					
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)

- = not tested

Table 2: Water Quality Results

SOURCE:	Building 5672 - Swimming Pool		Building 5676 - Eliza Van Bibber School			Building 5678 - Fire Hall			Building 5987 - Nursing Station			GCDWQ Criteria		
Location/ Resident Address	Pelly Crossing		Pelly Crossing			Pelly Crossing			Pelly Crossing					
Treatment	None		None			None			None					
Disinfection	None		None			None			None					
Source of Water	On-site well		On-site well			On-site well			On-site well					
Purpose of Sampling	Base Line	Additional Sampling	Base Line	Base Line	Additional Sampling	Base Line	Base Line	Additional Sampling	Base Line	Base Line	Additional Sampling			
Sample Location														
Date Sampled	8-Jun-05	23-Aug-05	29-Sep-04	8-Jun-05	23-Aug-05	29-Sep-04	8-Jun-05	23-Aug-05	29-Sep-04	8-Jun-05	23-Aug-05	Lower Limit	Upper Limit	
Physical Tests (ALS)												AO	MAC	AO
Colour (CU)	6.4		12	7.1		9	<5.0		<5	<5.0				15
Conductivity (uS/cm)	405			402			414			410				
Total Dissolved Solids	225		208	226		222	235		214	230				500
Hardness CaCO3	181		191	177		209	189		198	192		AO >200 = poor, > 500 unacceptable ^A		
pH	8.2		8.1	8.17		8.11	8.2		8	8.18		6.5		8.5
Turbidity (NTU)	4.07	1.29	1.0	0.33		3.1	1.39	4.94	0.1	0.11			1	5
UV Absorbance		0.112			0.0800			0.018			0.056			
% Transmittance		81.0			96.2			96.2			87.7			
Dissolved Anions (ALS)														
Alkalinity-Total CaCO3	183		179	176		175	155		188	179				
Chloride Cl	0.69		0.9	0.61		1.5	<0.50		0.5	0.9				250
Fluoride F	0.117		0.1	0.114		0.08	0.098		0.11	0.126			1.5	
Silicate SiO4														
Sulphate SO4	29.1		26.4	33.5		38.1	54.9		23.1	30.7				500
Nitrate Nitrogen N	<0.10		<0.1	<0.10		0.5	<0.10		<0.1	<0.10			10	
Nitrite Nitrogen N	<0.10		<0.05	<0.10		<0.05	<0.10		<0.05	<0.10			1	
Ammonia Nitrogen N														
Total Phosphate PO4														
Total Metals (ALS)														
Aluminum T-Al	<0.010		<0.005	<0.010		<0.005	0.016		<0.005	<0.010				
Antimony T-Sb	<0.00050		<0.0002	<0.00050		<0.0002	<0.00050		<0.0002	<0.00050			0.006	
Arsenic T-As	0.0014		0.0013	0.00119		0.0006	0.00036		0.0003	0.00029			0.025	
Barium T-Ba	0.104		0.124	0.108		0.081	0.078		0.062	0.047			1	
Boron T-B	<0.10		0.004	<0.10		0.003	<0.10		0.004	<0.10			5	
Cadmium T-Cd	<0.00020		<0.00001	<0.00020		<0.00001	<0.00020		<0.00001	<0.00020			0.005	
Calcium T-Ca	51.8			50.5			53.6			55.2				
Chromium T-Cr	<0.0020		0.001	<0.0020		0.001	<0.0020		0.0012	<0.0020			0.05	
Copper T-Cu	0.019			0.001		0.011	0.0235		0.008	0.003			1	
Iron T-Fe	0.945	0.748	0.35	0.198		0.3	1.23	1.51	<0.01	<0.030				0.3
Lead T-Pb	0.0023		<0.0001	0.0017		0.0002	<0.0010		0.0006	<0.0010			0.01	
Magnesium T-Mg	12.5			12.3			13.5			13.3				
Manganese T-Mn	0.500	0.452	0.611	0.535	0.595	0.033	0.0353		<0.005	<0.0020				0.05
Mercury T-Hg	<0.00020			<0.00020			<0.00020			<0.00020			0.001	
Potassium T-K	2.49			2.29			1.59			3.32				
Selenium T-Se	<0.0010			<0.0010			0.0033			<0.0010			0.01	
Sodium T-Na	5.1		4.2	4.7		3.1	3.4		4.8	4.8				200
Uranium T-U	0.00063		0.0007	0.00066		0.0008	0.00089		0.0008	0.00084			0.02	
Vanadium T-V														
Zinc T-Zn	0.207		0.002	<0.050		0.004	<0.050		0.004	<0.050				5
Dissolved Metals														
Aluminum D-Al														
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		0.104						<0.030						0.3
Lead D-Pb													0.01	
Magnesium D-Mg														
Manganese D-Mn		0.437			0.588									0.05
Mercury D-Hg													0.001	
Potassium 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		0.32			0.29			0.14			0.17			
Total Organic Carbon C		4.87			4.02			1.33			3.6			
Extractable Hydrocarbons														
EPH10-19					<0.30									
EPH19-32					<1.0									
LEPH														
HEPH														
Field Chemistry (EBA)														
pH		7.84			7.98			8.17			7.93	6.5		8.5
TDS (ppm)		182			175			178			185			500
EC (uS/cm)		364			354			362			370			
Temperature (°C)		22.3			10.4			8.4			18			
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)

- = not tested



Table 2: Water Quality Results

	SOURCE: Building 5629 - Mayo Grader Station			Building 5636 - Mayo ATB Day Use Building	Building 5640 - Mayo PMA Shop	Building 5650 - Mayo Wildlife Workshop			Building 5653 - Mayo Airport Terminal Building		Building 5622 - Keno City Fire Hall			GCDWQ Criteria		
Location/ Resident Address	Mayo			Mayo	Mayo	Mayo			Mayo		Keno					
Treatment	None			None	None	Filtration			Filtration		None					
Disinfection	None			None	None	None			None		Chlorination (manual)					
Source of Water	On-site well			Water delivery	Water delivery	On-site well			On-site well		On-site well					
Purpose of Sampling	Base Line	Base Line	Additional Sampling	Base Line	Base Line	Base Line	Base Line	Additional Sampling	Base Line	Additional Sampling	Base Line	Base Line	Additional Sampling			
Sample Location			Kitchen faucet					Kitchen faucet		Washroom faucet			Washroom faucet			
Date Sampled	29-Sep-04	8-Jun-05	17-Aug-05	N/A	N/A	27-Sep-04	8-Jun-05	17-Aug-05	27-Sep-04	17-Aug-05	2-Jul-04	8-Jun-05	17-Aug-05	Lower Limit	Upper Limit	
Physical Tests (ALS)														AO	MAC	AO
Colour (CU)	<5	<5.0				>60	<5.0		>60	<5.0	5	<5.0				15
Conductivity (uS/cm)		884					638			652	559	583				
Total Dissolved Solids	422	483				338	354		388	436	360	361				500
Hardness CaCO3	362	369				273	280	282	349	333	297	272		AO >200 = poor, > 500 unacceptable ^A		
pH	7.92	8.1				8.01	8.14		8.14	8.15	7.85	7.96		6.5		8.5
Turbidity (NTU)	1.5	0.51				96.1	92.7		23.5	65.4	0.26	3.24			1	5
UV Absorbance			0.0100					0.046		0.027						
% Transmittance			97.7					90		94						
Dissolved Anions (ALS)																
Alkalinity-Total CaCO3	278	274				268	269		313	296	156	158				
Chloride Cl	79.8	100	112			12	13.9		<0.5	<0.50	9.6	7.62				250
Fluoride F	0.07	0.075				0.09	0.1		0.11	0.121	0.038	0.046			1.5	
Silicate SiO4								8.4		11.4						
Sulphate SO4	21.8	22.3				41.8	44.9		72.8	85.8	120	124				500
Nitrate Nitrogen N	0.2	0.22	0.261			0.01	<0.10		<0.01	<0.10	1.66	1.37			10	
Nitrite Nitrogen N	<0.05	<0.10	<0.0010			<0.005	<0.10		<0.005	<0.10	0.1	<0.10			1	
Ammonia Nitrogen N			0.023										0.048			
Total Phosphate PO4								0.0072		0.0794						
Total Metals (ALS)																
Aluminum T-Al	<0.005	<0.040				<0.005	<0.010	<0.010	<0.005	<0.010	0.01	<0.010				
Antimony T-Sb	<0.0002	<0.0010				<0.0002	<0.00050	<0.00050	<0.0002	<0.00050		<0.00050			0.006	
Arsenic T-As	0.0009	0.0007				0.0087	0.0142	0.00828	0.0756	0.0575	0.003	0.00188			0.025	
Barium T-Ba	0.254	0.224				1.53	1.38	1.44	0.037	0.033	0.157	0.138			1	
Boron T-B	0.008	<0.20				0.011	<0.10	<0.10	0.011	<0.10	0.1	<0.10			5	
Cadmium T-Cd	<0.00001	<0.00040				<0.00001	<0.00020	<0.00020	<0.00001	<0.00020	0.00099	0.00092			0.005	
Calcium T-Ca		109					87.9	90		83	88	79.9				
Chromium T-Cr	0.0022	<0.0040				0.0018	<0.0020	<0.0020	0.0019	<0.0020	0.002	<0.0020			0.05	
Copper T-Cu	0.016	0.0207				0.002	<0.0010	<0.0010	<0.001	<0.0010	0.01	0.011			1	
Iron T-Fe	0.04	0.077				6.53	4.3	5.5	2.62	3.77	0.03	0.085				0.3
Lead T-Pb	0.0007	<0.0020				0.0003	<0.0010	<0.0010	<0.0001	<0.0010	0.001	<0.0010			0.01	
Magnesium T-Mg		23.4					14.6	14.3		30.7	18.7	17.6				
Manganese T-Mn	<0.005	<0.0040				0.683	0.626	0.677	0.272	0.289	0.0025	0.0039				0.05
Mercury T-Hg		<0.00020					<0.00020	<0.00020		<0.00020	0.0002	<0.00020			0.001	
Potassium T-K		1.78					12.6	16.8		2.04	0.35	0.28				
Selenium T-Se		<0.0020					<0.0010	<0.0010		<0.0010	0.0037	0.0023			0.01	
Sodium T-Na	22.1	21.8					9.3	9.5	8.7	9.6	2.6	2.5				200
Uranium T-U	0.0013	0.00119				0.0006	0.00081	0.00051	<0.0005	0.00042	0.0116	0.00953			0.02	
Vanadium T-V								<0.030		<0.030						
Zinc T-Zn	0.023	<0.10				0.004	<0.050	<0.050	0.026	0.196	0.224	0.163				5
Dissolved Metals																
Aluminum D-Al								<0.010								
Antimony D-Sb								<0.00050							0.006	
Arsenic D-As								0.00177		0.0200					0.025	
Barium D-Ba								1.31							1.0	
Boron D-B								<0.10							5	
Cadmium D-Cd								<0.00020							0.005	
Calcium D-Ca								89.7								
Chromium D-Cr								<0.0020							0.05	
Copper D-Cu								<0.0010								1.0
Iron D-Fe								<0.030		<0.030						0.3
Lead D-Pb								<0.0010							0.01	
Magnesium D-Mg								14.2								
Manganese D-Mn								0.657		0.273						0.05
Mercury D-Hg								<0.00020							0.001	
Potassium D-K								16.8								
Selenium D-Se								<0.0010							0.01	
Sodium D-Na								9.5								200
Uranium D-U								0.00051							0.02	
Vanadium D-V								-								
Zinc D-Zn								<0.050								5.0
Field Chemistry (EBA)																
pH			7.76	8.31	8.21			7.88		8.13			8.12	6.5		8.5
TDS (ppm)			393	94	102			291		324			317			500
EC (uS/cm)			787	190	207			580		649			635			
Temperature (°C)			12.2	15.1	20.3			7.88		5.6			7.4			
Free Available Chlorine				0.02	0.01								0.00			

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)
- = not tested



Table 2: Water Quality Results

SOURCE:	Building 2544 - Dawson City Airport Terminal Building			Building 2575 - Dawson City Wildlife Office		Building - 2592 Klondike Valley Fire Hall		Building 2599 - Dawson City Grader Station				GCDWQ Criteria		
Location/ Resident Address	Dawson City			Dawson City		Dawson City		Dawson City						
Treatment	None			N/A		None		Softener, filtration, reverse osmosis	None	Softener, filtration	Softener, filtration, reverse osmosis			
Disinfection	None			N/A		Chlorination		None						
Source of Water	On-site well			Water Delivery		On-site well								
Purpose of Sampling	Base Line	Base Line	Additional Sampling	Base Line	Additional Sampling	Base Line	Additional Sampling	Base Line	Base Line	Additional Sampling	Additional Sampling			
Sample Location										Laundry sink faucet (Non- Potable)	Washroom			
Date Sampled	29-Sep-04	8-Jun-05	19-Aug-05	8-Jun-05	N/A	2-Jun-04	19-Aug-05	29-Sep-04	8-Jun-05	19-Aug-05	19-Aug-05	Lower Limit	Upper Limit	
Physical Tests (ALS)												AO	MAC	AO
Colour (CU)	<5	<5.0		<5.0		<5.0		<5	8.5					15
Conductivity (uS/cm)		326		297		312			386					
Total Dissolved Solids	187	191		178		162		<1	243	<1.3				500
Hardness CaCO3	170	163		145		152		<0.9	185			AO >200 = poor, > 500 unacceptable ^A		
pH	7.4	7.41		7.9		7.79		6.14	7.96			6.5		8.5
Turbidity (NTU)	0.4	0.15		0.65		<0.10		0.3	41.1	1.22			1	5
UV Absorbance			0.025							0.109				
% Transmittance			94.4							77.8				
Dissolved Anions (ALS)														
Alkalinity-Total CaCO3	112	108		105		85.5		<5	134					
Chloride Cl	2	1.79		2.56		1.95		<0.5	0.99					250
Fluoride F	0.05	0.066		0.085		0.062		<0.05	0.112				1.5	
Silicate SiO4										13.8				
Sulphate SO4	55.3	61.5		53.7		61.8		<0.2	72.7					500
Nitrate Nitrogen N	0.3	0.94		0.25		0.21		<0.1	<0.10				10	
Nitrite Nitrogen N	<0.05	<0.10		<0.10		<0.10		<0.05	<0.10				3.4	
Ammonia Nitrogen N														
Total Phosphate PO4										0.0159				
Total Metals (ALS)														
Aluminum T-Al	<0.005	<0.010		<0.010		<0.010		<0.005	0.092	<0.020				
Antimony T-Sb	0.0003	<0.00050		<0.00050		<0.00050		<0.0002	<0.00050	<0.0010			0.006	
Arsenic T-As	0.0027	0.00243		0.00013		<0.0010		0.0047	0.0864	0.047	0.00457		0.025	
Barium T-Ba	0.018	<0.020		0.079		0.076		<0.001	0.165	<0.040			1	
Boron T-B	0.006	<0.10		<0.10		<0.10		0.002	<0.10	<0.20			5	
Cadmium T-Cd	0.00003	<0.00020		<0.00020		<0.00020		<0.00001	<0.00020	<0.00040			0.005	
Calcium T-Ca		44.3		39.7		42.5			48.7	<0.20				
Chromium T-Cr	0.0009	<0.0020		<0.0020		<0.0020		<0.0005	<0.0020	<0.0040			0.05	
Copper T-Cu	0.153	0.339		0.637		0.039		0.259	0.0423	0.0097			1	
Iron T-Fe	0.02	<0.030		0.047		<0.030		<0.01	8.39	0.171				0.3
Lead T-Pb	<0.0001	<0.0010		0.0023		<0.0010		0.0039	0.0174	<0.0020			0.01	
Magnesium T-Mg		12.7		11		11.1			15.3	<0.20				
Manganese T-Mn	0.023	0.0046		0.0212		<0.0020		<0.005	0.651	<0.0040				0.05
Mercury T-Hg		<0.00020		<0.00020		<0.00020			<0.00020	<0.00020			0.001	
Potassium T-K		0.55		0.73		0.61			0.81	172				
Selenium T-Se		<0.0010		<0.0010		<0.0010			<0.0010	<0.0020			0.01	
Sodium T-Na	2.4	<2.0		2.2		3.1		<0.4	4.3	<2.0				200
Uranium T-U	<0.0005	0.00011		0.0007		0.00028		<0.0005	0.00189	0.00084			0.02	
Vanadium T-V										<0.030				
Zinc T-Zn	0.013	<0.050		<0.050		<0.050		0.019	0.134	<0.10				5
Dissolved Metals														
Aluminum D-Al										<0.020				
Antimony D-Sb										<0.0010			0.006	
Arsenic D-As										0.0441			0.025	
Barium D-Ba										<0.040			1.0	
Boron D-B										<0.20			5	
Cadmium D-Cd										<0.00040			0.005	
Calcium D-Ca										<0.20				
Chromium D-Cr										<0.0040			0.05	
Copper D-Cu										0.0138				1.0
Iron D-Fe										0.043				0.3
Lead D-Pb										<0.0020			0.01	
Magnesium D-Mg										<0.20				
Manganese D-Mn										<0.0040				0.05
Mercury D-Hg										<0.00020			0.001	
Potassium D-K										172				
Selenium D-Se										<0.0020			0.01	
Sodium D-Na										<2.0				200
Uranium D-U										0.0008			0.02	
Vanadium D-V										<0.030				
Zinc D-Zn										<0.10				5.0
Trihalomethanes														
Bromodichloromethane						<0.0010								
Bromoform						<0.0010								
Chloroform						0.0012								
Dibromochloromethane						<0.0010								
Total Trihalomethanes						<0.0040							0.1	
Organic Parameters														
Tannin and Lignin			<0.10							0.24				
Total Organic Carbon C			1.71				1.25			4.61				
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					7.88		7.81			7.81	7.83	6.5		8.5
TDS (ppm)					146		142			267	3			500
EC (uS/cm)					295		286			535	6			
Temperature (°C)					16.4		6.3			1.1	17.2			
Free Available Chlorine					0.19		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 (°C) and Turbidity (NTU)

< = Less than the detection limit indicated.

AO = Aesthetic Objective

MAC = Maximum Acceptable Concentration (Health Based)

- = not tested



Table 2: Water Quality Results

SOURCE:	Building 5681 - Stewart Crossing Grader Station			Building 5682 - Stewart Crossing Living Complex	Building 2600 - Klondike Grader Station			Building 2661 - Ogilvie Grader Station	Building 2665 - Ogilvie Living Complex			GCDWQ Criteria		
Location/ Resident Address	Stewart Crossing			Stewart Crossing	Dempster Highway			Ogilvie	Ogilvie					
Treatment	Softener (not in use), filtration			Softener (not in use), filtration	None			None	None					
Disinfection	Chlorination (not in use)			Chlorination (not in use)	None			None	None					
Source of Water	On-site well			On-site well	On-site well			Abandoned Well at Maintenance Building	On-site well (shared with 2661)					
Purpose of Sampling	Base Line	Base Line	Additional Sampling Living Complex Residence	Base Line	Base Line	Base Line	Additional Sampling	Base Line	Base Line	Base Line	Additional Sampling			
Sample Location							Washroom faucet				Washroom faucet			
Date Sampled	29-Sep-04	8-Jun-05	16-Aug-05	29-Sep-04	29-Sep-04	8-Jun-05	18-Aug-05	8-Jun-05	29-Sep-04	8-Jun-05	18-Aug-05	Lower Limit	Upper Limit	
Physical Tests (ALS)												AO	MAC	AO
Colour (CU)	27	<5.0		7	29	<5.0	<5.0	<5.0	<5.0	<5.0				15
Conductivity (uS/cm)		344				432		267		465				
Total Dissolved Solids	180	180		181	239	259		160	270	279				500
Hardness CaCO3	169	171		168	201	201		126	231	228		AO >200 = poor, > 500 unacceptable ^A		
pH	8.07	8.22		8.07	8.02	8.20		7.92	7.98	8.10		6.5		8.5
Turbidity (NTU)	10.3	17.7	8.02	1.4	13.0	12.5	18.6	0.33	0.2	0.1			1	5
UV Absorbance							0.005				0.037			
% Transmittance							98.9				91.8			
Dissolved Anions (ALS)														
Alkalinity-Total CaCO3	161	160		163	166	173		89.4	178	169				
Chloride Cl	0.8	<0.50		0.6	2.1	2.64		2.12	4.7	6.25				250
Fluoride F	0.15	0.173		0.15	0.18	0.22		0.092	0.08	0.094			1.5	
Silicate SiO4			10.2											
Sulphate SO4	17.7	18.5		17.8	56.7	60.9		48.2	67.8	73.0				500
Nitrate Nitrogen N	<0.1	<0.10		<0.1	<0.1	<0.10		0.2	<0.1	<0.10			10	
Nitrite Nitrogen N	<0.05	<0.10		<0.05	<0.05	<0.10		<0.10	<0.05	<0.10			1	
Ammonia Nitrogen N														
Total Phosphate PO4			0.0285											
Total Metals (ALS)														
Aluminum T-Al	<0.005	<0.010		<0.005	0.008	<0.010		<0.010	<0.005	<0.010				
Antimony T-Sb	<0.0002	<0.00050		<0.0002	<0.0002	<0.00050		<0.00050	<0.0002	<0.00050			0.006	
Arsenic T-As	0.0094	0.0117	0.0108	0.0074	0.003	0.00261		0.00016	0.0002	0.00011			0.025	
Barium T-Ba	0.08	0.077		0.072	0.083	0.071		0.069	0.115	0.091			1	
Boron T-B	0.005	<0.10		0.004	0.021	<0.10		<0.10	0.02	<0.10			5	
Cadmium T-Cd	<0.00001	<0.00020		<0.00001	<0.00001	<0.00020		<0.00020	<0.00001	<0.00020			0.005	
Calcium T-Ca		53.5				51.2		34.6		63.4				
Chromium T-Cr	0.001	<0.0020		0.001	0.0011	<0.0020		<0.0020	0.0011	<0.0020			0.05	
Copper T-Cu	<0.001	0.0057		0.002	<0.001	<0.0010		0.0567	0.053	0.039			1	
Iron T-Fe	0.6	1.48	0.923	0.28	0.74	1.39	1.32	<0.030	0.01	<0.030				0.3
Lead T-Pb	<0.0001	<0.0010		0.0002	<0.0001	<0.0010		<0.0010	0.0003	<0.0010			0.01	
Magnesium T-Mg		9.11				17.7		9.56		16.9				
Manganese T-Mn	0.136	0.134	0.14	0.136	0.138	0.142	0.138	0.0156	<0.005	<0.0020				0.05
Mercury T-Hg		<0.00020				<0.00020		<0.00020		<0.00020			0.001	
Potassium T-K		1.38				0.83		0.67		0.55				
Selenium T-Se		<0.0010				<0.0010		<0.0010		<0.0010			0.01	
Sodium T-Na	3	3.4		3	10.9	11.3		2.2	9.9	9				200
Uranium T-U	<0.0005	<0.00010		<0.0005	<0.0005	0.00025		0.00053	0.002	0.00184			0.02	
Vanadium T-V			<0.030											
Zinc T-Zn	0.221	0.43		0.226	<0.001	<0.050		<0.050	0.018	<0.050				5
Dissolved Metals														
Aluminum D-Al														
Antimony D-Sb													0.006	
Arsenic D-As			0.00697										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			<0.030				<0.030						0.01	0.3
Lead D-Pb														
Magnesium D-Mg													0.01	
Manganese D-Mn			0.135				0.133							0.05
Mercury D-Hg													0.001	
Potassium D-K														
Selenium D-Se													0.01	
Sodium D-Na														200
Uranium D-U													0.02	
Vanadium D-V														
Zinc D-Zn														5.0
Organic Parameters														
Tannin and Lignin							0.27			0.28				
Total Organic Carbon C			1.44				0.74			1.9				
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			8.38				8.1			8.17		6.5		8.5
TDS (ppm)			165				203			223				500
EC (uS/cm)			326				406			446				
Temperature (°C)			15.5				7.1			7.4				
Free Available Chlorine			0.01											

Notes:

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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)

- = not tested



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

Updated March 2006

Well Identification			GPS Coordinates			Well Details								Potential Contaminant Sources						Well Deficiencies					
Building #	Building Name	Location	Northing (+/- 10 m)	Easting (+/- 10 m)	Grade Elevation (+/- 10 m)	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 Grade (m-bg)	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.	Wellhead Above ground (m)	Well Cap	Well Screen	Surface Seal	Apron Grading	Comments
M0026 / M0227	R.C.M.P. Residences	Pelly Crossing	6966865	419665	479	152	1979	Yes	17.5	No	N/A	N/A	7.3	25	4	> 100 m	AST 1/2	9	Potentially 5 septic systems or portions of exist within 60 m of the wellhead	0.80 m below grade	Yes- split gasket cap	Yes	No	No	Evidence of significant flooding within well pit- silt deposited around casing and on top of cap.
																	AST 3/4	30							
M0226/ M0156	R.C.M.P. Detachment / Residence	Pelly Crossing	6966925	419610	474	152	1984	Yes	12.5	No	N/A	10 USgpm (drillers log)	N/A	36 to septic tank	3	> 100 m	AST 1	17	Potentially 3 septic systems or portions of exist within 60 m of the wellhead	0.67 m below grade	Yes- split gasket cap	Yes	No	No	
																	AST 2	36							
																	AST 3	14							
5672	Swimming Pool	Pelly Crossing	6966887	419787	477	152	N/A	No	N/A	Unlikely	N/A	N/A	7.84	Unknown, but likely	2.5	> 100 m	AST 1	17		1.18 m below grade	Yes- split gasket cap	N/A	Unlikely	No	
5676	Eliza Van Bibber School	Pelly Crossing	6966932	419859	478	152	1982	Yes	15.24	No	N/A	35 USgpm (drillers log)	6.71	24	Inside building	> 100 m	AST 1	5	Roof Drain at 10 m from well	0.94 m below grade (however in building with sump)	Yes- split gasket cap	Yes	No	No- but site is well drained	
																	AST 2	8							
5678	Fire hall	Pelly Crossing	6967043	420103	481	152	1988	Yes	13.1	Silt- surface to 2.1 m	N/A	5 USgpm (drillers log)	10.4	Greater than 30 m	2.5	80 m to Pelly River	AST 1	14		0.89 m below grade	Yes- split gasket cap	Yes	No	No	Significant amounts of mouse feces around well casing and on top of well cap.
5987	Nursing Station	Pelly Crossing	6966993	419798	467	152	1977	Yes	12.7	No	N/A	5 USgpm (drillers log)	6.71	28 m to septic tank 40 m to field	4	> 100 m	AST 1	30	Abandoned well at 2 m	0.66 m below grade	Yes- split gasket cap	Yes	No	No	
5681/ 5682	Grader Station/ Living Complex	Stewart Crossing	7028437	416194	468	300 to 12.8 m	1994	Yes	177.4	Silt -14.3 - 158.5 m	N/A	100 USgpm (drillers log)	N/A	33 m to leach pit	1.65	> 100 m	UST 1	40	Outhouse at 40 m	Yes (unknown height)	Likely- but unaccessable	Yes	No	No- but site is well drained	
						AST 1											100	Paint and Toluene drums at 15 m							
						AST 2											100	Creosote timbers at 15 m							
						AST 3											100	Salt Storage at 35 m							
						TAR TANK											55	Dug Well at 120 m Unlabelled drums at 10 m							
5629	Grader Station	Mayo	7054099	456418	508	152	N/A	No	12.515	N/A	N/A	N/A	7.39	26	Inside building enclosure	> 100 m	AST 1	22	Salt storage at 80 m	0.1	No	N/A	Unlikely	No- but site is well drained	
																	UST 1	7							
5636	ATB Day Use Building	Mayo	7054867	456503	509	System is on water delivery.								N/A	Storage tank is located outside building	> 100 m	N/A	N/A		System is on water delivery.					Tank is located outside building with a vermin proof fill with no vent.
5640	PMA Workshop	Mayo	7054007	456481	507	System is on water delivery.								N/A	Storage tank is located inside building	> 100 m	N/A	N/A		System is on water delivery.					Tank is located inside building, there is no vermin screen on the overflow.
5650	Wildlife Workshop	Mayo	7053891	456556	511	152	N/A	No	N/A	N/A	N/A	N/A	N/A	16	4	> 100 m	AST 1	7	Jet fuel drums at 34 m Parking (boats) at 2 m	1.0 below grade	Yes- split gasket cap	N/A	Unlikely	No	Evidence of flooding (damp within enclosure)
5653	Air Terminal Building	Mayo	7054513	456406	508	152	N/A	No	56	N/A	N/A	N/A	8.9	34	3	> 100 m	UST 1	18	Cemetery at 63 m Bulk Fuel Storage at 100 m	1.2	Not at time of assessment- has been installed since.	N/A	Unlikely	No- but site is well drained	

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

Updated March 2006

Well Identification			GPS Coordinates			Well Details								Potential Contaminant Sources							Well Deficiencies					
Building #	Building Name	Location	Northing (+/- 10 m)	Easting (+/- 10 m)	Grade Elevation (+/- 10 m)	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 Grade (m-bg)	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.	Wellhead Above ground (m)	Well Cap	Well Screen	Surface Seal	Apron Grading	Comments	
2544	Air Terminal Building	Dawson City	7103361	591523	375	152	1988	Yes	12.2	Silt- surface to 1.8 m	N/A	20 USgpm (drillers log)	4.7	28 to septic tank	4	> 100 m	AST 1	30	Abandoned wells at 12 and 49 m	0.45	Yes- split gasket cap	Yes	No	No- but site is well drained		
																	AST 2/3	60								
2575	Wildlife Office	Dawson City	7102116	580298	344	152	N/A	No	9.4 (pump?)	Unlikely	N/A	N/A	7.9	15 to holding tank	3	65 m to dredge pond	AST 1	9	Bulk Fuel Storage facilities located upgradient from wellhead.	0.6	No, however, well not in use	N/A	Unlikely	No- but site is well drained	Well is no longer in use, system is on water delivery	
2592	Klondike Valley Fire hall	Dawson City	7104220	592363	379	152	1992	Yes	12.5	No	10.4	13 USgpm (pumping test)	1.2	40 (36 to septic tank)	13	Possibly within 100 m of Klondike River	No	N/A	Road at 12 m Highway at 80 m	1.20 below grade	Yes- split gasket cap	Yes	No	No- but site is well drained		
2599	Grader Station	Dawson City	7102051	583201	343	152	N/A	No	N/A	Unlikely	N/A	N/A	N/A	50 (42 to septic tank)	6	35 m to Dredge pond	AST(s)	44	Fueling Station at 74 m Vehicle Parking at 2 m Drums at 33m Rock Pits at 36m Oil/water separator at 40m	2.30 below grade	Yes- split gasket cap	N/A	Unlikely	No- but site is well drained		
2600	Klondike Grader Station	Dempster Highway	7150453	633968	974	152	1988	Yes	14.3	No	N/A	25 USgpm (drillers log)	3.7	25	10	15 m to Klondike River	AST 1	20	Abandoned (dug) well at 35 m, various monitoring wells on the property	0.15	None	Yes	No	No- but site is well drained	Mouse feces present in well enclosure.	
																	AST 2	30								
																	AST 3	35								
																	AST 4	40								
																	AST 5	15								
																	AST 6/7	>60								
2661/ 2665	Grader Station/ Living Complex	Ogilvie	7251342	655265	609	850	N/A	No	5.6	Unlikely	N/A	N/A	3.6	30 (25 to septic tank) from well that is not in use. > 30 from new well	Inside building	93 m to Ogilvie River	UST 1	21	Waste oil and fuel drums at 2 m Abandoned dug well located inside living complex.	1.6 below grade	Tight fitting lid	No	No	No- but site is well drained.	Dug well, 850 mm galvanized steel casing with tight fitting lid located in basement of living complex. Services living complex, maintenance garage and living complex.	
																	AST 1	2.5								
																	AST 2	7.5								
																	AST 3/4	17.5								
																	AST 5	7.5								
																	AST 6	15								
																	AST 7	15.5								
																	AST 8	14								
5622	Fire hall	Keno	7086946	484996	942	200 to 36 m 150 to 93 m	1987	Yes	93	Till- 38.1 to 55.2	N/A	20 USgpm (drillers log)	54.9	36	18	> 100 m	N/A	N/A	Drainage ditch at 2 m Outhouses at 30,32 and 34 m Empty Drums at 10 m Partly Filled Drums at 32 m	0.25	Yes- split gasket cap	No	No	No- but site is well drained.		
YTG - Small Public Drinking Water Systems								-	-	N/A	-	-	> 30 m from any part of a sewage disposal system	-	-	-	>30 from any potential sources of pollution	>30 from any potential sources of pollution >120 m from solid waste site, dump, or cemetery >300 m from sewage lagoon or pit	-	-	-	-	-			

Notes:

A: Yellow Highlighting indicates deviation from YTG Public Drinking Water Systems Regulation, or potential deficiencies.



TABLE 4: SUMMARY OF OBSERVED DEFICIENCIES AND ESTIMATE COSTS
SMALL PUBLIC DRINKING WATER SYSTEMS - Northern Region

Building #	Building Name	HIGH AND MEDIUM RISK DEFICIENCIES	RECOMMENDED PRIORITY 1 MITIGATION	PRIORITY 1 ADDITIONAL ASSESSMENT	PRIORITY 1 COSTS				RECOMMENDED PRIORITY 2 - MITIGATION	PRIORITY 2 - ADDITIONAL ASSESSMENT	PRIORITY 2 - COSTS				LOW RISK DEFICIENCIES	RECOMMENDED PRIORITY 3 - MITIGATION	PRIORITY 3 - COSTS				
					Labour and Materials	Engineering	Contingency	Subtotal			Labour and Materials	Engineering	Contingency	Subtotal			Labour and Materials	Engineering	Contingency	Subtotal	Total
M0026	Pelly Crossing RCMP Residence	Poor surface completion of wellhead. No surface sanitary seal. Wellhead enclosure subject to flooding. Well within 30 m of potential contaminant sources including septic discharge fields. No driller's log available. Well depth of 12.5 m (shallow) likely within an unconfined aquifer. Bacteriological analysis tested positive for total coliform bacteria. No treatment or disinfection system.	In consideration of the fact that a piped distribution system is scheduled to be constructed in Pelly Crossing within next 2 years, some interim upgrades are recommended: Extend casing at least 500 mm above base of well pit. Install near surface bentonite seal. Superchlorinate well and water system. Disinfection treatment consisting of filtration to 1 micron absolute, and a UV system that is NSF/ANSI certified should be installed.	None Identified	\$6,800	\$1,360	\$1,360	\$9,520	Connect to piped distribution (assume 30m service connection). Utilize UV system and filtration at another YTG site.	None Identified	\$4,000	\$0	\$800	\$4,800	Well located within 30 m of indoor fuel storage tanks. Water softener not functioning.	Decommission existing well. All other health risks mitigated by Priority 1 and 2 Upgrades	\$1,000	\$200	\$200	\$1,400	\$7,850
M0227	Pelly Crossing RCMP Residence									None Identified											\$7,850
M0156	Pelly Crossing RCMP Detachment	Poor surface completion of well. No surface sanitary seal. Shallow well, likely within unconfined aquifer. Located within 30 m of potential contaminant sources including AST. Previous CDWQG MAC exceedence of copper. Elevated and variable concentrations of chloride and nitrate concentrations may indicate aquifer is being impacted by septic wastes. No treatment or disinfection system.	In consideration of the fact that a piped distribution system is scheduled to be constructed in Pelly Crossing within next 2 years, some interim upgrades are recommended: Extend casing at least 500 mm above base of well pit. Install near surface bentonite seal. Superchlorinate well and water system. Disinfection treatment consisting of filtration to 1 micron absolute, and a UV system that is NSF/ANSI certified should be installed. Existing water softener system should be brought back into operation.	None Identified	\$3,800	\$760	\$760	\$5,320	Connect to piped distribution (assume 30m service connection)	None Identified	\$4,000	\$0	\$800	\$4,800	Well located within 30 m of indoor AST. Water softener not functioning. Two pressure tanks and controls appear to be in service, but unknown which is used for this system.	Decommission existing well. All other health risks mitigated by Priority 1 and 2 Upgrades	\$1,000	\$200	\$200	\$1,400	\$5,800
M0226	Pelly Crossing RCMP Residence								Connect to piped distribution (assume 30m service connection)	None Identified											\$5,800
5672	Pelly Crossing Swimming Pool	Wellhead completed in well pit. No surface sanitary seal. No driller's log available. Septic system not located during assessment, may be within 30m of the well. CDWQG MAC exceedences of turbidity. No treatment or disinfection system.	Option 1: In light of fact that piped distribution system is scheduled to be installed within next 2 years, we have provided some options for interim upgrades: Option 1: Extend casing at least 500 mm above base of well pit. Install near surface bentonite seal. Superchlorinate well and water system. Disinfection treatment consisting of filtration to 1 micron absolute, and a UV system that is NSF/ANSI 55 certified should be installed.	Determine location of septic system. Obtain well log.	\$7,800	\$1,560	\$1,560	\$10,920	Connect to piped distribution (assume 30m service connection)	None Identified	\$4,000	\$800	\$800	\$5,600	Plumbing requires improvement, and outdoor piping should be installed below grade with freeze protection. Depending on when the piped distribution system becomes available, this may not be necessary and has not been included as a cost.	Decommission existing well. All other health risks mitigated by Priority 1 and 2 Upgrades	\$1,000	\$200	\$200	\$1,400	\$17,900
			Option 2: Extend casing at least 500 mm above base of well pit. Install near surface bentonite seal. Superchlorinate well and water system. Disinfection treatment consisting of filtration to 1 micron absolute, and a proportional feed chlorine injection system with retention tanks if properly designed, could be installed and utilized for a back-up well chlorination.		\$8,800	\$1,760	\$1,760	\$12,320													\$19,300
5676	Eliza Van Bibber School	No surface sanitary seal. Well completed within unconfined aquifer. Well within 30 m of potential contaminant sources including a septic discharge field and AST, fuel spill of unknown quantity at AST in 1998. One of ten bacteriological analysis tested positive for total coliform bacteria. No treatment or disinfection system present.	Shock chlorinate well and water system. Install filtration to 1 micron absolute (duplex commercial stainless steel) and proportional feed chlorination system with adequately sized retention tanks.	None Identified	\$11,700	\$2,340	\$2,340	\$16,380	Connect to piped distribution (assume 30m service connection)	None Identified	\$4,000	\$800	\$800	\$5,600	Well located within 30 m of indoor AST. Manganese and iron concentrations exceeded CDWQG AO.	All health risk mitigated by Priority 1 and 2 Upgrades	\$0	\$0	\$0	\$0	\$22,000
5678	Pelly Crossing Fire Hall	Poor surface completion of wellhead. No surface sanitary seal. Well completed at 13.7 m below grade and in shallow unconfined aquifer. Bacteriological analysis tested positive for total coliform bacteria. Turbidity above the CDWQG MAC. Water storage tank and water system not accessible for cleaning and maintenance. No treatment or disinfection system.	In light of fact that piped distribution system is scheduled to be installed within next 2 years, the following is recommended: Clean out well enclosure. Install Pitless adapter and extend casing at least 500 mm above base of well pit. Install near surface bentonite seal. Superchlorinate well and water system. Disinfection treatment consisting of filtration to 1 micron absolute, and a UV system that is NSF/ANSI 55 certified should be installed. Install backflow prevention from tank to domestic water supply side.	None Identified	\$4,400	\$880	\$880	\$6,160	Connect to piped distribution (assume 30m service connection)	None Identified	\$4,000	\$800	\$800	\$5,600	Iron concentration reported above CDWQG AO. At time of assessment pressure tank was waterlogged, causing water pump to rapid cycle.	May require Pressure Tank replacement depending on when piped distribution is installed.	\$600	\$0	\$120	\$720	\$12,500
5987	Pelly Crossing Health Centre	Poor surface completion of well. No surface sanitary seal. Well depth of 12.8 m, within shallow, unconfined aquifer. Well within 30 m of potential contaminant sources, including abandoned well and AST. No treatment or disinfection system.	In light of fact that piped distribution system is scheduled to be installed within next 2 years, the following is recommended: Extend casing at least 500 mm above base of well pit. Install near surface bentonite seal. Superchlorinate well and water system. Disinfection treatment consisting of filtration to 1 micron absolute, and a UV system that is NSF/ANSI 55 certified should be installed. Install backflow prevention. Decommission abandoned well.	Sample for EPH and PAH (\$400)	\$5,000	\$1,000	\$1,000	\$7,000	Connect to piped distribution (assume 30m service connection)	None Identified	\$4,000	\$800	\$800	\$5,600	No low-risk deficiencies identified for this site.	Decommission existing well. All other health risks mitigated by Priority 1 and 2 Upgrades	\$1,000	\$0	\$0	\$1,000	\$13,600
5681	Stewart Crossing Grader Station	Poor surface completion of the well. No surface sanitary seal (not likely 500 mm above grade and in unsanitary enclosure). Well within 30 m of potential contaminant sources including chemical storage drums, creosote timbers, and industrial activities. Turbidity exceeded CDWQG MAC and AO. Chlorination system not in operation. No backflow prevention from Community fill.	Standard wellhead upgrades with pitless unit. Install filtration to 1 micron absolute (commercial duplex unit). Return chlorination (replace pump with Digital Dosing pump). Relocate drums and chemical storage to at least 30 m away from wellhead. Regulate activities within 30 m of wellhead. Re-plumb truck fill and water pick-up station with backflow prevention.		\$10,100	\$2,020	\$2,020	\$14,140	Recondition softener system (replace media). Consider completing this work at the same time as Priority 1 upgrades. All other High and Medium Risk Deficiencies Mitigate by proposed Priority 1 Upgrades.	Monitor arsenic concentrations with softener in operation.	\$500	\$100	\$100	\$700	Arsenic concentration above proposed MAC of 0.005 mg/L. Colour, manganese and total iron concentration in exceedence of CDWQG AO. Public water fill port located before softening system. Softening and disinfection systems not operating at time of assessment.	Assumes would require arsenic removal system if softener is not adequate to remove to less than proposed MAC. As well, would likely require new building to house equipment.	\$24,000	\$4,800	\$4,800	\$33,600	\$48,400
5682	Stewart Crossing Living Complex																				

TABLE 4: SUMMARY OF OBSERVED DEFICIENCIES AND ESTIMATE COSTS
SMALL PUBLIC DRINKING WATER SYSTEMS - Northern Region

Building #	Building Name	HIGH AND MEDIUM RISK DEFICIENCIES	RECOMMENDED PRIORITY 1 MITIGATION	PRIORITY 1 ADDITIONAL ASSESSMENT	PRIORITY 1 COSTS				RECOMMENDED PRIORITY 2 - MITIGATION	PRIORITY 2 - ADDITIONAL ASSESSMENT	PRIORITY 2 - COSTS				LOW RISK DEFICIENCIES	RECOMMENDED PRIORITY 3 - MITIGATION	PRIORITY 3 - COSTS				
					Labour and Materials	Engineering	Contingency	Subtotal			Labour and Materials	Engineering	Contingency	Subtotal			Labour and Materials	Engineering	Contingency	Subtotal	Total
5629	Mayo Grader Station	Poor surface completion of well. No surface sanitary seal. No driller's log available. Well depth of 12.5 m, likely within shallow, unconfined aquifer. Well within 30 m of potential contaminant sources including UST, above ground waste oil storage tank, septic discharge field, and industrial activities. Chloride concentrations elevated, indicating potential connection with septic or road salt storage. Bacteriological analysis tested positive for total coliform bacteria (1/9 times). No treatment or disinfection system present.	Option 1: Drill a replacement well sited an appropriate distance and upgradient from potential contaminant sources. In interim, and do not use existing well for potable water. Water treatment will likely be required (softener and RO for potable water) due to elevated iron, manganese and arsenic for deep wells in the area.	None Identified	\$57,700	\$11,540	\$11,540	\$80,780	All High and Medium Risk Deficiencies Mitigate by proposed Priority 1 Upgrades.	None Identified	\$0	\$0	\$0	\$0	No low-risk deficiencies identified for this site.	None Identified	\$0	\$0	\$0	\$0	\$80,800
			Option 2: Water Delivery. Note that water is delivered to PMA shop on same property. Life cycle costs should be compared with the option of new well and required treatment. The existing well could be used for non-potable use such as truck washing and commercial operations.	None Identified	\$6,000	\$1,200	\$1,200	\$8,400	All High and Medium Risk Deficiencies Mitigated by proposed Priority 1 Upgrades.	None Identified	\$0	\$0	\$0	\$0	No low-risk deficiencies identified for this site.	None Identified	\$0	\$0	\$0	\$0	\$8,400
5636	Mayo A.T.B. Day Use Building	Water not used for drinking water, all deficiencies considered low-risk for this system as long as it is not used for drinking water.	Consult with EHSS regarding existing advisories to ensure that they are adequate.	None Identified	\$0	\$0	\$0	\$0	None identified	None Identified	\$0	\$0	\$0	\$0	Water storage tank located outside. FAC below required 0.2 mg/L at point of use. No records of bacteriological analyses.	In order to make water safe as drinking water supply it is recommended that filtration and UV system be installed and proper monitoring and maintenance be initiated.	\$8,000	\$1,600	\$1,600	\$11,200	\$11,200
5640	Mayo Property Management Agency Shop	FAC below required 0.2 mg/L at point of use, therefore, inadequate disinfection. No records of bacteriological analyses. Tank does not appear to have been recently cleaned.	Install filtration and UV to ensure adequately disinfected water supply in light of low residual chlorine concentration. Install vermin proof screen on the vent/overflow.	Initiate routine bacteriological testing program and tank cleaning program.	\$3,000	\$0	\$600	\$3,600	None identified.	None Identified	\$0	\$0	\$0	\$0	No low-risk deficiencies identified for this site.	None Identified	\$0	\$0	\$0	\$0	\$3,600
5650	Mayo Wildlife Workshop	Poor surface completion of wellhead. No surface sanitary seal. No well log available. Well within 30 m of potential contaminant sources, including septic discharge field, AST, and vehicle parking. Barium concentration above CDWQG MAC. Turbidity above CDWQG MAC and AO. No disinfection system present.	Option 1: Provide bottled water station and post appropriate advisories. Drill replacement well when funds available.	Consult with EHSS regarding appropriate advisories.	\$250	\$50	\$50	\$350	Drill a replacement well sited an appropriate distance and upgradient from potential contaminant sources. In interim, do not use existing well for potable water. Even when new well is drilled, water treatment will likely be required (softener and RO for potable water) due to naturally	None Identified	\$44,100	\$8,820	\$8,820	\$61,740	Arsenic concentration above proposed MAC of 0.005 mg/L. Colour and concentrations of iron and manganese have exceeded CDWQG AO.	Decommission existing well. All other health risks should be mitigatee by proposed Priority 1 Upgrades.	\$1,000	\$200	\$200	\$1,400	\$63,500
			Option 2: Provide bottled water station and post appropriate advisories. Reconfigure for water delivery when funds become available.	Consult with EHSS regarding appropriate advisories.	\$250	\$50	\$50	\$350	Reconfigure for water delivery. Install filtration and UV disinfection system.	None Identified	\$6,450	\$1,290	\$1,290	\$9,030	No low-risk deficiencies identified for this site.	Decommission existing well. All other health risks should be mitigatee by proposed Priority 1 Upgrades.	\$1,000	\$200	\$200	\$1,400	\$10,800
5653	Mayo Airport Terminal Building	Poor surface completion of wellhead. No surface sanitary seal. No driller's log available. Well within 30 m of potential contaminant sources including UST. Well within 120 m of cemetery. Bacteriological analysis positive for total coliform bacteria. Total arsenic concentration in exceedence of CDWQG MAC. Turbidity in exceedence of CDWQG MAC and AO. No disinfection system present.	Standard wellhead upgrades with pitless unit. Install filtration (to 5 micron) and UV. Install duplex softener and residential RO to kitchen sink. Post signs in washrooms indicating that water should not be consumed except from dedicated tap in kitchen.	Review water quality following recent well redevelopment and chemical cleaning. Attempt to obtain well log.	\$12,800	\$2,560	\$2,560	\$17,920	All High and Medium Risk Deficiencies Mitigate by proposed Priority 1 Upgrades.	None Identified	\$0	\$0	\$0	\$0	Iron and manganese concentrations in exceedence of CDWQG AO. Colour reported above CDWQG AO.	Mitigate by proposed Priority 1 Upgrades.	\$0	\$0	\$0	\$0	\$17,900
2544	Dawson City Airport Terminal Building	Poor surface completion of wellhead. No surface sanitary seal. Well depth of 12.2 m within shallow, unconfined aquifer. Well within 30 m of potential contaminant sources, including abandoned well and AST. Several spill events on property, some in close proximity to well. No treatment or disinfection system present.	Install filtration (to 1 micron absolute) and NSF/ANSI 55 certified UV to ensure adequately disinfected water supply. Regulate activities in area upgradient of well.	Install filtration. Regulate activities within the WPA. Develop contingency plans. Costs are not included for routine monthly monitoring.	\$13,000	\$8,600	\$2,600	\$24,200	Standard wellhead upgrades and retrofit of sanitary seal. Decommission abandoned well.	None Identified	\$4,000	\$800	\$800	\$5,600	No low-risk deficiencies identified for this site.	None Identified	\$0	\$0	\$0	\$0	\$29,800
2575	Dawson City Wildlife Office	No access port in water storage tank for cleaning. There is no cap on fill pipe, and no vermin proof screen on overflow/vent.	Install access port for proper monitoring and cleaning. Top of tank is very close to ceiling. May require reducing overall height of tank, or put in side access hatch to facilitate cleaning.	Institute regular FAC monitoring program. Routine cleaning program (note confined entry).	\$1,050	\$210	\$210	\$1,470		None Identified	\$0	\$0	\$0	\$0	Abandoned well not properly decommissioned. Fill pipe and vent constructed with ABS piping, not suitable for drinking water.	Decommission abandoned well. Replace ABS piping with PVC.	\$1,200	\$240	\$240	\$1,680	\$3,200



TABLE 4: SUMMARY OF OBSERVED DEFICIENCIES AND ESTIMATE COSTS
SMALL PUBLIC DRINKING WATER SYSTEMS - Northern Region

Building #	Building Name	HIGH AND MEDIUM RISK DEFICIENCIES	RECOMMENDED PRIORITY 1 MITIGATION	PRIORITY 1 ADDITIONAL ASSESSMENT	PRIORITY 1 COSTS				RECOMMENDED PRIORITY 2 - MITIGATION	PRIORITY 2 - ADDITIONAL ASSESSMENT	PRIORITY 2 - COSTS				LOW RISK DEFICIENCIES	RECOMMENDED PRIORITY 3 - MITIGATION	PRIORITY 3 - COSTS				
					Labour and Materials	Engineering	Contingency	Subtotal		None Identified	Labour and Materials	Engineering	Contingency	Subtotal			Labour and Materials	Engineering	Contingency	Subtotal	Total
2592	Klondike Valley Fire Hall	Poor surface completion of well. No surface sanitary seal. Well depth of 12.2 m within shallow, unconfined aquifer. Bacteriological analysis positive for total coliform bacteria. On site sewage disposal within 60 m of wellhead (this is a community well), and depth to static water level is 1.2 m. Septic field may be upgradient of well. Only single check valve between fire storage and domestic side of water system.	Option 1: Upgrade existing well and convert system to sewage eduction.	Hydrogeological assessment to confirm groundwater flow direction and in particular, whether septic system is upgradient of well. (\$10,000 included in engineering).	\$13,600	\$12,720	\$2,720	\$29,040	Replumb inside plumbing to hose bib. Relocate hose bib at least 1 m above grade. Install double check valve assembly for backflow prevention.	None Identified	\$500	\$100	\$100	\$700	Well located within 12 m of road.	None recommended at this time.	\$0	\$0	\$0	\$0	\$29,700
			Option 2: Upgrade existing well and re-locate septic effluent system to a location downgradient of the existing well.,		\$37,600	\$17,520	\$7,520	\$62,640													\$63,300
2599	Dawson City Grader Station	Poor surface completion of well. No surface sanitary seal. No driller's log available. Well within 30 m of potential contaminant sources, including vehicle parking and industrial activities. No primary disinfection. Note that samples taken from raw water have elevated arsenic, lead, turbidity, iron, manganese and colour.	Install NSF/ANSI 55 UV certified system post softener. Superchlorinate well and water system.	None Identified	\$2,800	\$560	\$560	\$3,920	Standard wellhead upgrades with Snappy Pitless and Surface Protection.	None Identified	\$3,000	\$600	\$600	\$4,200	pH of reverse osmosis treated water below the CDWQG AO at time of analysis (likely not the case). Field pH, however was within acceptable range.	Monitor pH of treated water.	\$0	\$0	\$0	\$0	\$8,100
2600	Klondike Grader Station	Poor surface completion of wellhead. No well cap at time of assessment. No surface sanitary seal. Well depth of 14.4 m within shallow, unconfined aquifer. Well within 30 m of potential contaminant sources including septic discharge field, nearby river, and various ASTs. Site has been subject to hydrocarbon spills and there is known soil and groundwater contamination. No bacteriological results available. Turbidity in exceedence of CDWQG MAC. No treatment or disinfection system present.	Option 1: Temporary wellhead upgrades. Superchlorinate well and water system. Install NSF/ANSI 55 UV certified system with pre-filtration to 1 micron absolute.	Routine Bacteriological and Chemical Testing	\$5,200	\$1,040	\$1,040	\$7,280	Drill a replacement well sited an appropriate distance and upgradient from potential contaminant sources.	None Identified	\$36,000	\$7,200	\$7,200	\$50,400	Colour, iron concentration and manganese concentration in exceedence of CDWQG AO.	Decommission abandoned well, or keep for monitoring well. Mitigated by proposed Priority 1 and 2 Upgrades.	\$1,000	\$200	\$200	\$1,400	\$59,100
			Option 2: Provide bottled water station and post appropriate advisories.	Consult with EHSS regarding appropriate advisories.	\$250	\$50	\$50	\$350	Drill a replacement well sited an appropriate distance and upgradient from potential contaminant sources. Install disinfection treatment system.	None Identified	\$41,000	\$8,200	\$8,200	\$57,400							\$59,200
2661	Ogilvie Grader Station	Shallow well likely completed in unconfined aquifer subject to surficial contamination. Well in maintenance garage not properly decommissioned. Bacteriological analysis tested positive for total coliform bacteria. No treatment or disinfection system present.	Superchlorinate well and water system. Install NSF/ANSI 55 UV certified system with pre-filtration to 1 micron absolute. Disconnect shop well.	None Identified	\$4,700	\$940	\$940	\$6,580	Decommission shop well. Note: Consider completing with Priority 1 to save on mob/demob costs.	\$1,500	\$0	\$0	\$0	\$0	Top of culvert well does not extend above grade because it is in the basement, however, Living Complex is on high part of site and foundation is concrete slab and walls.	No upgrades necessary.	\$0	\$0	\$0	\$0	\$6,600
2665	Ogilvie Living Complex										\$0	\$0	\$0	\$0							
5622	Keno City Fire Hall	Poor surface completion of well. No surface sanitary seal. Well within 30 m of potential contaminant sources including drainage ditch, fuel drums, and outhouse. Turbidity in exceedence of CDWQG MAC. Elevated chloride and nitrate concentrations indicate the well may be under the influence of surficial or septic sources. Chlorination system not in service. FAC below required 0.2 mg/L at point of use.	Install proportional feed chlorination system and separate fire protection supply from domestic supply. Note that YTG - Community Services has put out a RFP for the plumbing and chlorination system upgrades.	None Identified	\$57,600	\$11,520	\$11,520	\$80,640	Standard wellhead upgrades with Commercial pitless Unit.	None Identified	\$5,000	\$1,000	\$1,000	\$7,000	Pressure tank waterlogged, causing water pump to rapid cycle.		\$0	\$0	\$0	\$0	\$87,600

TABLE 5: OVERALL ASSESSED LEVEL OF RISK TO EXISTING WATER SUPPLY SYSTEMS USING MULTI-BARRIER APPROACH

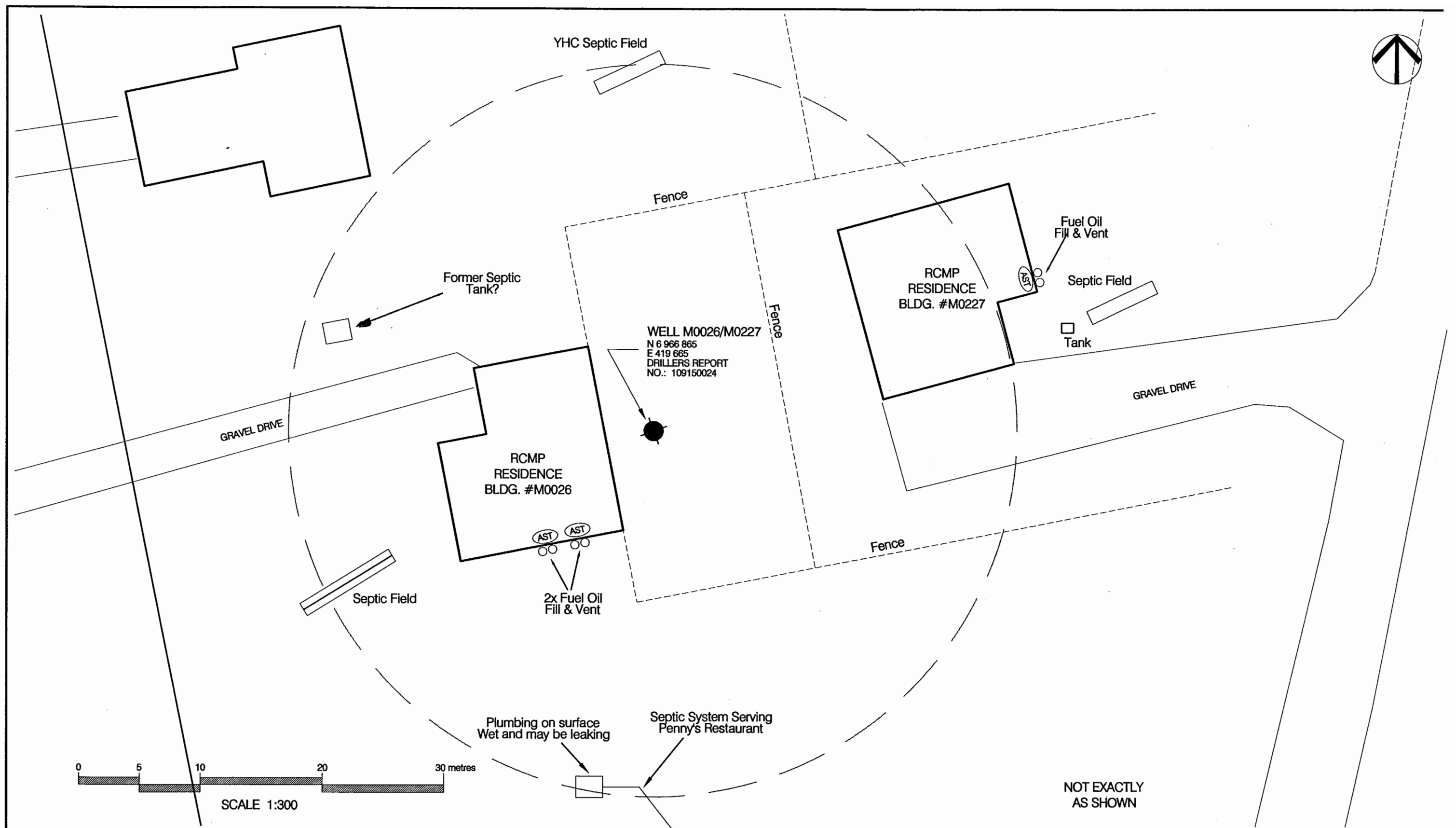
		RISK INDICATORS				RISK MITIGATORS				OVERALL RISK AND PRIORITY		
Well System ID #	Building Name	Exceedence of MAC other than total coliform or turbidty	Poor Quality Indicators (turbidity, coliform, nutrients)	Potential Bacteriological Contaminants within 30 m	Public Accessibility or Residence	Favourable Hydrogeological Conditions	Well Construction (surface casing, driven casing in tight formation etc..)	Disinfection Treatment (primary - ie. filtration to 1 micron)	Disinfection Treatment (secondary - ie. Chlorination or UV)	Overall Risk	Rationale	Priority 1, 2 or 3
M0026 / M0227	R.C.M.P. Residences	No	1/17 Total Coliform	Yes	Yes- Residence	No	No	No	No	High	Potential risk and exposure exists, however no risk mitigation.	1
M0226/ M0156	R.C.M.P. Detachment / Residence	No	Elevated Chloride/ Nitrate	No	Yes- Residence	No	No	No	No	High	Potential risk and exposure exists, however no risk mitigation.	1
5672	Pelly Crossing Swimming Pool	No	Turbidity	No	Yes	Unlikely	No	No	No	High	Potential risk and exposure exists, however no risk mitigation.	1
5676	Eliza Van Bibber School	No	Turbidity, 1/9 Total Coliform	Yes	Yes	No	No	No	No	High	Potential risk and exposure exists, however no risk mitigation.	1
5678	Pelly Crossing Firehall	No	Turbidity, 1/9 Total Coliform	No	No	No	No	No	No	High	Potential risk and exposure exists, however no risk mitigation.	3
5987	Pelly Crossing Nursing Station	No	No	No	Yes	No	No	No	No	High	Shallow well	1
5681/ 5682	Stewart Crossing Grader Station/ Living Complex	Total and dissolved arsenic greater than proposed MAC	Turbidity	No	Yes	Yes	No	No	No - Chlorination not functioning at time of Assessment	Moderate - High	Risk could be lowered with disinfection system upgrade	1
5629	Mayo Grader Station	No	Turbidity, Elevated Chloride, 1/9 Total Coliform	Yes	No	Unlikely	Unlikely	No	No	High	Shallow well, no risk mitigation	3
5636	Mayo ATB Day Use Building	?	?	No	No	System is on water delivery	System is on water delivery	No	Yes- Chlorination at Source	Low	System is currently on water delivery, however, not used for drinking water (advisories posted) therefore risk is low.	3
5640	Mayo PMA Workshop	?	?	No	No	System is on water delivery	System is on water delivery	No	Yes- Chlorination at Source	Moderate - High	System is currently on water delivery. Risk could be reduced with storage tank cleaning and system superchlorination.	3
5650	Mayo Wildlife Workshop	Barium	Turbidity, Elevated Chloride	Yes	No	Unknown	Unknown	No	No	High	Potential risk and exposure exists, however no risk mitigation.	2

TABLE 5: OVERALL ASSESSED LEVEL OF RISK TO EXISTING WATER SUPPLY SYSTEMS USING MULTI-BARRIER APPROACH

		RISK INDICATORS				RISK MITIGATORS				OVERALL RISK AND PRIORITY		
Well System ID #	Building Name	Exceedence of MAC other than total coliform or turbidity	Poor Quality Indicators (turbidity, coliform, nutrients)	Potential Bacteriological Contaminants within 30 m	Public Accessibility or Residence	Favourable Hydrogeological Conditions	Well Construction (surface casing, driven casing in tight formation etc..)	Disinfection Treatment (primary - ie. filtration to 1 micron)	Disinfection Treatment (secondary - ie. Chlorination or UV)	Overall Risk	Rationale	Priority 1, 2 or 3
5653	Mayo Air Terminal Building	Arsenic	Turbidity, 1/9 Total Coliform	No	Yes	Unknown	Unknown	No	No	Moderate	Advisories posted to not use water for drinking.	1
2544	Dawson City Air Terminal Building	No	No	No	Yes	No	No	No	No	High	Shallow well in vulnerable aquifer. Potential risk and exposure exists, however no risk mitigation.	1
2575	Wildlife Office	No	No	No	No	No	No	No	Yes-Chlorination at Source	Low	System is supplied by water delivery (treated at the source). FAC was adequate at time of sampling.	2
2592	Klondike Valley Fire Hall	No	No	Yes	Yes	No	No	No	Yes-Chlorination	High	Risk could be lowered with filtration.	1
2599	Dawson City Grader Station	Lead and Arsenic (pre-treatment)	Turbidity (pre-treatment)	No	No	No	No	Yes - RO membrane filtration	No	Moderate	Potential risk and exposure exists, however no risk mitigation.	3
2600	Klondike Grader Station	No	Turbidity, 2/6 Total Coliform	Yes	Yes- Residence	No	No	No	No	High	Potential risk and exposure exists, however no risk mitigation.	1
2661/ 2665	Ogilvie Grader Station and Living Complex	No	1/2 Total Coliform	No	Yes- Residence	No	No	No	No	High	Potential risk and exposure exists, however no risk mitigation.	1
5622	Keno Firehall	No	Turbidity	No	Yes	No	No	No	Disinfection system not functioning	High	Potential risk and exposure exists, however no risk mitigation.	1



APPENDIX A



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.

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

DESIGNED BY:	R. MARTIN
DRAWN BY:	J. BUYCK
DATE:	SEPT. 2005
SCALE:	AS SHOWN
PROJECT No.:	1260002.004
ACAD FILENAME:	004-NORTHERN REGION

CLIENT:

 Highways and Public Works

 Property Management Branch

SMALL PUBLIC WATER SYSTEMS ASSESSMENT NORTHERN REGION	
GOVERNMENT OF YUKON HIGHWAYS & PUBLIC WORKS	
PELLEY RCMP BUILDING # M0227 & M0026 SITE LOCATION DIAGRAM WELL ID: M0026/M0227	
REVISION	ISSUE
0	0
FIGURE No. FIGURE M0026 /M0227-A	

LEGEND



PUMP



PRESSURE GAUGE



GATE VALVE



CHECK VALVE



SOLENOID

#2

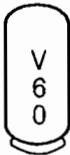
COMPONENT ID. No.
(SEE TABLE ON FOLLOWING PAGE)



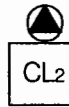
FLOW METER



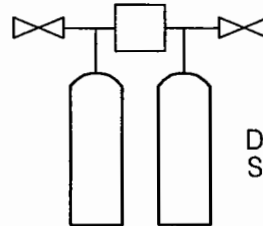
WATER FILTER
(CARTRIDGE TYPE)



PRESSURE TANK



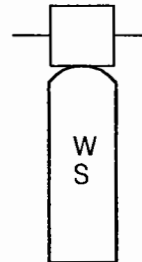
CHLORINE RESERVOIR AND
INJECTION PUMP



DUPLEX WATER
SOFTENER



WELL WITH
SUBMERSIBLE PUMP



ACTIVATED
CARBON



EBA Engineering Consultants Ltd.

CLIENT



PROJECT

SMALL PUBLIC WATER SYSTEMS ASSESSMENT
WESTERN REGION

TITLE

SCHEMATIC SYSTEM
LEGEND

DATE APRIL 2006

DWN. JSB

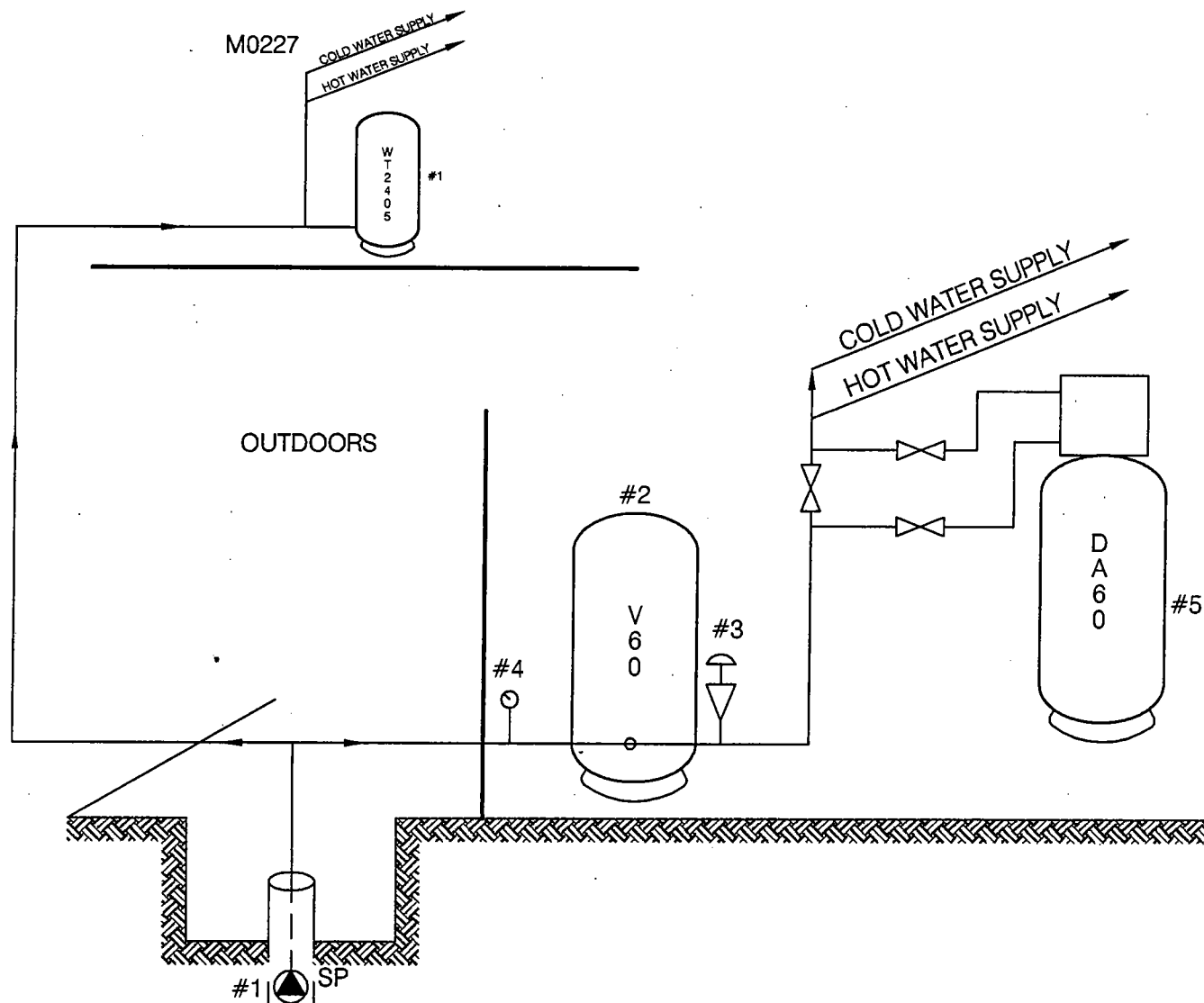
CHKD. RMM

FILE NO.

1260002

DRWG.

LEGEND



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



EBA Engineering Consultants Ltd.

CLIENT



PROJECT

SMALL PUBLIC WATER SYSTEMS ASSESSMENT
NORTHERN REGION

TITLE

WATER SYSTEM DISTRIBUTION/TREATMENT
SCHEMATIC SYSTEM ID.: M0026
RCMP - PELLY CROSSING, YT.

DATE

SEPT. 2005

DWN.

JSB

CHKD.

RMM

FILE NO.

1260002.004

DWG.:

FIGURE M0026-B

Northern Region – Pelly Crossing R.C.M.P. Housing
Building # ~~M0226~~ M0026

Photo 101-199

DISTRIBUTION & TREATMENT SYSTEM DATA

Item	Description	Manufacturer	Model	Part No.	Serial No.	Size
1	SUB PUMP	GOULDS	10GSA12		K022226	1/2 HP 4"
2	PRESSURE TANK	AO SMITH	V60		GB9309	
3	PRESSURE SWITCH	SQUARE D	FSG2			2HP 1/4" FIPT
4	PRESSURE GAUGE	MARSH	0-100			2" 1/4" FIPT
5	WATER SOFTENER	DURO	DA 60		8507	60K
6						
7						
8						
9						
10						

Northern Region – Pelly Crossing R.C.M.P. Housing
Building # MO227

DISTRIBUTION & TREATMENT SYSTEM DATA

PHOTO 101-200

Item	Description	Manufacturer	Model	Part No.	Serial No.	Size
1	PRESSURE TANK	WEU RITE	WR240S		1030-93	
2						
3						
4						
5						
6						
7						
8						
9						
10						

TABLE M0026/M0227 - 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?
M0026	Pelly Crossing RCMP Residence	9	Oct-04 to Jun-05	no	0/9	no	9-Jun-05	no
M0227	Pelly Crossing RCMP Residence	8	Oct-04 to Jun-05	yes	1/8	no	9-Jun-05	no



Table M0026/M0227 - 2: Water Quality Results

SOURCE:		Building M0026 - R.C.M.P. Residence			Building M0227 - R.C.M.P. Residence		GCDWQ Criteria		
Location/ Resident		Pelly Crossing			Pelly Crossing				
Address									
Treatment		Water softener (not in use)			Water softener (not in use)				
Disinfection		None			None				
Source of Water		On-site well (shared with M0227)			On-site well (shared with M0026)				
Purpose of Sampling		Base Line	Base Line	Additional Sampling	Base Line	Base Line			
Sample Location									
Date Sampled		29-Sep-04	8-Jun-05	23-Aug-05	29-Sep-04	8-Jun-05	Lower	Upper Limit	
Physical Tests (ALS)							AO	MAC	AO
Colour (CU)		<5	<5.0		<5	<5.0			15
Conductivity (uS/cm)			436			437			
Total Dissolved Solids		233	235		233	238			500
Hardness CaCO3		216	203		215	202	AO >200 = poor, > 500 unacceptable ^A		
pH		7.98	8.16		8	8.14	6.5		8.5
Turbidity (NTU)		0.7	0.16		0.3	0.15		1	5
UV Absorbance				0.0480					
% UV Transmittance				89.5					
Dissolved Anions (ALS)									
Alkalinity-Total CaCO3		200	208		199	205			
Chloride Cl		0.9	0.75		0.8	0.76			250
Fluoride F		0.1	0.119		0.1	0.121		1.5	
Silicate SiO4									
Sulphate SO4		28.3	25.7		28.8	25.5			500
Nitrate Nitrogen N		0.3	0.13		0.3	0.13		10	
Nitrite Nitrogen N		<0.05	<0.10		<0.05	<0.10		1	
Ammonia Nitrogen N									
Total Phosphate PO4									
Total Metals (ALS)									
Aluminium T-Al		<0.005	<0.010		<0.005	<0.010		0.1	
Antimony T-Sb		<0.0002	<0.00050		<0.0002	<0.00050		0.006	
Arsenic T-As		0.0003	<0.00010		0.0002	<0.00010		0.025	
Barium T-Ba		0.087	0.075		0.088	0.076		1	
Boron T-B		0.003	<0.10		0.003	<0.10		5	
Cadmium T-Cd		0.00002	<0.00020		0.00002	<0.00020		0.005	
Calcium T-Ca			59.5			59.1			
Chromium T-Cr		0.0012	<0.0020		0.0012	<0.0020		0.05	
Copper T-Cu		0.684	0.142		0.388	0.378		1	
Iron T-Fe		<0.005	<0.030		0.03	0.031			0.3
Lead T-Pb		0.0002	<0.0010		0.0006	<0.0010		0.01	
Magnesium T-Mg			13.2			13.1			
Manganese T-Mn		<0.005	<0.0020		<0.005	<0.0020			0.05
Mercury T-Hg			<0.00020			<0.00020		0.001	
Potassium T-K			2.71			2.68			
Selenium T-Se			<0.0010			<0.0010		0.01	
Sodium T-Na		5.0	5.7		5	5.5			200
Uranium T-U		0.0007	0.00071		0.0007	0.00073		0.02	
Vanadium T-V									
Zinc T-Zn		0.005	<0.050		0.016	<0.050			5
Organic Parameters									
Tannin and Lignin				0.2					
Total Organic Carbon C				2.95					
Field Chemistry (EBA)									
pH				8.05			6.5		8.5
TDS (ppm)				189					500
EC (uS/cm)				375					
Temperature (°C)				9.6					
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)



SMALL PUBLIC WATER SYSTEM ASSESSMENT**PART A: EBA Site Inspection**Inspector: KSJ / RMMDate Aug 23 / 05

WELL ID #	Owner	Location Description
M0026 / 227	VTG	RCMP Residence.

1. Well Location and Potential Contaminant Sources

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

Pelly Crossing

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

RCMP Residence M0026 (w side of building & rear of porch.c. GPS location: 08 E 0419665N 6966865(Waypoint 036)
elev: 479d. Is there electric power? ☒ Yes ☐ Noe. Is there outside water access? ☒ Yes ☐ No

f. Does the well system have:

☐ 15 or more service connections to a piped distribution system? No If so how many _____☐ 5 or more delivery sites on a trucked distribution system? No If so how many _____g. Nearest building, specify RCMP Residence M0026h. Distance from well to building < 1 mi. If there is an effluent disposal field, is its location known? ☒ Yes ☐ Noj. Distance from well to nearest point of known field: 25m (field)k. Well location relative to field: ☐ upslope ☐ downslope ☒ lateral-5 within 30m of well head.

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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 Entrance by animals? ☐ Yes ☒ No

p. Is well site subject to flooding? ☒ Yes ☐ No *sediment build up in pit*

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: septic #1; Distance from well to Potential Source 1: 25m (MO026)

Potential Source 2: #2; Distance from well to Potential Source 2: 27m (N property) 4k.

Potential Source 3: neighbor #3; Distance from well to Potential Source 3: 30-60m MO227 (>30)

Potential Source 4: neighbor #4; Distance from well to Potential Source 4: 30-60m (Penny's ?)
neighbor #5 30-60m (E. neighbor - can't confirm location)

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

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

likely #6 ~33m. (NE. neighbor)
2x AST in MO227 w metal tray -
well on this property - 2x AST in MO026/11 concrete floor - 9m

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2. Well and Wellhead information:

- a. When was well installed? Year unk. Month unk.
- 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 6" (152mm) Material: ☒ steel ☐ plastic ☐ concrete
- g. Depth of well: unk. ☐ measured (if possible) ☐ reported ☐ from log
- h. Static water level below ground: unk.
☐ 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 n/a
- j. (If bedrock) Does the well have a liner? ☐ yes ☐ No ☐ steel ☐ plastic
- k. If there is a well screen: length unk. slot size(s) _____
Location of screen: from _____ to _____ 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 pit 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 Yes 0.80m below
- 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
- 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?

no surface water ☒ Yes ☐ No ☐ farther investigation required.

If yes is there treatment or disinfection ☐ Yes ☐ No

Explain (filtration, disinfection etc...) _____

4. Aquifer Supplying This Well:

- a. The aquifer is: ☐ bedrock ☒ granular sediment ☐ unknown
most likely

- 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 Goulds Model 1065412
horsepower 1/2 capacity _____ voltage _____

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d. Date installed: _____ By: _____

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

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

g. Pump delivers water to: ☒ pressure tank ☐ elevated tank ☐ other 2*

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 n ground + insulation.

l. Comments on pump installation: _____

6. Conclusions

a. Comments on overall installation:

b. Recommendations: _____

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PART B: DBA Site Inspection

Inspector: BERT ALBISSEN

Date AUG 23/05

WELL ID #	Owner	Location Description
<u>MO 026</u> <u>+ MO 227</u>	<u>VTG</u>	<u>RCHD-PELLEY CROSSING.</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: PRESSURE TANK

Where is it located?

Comments: basement

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: _____

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Overall Tank

What are the tank size and dimensions?

What material is the tank constructed of? _____

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

Comments: _____

Tank Inlet, Outlet and Lid

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

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

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

Is the water tank drain accessible? YES NO

WATER TANK AND WATER QUALITY CONDITION

Are there signs of staining or biofouling? YES NO

Comments: _____

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

Comments: _____

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

Have there been any bacteriological analyses conducted previously? YES NO

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

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

8. Conclusions

a. Comments on overall installation:

THIS IS A GOOD QUALITY INSTALLATION IN
BOTH MATERIAL & WORKMANSHIP. THIS

b. Recommendations:

RETURN SOFTNER TO OPERATION, INSTALL
FILTRATION & UV (RSF 55) 10 GPM.

M0026 / M0227



FIELD REPORT

(109150041)

Started..Nov..7.....1977.

Completed..Nov..9.....1977.

NAME AND ADDRESS OF CLIENT	DESCRIPTION OF WORK	LOCATION OF WORK
Y. L. LINGGARD AND ASSOCIATES INC. R.C.M.P. 201A 303 SARVIS WILLOW 17.	WATER WELL	Lot #15 PERRY CROSSING R.C.M.P. Lot

FORMATION LOG			DESCRIPTION OF WORK	TIME			
FROM	TO	FORMATION		DATE	FROM	TO	HOURS
0	5	BROWN S.V. SAND	MOVE	Nov 7	8	12	4
5	7	SAND	Fill water truck & set up		12 ³⁰	2 ³⁰	2
7	9	GR	DRILL 6" to 15'		2 ³⁰	5	2.0
14	21	rocky GR fill	CLEANED UP		5	5 ³⁰	.8
21	39	GR					-9.17
39	41	SAND					DRILLING 5
41	45	GR					TRAVEL 4.4
45	60	GR & SAND	STARTING UP	Nov 8	8	9	1
60	81	GLAY (BLUE)	DRILLED 6" to 60'		9	10 ³⁰	1.5
			RATCHED 7 1/2" & RUN		10 ³⁰	2 ³⁰	4
			CHECK TO 58'				
			SET SCREEN 25 S.L.T.		2 ³⁰	4 ⁰⁰	1.5
			DEVELOPING		11 ⁰⁰	6 ⁰⁰	2
							DRILLING 10.4
			STARTING	Nov 9	8	8 ³⁰	.5
			A.R. DEVELOPING		8 ³⁰	11 ³⁰	3.0

Rcd. of Casing & Pipe				Remarks:
Size	Type	Size	Type	
Feet	Inch	Feet	Inch	
21	1			SCREEN 25 S.L.T.
21	1			2' RISER RIGID PUCKER 1/2" BIT BOTTOM
15	10			BOTTOM 57' 6" FROM GROUND
58	0			
4	0			
54	0			
STATIC LEVEL				Total Rig Time hrs.
Ground level 24'				Total Standby hrs.
Top of casing 25'				Drilling Mud 7 sacks

SIGNATURES

 MIDNIGHT SUN... M. R. L. TALL...
 TITLE... DRILLER...

 CLIENT.....
 TITLE.....



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

Spill Report Information

Spill #	8621
Jurisdiction	Yukon
Community	Pelly Crossing
Address	
Highway	
Milepost	
Feature	Pelly Crossing
Location and Cause	overturned home heating fuel storage tank - garbage truck backed into supporting stand
Latitude	62.819543
Longitude	-136.569408
Incident Date	12/31/1986 2:00:00 PM
Lead Agency	Environment Canada - Environmental Protection Service
Other Agency	RCMP
Company(s)	Selkirk Indian Band
Amount	1890
Units	Litres
Quantity	Estimate
Release Description	Spilled
Additional Quantiti	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Furnace Oil
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	fuel spilled onto frozen ground and snow/ice cover - fuel was flushed with water and dispersed over a wider area - band advised to remove cont snow



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Enforcement and Emergencies Section

91782 Alaska Highway, Whitehorse, YT Y1A 5B7

PH: 867.667.3400 FAX: 867.667.7962

Spill Report Information

Spill #	9840
Jurisdiction	Yukon
Community	Pelly Crossing
Address	
Highway	
Milepost	
Feature	Pelly Crossing
Location and Cause	Pelly Crossing School - valve opened intentionally on heating fuel tank - tank drained
Latitude	62.8181
Longitude	-136.5665
Incident Date	9/11/1998
Lead Agency	Yukon Government - Renewable Resources
Other Agency	
Company(s)	
Amount	
Units	
Quantity	Unknown
Release Description	
Additional Quantit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Furnace Oil
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	spill to ground - near community well - soil excavated - EC suggested taking contaminated soil to dump and spreading out on tarps - no further information on file



Photo 385: M0026 Wellhead.



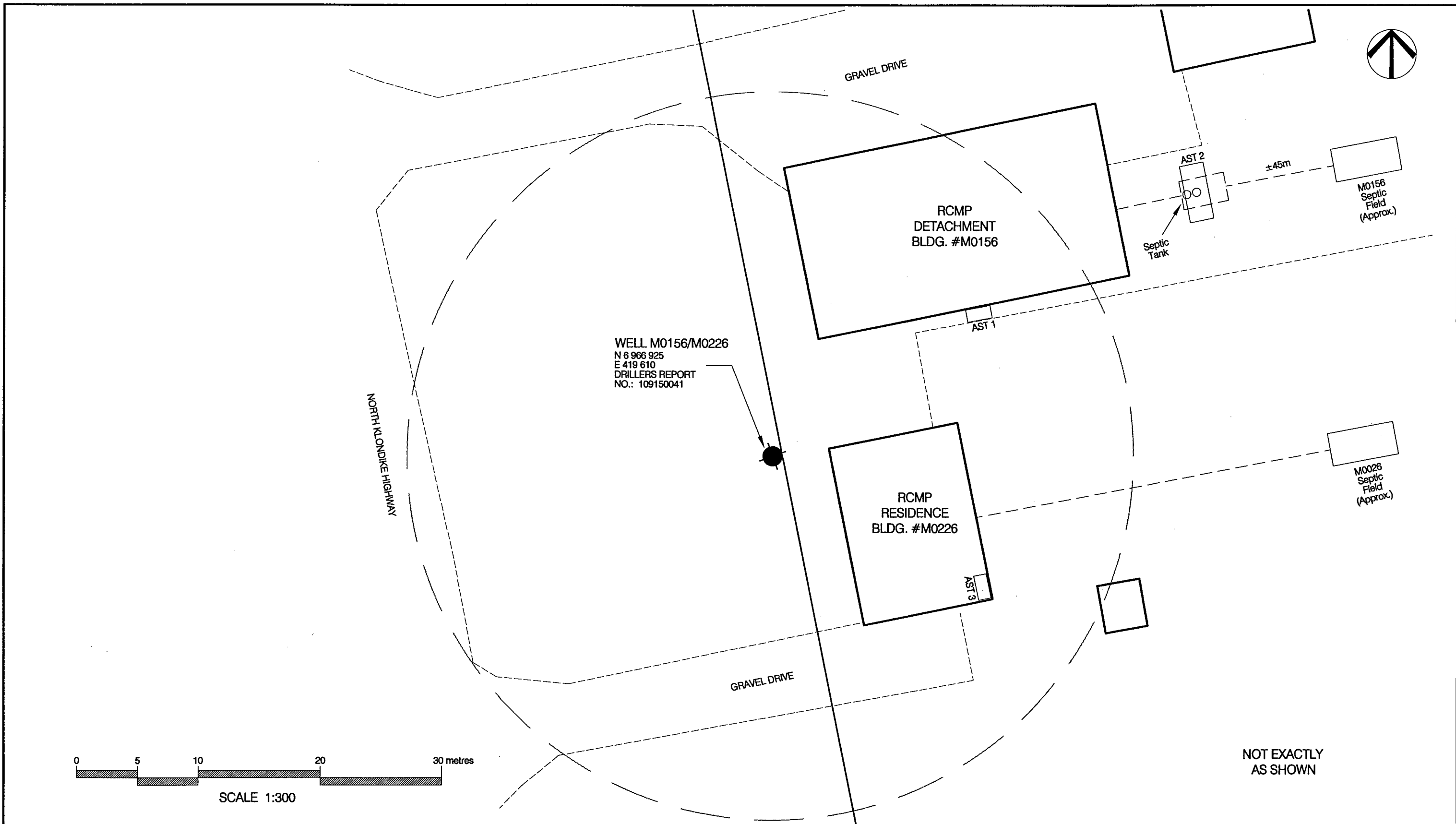
Photo 386: M0026 Well enclosure.



Photo 390: M0227 Septic system.



Photo 200: M0227 Pressure tank.



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	00/00/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

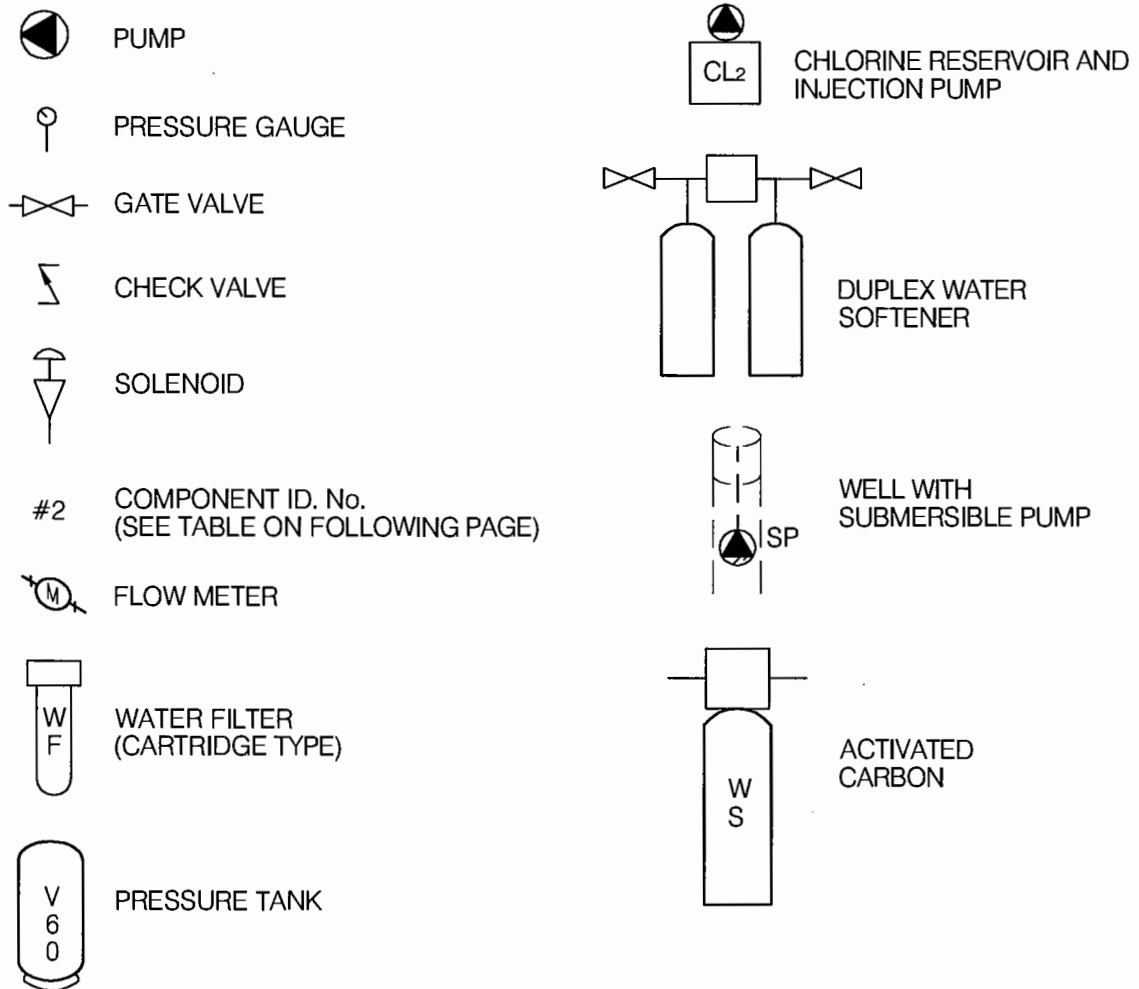
GOVERNMENT OF YUKON
HIGHWAYS & PUBLIC WORKS

PELLY RCMP
BUILDING # M0156/M0226
SITE LOCATION DIAGRAM
WELL ID: M0156/M0226

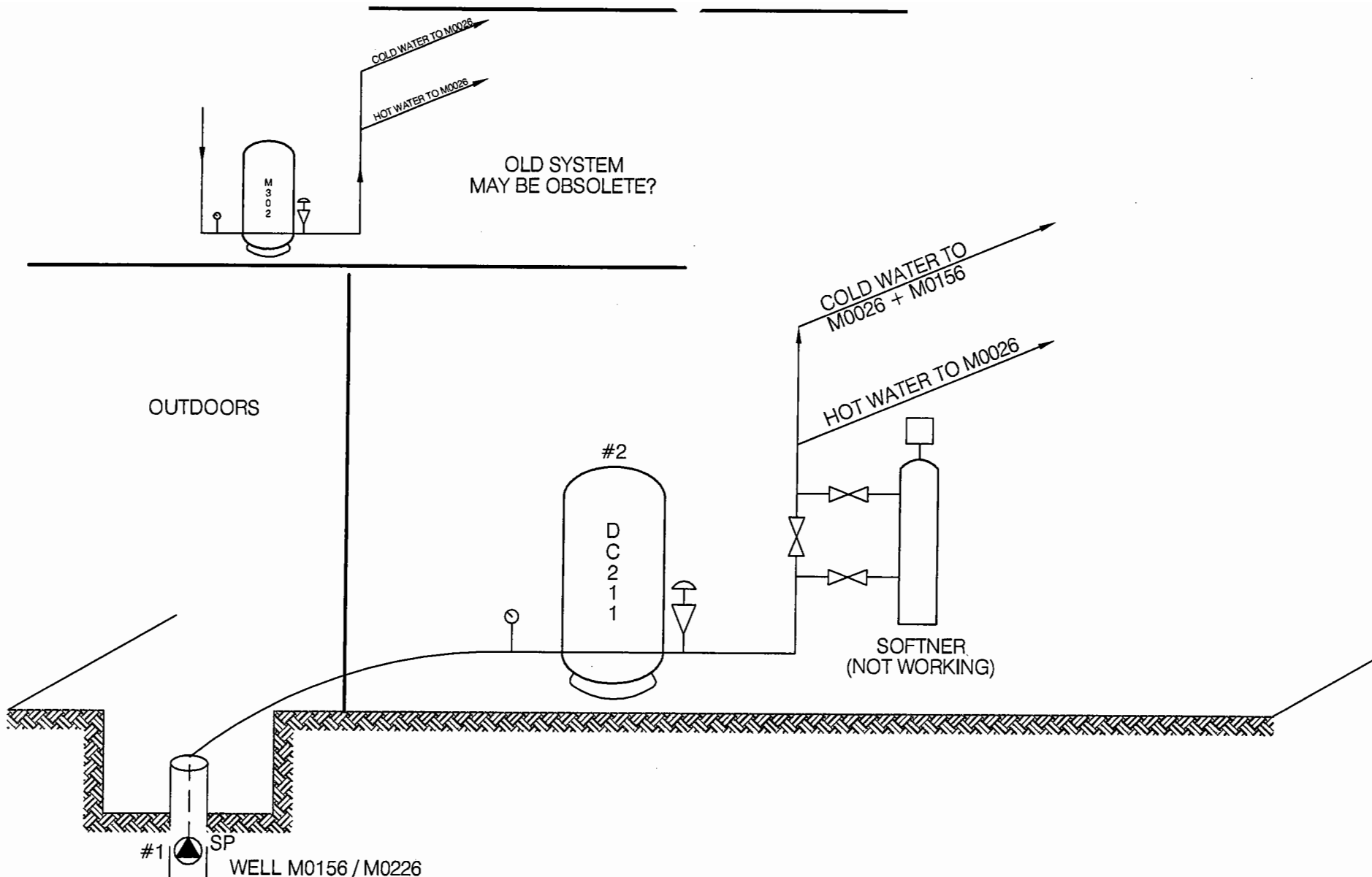
REVISION ISSUE
0

FIGURE No.
FIGURE 0156
/0226-A

LEGEND



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



EBA Engineering Consultants Ltd.

CLIENT



Highways and Public Works
Property Management Branch

PROJECT

SMALL PUBLIC WATER SYSTEMS ASSESSMENT
NORTHERN REGION

TITLE

WATER SYSTEM DISTRIBUTION/TREATMENT
SCHEMATIC SYSTEM ID.: M0156/M0226
RCMP - PELLY CROSSING, YT.

DATE

SEPT. 2005

DWN.

JSB

CHKD.

RMM

FILE NO.

1260002.004

DWG.:

FIGURE M0156/M0226-B

Northern Region – Pelly Crossing R.C.M.P. Housing
 Building # ~~M0025~~ M0226

DISTRIBUTION & TREATMENT SYSTEM DATA

Item	Description	Manufacturer	Model	Part No.	Serial No.	Size
#1 1	SUB. Pump	N/A				
2	PRESSURE TANK	MONARCH	M 302			
3	PRESSURE SWITCH	SQUARE D	FSG-2			
4	PRESSURE GAUGE	MARSIT	0-100 PSI			
5	WATER SOFTNER	POTWA	P 460-30MI			
#2 6	PRESSURE TANK	CHALLENGER	PC-211			
7	PRESSURE SWITCH					
8						
9						
10						

Northern Region – Pelly Crossing R.C.M.P. Detachment
Building # MO156

DISTRIBUTION & TREATMENT SYSTEM DATA

Item	Description	Manufacturer	Model	Part No.	Serial No.	Size
1	No EQUIPMENT					
2	Piping only					
3						
4						
5						
6						
7						
8						
9						
10						

TABLE M0156/M0226 - 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?
M0156	Pelly Crossing RCMP Detachment	8	Oct-04 to Jun-05	no	0/8	no	9-Jun-05	no
M0226	Pelly Crossing RCMP Residence	9	Oct-04 to Jun-05	no	0/9	no	9-Jun-05	no



Table M0156/M0226 - 2: Water Quality Results

SOURCE:		Building M0156 - R.C.M.P. Detachment			Building M0226 - R.C.M.P. Residence			GCDWQ Criteria		
Location/ Resident Address		Pelly Crossing			Pelly Crossing					
Treatment		Water softener (not in use)			Water softener (not in use)					
Disinfection		None			None					
Source of Water		On-site well (shared with M0226)			On-site well (shared with M0156)					
Purpose of Sampling		Base Line	Base Line	Additional Sampling	Base Line	Base Line	Additional Sampling			
Sample Location										
Date Sampled		29-Sep-04	8-Jun-05	23-Aug-05	29-Sep-04	8-Jun-05	23-Aug-05	Lower	Upper Limit	
Physical Tests (ALS)								AO	MAC	AO
Colour (CU)		<5	<5.0		<5	<5.0				15
Conductivity (uS/cm)			596			583				
Total Dissolved Solids		229	340		234	323				500
Hardness CaCO3		219	256		216	261		AO >200 = poor, > 500 unacceptable ^A		
pH		8.04	8.12		8.02	8.1		6.5		8.5
Turbidity (NTU)		0.5	0.17		0.5	0.21			1	5
UV Absorbance				0.041						
% UV Transmittance				91.0						
Dissolved Anions (ALS)										
Alkalinity-Total CaCO3		196	214		207	219				
Chloride Cl		0.8	39.4	2.32	1.1	36.9				250
Fluoride F		0.09	0.102		0.09	0.103			1.5	
Silicate SiO4										
Sulphate SO4		26	28.2		25.3	28.1				500
Nitrate Nitrogen N		0.1	1.41	0.21	0.1	1.32			10	
Nitrite Nitrogen N		<0.05	<0.10	<0.0010	<0.05	<0.10			1	
Ammonia Nitrogen N				<0.020						
Total Phosphate PO4										
Total Metals (ALS)										
Aluminum T-Al		<0.005	<0.010		<0.005	<0.010			0.1	
Antimony T-Sb		<0.0002	<0.00050		<0.0002	<0.00050			0.006	
Arsenic T-As		<0.0002	<0.00010		<0.0002	<0.00010			0.025	
Barium T-Ba		0.082	0.099		0.088	0.1			1	
Boron T-B		0.003	<0.10		0.003	<0.10			5	
Cadmium T-Cd		0.00002	<0.00020		0.00003	<0.00020			0.005	
Calcium T-Ca			74.1			75.8				
Chromium T-Cr		0.0017	<0.0020		0.0012	<0.0020			0.05	
Copper T-Cu		2.37	0.522	0.197	0.154	0.123			1	
Iron T-Fe		0.02	0.046		0.04	0.037				0.3
Lead T-Pb		0.0008	<0.0010		0.0003	<0.0010			0.01	
Magnesium T-Mg			17.2			17.4				
Manganese T-Mn		<0.005	<0.0020		<0.005	<0.0020				0.05
Mercury T-Hg			<0.00020			<0.00020			0.001	
Potassium T-K			3.19			3.26				
Selenium T-Se			0.0012			<0.0010			0.01	
Sodium T-Na		4.8	10		4.8	9.7				200
Uranium T-U		0.0007	0.00079		0.0007	0.00084			0.02	
Vanadium T-V										
Zinc T-Zn		0.063	0.057		0.051	<0.050				5
Dissolved Metals										
Copper D-Cu				0.186						1.0
Organic Parameters										
Tannin and Lignin				0.18						
Total Organic Carbon C				2.76						
Field Chemistry (EBA)										
pH										
TDS (ppm)							8.04			
EC (uS/cm)							198			
Temperature (°C)							396			
Free Available Chlorine							16.7			

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)



EBA Engineering Consultants Ltd.

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SMALL PUBLIC WATER SYSTEM ASSESSMENT

PART A: EBA Site Inspection

Inspector: KSJ/RMM

Date August 23/05

WELL ID #	Owner	Location Description
<u>M0156 / M0226</u> <i>corporals residence</i>	<u>YTB</u>	<u>Pelly Crossing - RCMP Detachment</u>

1. Well Location and Potential Contaminant Sources

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

West of RCMP residence, south of detachment
0226 0156

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

East of highway (North Klondike Highway)
Pelly Crossing

c. GPS location: N 08 6966925 E 0419610 elev. 474m

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 _____

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

g. Nearest building, specify RCMP residence

h. Distance from well to building 2.95m

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

j. Distance from well to nearest point of known field: _____

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

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2. Well and Wellhead information:

- a. When was well installed? Year unk. 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 _____ ☒ No
- f. Well casing: Diameter 152mm (6") Material: ☒ steel ☐ plastic ☐ concrete
- g. Depth of well: unk. ☐ measured (if possible) ☐ reported ☐ from log
- h. Static water level below ground: unk.
☐ measured (if possible) ☐ reported ☐ from log ☐ flowing
- i. (If granular) Is the well completed: ☐ open end casing ☐ with a well screen unk.
☐ 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 unk. slot size(s) _____
Location of screen: from _____ to _____ from log reported
- l. Is there a sump below the screen? ☐ Yes ☐ No unk.
- m. Is the well head: ☐ in pumphouse ☒ in pit ☐ pitless adaptor ☐ in a building
☐ in a wooden enclosure other, describe PWF
- n. If the well head is located in a wooden enclosure,

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- d. Date installed: unk By: unk
- e. For submersible pump, depth of setting below surface unk
- f. Drop pipe for submersible pump: ☐ steel ☐ plastic unk
- 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: see well schematic

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 ALBISER

Date AUG. 23/05

WELL ID #	Owner	Location Description
<u>M0226</u> <u>+M0156</u>	<u>YTG.</u>	<u>Perry Crossing.</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 _____

Overall Tank

What are the tank size and dimensions?

What material is the tank constructed of? _____

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

Comments: _____

Tank Inlet, Outlet and Lid

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

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

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

Is the water tank drain accessible? YES NO

WATER TANK AND WATER QUALITY CONDITION

Are there signs of staining or biofouling? YES NO

Comments: _____

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

Comments: _____

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

Have there been any bacteriological analyses conducted previously? YES NO

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

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

Field Report (109156024)

Completed. *NAH. 15....19.84*

NAME AND ADDRESS OF CLIENT	DESCRIPTION OF WORK	LOCATION OF WORK
	W / W	Pally R.C.M.P.

FORMATION LOG			DESCRIPTION OF WORK	TIME			
FROM	TO	FORMATION		DATE	FROM	TO	HOURS
			MOVE				
			loading	Nov 13	8:00	9:00	1
			Travel to Pelly	Nov 14	7:00	11:30	4.5
			move on set up	"	12:00	1:00	1
0'	41'	sand Gr.	Develop	"	1:00	3:00	2
			move off.	"	3:00	4:00	1
				"	4:00	4:30	0.5
			Travel to Mayo.	"	6:00	7:00	1
			Travel to Keno +	Nov 15	9:00	1:00	4
			back to Pelly.				
			starting equipment	"	2:30	4:00	1.5
			travel to Whitehorse	"	4:00	8:30	4.5

Rc'd. of Casing & Pipe				Remarks:
Size	Type	Size	Type	
6				1- drive shoe.
Feet	Inch	Feet	Inch	2' riser lead packer
38				20 slot screen Bottom 41'
				10 GPM.
				Static Level Total Rig Time hrs.
				Ground Level Total Standby hrs.
				Top Of Casing Drilling Mud sacks

MIDNIGHT SUN.....

CLIENT.....

TITLE.....

TITLE.....



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

Spill Report Information

Spill #	8621
Jurisdiction	Yukon
Community	Pelly Crossing
Address	
Highway	
Milepost	
Feature	Pelly Crossing
Location and Cause	overturned home heating fuel storage tank - garbage truck backed into supporting stand
Latitude	62.819543
Longitude	-136.569408
Incident Date	12/31/1986 2:00:00 PM
Lead Agency	Environment Canada - Environmental Protection Service
Other Agency	RCMP
Company(s)	Selkirk Indian Band
Amount	1890
Units	Litres
Quantity	Estimate
Release Description	Spilled
Additional Quantit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Furnace Oil
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	fuel spilled onto frozen ground and snow/ice cover - fuel was flushed with water and dispersed over a wider area - band advised to remove cont snow



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

Spill Report Information

Spill #	9840
Jurisdiction	Yukon
Community	Pelly Crossing
Address	
Highway	
Milepost	
Feature	Pelly Crossing
Location and Cause	Pelly Crossing School - valve opened intentionally on heating fuel tank - tank drained
Latitude	62.8181
Longitude	-136.5665
Incident Date	9/11/1998
Lead Agency	Yukon Government - Renewable Resources
Other Agency	
Company(s)	
Amount	
Units	
Quantity	Unknown
Release Description	
Additional Quantit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Furnace Oil
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	spill to ground - near community well - soil excavated - EC suggested taking contaminated soil to dump and spreading out on tarps - no further information on file



Photo 381: M0156 Pelly Crossing RCMP detachment. (left) Residence M0226 on (right).



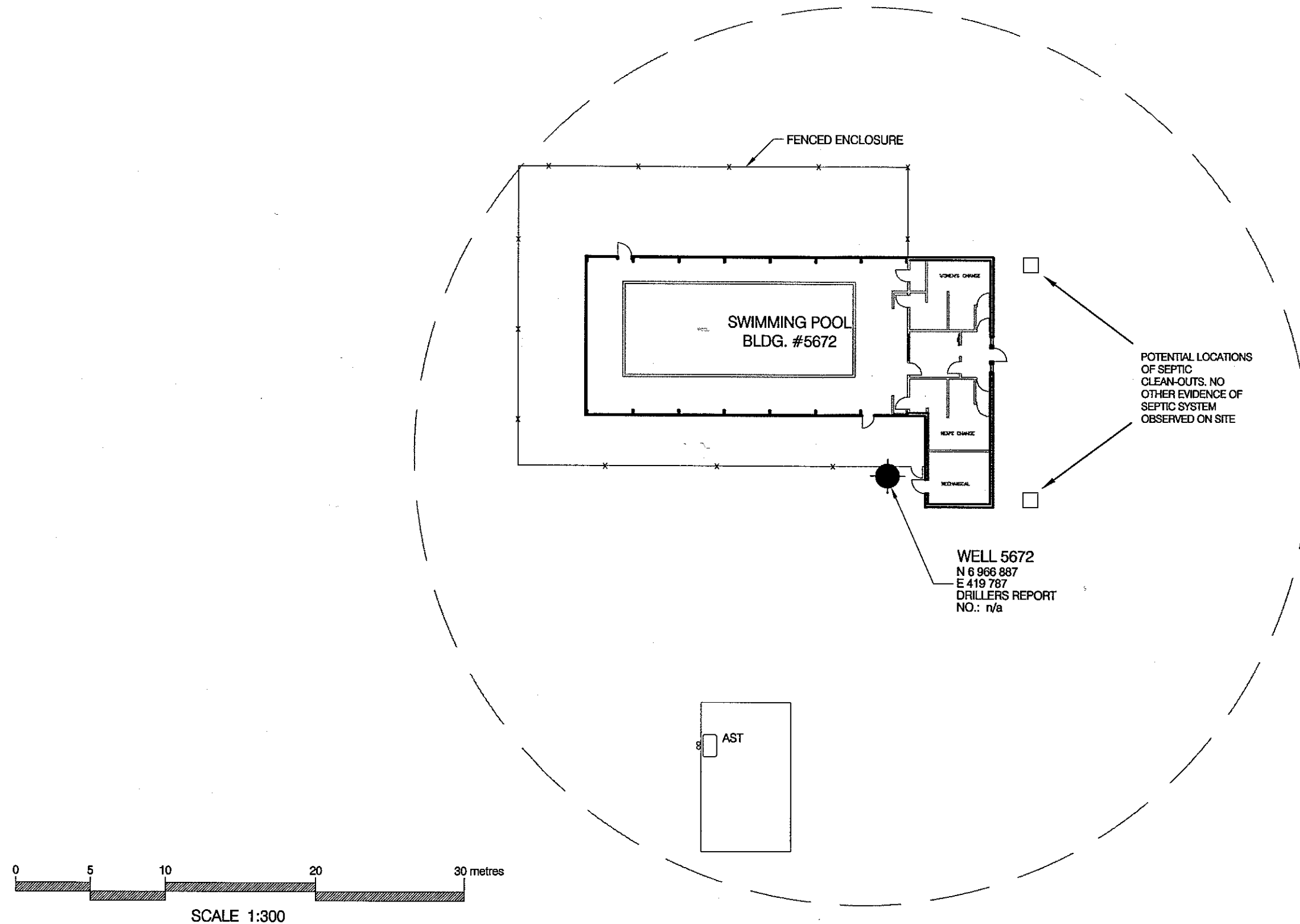
Photo 381: M0156/M0226 Well enclosure.



Photo 379: M0156/M0226 Well enclosure and wellhead.



Photo 199: M0156/M0226 Water System (pressure tank, pump controls, softener).



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.

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

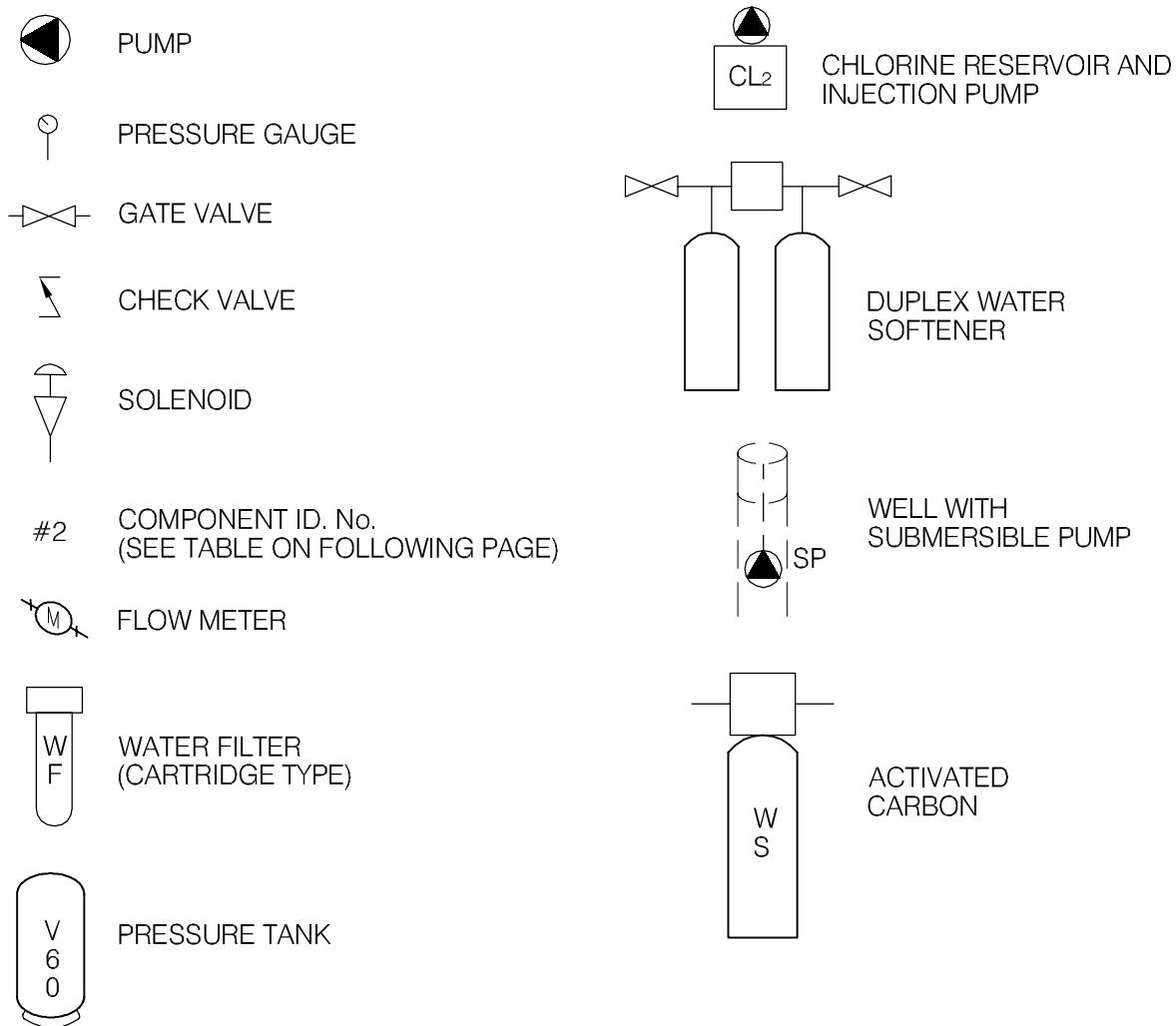
DESIGNED BY:	R. MARTIN
DRAWN BY:	J. BUYCK
DATE:	SEPT. 2005
SCALE:	AS SHOWN
PROJECT No.:	1260002.004
ACAD FILENAME:	004-NORTHERN REGION

CLIENT:

Highways and Public Works
Property Management Branch

SMALL PUBLIC WATER SYSTEMS ASSESSMENT NORTHERN REGION	
GOVERNMENT OF YUKON HIGHWAYS & PUBLIC WORKS	
PELLEY SWIMMING POOL BUILDING # 5672 SITE LOCATION DIAGRAM WELL ID: 5672	REVISION ISSUE 0 FIGURE No. FIGURE 5672-A

LEGEND



EBA Engineering Consultants Ltd.

CLIENT

Yukon
Highways and Public Works
Property Management Branch

PROJECT

SMALL PUBLIC WATER SYSTEMS ASSESSMENT
WESTERN REGION

TITLE

SCHEMATIC SYSTEM
LEGEND

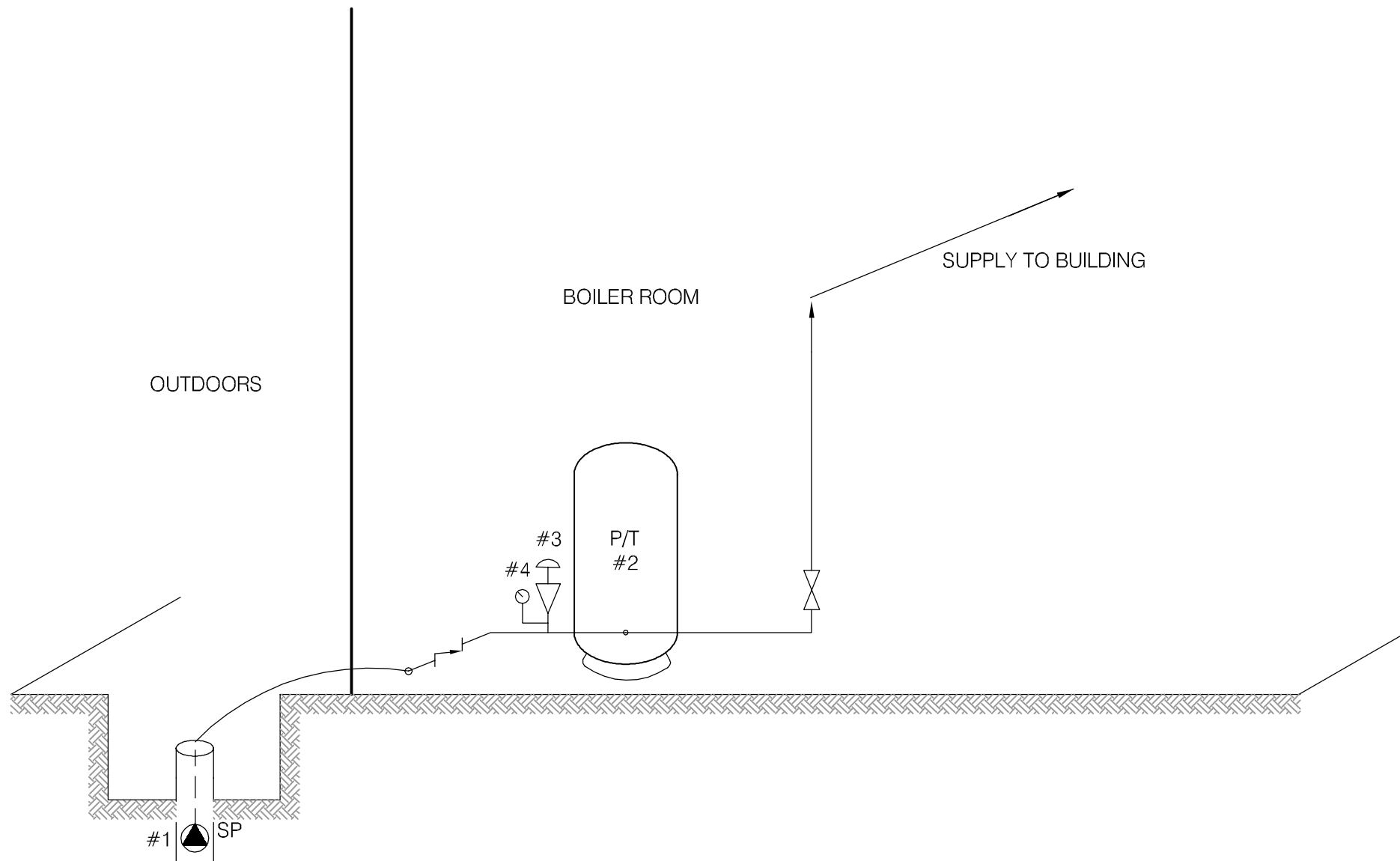
DATE APRIL 2006

DWN. JSB

CHKD. RMM

FILE NO. 1260002

DRWG. LEGEND



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



EBA Engineering Consultants Ltd.

CLIENT



Highways and Public Works
Property Management Branch

PROJECT

SMALL PUBLIC WATER SYSTEMS ASSESSMENT
NORTHERN REGION

TITLE

WATER SYSTEM DISTRIBUTION/TREATMENT
SCHEMATIC SYSTEM ID.: 5672
PELLEY CROSSING SWIMMING POOL

DATE SEPT. 2005

DWN. JSB

CHKD. RMM

FILE NO. 1260002.004

DWG.: FIGURE 5672-B

**Northern Region – Pelly Crossing Swimming Pool
Building # 5672**

Photo 102-0208

DISTRIBUTION & TREATMENT SYSTEM DATA

Item	Description	Manufacturer	Model	Part No.	Serial No.	Size
1	SUB PUMP	N/A	1 1/2 HP-4"			
2	PRESSURE TANK	MONARCH	M 252			80 GALLON
3	PRESSURE SWITCH	SQUARE D	FSG-2			2HP - 1/4" FPT
4	PRESSURE GAUGE	MARSH	0-100			2 1/2" - 1/4" FPT
5						
6						
7						
8						
9						
10						

TABLE 5672 - 1: SUMMARY OF BACTERIOLOGICAL RESULTS

		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?
Building #	Building Name							
5672	Pelly Crossing Swimming Pool	1	5-Jun	no	0/1	no	9-Jun-05	no



Table 5672 - 2: Water Quality Results

SOURCE:		Building 5672 - Swimming Pool		GCDWQ Criteria		
Location/ Resident		Pelly Crossing				
Address						
Treatment		None				
Disinfection		None				
Source of Water		On-site well				
Purpose of Sampling		Base Line	Additional Sampling			
Sample Location						
Date Sampled		8-Jun-05	23-Aug-05	Lower	Upper Limit	
Physical Tests (ALS)				AO	MAC	AO
Colour (CU)		6.4				15
Conductivity (uS/cm)		405				
Total Dissolved Solids		225				500
Hardness CaCO3		181		AO >200 = poor, > 500 unacceptable ^A		
pH		8.2		6.5		8.5
Turbidity (NTU)		4.07	1.29		1	5
UV Absorbance			0.112			
% UV Transmittance			81.0			
Dissolved Anions (ALS)						
Alkalinity-Total CaCO3		183				
Chloride Cl		0.69				250
Fluoride F		0.117			1.5	
Silicate SiO4						
Sulphate SO4		29.1				500
Nitrate Nitrogen N		<0.10			10	
Nitrite Nitrogen N		<0.10			1	
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		0.0014			0.025	
Barium T-Ba		0.104			1	
Boron T-B		<0.10			5	
Cadmium T-Cd		<0.00020			0.005	
Calcium T-Ca		51.8				
Chromium T-Cr		<0.0020			0.05	
Copper T-Cu		0.019			1	
Iron T-Fe		0.945	0.748			0.3
Lead T-Pb		0.0023			0.01	
Magnesium T-Mg		12.5				
Manganese T-Mn		0.500	0.452			0.05
Mercury T-Hg		<0.00020			0.001	
Potassium T-K		2.49				
Selenium T-Se		<0.0010			0.01	
Sodium T-Na		5.1				200
Uranium T-U		0.00063			0.02	
Vanadium T-V						
Zinc T-Zn		0.207				5
Dissolved Metals						
Iron D-Fe			0.104			0.3
Manganese D-Mn			0.437			0.05
Organic Parameters						
Tannin and Lignin			0.32			
Total Organic Carbon C			4.87			
Field Chemistry (EBA)						
pH			7.84	6.5		8.5
TDS (ppm)			182			500
EC (uS/cm)			364			
Temperature (°C)			22.3			
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)



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SMALL PUBLIC WATER SYSTEM ASSESSMENT

PART A: EBA Site Inspection

Inspector: KSJ / RMM

Date Aug. 23/05

WELL ID #	Owner	Location Description
<u>5672</u>	<u>YTG</u>	<u>Pelly Crossing - Swimming Pool</u>

1. Well Location and Potential Contaminant Sources

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

Pelly Crossing 462 Klondike Hwy.

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

Swimming Pool beside Eliza Van Bibber School

c. GPS location: 08 E 419787 N 6966887 ± 5m
elev. 477m.

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 No

☐ 5 or more delivery sites on a trucked distribution system? If so how many No

g. Nearest building, specify Swimming Pool

h. Distance from well to building 3.0m

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

j. Distance from well to nearest point of known field: _____

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



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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 Entrance by animals? ☐ Yes ☒ No

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

q. Is the well site well drained? ☒ Yes ☐ No *graded away from w.h.*

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: AST 1; Distance from well to Potential Source 1: 17m (inside building)

Potential Source 2: _____; Distance from well to Potential Source 2: _____

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

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2. Well and Wellhead information:

- a. When was well installed? Year N/A Month N/A
- 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 ☐ No
- f. Well casing: Diameter 6" Material: ☒ steel ☐ plastic ☐ concrete
- g. Depth of well: unk ☐ measured (if possible) ☐ reported ☐ from log
- h. Static water level below ground: _____
☐ measured (if possible) ☐ reported ☐ from log ☐ flowing
- i. (If granular) Is the well completed: ☐ open end casing ☐ with a well screen
☐ with slotted pipe ☐ unknown other _____
- j. (If bedrock) Does the well have a liner? ☐ yes ☐ No ☐ steel ☐ plastic
- k. If there is a well screen: length unk slot size(s) unk
Location of screen: from _____ to _____ 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 PWF below ground.
- 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 Yes
- 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
- 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?

no surface seal ☒ Yes ☐ No ☐ farther investigation required.

If yes is there treatment or disinfection ☐ Yes ☐ No

Explain (filtration, disinfection etc...) N/A

4. Aquifer Supplying This Well:

- a. The aquifer is: ☐ bedrock ☐ granular sediment ☒ unknown no log

- 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 1 1/2 capacity _____ voltage _____

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d. Date installed: _____ By: _____

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

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

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

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

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

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

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

If yes, describe: _____

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 Aug. 23 / 05

WELL ID #	Owner	Location Description
<u>S672</u>	<u>YTG</u>	<u>SWIMMING POOL, Rely Crossing</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: PRESSURE TANK

Where is it located?

Comments: Boiler Room

Is the room in which the water tank is located heated to maintain an optimum temperature of 4°C for stored water?

☒ YES ☐ NO

Comments: _____

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

Comments: _____

Are there other heat sources near the tank? YES NO

Comments: _____

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

Comments: _____

Overall Tank

What are the tank size and dimensions?

What material is the tank constructed of? _____

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

Comments: _____

Tank Inlet, Outlet and Lid

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

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

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

Is the water tank drain accessible? YES NO

WATER TANK AND WATER QUALITY CONDITION

Are there signs of staining or biofouling? YES NO

Comments: _____

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

Comments: _____

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

Have there been any bacteriological analyses conducted previously? YES NO

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

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

8. Conclusions

a. Comments on overall installation:

THIS INSTALLATION REQUIRES UPGRADING
THE TEMPORARY LINE IS EXPOSED ABOVE
GROUND

b. Recommendations:

REPAIR PIPING SYSTEM. INSTALL
WATER TREATMENT AS REQUIRED BY
WATER ANALYSIS.
INSTALL PROPORTIONAL CHLORINATION
SYSTEM



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 #	8621
Jurisdiction	Yukon
Community	Pelly Crossing
Address	
Highway	
Milepost	
Feature	Pelly Crossing
Location and Cause	overturned home heating fuel storage tank - garbage truck backed into supporting stand
Latitude	62.819543
Longitude	-136.569408
Incident Date	12/31/1986 2:00:00 PM
Lead Agency	Environment Canada - Environmental Protection Service
Other Agency	RCMP
Company(s)	Selkirk Indian Band
Amount	1890
Units	Litres
Quantity	Estimate
Release Description	Spilled
Additional Quantit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Furnace Oil
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	fuel spilled onto frozen ground and snow/ice cover - fuel was flushed with water and dispersed over a wider area - band advised to remove cont snow



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Canada

Environnement
Canada

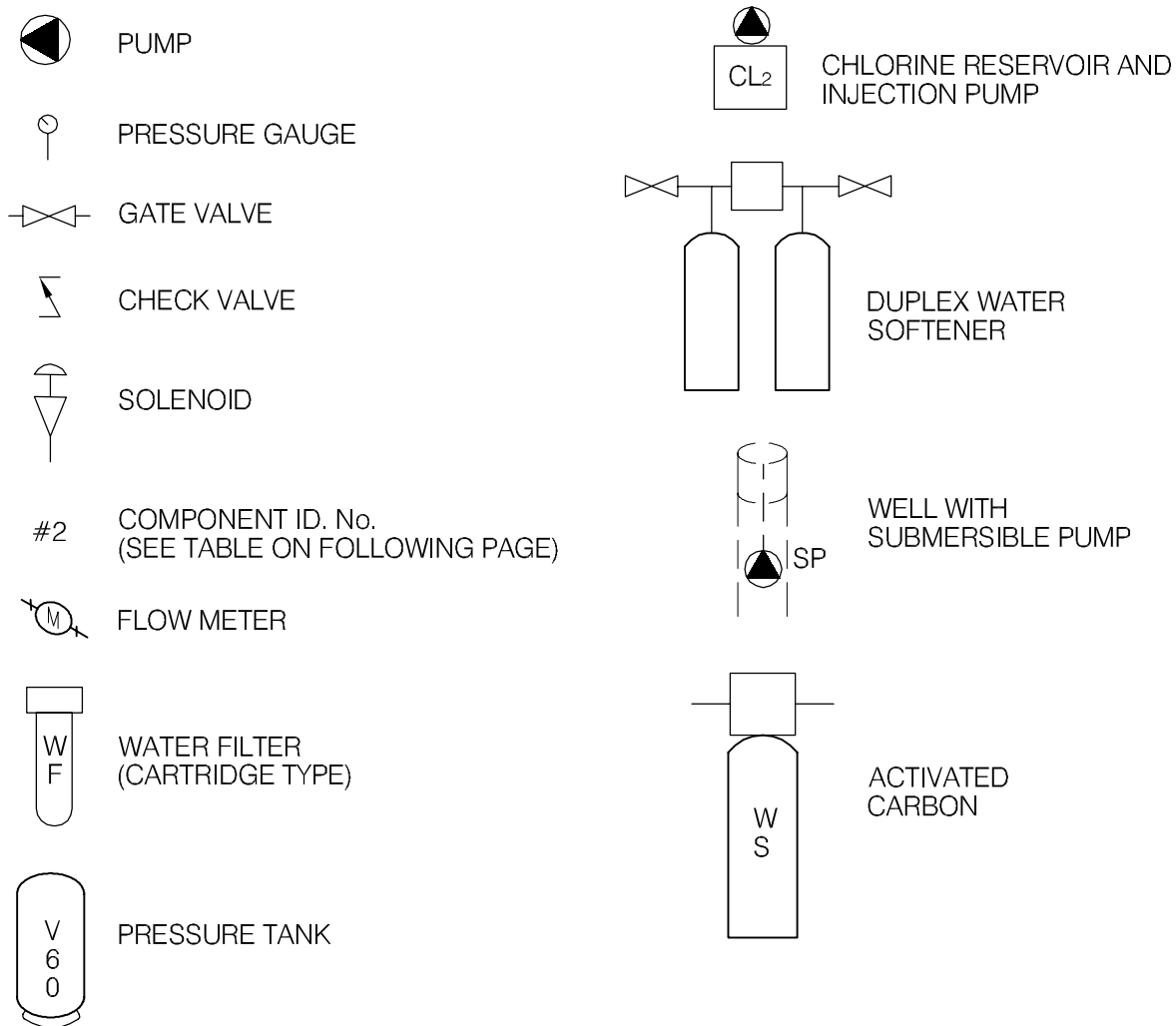
Enforcement and Emergencies Section
91782 Alaska Highway, Whitehorse, YT Y1A 5B7
PH: 867.667.3400 FAX: 867.667.7962

Spill Report Information

Spill #	9840
Jurisdiction	Yukon
Community	Pelly Crossing
Address	
Highway	
Milepost	
Feature	Pelly Crossing
Location and Cause	Pelly Crossing School - valve opened intentionally on heating fuel tank - tank drained
Latitude	62.8181
Longitude	-136.5665
Incident Date	9/11/1998
Lead Agency	Yukon Government - Renewable Resources
Other Agency	
Company(s)	
Amount	
Units	
Quantity	Unknown
Release Description	
Additional Quantitit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Furnace Oil
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	spill to ground - near community well - soil excavated - EC suggested taking contaminated soil to dump and spreading out on tarps - no further information on file

**Photo 209:** 5672 Pelly Crossing swimming pool. (northeast)**Photo 209:** 5672 Well enclosure and wellhead.**Photo 208:** 5672 Water system. (pump controls, pressure tank)**Photo 214:** 5672 Potential septic clean out?

LEGEND



EBA Engineering Consultants Ltd.

CLIENT

Yukon
Highways and Public Works
Property Management Branch

PROJECT

SMALL PUBLIC WATER SYSTEMS ASSESSMENT
WESTERN REGION

TITLE

SCHEMATIC SYSTEM
LEGEND

DATE APRIL 2006

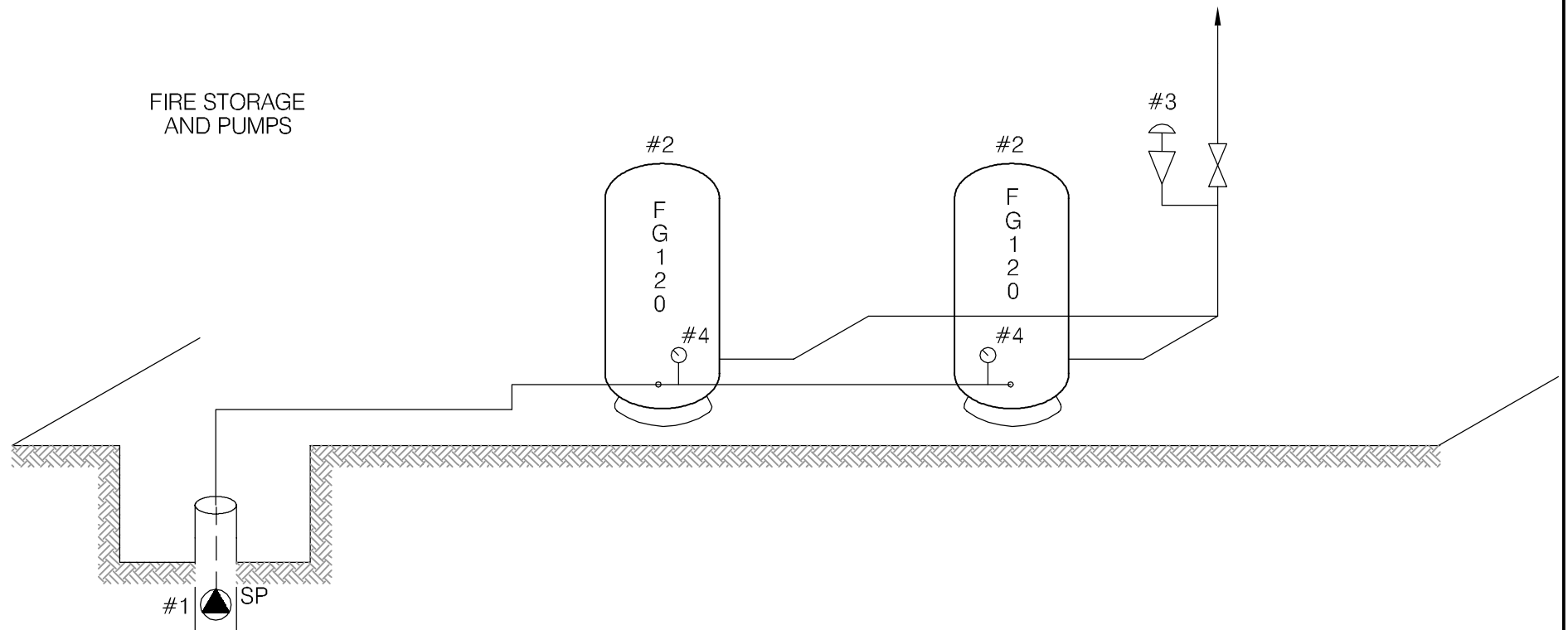
DWN. JSB

CHKD. RMM

FILE NO. 1260002

DRWG. LEGEND

FIRE STORAGE
AND PUMPS



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



EBA Engineering Consultants Ltd.

CLIENT



PROJECT

SMALL PUBLIC WATER SYSTEMS ASSESSMENT
NORTHERN REGION

TITLE

WATER SYSTEM DISTRIBUTION/TREATMENT
SCHEMATIC SYSTEM ID.: 5676
ELIZA VAN BIBBER SCHOOL - PELLY CROSSING, YT.

DATE SEPT. 2005

DWN. JSB

CHKD. RMM

FILE NO. 1260002.004

DWG.: FIGURE 5676-B

Northern Region – Eliza Van Bibber School
Building # 5676

Photo 102-203
102-204

DISTRIBUTION & TREATMENT SYSTEM DATA

Item	Description	Manufacturer	Model	Part No.	Serial No.	Size
1	SUB PUMP	N/A	PNLA	CCT 32-34		
2	PRESSURE TANK	STA-CHARGE	FG-120 K2			
3	PRESSURE SWITCH	SQUARE D	GSG-2			5HP - 1/4" FIPT
4	PRESSURE GAUGE	WINTERS	O-160			4" - 1/4 FIPT
5						
6						
7						
8						
9						
10						

TABLE 5676 - 1: SUMMARY OF BACTERIOLOGICAL RESULTS

		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?
Building #	Building Name							
5676	Eliza Van Bibber School	10	Jun-04 to Jun-05	yes	1/10	no	9-Jun-05	yes



Table 5676 - 2: Water Quality Results

SOURCE:		Building 5676 - Eliza Van Bibber School			GCDWQ Criteria		
Location/ Resident		Pelly Crossing					
Address							
Treatment		None					
Disinfection		None					
Source of Water		On-site well					
Purpose of Sampling		Base Line	Base Line	Additional Sampling			
Sample Location							
Date Sampled		29-Sep-04	8-Jun-05	23-Aug-05	Lower	Upper Limit	
Physical Tests (ALS)					AO	MAC	AO
Colour (CU)	12	7.1					15
Conductivity (uS/cm)		402					
Total Dissolved Solids	208	226					500
Hardness CaCO3	191	177			AO >200 = poor, > 500 unacceptable ^A		
pH	8.1	8.17			6.5		8.5
Turbidity (NTU)	1.0	0.33				1	5
UV Absorbance				0.0800			
% UV Transmittance				96.2			
Dissolved Anions (ALS)							
Alkalinity-Total CaCO3	179	176					
Chloride Cl	0.9	0.61					250
Fluoride F	0.1	0.114				1.5	
Silicate SiO4							
Sulphate SO4	26.4	33.5					500
Nitrate Nitrogen N	<0.1	<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				0.1	
Antimony T-Sb	<0.0002	<0.00050				0.006	
Arsenic T-As	0.0013	0.00119				0.025	
Barium T-Ba	0.124	0.108				1	
Boron T-B	0.004	<0.10				5	
Cadmium T-Cd	<0.00001	<0.00020				0.005	
Calcium T-Ca		50.5					
Chromium T-Cr	0.001	<0.0020				0.05	
Copper T-Cu		0.001				1	
Iron T-Fe	0.35	0.198					0.3
Lead T-Pb	<0.0001	0.0017				0.01	
Magnesium T-Mg		12.3					
Manganese T-Mn	0.611	0.535	0.595				0.05
Mercury T-Hg		<0.00020				0.001	
Potassium T-K		2.29					
Selenium T-Se		<0.0010				0.01	
Sodium T-Na	4.2	4.7					200
Uranium T-U	0.0007	0.00066				0.02	
Vanadium T-V							
Zinc T-Zn	0.002	<0.050					5
Dissolved Metals							
Manganese D-Mn				0.588			0.05
Organic Parameters							
Tannin and Lignin				0.29			
Total Organic Carbon C				4.02			
Extractable Hydrocarbons							
EPH10-19				<0.30			
EPH19-32				<1.0			
Field Chemistry (EBA)							
pH				7.98	6.5		8.5
TDS (ppm)				175			500
EC (uS/cm)				354			
Temperature (°C)				10.4			
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)



EBA Engineering Consultants Ltd.

Creating and Delivering Better Solutions

SMALL PUBLIC WATER SYSTEM ASSESSMENT

PART A: EBA Site Inspection

Inspector: KSI/RMM

Date August 23/05

WELL ID #	Owner	Location Description
5676	YTG	Eliza Van Bibber School

1. Well Location and Potential Contaminant Sources

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

Pelly Crossing // 462 Klondike Highway

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

Eliza Van Bibber School.

c. GPS location: DB E 419857 N 6966932 eler 478m

d. Is there electric power? ☒ Yes ☐ No

GPS Waypoint 5676

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 No

☐ 5 or more delivery sites on a trucked distribution system? If so how many No

g. Nearest building, specify Inside building

h. Distance from well to building Inside building

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

j. Distance from well to nearest point of known field: <30m (25m)

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

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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 Entrance by animals? ☐ Yes ☒ No

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 *unlikely.*

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: AST #1; Distance from well to Potential Source 1: 5m. (inside)

Potential Source 2: AST #2; Distance from well to Potential Source 2: 8m. 15000L double wall enviro tank.

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

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2. Well and Wellhead information:

- a. When was well installed? Year 1982 Month August 19
- b. Type: ☒ drilled ☐ dug ☐ sand point ☐ other _____
- c. Is there a drillers log for the well: ☒ Yes ☐ No MSD
- d. Is there a surface seal to 6 m ☐ Yes ☐ No ☒ unknown ☐ unlikely
- e. Surface casing: ☐ Yes Diameter _____ ☒ No
- f. Well casing: Diameter 6" Material: ☒ steel ☐ plastic ☐ concrete
- g. Depth of well: 50' ☐ measured (if possible) ☐ reported ☐ from log
- h. Static water level below ground: 22'
☐ measured (if possible) ☐ reported ☒ from log ☐ flowing
- i. (If granular) Is the well completed: ☐ open end casing ☒ with a well screen
☐ with slotted pipe ☐ unknown other _____
- j. (If bedrock) Does the well have a liner? ☐ yes ☐ No ☐ steel ☐ plastic
- k. If there is a well screen: length ? slot size(s) 15
Location of screen: from ? to _____ 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 basement of school.
- 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 Yes - see diagram.
- 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
- 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?

no surface seal ☒ Yes ☐ No ☐ farther investigation required.

If yes is there treatment or disinfection ☐ 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 w Pelly River

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 PNLA Model ?
horsepower 1 1/2 - 1 capacity _____ voltage _____

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PART B: EBA Site Inspection

Inspector: BERT ALBISSEK

Date AUG. 23/05

WELL ID #	Owner	Location Description
<u>5676</u>	<u>YTG</u>	<u>SCHOOL, PELLY CROSSING.</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: PRESSURE TANKS

Where is it located?

Comments:

Boiler Room

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: _____

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Overall Tank

What are the tank size and dimensions?

What material is the tank constructed of? _____

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

Comments: _____

Tank Inlet, Outlet and Lid

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

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

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

Is the water tank drain accessible? YES NO

WATER TANK AND WATER QUALITY CONDITION

Are there signs of staining or biofouling? YES NO

Comments: _____

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

Comments: _____

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

Have there been any bacteriological analyses conducted previously? YES NO

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

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

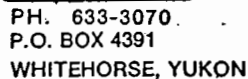
8. Conclusions

a. Comments on overall installation:

THIS IS A PROFESSIONAL INSTALLATION

b. Recommendations:

INSTALL PROPORTIONAL CHLORINATION
SYSTEM.



Started... Aug ... 19 1982

Completed. Aug. 19.....19....92

rd. of Casing & Pipe				Remarks:
Size	Type	Size	Type	
Feet	Inch	Feet	Inch	46' - 219 wall 6" casing
				1 - 6" Drive Shoe
				1 - 15 slot screen
				1 - LEAD PACKER
				1 - 5 3/4 BIT PMW BOTTOM
				1 - 2' RISER PIPE
				Static Level 22'
				Ground Level
				Top Of Casing
				Total Rig Time hrs.
				Total Standby hrs.
				Drilling Mud sacks

MIDNIGHT SUN.....*27*.....

TITLE..... *V. Bred*

CLIENT.....

TITLE.....



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 #	8621
Jurisdiction	Yukon
Community	Pelly Crossing
Address	
Highway	
Milepost	
Feature	Pelly Crossing
Location and Cause	overturned home heating fuel storage tank - garbage truck backed into supporting stand
Latitude	62.819543
Longitude	-136.569408
Incident Date	12/31/1986 2:00:00 PM
Lead Agency	Environment Canada - Environmental Protection Service
Other Agency	RCMP
Company(s)	Selkirk Indian Band
Amount	1890
Units	Litres
Quantity	Estimate
Release Description	Spilled
Additional Quantitit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Furnace Oil
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	fuel spilled onto frozen ground and snow/ice cover - fuel was flushed with water and dispersed over a wider area - band advised to remove cont snow



Environment
Canada

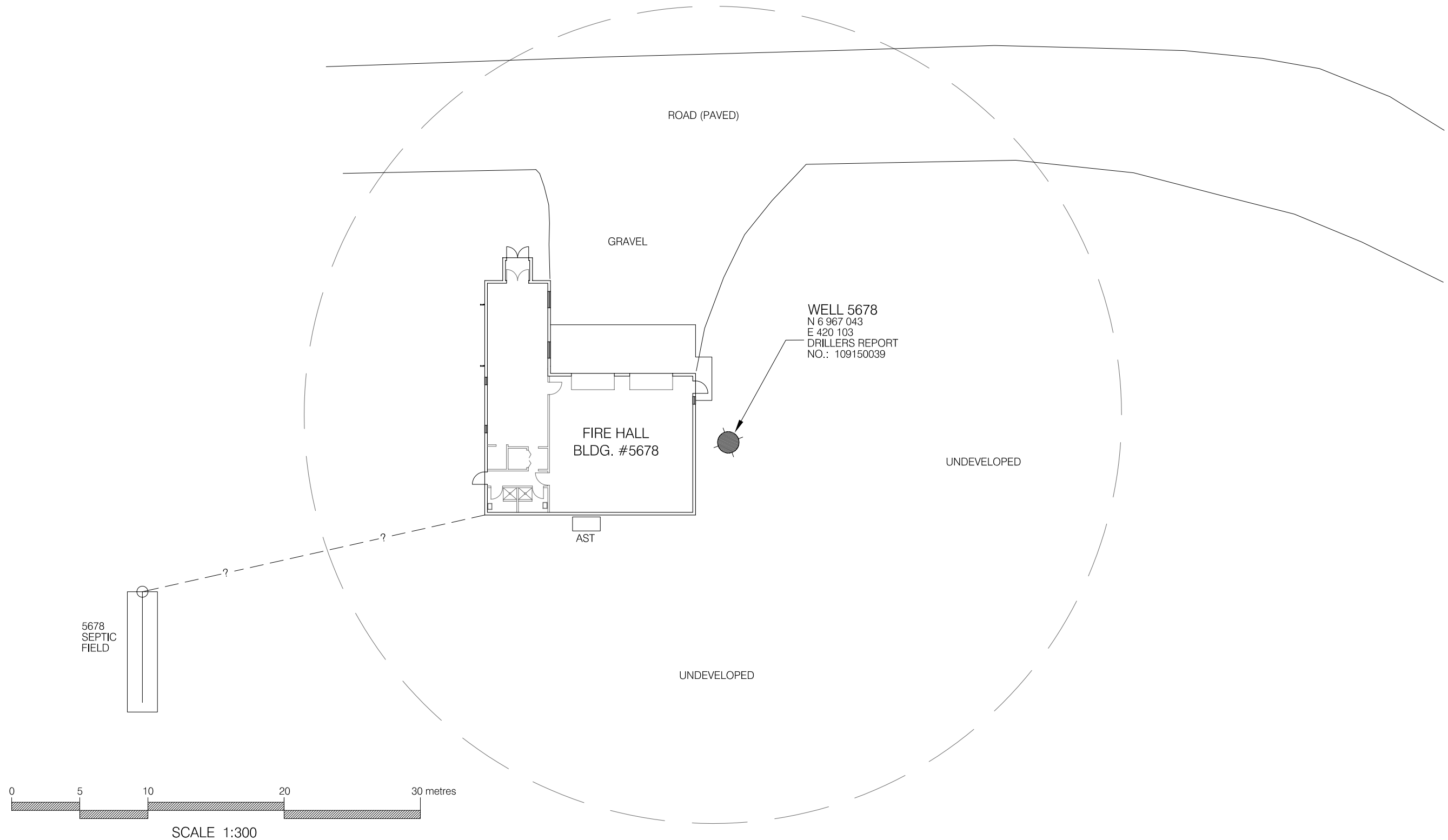
Environnement
Canada

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

Spill Report Information

Spill #	9840
Jurisdiction	Yukon
Community	Pelly Crossing
Address	
Highway	
Milepost	
Feature	Pelly Crossing
Location and Cause	Pelly Crossing School - valve opened intentionally on heating fuel tank - tank drained
Latitude	62.8181
Longitude	-136.5665
Incident Date	9/11/1998
Lead Agency	Yukon Government - Renewable Resources
Other Agency	
Company(s)	
Amount	
Units	
Quantity	Unknown
Release Description	
Additional Quantitit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Furnace Oil
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	spill to ground - near community well - soil excavated - EC suggested taking contaminated soil to dump and spreading out on tarps - no further information on file

**Photo 203:** 5676 Wellhead.**Photo 204:** 5676 Water System. (pump controls and pressure tanks)**Photo 400:** 5676 Eliza Van Bibber School's septic system.**Photo 399:** 5676 Monitoring well for rock pit drain.



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.

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

**EBA Engineering Consultants Ltd.**

DESIGNED BY: R. MARTIN
DRAWN BY: J. BUYCK
DATE: AUG. 2005
SCALE: AS SHOWN
PROJECT No.: 1260002.003
ACAD FILENAME: 003-WESTERN REGION

CLIENT:
**Yukon**
Highways and Public Works
Property Management Branch

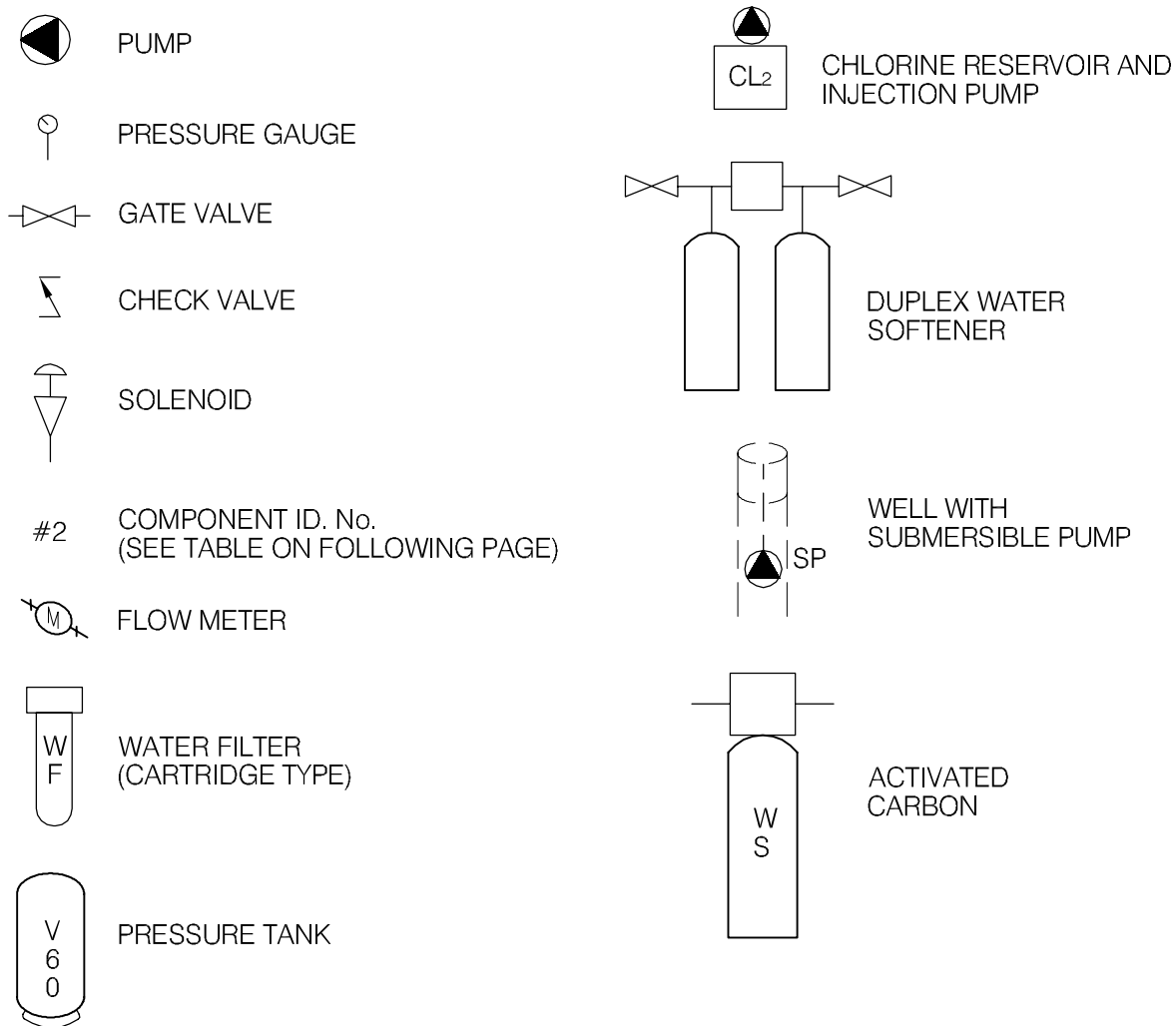
SMALL PUBLIC WATER SYSTEMS ASSESSMENT
WESTERN REGION

GOVERNMENT OF YUKON
HIGHWAYS & PUBLIC WORKS

PELLEY CROSSING FIRE HALL
BUILDING # 5678
SITE LOCATION DIAGRAM
WELL ID: 5678

REVISION ISSUE
0
FIGURE No.
FIGURE 5678-A

LEGEND



EBA Engineering Consultants Ltd.

CLIENT

Yukon
Highways and Public Works
Property Management Branch

PROJECT

SMALL PUBLIC WATER SYSTEMS ASSESSMENT
WESTERN REGION

TITLE

SCHEMATIC SYSTEM
LEGEND

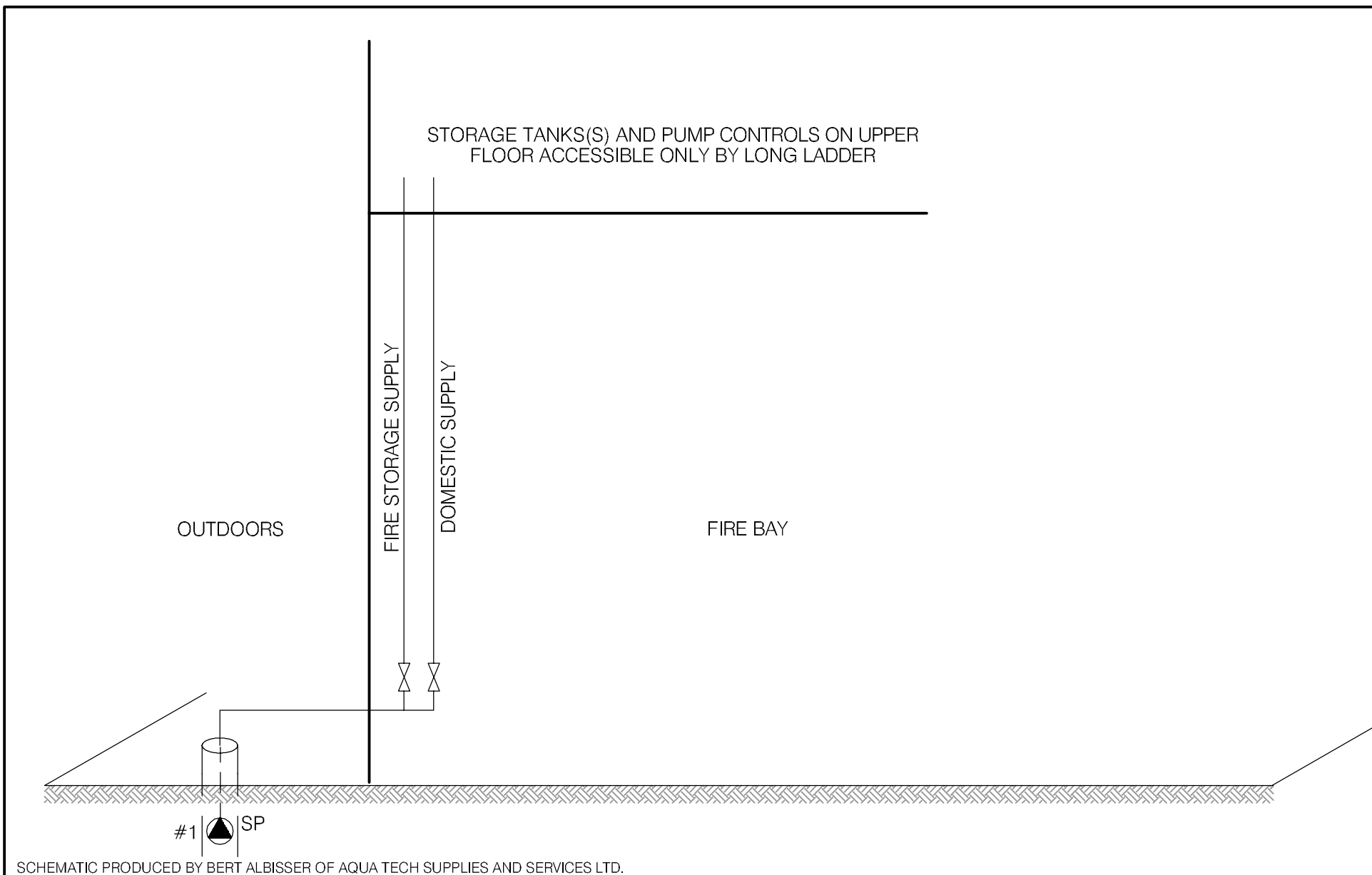
DATE APRIL 2006

DWN. JSB

CHKD. RMM

FILE NO. 1260002

DRWG. LEGEND



SCHEMATIC PRODUCED BY BERT ALBISSER OF AQUA TECH SUPPLIES 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.: 5678 PELLY CROSSING FIRE HALL						
DATE	SEPT. 2005	DWN.	JSB	CHKD.	RMM	FILE NO.	1260002.004	DWG.:	FIGURE 5678-B

Northern Region – Pelly Crossing Firehall
Building # 5678

Photo 102-0205
102-0206

DISTRIBUTION & TREATMENT SYSTEM DATA

Item	Description	Manufacturer	Model	Part No.	Serial No.	Size
1	Sub Pump	GRUNDFOS	16S07-8			4" - 3/4 HP
2	Pressure Tank	NOT ACCESSIBLE				
3	Water Storage Tank	NOT ACCESSIBLE				
4	Pump Controls	NOT ACCESSIBLE				
5						
6						
7						
8						
9						
10						

TABLE 5678 - 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?
5678	Pelly Crossing Fire Hall	9	Oct-04 to Jun-05	yes	1/9	no	9-Jun-05	no



Table 5678 - 2: Water Quality Results

SOURCE:		Building 5678 - Fire Hall			GCDWQ Criteria		
Location/ Resident		Pelly Crossing					
Address							
Treatment		None					
Disinfection		None					
Source of Water		On-site well					
Purpose of Sampling		Base Line	Base Line	Additional Sampling			
Sample Location							
Date Sampled		29-Sep-04	8-Jun-05	23-Aug-05	Lower	Upper Limit	
Physical Tests (ALS)					AO	MAC	AO
Colour	(CU)	9	<5.0				15
Conductivity	(uS/cm)		414				
Total Dissolved Solids		222	235				500
Hardness	CaCO3	209	189		AO >200 = poor, > 500 unacceptable ^A		
pH		8.11	8.2		6.5		8.5
Turbidity	(NTU)	3.1	1.39	4.94		1	5
UV Absorbance				0.018			
% UV Transmittance				96.2			
Dissolved Anions (ALS)							
Alkalinity-Total	CaCO3	175	155				
Chloride	Cl	1.5	<0.50				250
Fluoride	F	0.08	0.098			1.5	
Silicate	SiO4						
Sulphate	SO4	38.1	54.9				500
Nitrate Nitrogen	N	0.5	<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	0.016			0.1	
Antimony	T-Sb	<0.0002	<0.00050			0.006	
Arsenic	T-As	0.0006	0.00036			0.025	
Barium	T-Ba	0.081	0.078			1	
Boron	T-B	0.003	<0.10			5	
Cadmium	T-Cd	<0.00001	<0.00020			0.005	
Calcium	T-Ca		53.6				
Chromium	T-Cr	0.001	<0.0020			0.05	
Copper	T-Cu	0.011	0.0235			1	
Iron	T-Fe	0.3	1.23	1.51			0.3
Lead	T-Pb	0.0002	<0.0010			0.01	
Magnesium	T-Mg		13.5				
Manganese	T-Mn	0.033	0.0353				0.05
Mercury	T-Hg		<0.00020			0.001	
Potassium	T-K		1.59				
Selenium	T-Se		0.0033			0.01	
Sodium	T-Na	3.1	3.4				200
Uranium	T-U	0.0008	0.00089			0.02	
Vanadium	T-V						
Zinc	T-Zn	0.004	<0.050				5
Dissolved Metals							
Iron	D-Fe			<0.030			0.3
Organic Parameters							
Tannin and Lignin				0.14			
Total Organic Carbon C				1.33			
Field Chemistry (EBA)							
pH				8.17	6.5		8.5
TDS (ppm)				178			500
EC (uS/cm)				362			
Temperature (°C)				8.4			
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)



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SMALL PUBLIC WATER SYSTEM ASSESSMENT

PART A: EBA Site Inspection

Inspector: KSI/RMM

Date August 23/2005

WELL ID #	Owner	Location Description
5678	YTG	Pelly Crossing Firehall

1. Well Location and Potential Contaminant Sources

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

Pelly Crossing 462 Klondike Highway

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

Pelly Crossing: Firehall

c. GPS location: DB E 420103 N 6967043 elev. 481m ±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 No

☐ 5 or more delivery sites on a trucked distribution system? If so how many No

g. Nearest building, specify firehall

h. Distance from well to building 2.5m

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

j. Distance from well to nearest point of known field: _____

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

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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

Entrance by animals? ☐ Yes ☒ No

significant mouse feces in well enclosure.

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

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

graded away from well head.

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

unk.

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: AST 1; Distance from well to Potential Source 1: 14m

Potential Source 2: _____; Distance from well to Potential Source 2: _____

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

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2. Well and Wellhead information:

- a. When was well installed? Year 1988 Month Sept 11
- b. Type: ☒ drilled ☐ dug ☐ sand point ☐ other _____
- c. Is there a drillers log for the well: ☒ Yes ☐ No MSD
- d. Is there a surface seal to 6 m ☐ Yes ☒ No ☐ unknown ☐ unlikely
- e. Surface casing: ☐ Yes Diameter _____ ☐ No
- f. Well casing: Diameter 6" (152mm) Material: ☒ steel ☐ plastic ☐ concrete
- g. Depth of well: 45' ☐ measured (if possible) ☐ reported ☒ from log
- h. Static water level below ground: 34'
☐ 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 15 slot
- j. (If bedrock) Does the well have a liner? ☐ yes ☐ No ☐ steel ☐ plastic
- k. If there is a well screen: length 4' slot size(s) 15'
Location of screen: from 41 to 45' 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 PWF pit 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 Yes - 0.92 m - by

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 Yes - significant amounts of mouse feces

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?

no surface seal + distance to Pelly River. ☐ Yes ☐ No ☒ farther investigation required.

If yes is there treatment or disinfection ☐ 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 _____

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

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

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

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

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

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

If yes, describe: _____

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 ALBISER

Date AUG. 23/05

WELL ID #	Owner	Location Description
5678	YTG	FIRE HALL, Pelly Crossing

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:

Where is it located?

Comments: _____

Is the room in which the water tank is located heated to maintain an optimum temperature of 4°C for stored water?

YES NO

Comments: _____

Are there windows in the add-on that may allow direct sunlight onto the water holding tank? YES

NO

Comments: _____

Are there other heat sources near the tank? YES NO

Comments: _____

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

Comments: _____

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Overall Tank

What are the tank size and dimensions?

What material is the tank constructed of? _____

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

Comments: _____

Tank Inlet, Outlet and Lid

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

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

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

Is the water tank drain accessible? YES NO

WATER TANK AND WATER QUALITY CONDITION

Are there signs of staining or biofouling? YES NO

Comments: _____

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

Comments: _____

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

Have there been any bacteriological analyses conducted previously? YES NO

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

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

8. Conclusions

a. Comments on overall installation:

THIS INSTALLATION IS NOT ACCEPTABLE. ACCESS TO THE WATER STORAGE TANKS & CONTROLS IS FOR EXPERIENCED CLIMBERS ONLY. THE PRESSURE TANK IS WATERLOGGED, WHICH CAUSES THE WELL PUMP TO RAPID CYCLE.

b. Recommendations:

INSTALL PROPER ACCESS TO THE WATER STORAGE AREA.

INSTALL WATER TREATMENT AS REQUIRED FOR UV SYSTEM (NSF 55 CERTIFIED)

INSTALL UV SYSTEM.



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Enforcement and Emergencies Section

91782 Alaska Highway, Whitehorse, YT Y1A 5B7

PH: 867.667.3400 FAX: 867.667.7962

Spill Report Information

Spill #	9840
Jurisdiction	Yukon
Community	Pelly Crossing
Address	
Highway	
Milepost	
Feature	Pelly Crossing
Location and Cause	Pelly Crossing School - valve opened intentionally on heating fuel tank - tank drained
Latitude	62.8181
Longitude	-136.5665
Incident Date	9/11/1998
Lead Agency	Yukon Government - Renewable Resources
Other Agency	
Company(s)	
Amount	
Units	
Quantity	Unknown
Release Description	
Additional Quantitit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Fumace Oil
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	spill to ground - near community well - soil excavated - EC suggested taking contaminated soil to dump and spreading out on tarps - no further information on file



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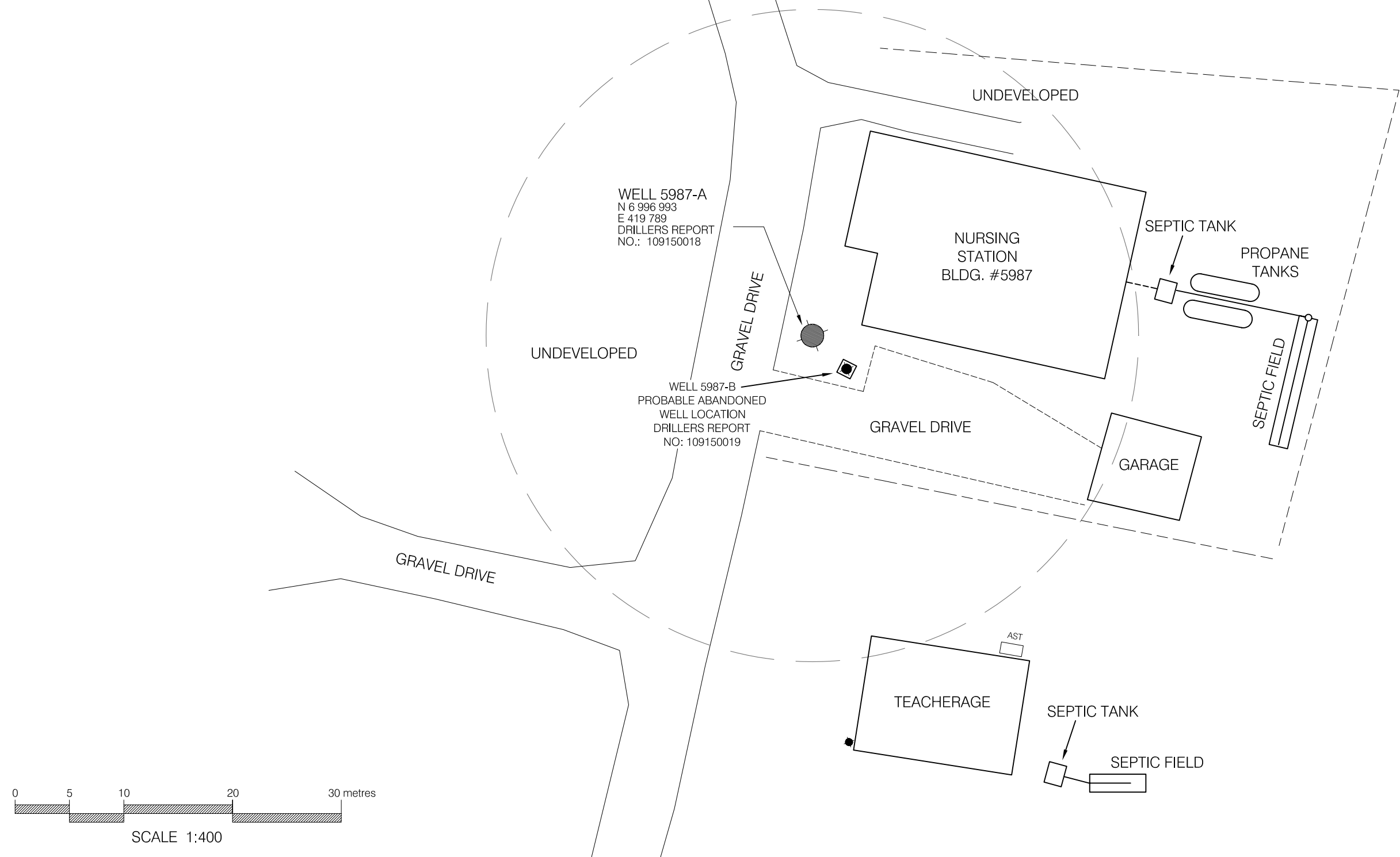
Environnement
Canada

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

Spill Report Information

Spill #	8621
Jurisdiction	Yukon
Community	Pelly Crossing
Address	
Highway	
Milepost	
Feature	Pelly Crossing
Location and Cause	overturned home heating fuel storage tank - garbage truck backed into supporting stand
Latitude	62.819543
Longitude	-136.569408
Incident Date	12/31/1986 2:00:00 PM
Lead Agency	Environment Canada - Environmental Protection Service
Other Agency	RCMP
Company(s)	Selkirk Indian Band
Amount	1890
Units	Litres
Quantity	Estimate
Release Description	Spilled
Additional Quantit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Furnace Oil
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	fuel spilled onto frozen ground and snow/ice cover - fuel was flushed with water and dispersed over a wider area - band advised to remove cont snow

**Photo 405:** 5678 Pelly Crossing Fire hall. (looking west)**Photo 402:** 5678 Well enclosure and wellhead.**Photo 403:** 5678 On site AST on west side of building.**Photo 406:** 5678 Septic system.



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.

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

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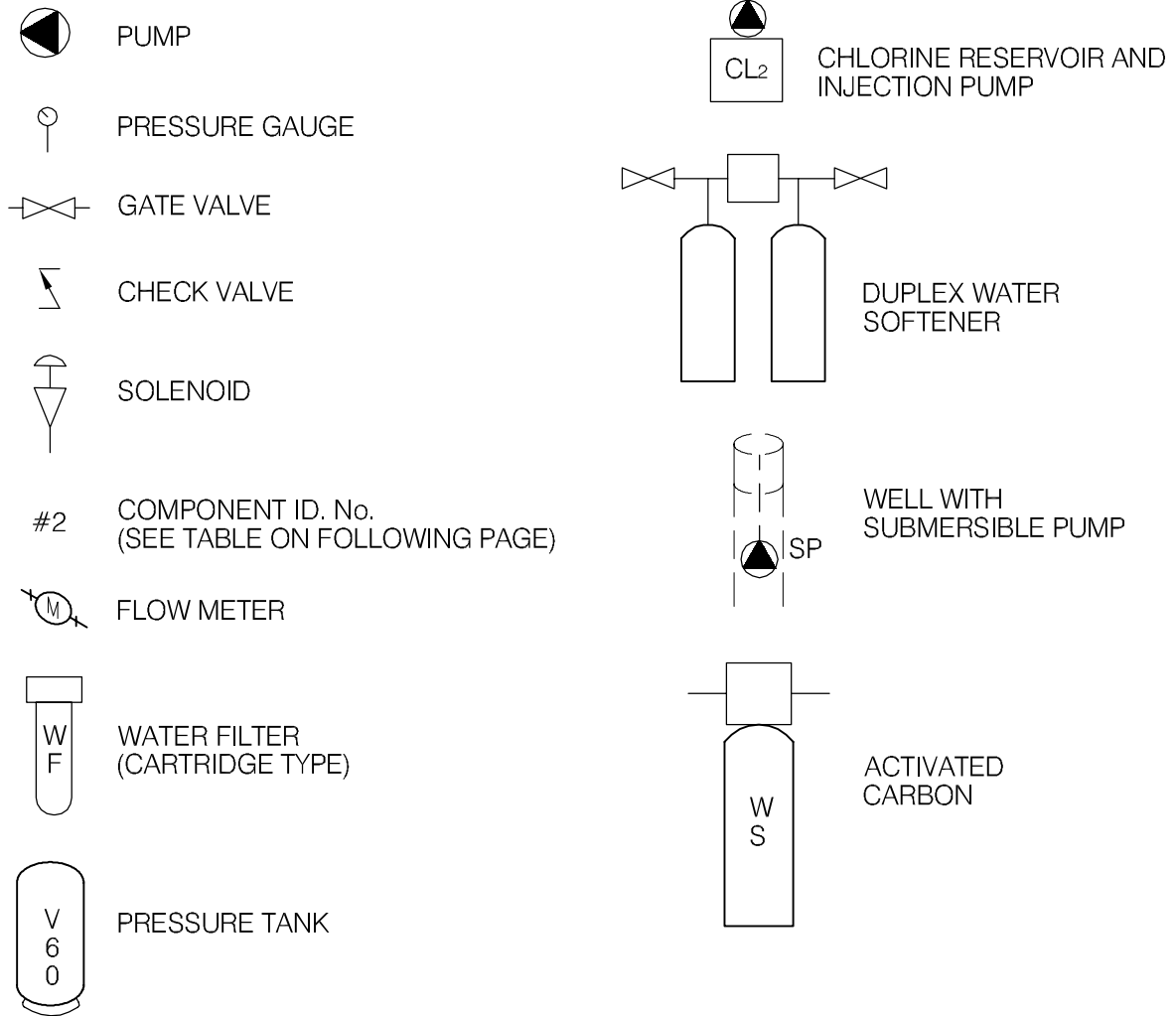
DESIGNED BY: R. MARTIN
DRAWN BY: J. BUYCK
DATE: SEPT. 2005
SCALE: AS SHOWN
PROJECT No.: 1260002.004
ACAD FILENAME: 004-NORTHERN REGION

CLIENT:

Highways and Public Works
Property Management Branch

SMALL PUBLIC WATER SYSTEMS ASSESSMENT NORTHERN REGION	
GOVERNMENT OF YUKON HIGHWAYS & PUBLIC WORKS	
PELLY NURSING STATION BUILDING # 5987 SITE LOCATION DIAGRAM WELL ID: 5987	REVISION ISSUE 0 FIGURE No. FIGURE 5987-A

LEGEND



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CLIENT

Yukon
Highways and Public Works
Property Management Branch

PROJECT

SMALL PUBLIC WATER SYSTEMS ASSESSMENT
WESTERN REGION

TITLE

SCHEMATIC SYSTEM
LEGEND

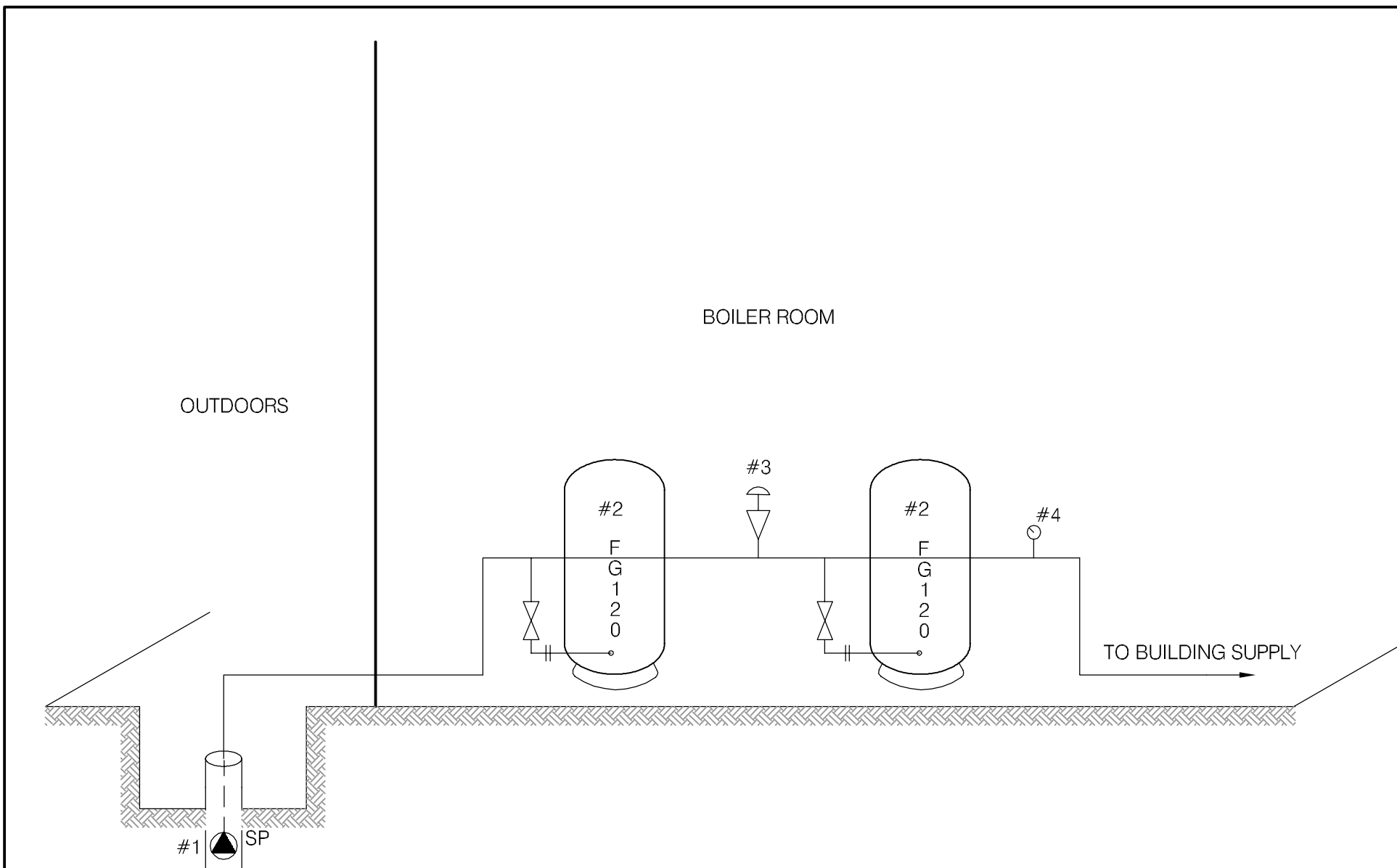
DATE APRIL 2006

DWN. JSB

CHKD. RMM

FILE NO. 1260002

DRWG. LEGEND



SCHEMATIC PRODUCED BY BERT ALBISSER OF AQUA TECH SUPPLIES 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.: 5987 NURSING STATION - PELLY CROSSING, YT.						
DATE	SEPT. 2005	DWN.	JSB	CHKD.	RMM	FILE NO.	1260002.004	DWG.:	FIGURE 5987-B

**Northern Region – Pelly Crossing Nursing Station
Building # 5987**

Photo 102-0201
102-0202

DISTRIBUTION & TREATMENT SYSTEM DATA

Item	Description	Manufacturer	Model	Part No.	Serial No.	Size
1	SUB PUMP	GRUNDFOS	2SS10-7			3" - 3/4 HP
2	PRESSURE TANKS	MONARCH	FG120	x 2		120 GALLON
3	PRESSURE SWITCH	SQUARED	FSG-2			2 HP - 1/4" FPT
4	PRESSURE GAUGE	MARSH	0-100 PSI			2" - 1/4" FPT
5						
6						
7						
8						
9						
10						

TABLE 5987 - 1: SUMMARY OF BACTERIOLOGICAL RESULTS

		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?
Building #	Building Name							
5987	Pelly Crossing Health Centre	9	Oct-04 to Jun-05	no	0/9	no	9-Jun-05	no



Table 5987 - 2: Water Quality Results

SOURCE: Building 5987 - Nursing Station					GCDWQ Criteria		
Location/ Resident		Pelly Crossing					
Address							
Treatment		None					
Disinfection		None					
Source of Water		On-site well					
Purpose of Sampling	Base Line	Base Line	Additional Sampling				
Sample Location							
Date Sampled	29-Sep-04	8-Jun-05	23-Aug-05	Lower	Upper Limit		
Physical Tests (ALS)				AO	MAC	AO	
Colour (CU)	<5	<5.0				15	
Conductivity (uS/cm)		410					
Total Dissolved Solids	214	230				500	
Hardness CaCO3	198	192		AO >200 = poor, > 500 unacceptable ^A			
pH	8	8.18		6.5		8.5	
Turbidity (NTU)	0.1	0.11			1	5	
UV Absorbance			0.056				
% UV Transmittance			87.7				
Dissolved Anions (ALS)							
Alkalinity-Total CaCO3	188	179					
Chloride Cl	0.5	0.9				250	
Fluoride F	0.11	0.126			1.5		
Silicate SiO4							
Sulphate SO4	23.1	30.7				500	
Nitrate Nitrogen N	<0.1	<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			0.1		
Antimony T-Sb	<0.0002	<0.00050			0.006		
Arsenic T-As	0.0003	0.00029			0.025		
Barium T-Ba	0.062	0.047			1		
Boron T-B	0.004	<0.10			5		
Cadmium T-Cd	<0.00001	<0.00020			0.005		
Calcium T-Ca		55.2					
Chromium T-Cr	0.0012	<0.0020			0.05		
Copper T-Cu	0.008	0.003			1		
Iron T-Fe	<0.01	<0.030				0.3	
Lead T-Pb	0.0006	<0.0010			0.01		
Magnesium T-Mg		13.3					
Manganese T-Mn	<0.005	<0.0020				0.05	
Mercury T-Hg		<0.00020			0.001		
Potassium T-K		3.32					
Selenium T-Se		<0.0010			0.01		
Sodium T-Na	4.8	4.8				200	
Uranium T-U	0.0008	0.00084			0.02		
Vanadium T-V							
Zinc T-Zn	0.004	<0.050				5	
Organic Parameters							
Tannin and Lignin			0.17				
Total Organic Carbon C			3.6				
Field Chemistry (EBA)							
pH			7.93	6.5		8.5	
TDS (ppm)			185			500	
EC (uS/cm)			370				
Temperature (°C)			18				
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)



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SMALL PUBLIC WATER SYSTEM ASSESSMENT

PART A EBA Site Inspection

Inspector: KSJ/RMM

Date Aug 23/05

WELL ID #	Owner	Location Description
<u>5987</u>	<u>YTB</u>	<u>Pelly Xing - Nursing Station</u>

1. Well Location and Potential Contaminant Sources

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

Pelly Crossing

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

Nursing Station SW corner of building.
5987 462 Klondike Hwy

c. GPS location: 08 E 0419798 N. 6966993 elev. 467

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 No

☐ 5 or more delivery sites on a trucked distribution system? If so how many No

g. Nearest building, specify Nursing Station (~4m)

h. Distance from well to building (~4m)

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

j. Distance from well to nearest point of known field: >30m

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

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- 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

septic tank (28m)

- 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 Entrance by animals? ☐ Yes ☒ No

- 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 unk.

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: AST 1; Distance from well to Potential Source 1: 30m (neighboring property)

Potential Source 2: Abandoned well; Distance from well to Potential Source 2: 2m.

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

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2. Well and Wellhead information:

- a. When was well installed? Year 1977 Month June 21
- 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 6" Material: ☒ steel ☐ plastic ☐ concrete
- g. Depth of well: 42' ☐ measured (if possible) ☒ reported ☒ from log ^{c 14.10m.}
- h. Static water level below ground: 7.76m.
☐ measured (if possible) ☒ reported ☐ from log ☐ flowing
Mar 20/99
- 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 4'6" (5x?) slot size(s) 15 slot
Location of screen: from _____ to 41'8" 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 pwf 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 Yes (-0.66 m)
- ii. Are there signs of ponding on the enclosure(e.g. water stains, etc.)? ☐ Yes ☒ No
- iii. Is the wellhead enclosed by fiberglass insulations? ☒ Yes ☐ No
- 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?

no surface seal ☒ Yes ☐ No ☐ farther investigation required.

If yes is there treatment or disinfection ☐ 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

*'most likely connected
to Pelly River*

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 Grundfos Model 25510-7 3"
horsepower _____ capacity _____ voltage _____

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d. Date installed: March 13 / 2001 By: Aqua Tec

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

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

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

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

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

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

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

If yes, describe: heat trace + fibreglass 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 ALBISSEN

Date AUG. 23/05

WELL ID #	Owner	Location Description
5987	YTG	HEALTH CENTRE - PEWY CROSSING

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
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- h. Is the drinking water tested daily with an accurate reading chlorine test kit capable of reading in the range 0 to 3.5 mg/L of free chlorine residual in increments of 0.1mg/L? ☐ Yes ☐ No ☐ unknown
- i. If yes is the test performed in accordance with manufactures directions? ☐ Yes ☐ No ☐ unknown
- j. Is a record of the date, time, name of person performing the test and results of the drinking water sample kept? ☐ Yes ☐ No

TANK AND PIPING DETAILS

Tank Room

Is there a water tank? Yes No Details:

Where is it located?

Comments: _____

Is the room in which the water tank is located heated to maintain an optimum temperature of 4°C for stored water?

YES NO

Comments: _____

Are there windows in the add-on that may allow direct sunlight onto the water holding tank? YES

NO

Comments: _____

Are there other heat sources near the tank? YES NO

Comments: _____

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

Comments: _____

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Overall Tank

What are the tank size and dimensions?

What material is the tank constructed of? _____

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

Comments: _____

Tank Inlet, Outlet and Lid

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

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

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

Is the water tank drain accessible? YES NO

WATER TANK AND WATER QUALITY CONDITION

Are there signs of staining or biofouling? YES NO

Comments: _____

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

Comments: _____

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

Have there been any bacteriological analyses conducted previously? YES NO

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

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

8. Conclusions

a. Comments on overall installation:

b. Recommendations:



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Enforcement and Emergencies Section

91782 Alaska Highway, Whitehorse, YT Y1A 5B7

PH: 867.667.3400 FAX: 867.667.7962

Spill Report Information

Spill #	9840
Jurisdiction	Yukon
Community	Pelly Crossing
Address	
Highway	
Milepost	
Feature	Pelly Crossing
Location and Cause	Pelly Crossing School - valve opened intentionally on heating fuel tank - tank drained
Latitude	62.8181
Longitude	-136.5665
Incident Date	9/11/1998
Lead Agency	Yukon Government - Renewable Resources
Other Agency	
Company(s)	
Amount	
Units	
Quantity	Unknown
Release Description	
Additional Quantitit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Fumace Oil
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	spill to ground - near community well - soil excavated - EC suggested taking contaminated soil to dump and spreading out on tarps - no further information on file



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

Spill Report Information

Spill #	8621
Jurisdiction	Yukon
Community	Pelly Crossing
Address	
Highway	
Milepost	
Feature	Pelly Crossing
Location and Cause	overturned home heating fuel storage tank - garbage truck backed into supporting stand
Latitude	62.819543
Longitude	-136.569408
Incident Date	12/31/1986 2:00:00 PM
Lead Agency	Environment Canada - Environmental Protection Service
Other Agency	RCMP
Company(s)	Selkirk Indian Band
Amount	1890
Units	Litres
Quantity	Estimate
Release Description	Spilled
Additional Quantitit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Furnace Oil
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	fuel spilled onto frozen ground and snow/ice cover - fuel was flushed with water and dispersed over a wider area - band advised to remove cont snow



Photo 393: 5987 Pelly Crossing nursing station. (looking northeast)



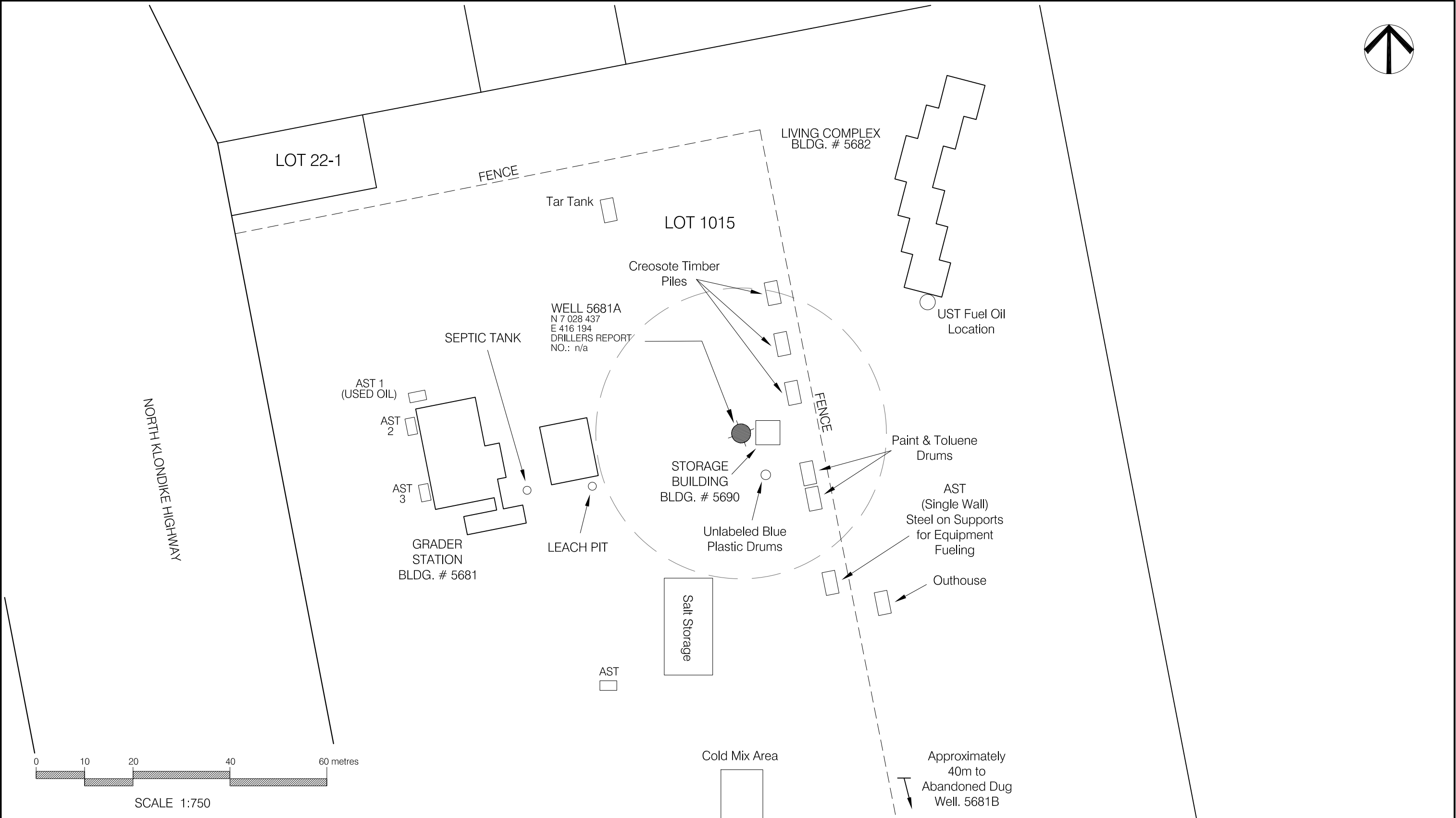
Photo 394: 5987 Well enclosure and wellhead in pit.



Photo 202: Water system. (pressure tanks & pump controls)



Photo 396: Potential location of abandoned well.



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:

Highways and Public Works
Property Management Branch

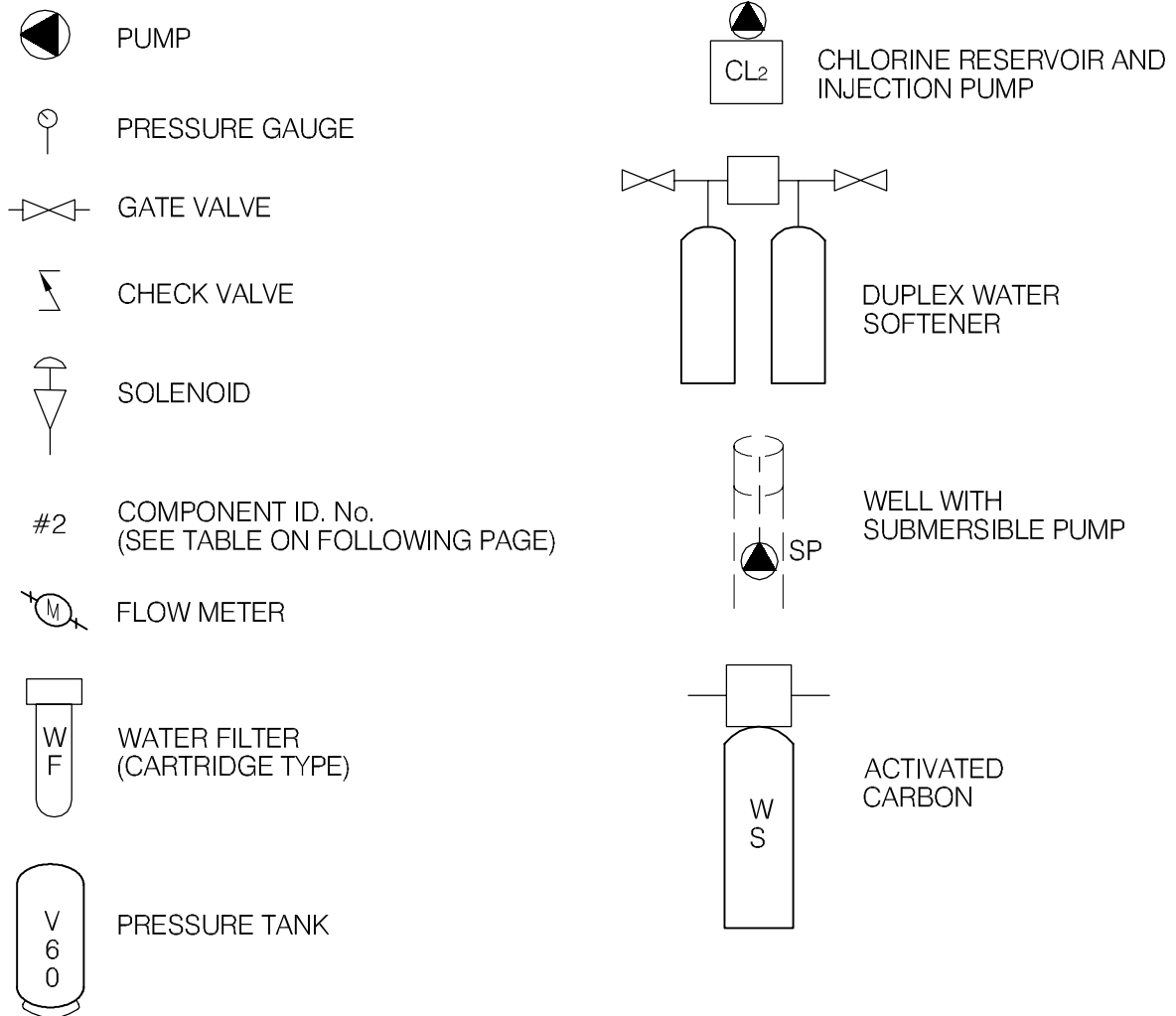
SMALL PUBLIC WATER SYSTEMS ASSESSMENT
NORTHERN REGION

GOVERNMENT OF YUKON
HIGHWAYS & PUBLIC WORKS

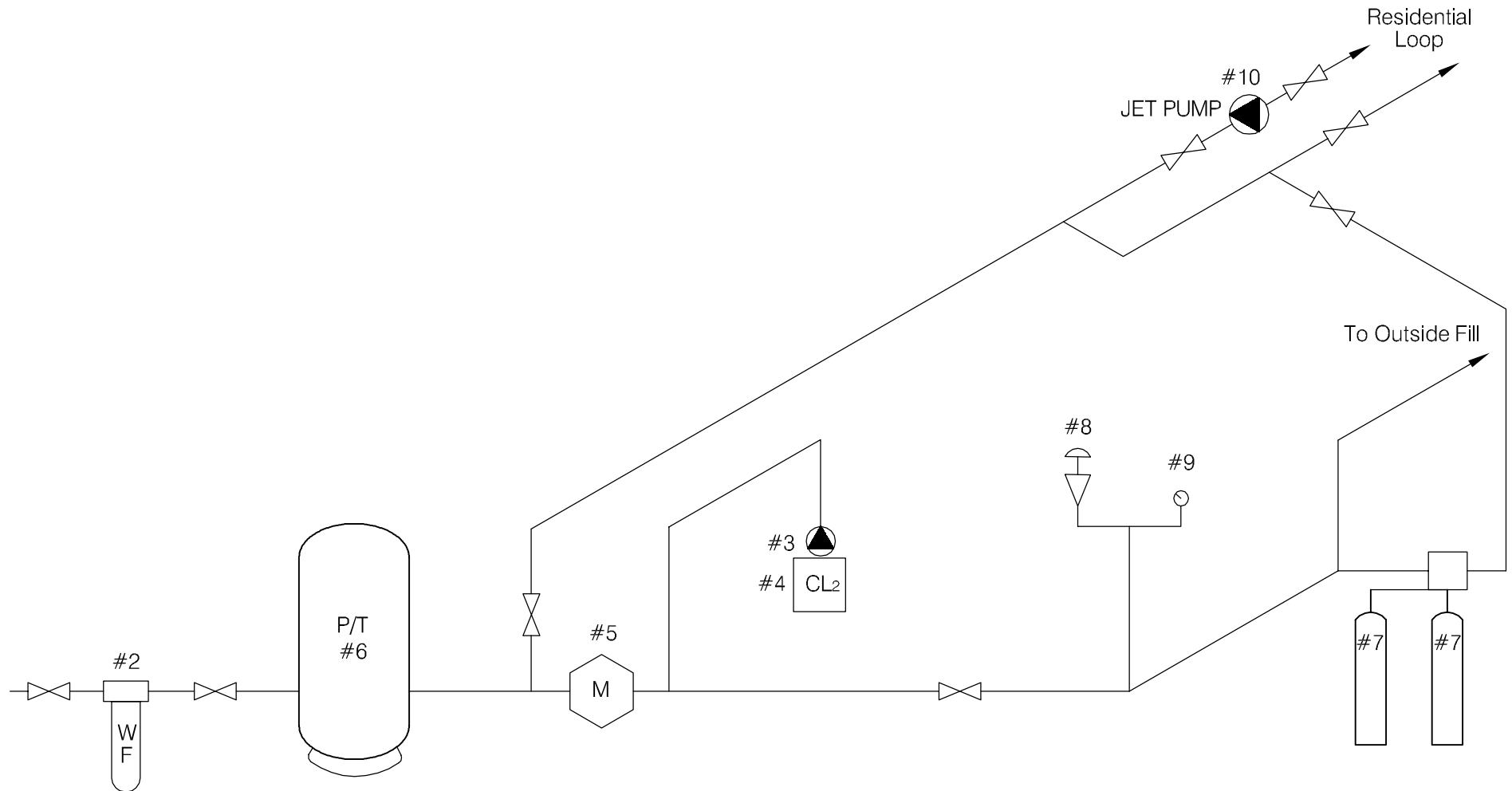
STEWART X-ING GRADER STATION
BUILDING # 5681
SITE LOCATION DIAGRAM
WELL ID: 5681

REVISION	ISSUE
0	
FIGURE No.	
FIGURE 5681-A	

LEGEND



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



SCHEMATIC PRODUCED 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.: 5681 GRADER STATION - STEWART CROSSING, YT.					
DATE SEPT. 2005		DWN. JSB		CHKD. RMM		FILE NO. 1260002.004		DWG.: FIGURE 5681-B	

**Northern Region – Stewart Crossing Grader Station
Building # 5681**

DISTRIBUTION & TREATMENT SYSTEM DATA

Item	Description	Manufacturer	Model	Part No.	Serial No.	Size
1	SUB PUMP	?				5HP-4"
2	INLINE FILTER	AMEYER	10" BB			1 1/2" x 10"
3	CHLORINE PUMP	LMI	A751-39251		20020712896	
4	CHLORINE TANK	LMI	20 I. GALLON			
5	FLOW METER	LMI	REF-010			
6	PRESSURE TANK	Wau x TRO L	Wx-360			
7	SOFTENER	AQUA-TECH	50265606	DUPLEX	184243	9000-1450 DUPLEX
8	PRESSURE SWITCH	SQUARE D	FSG-2			
9	PRESSURE GAUGE	MARSH	0-100			2 1/2" - 1/4" FPT
10	CIRC PUMP	ARMSTRONG	?			

TABLE 5681/5682- 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?
5681	Stewart Crossing Grader Station	9	Oct-04 to Jun-05	no	0/9	no	9-Jun-05	no
5682	Stewart Crossing Living Complex	8	Oct-04 to Jun-05	no	0/8	no	9-Jun-05	no



Table 5681/5682 - 2: Water Quality Results

SOURCE:	Building 5681 - Stewart Crossing Grader Station			Building 5682 - Stewart Crossing Living Complex	GCDWQ Criteria		
Location/ Resident	Stewart Crossing			Stewart Crossing			
Address							
Treatment	Softener (not in use), filtration			Softener (not in use), filtration			
Disinfection	Chlorination (not in use)			Chlorination (not in use)			
Source of Water	On-site well			On-site well			
Purpose of Sampling	Base Line	Base Line	Additional Sampling	Base Line			
Sample Location			Complex Residence				
Date Sampled	29-Sep-04	8-Jun-05	16-Aug-05	29-Sep-04	Lower	Upper Limit	
Physical Tests (ALS)					AO	MAC	AO
Colour (CU)	27	<5.0		7			15
Conductivity (uS/cm)		344					
Total Dissolved Solids	180	180		181			500
Hardness CaCO ₃	169	171		168	AO >200 = poor, > 500 unacceptable ^A		
pH	8.07	8.22		8.07	6.5		8.5
Turbidity (NTU)	10.3	17.7	8.02	1.4		1	5
UV Absorbance							
% UV Transmittance							
Dissolved Anions (ALS)							
Alkalinity-Total CaCO ₃	161	160		163			
Chloride Cl	0.8	<0.50		0.6			250
Fluoride F	0.15	0.173		0.15		1.5	
Silicate SiO ₄			10.2				
Sulphate SO ₄	17.7	18.5		17.8			500
Nitrate Nitrogen N	<0.1	<0.10		<0.1		10	
Nitrite Nitrogen N	<0.05	<0.10		<0.05		1	
Ammonia Nitrogen N							
Total Phosphate PO ₄			0.0285				
Total Metals (ALS)							
Aluminum T-Al	<0.005	<0.010		<0.005		0.1	
Antimony T-Sb	<0.0002	<0.00050		<0.0002		0.006	
Arsenic T-As	0.0094	0.0117	0.0108	0.0074		0.025	
Barium T-Ba	0.08	0.077		0.072		1	
Boron T-B	0.005	<0.10		0.004		5	
Cadmium T-Cd	<0.00001	<0.00020		<0.00001		0.005	
Calcium T-Ca		53.5					
Chromium T-Cr	0.001	<0.0020		0.001		0.05	
Copper T-Cu	<0.001	0.0057		0.002		1	
Iron T-Fe	0.6	1.48	0.923	0.28			0.3
Lead T-Pb	<0.0001	<0.0010		0.0002		0.01	
Magnesium T-Mg		9.11					
Manganese T-Mn	0.136	0.134	0.14	0.136			0.05
Mercury T-Hg		<0.00020				0.001	
Potassium T-K		1.38					
Selenium T-Se		<0.0010				0.01	
Sodium T-Na	3	3.4		3			200
Uranium T-U	<0.0005	<0.00010		<0.0005		0.02	
Vanadium T-V			<0.030				
Zinc T-Zn	0.221	0.43		0.226			5
Dissolved Metals							
Arsenic D-As			0.00697			0.025	
Iron D-Fe			<0.030				0.3
Manganese D-Mn			0.135				0.05
Organic Parameters							
Tannin and Lignin							
Total Organic Carbon C			1.44				
Field Chemistry (EBA)							
pH			8.38		6.5		8.5
TDS (ppm)			165				500
EC (uS/cm)			326				
Temperature (°C)			15.5				
Free Available Chlorine			0.01				

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)



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SMALL PUBLIC WATER SYSTEM ASSESSMENT

PART A: EBA Site Inspection

Inspector: Ryan Martin, Luke Lebel

Date Aug 16, 2005

WELL ID #	Owner	Location Description
5681	YTG	Stewart Crossing Grader Station

1. Well Location and Potential Contaminant Sources

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

Stewart Crossing

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

In wellhouse on grader station compound

c. GPS location: N 7028437 E 416194 elev 468m ±6m

d. Is there electric power? ☒ Yes ☐ No

e. Is there outside water access? ☒ Yes ☐ No
Publicly Accessible

f. Does the well system have:

☐ 15 or more service connections to a piped distribution system? If so how many _____

Maintenance garage and Living Complex

☐ 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 1.65m

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

j. Distance from well to nearest point of known field: leach pit @ 33m

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

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- 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

No. Tank @ ~45m; outhouse @ ~40m

- 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 ~40m

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

☒ Yes ☐ No Describe Industrial activities around the well

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

Potential Source 1: ^{Drums} (Unknown contents); Distance from well to Potential Source 1: ~10m

Potential Source 2: ^{Paint + Toluene} Drums; Distance from well to Potential Source 2: ~15m

Potential Source 3: ^{Tar tank}; Distance from well to Potential Source 3: ~45m

Potential Source 4: ^{Salt storage}; Distance from well to Potential Source 4: ~35m
^{Creosote timbers @ ~15m}

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

How many? 1 ☐ in use ☒ abandoned ☐ require proper sealing
dug well @ ~100m

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2. Well and Wellhead information:

- a. When was well installed? Year 1994 Month April
- 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 30 cm ☐ No
- f. Well casing: Diameter 30 cm to 12.8 m
20 cm to 150 m
15 cm to 176 m Material: ☒ steel ☐ plastic ☐ concrete
- g. Depth of well: 177.4 m ☐ measured (if possible) ☒ reported ☒ from log
- h. Static water level below ground: 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 1.8 m slot size(s) 80 slot and 50 slot
Location of screen: from 176.0 m to 177.4 m 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 adjacent to pumphouse
- 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
- 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
- v. Does the well casing have a proper seal cap? ☒ Yes ☐ No

If no, describe condition likely, but not able to observe due to insulation

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...) Filtration, softening, 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
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 _____

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d. Date installed: _____ By: _____

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

f. Drop pipe for submersible pump: ☐ steel ☐ plastic *unknown*

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: Insulation and heat trace

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 ALKSEK

Date AUG. 16/05

WELL ID #	Owner	Location Description
5681	VTG	STEWART CROSSING, YT

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 CHLORINATOR (LIQUID)

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

☐ Yes ☒ No _____ reading.

Tested at _____ (location)

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

☐ Yes ☒ No If yes how often? _____

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

7. Water Quality (observations):

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

Type of stain: ☐ brown ☐ red ☐ black

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

c. Is there an unpleasant odour? ☐ Yes ☒ No ☐ 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: PRESSURE TANK

Where is it located?

Comments: _____

Is the room in which the water tank is located heated to maintain an optimum temperature of 4°C for stored water?

YES NO

Comments: Wall House

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: _____

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Overall Tank

What are the tank size and dimensions?

Wx - 366

What material is the tank constructed of? STEEL & Butyl 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

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8. Conclusions

a. Comments on overall installation:

INSTALLATION IS ACCEPTABLE WITH THE
EXCEPTION OF THE SOFTNER DRAIN. THERE
IS NO PROPER DRAIN PIT IT DRAINS ON THE
GROUND OUTSIDE THE WELL HOUSE
THE CHLORINATOR IS UNPLUGGED. IT IS
NOT IN SERVICE AT THIS TIME

b. Recommendations:

INSTALL PROPER DRAIN FACILITY FOR
TREATMENT SYSTEM.
RETURN SOFTNER TO SERVICE AND
TRAIN PERSONNEL TO OPERATE THE
SYSTEM AND INSTITUTE CHLORINE
RESIDUAL TESTING AT SCHEDULED
INTERVALS. DAILY RESIDUAL TESTING
IS RECOMMENDED.

Willow Pickets



Field Report

13 MacDONALD ROAD
WHITEHORSE, YUKON
Y1A 4L1

PHONE (403) 633-3070
TELEX 036-8496

Started. *May 8*.....19*92*

Completed. *Apr 1*.....19*92*

NAME AND ADDRESS OF CLIENT	DESCRIPTION OF WORK	LOCATION OF WORK
<i>Com. Transportation</i>	<i>U1/W1</i>	<i>Stewart</i>
	<i>94-1A-3</i>	<i>King</i>

FORMATION LOG			DESCRIPTION OF WORK	TIME			
FROM	TO	FORMATION		DATE	FROM	TO	HOURS
			MOVE 8" casing				
			set 40' of 8" casing	<i>May 10</i>	<i>12:30</i>	<i>8:00</i>	<i>7.5</i>
<i>40</i>	<i>47</i>	<i>Gr. sand cobs</i>					
<i>47</i>	<i>100</i>	<i>silt</i>					
<i>100</i>	<i>175</i>	<i>silt</i>	Broke casing unable to close bit	<i>May 11</i>	<i>8:00</i>	<i>8:00</i>	<i>1.0</i>
			set up wait till 11:00	<i>May 12</i>	<i>8:00</i>	<i>4:00</i>	<i>8</i>
			for Pullars Pulling casing to slow				
			travel to where for	<i>"</i>	<i>4:00</i>	<i>9:00</i>	<i>5</i>
			Exer a 6" casing				
			Leading	<i>"</i>	<i>9:00</i>	<i>11:00</i>	<i>2</i>
			Travel to start	<i>May 13</i>	<i>1:00</i>	<i>7:00</i>	<i>6</i>
			Pulling 175' casing	<i>"</i>	<i>8:00</i>	<i>6:00</i>	<i>10</i>

Rcd. of Casing & Pipe

Size	Type	Size	Type

Feet	Inch	Feet	Inch

Remarks:

SIGNATURES

MIDNIGHT SUN.....

CLIENT.....

TITLE.....

TITLE.....



Field Report

13 MacDONALD ROAD
WHITEHORSE, YUKON
Y1A 4L1

PHONE (403) 633-3070
TELEX 036-8496

Started. *Mar...8.....1992*

Completed. *Apr...1.....1992*

NAME AND ADDRESS OF CLIENT	DESCRIPTION OF WORK	LOCATION OF WORK
<i>Corn & Transport</i>	<i>W / W</i>	<i>Stewart King</i>
	<i>94-1A-3</i>	

FORMATION LOG			DESCRIPTION OF WORK	TIME			
FROM	TO	FORMATION		DATE	FROM	TO	HOUR
			MOVE 8" casing				
			waiting for drive shoe	<i>Mar. 14</i>	<i>8:00</i>	<i>4:30</i>	<i>8.5</i>
			mount casing hammer				
			set 40' casing	<i>11</i>	<i>4:30</i>	<i>8:00</i>	<i>3.5</i>
			Redrill to 175'	<i>Mar. 15</i>	<i>8:00</i>	<i>8:00</i>	<i>12</i>
<i>175</i>	<i>290</i>	<i>silt</i>	Plugged bit	<i>Mar. 16</i>	<i>8:00</i>	<i>8:00</i>	<i>12</i>
			unable to keep bit	<i>Mar. 17</i>	<i>8:00</i>	<i>6:00</i>	<i>10</i>
			from plugging				
			Fix discharge hose				
			off casing hammer				
			Fix casing hammer				
			cable				

Rcd. of Casing & Pipe

Size	Type	Size	Type

Feet	Inch	Feet	Inch

Remarks:

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

SIGNATURES

MIDNIGHT SUN.....

CLIENT.....

TITLE.....

TITLE.....



Field Report

13 MacDONALD ROAD
WHITEHORSE, YUKON
Y1A 4L1

PHONE (403) 633-3070
TELEX 036-8496

Started *Mar. 8*.....19*9*

Completed *Mar. 1*.....19*9*

NAME AND ADDRESS OF CLIENT	DESCRIPTION OF WORK	LOCATION OF WORK
<i>Comm. Transport</i>	<i>W / W</i>	<i>Stewart</i>
	<i>94-1A-3</i>	<i>King</i>

FORMATION LOG			DESCRIPTION OF WORK	TIME			
FROM	TO	FORMATION		DATE	FROM	TO	HOUR
			MOVE 8" casing				
			Pull back to 100' 3 times	<i>Mar. 18</i>	<i>8:00</i>	<i>11:00</i>	<i>1.5</i>
			blow on in on Rapid				
			Feed back when using				
			casing hammer				
			wanted.				
			change over to clutch	<i>Mar. 19</i>	<i>8:00</i>	<i>8:00</i>	<i>1.2</i>
			bank, Not working				
			change spools				
			Plugged bit trip out				
			Bit plugged trip hole	<i>Mar. 20</i>	<i>8:00</i>	<i>12:00</i>	<i>1.6</i>
			Red will from 180' Built seal				
			for top of casing hammer				
<i>290</i>	<i>305</i>	<i>silt</i>	Put tent on				
			Blew hose off Fitting to				
			Injection pump trouble				
			with supply pump getting				
			water picking up rocks Blow seal				

Rcd. of Casing & Pipe
Size Type Size Type

Remarks:

Feet Inch Feet Inch

Static Level

Total Rig Time

hrs.

Ground Level

Total Standby

hrs.

Top Of Casing

Drilling Mud

sacks

SIGNATURES

MIDNIGHT SUN.....

CLIENT.....

TITLE.....

TITLE.....



Field Report

13 MacDONALD ROAD
WHITEHORSE, YUKON
Y1A 4L1

PHONE (403) 633-3070
TELEX 036-8496

Started...Mar...8.....1995

Completed...Mar...1.....1995

NAME AND ADDRESS OF CLIENT	DESCRIPTION OF WORK	LOCATION OF WORK
Com. & Transport	W/U	Stewart King
	94-1A.3	

FORMATION LOG			DESCRIPTION OF WORK	TIME			
FROM	TO	FORMATION		DATE	FROM	TO	HOURS
			MOVE 8" casing				
			Tripped hole Badrill & removed	Mar 21	8:00	11:00	
			220' Arclon compressor				
			dumped oil from				
			recovery tank cleaned				
			Fuel filters				
305	315	silt					
			Taking broken Piece	"	11:00	12:00	1
			odd casing hammer				
			Taking broken Piece	Mar 22	12:00	4:00	4
			odd casing hammer				
315	365	silt					
			2hrs Fixing short 6"	Mar 23	8:00	11:00	15
			discharge hose on				
			casing hammer				
365	385	silt					
			blowing oring in Ropit	Mar 24	8:00	10:30	14.5
			Feed control Bank				
			Plugged bit Tripped hole				
			Hole heaving				

Rcd. of Casing & Pipe

Size Type Size Type

Feet Inch Feet Inch

Remarks:

Static Level

Ground Level

Top Of Casing

Total Rig Time

Total Standby

Drilling Mud

hrs.

hrs.

sacks

SIGNATURES

MIDNIGHT SUN.....

TITLE.....

CLIENT.....

TITLE.....



Field Report

13 MacDONALD ROAD
WHITEHORSE, YUKON
Y1A 4L1

PHONE (403) 633-3070
TELEX 036-8496

Started May 8 1994

Completed Apr 1 1994

NAME AND ADDRESS OF CLIENT			DESCRIPTION OF WORK		LOCATION OF WORK			
Commins			W/W		Stewart			
			94-1A-3		Xing			
FORMATION LOG			DESCRIPTION OF WORK	TIME				
FROM	TO	FORMATION		DATE	FROM	TO	HOURS	
			MOVE 6" casing					
			Trip out	May 27	8:00	5:00	9	
			set 120' of 6" casing	"	5:00	8:00	3	
			set 270' of 6" casing	May 28	8:00	12:30	16.5	
490	520	silt		May 29	8:00	9:00	13	
520	569	silt	Br.	May 30	8:00	9:30	13.5	
567	574	silt	Br.	May 31				
574	579	silt	Sand Pss G.					
579	582	silt	G.					
			Trip out	May 31	8:00	11:00	3	
			check hole set screens	"	11:00	5:00	6	
			Druclop	"	5:00	12:00	7	
			rite shift 12:00-8:00 P.m.					
			Trip out clean up	Jun 1	8:00	2:00	6	
			Load					
			travel to whse with drill	"	2:00	7:30	5.5	
Rcd. of Casing & Pipe				Remarks:				
Size	Type	Size	Type	100 G.P.M.				
6				screen bottom 582' G.L.				
Feet	Inch	Feet	Inch	1-80 slot				
57.6				1-50 slot				
				1-2' riser + ~~1-2'~~ P-Packer				
				58 bit pin				
				Total Length 10' 6"				
				Static Level		Total Rig Time	hrs.	
				Ground Level		Total Standby	hrs.	
				Top Of Casing		Drilling Mud	sacks	

SIGNATURES

MIDNIGHT SUN.....

CLIENT.....

TITLE.....

TITLE.....



Photo 001: Abandoned well enclosure.



Photo 002: Wellhead of abandoned well.



Photo 003: Looking down abandoned dug well.



Photo 005: 5681 Stewart Crossing grader station facing west.



Photo 009: 5690 Existing deep well enclosure and well house storage building.



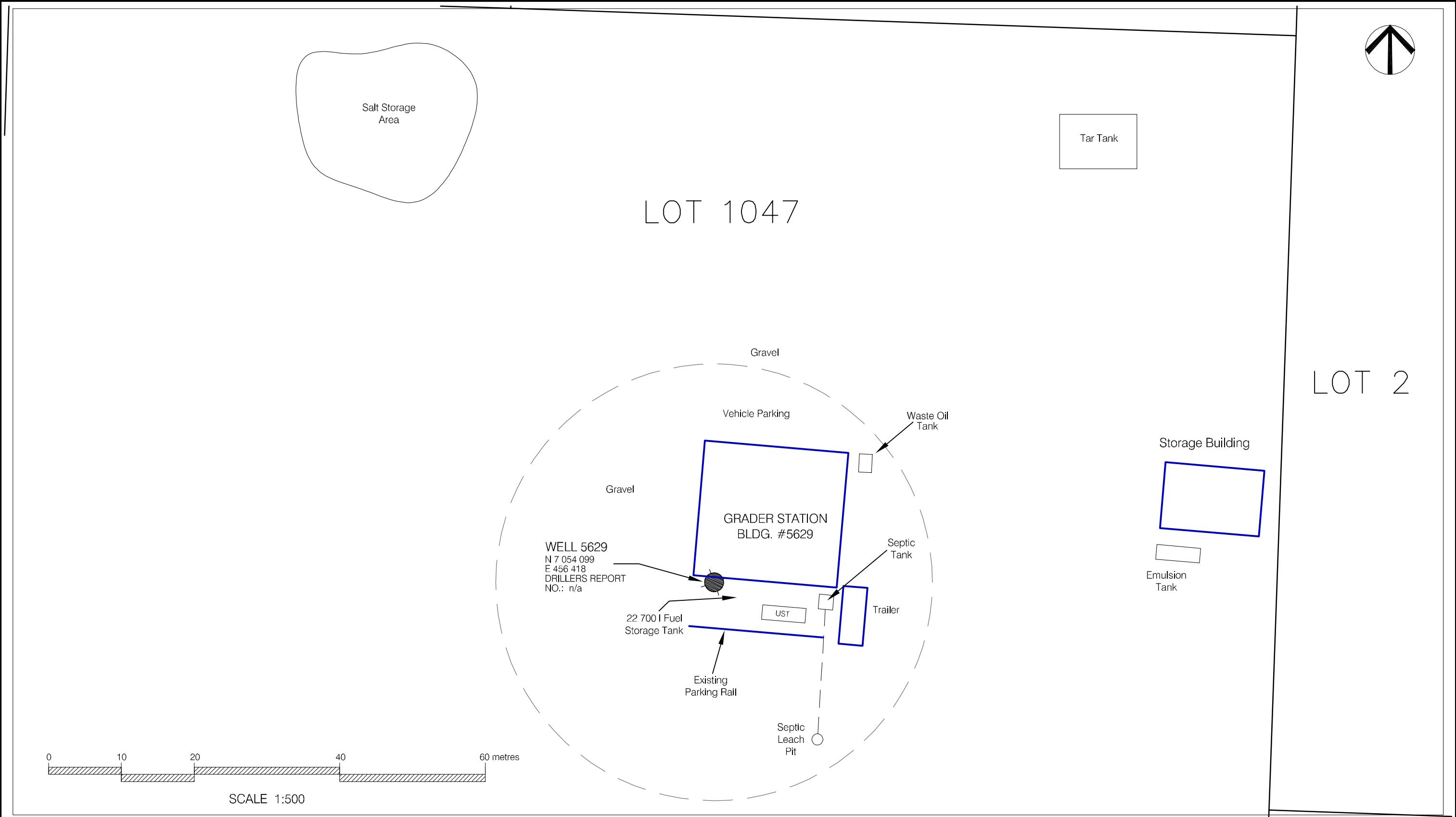
Photo 174: 5690 water system that serves 5681 & 5682. (pressure tank, filter, pump controls, LMI proportion feed chlorination system).



Photo 008: 5682 Living Complex.



Photo 012: Paint and toluene drum storage.



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.

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

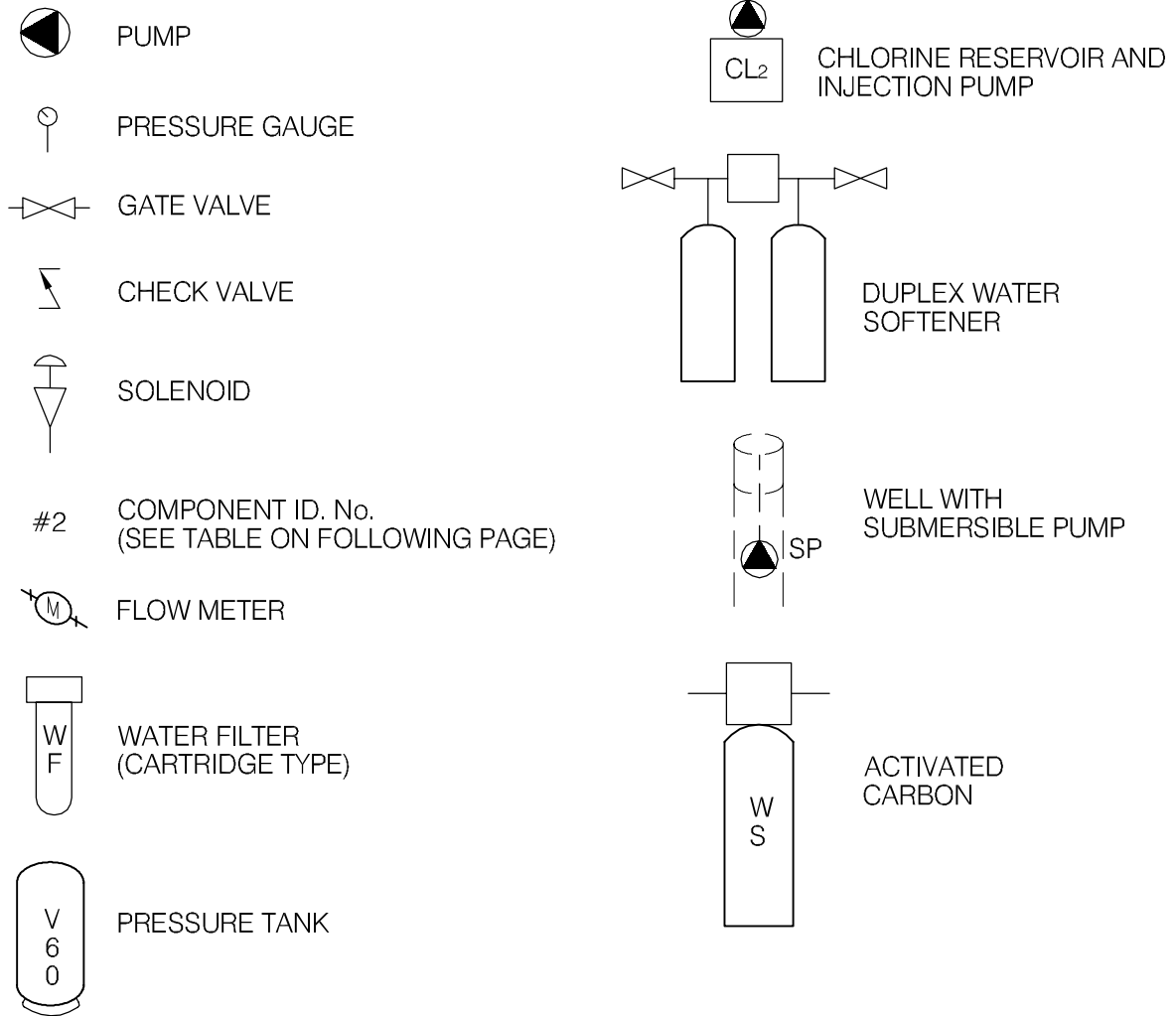
**GOVERNMENT OF YUKON
HIGHWAYS & PUBLIC WORKS**

**MAYO GRADER STATION
BUILDING # 5629
SITE LOCATION DIAGRAM
WELL ID: 5629**

REVISION ISSUE
0

FIGURE No.
FIGURE 5629-A

LEGEND



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Property Management Branch

PROJECT

SMALL PUBLIC WATER SYSTEMS ASSESSMENT
WESTERN REGION

TITLE

SCHEMATIC SYSTEM
LEGEND

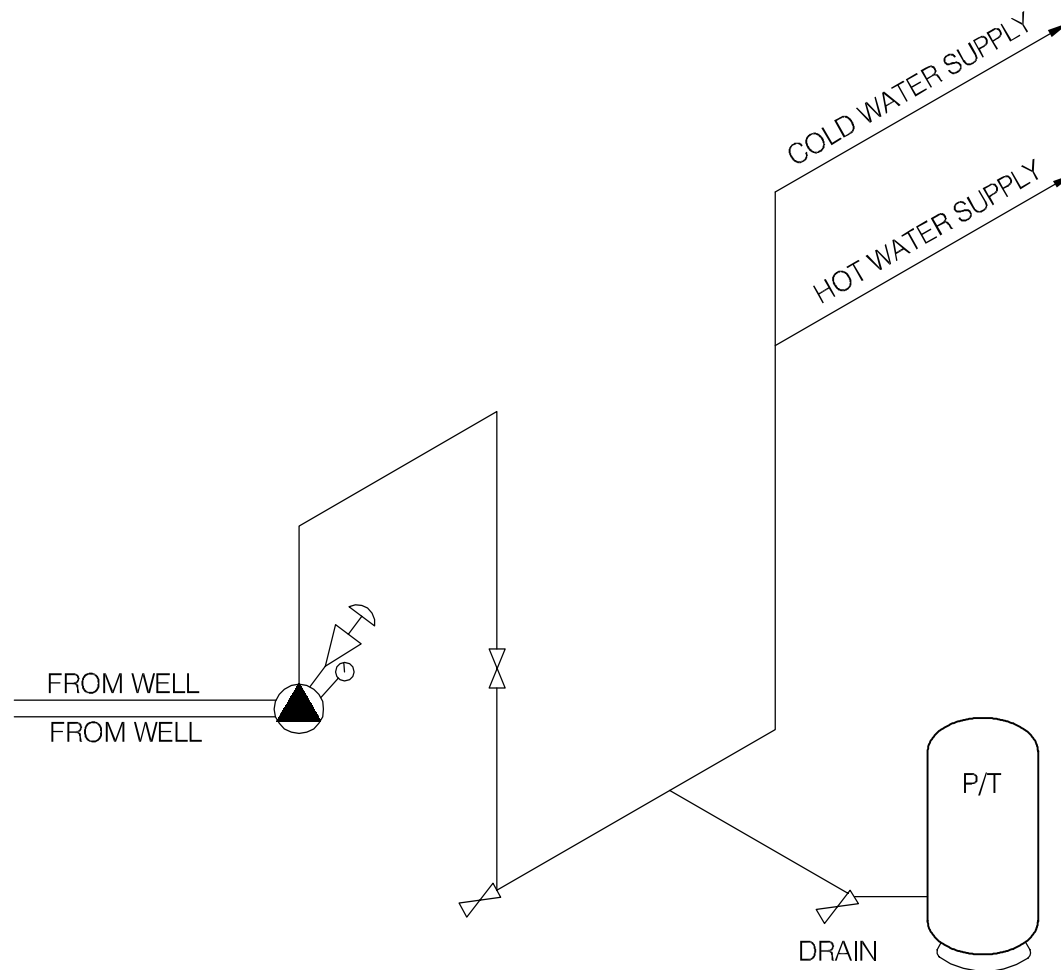
DATE APRIL 2006

DWN. JSB

CHKD. RMM

FILE NO. 1260002

DRWG. LEGEND



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



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Highways and Public Works
Property Management Branch

PROJECT

SMALL PUBLIC WATER SYSTEMS ASSESSMENT
NORTHERN REGION

TITLE

WATER SYSTEM DISTRIBUTION/TREATMENT
SCHEMATIC SYSTEM ID.: 5629
GRADER STATION - MAYO, YT.

DATE SEPT. 2005

DWN. JSB

CHKD. RMM

FILE NO. 1260002.004

DWG.: FIGURE 5629-B

Northern Region – Mayo Grader Station
Building # 5629

DISTRIBUTION & TREATMENT SYSTEM DATA

Item	Description	Manufacturer	Model	Part No.	Serial No.	Size
1	JET PUMP	MONARCH	JKC - 4			1 HP.
2	PRESSURE TANK	MONARCH	PC-122			122 L
3						
4						
5						
6						
7						
8						
9						
10						

TABLE 5629 - 1: SUMMARY OF BACTERIOLOGICAL RESULTS

		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?
Building #	Building Name							
5629	Mayo Grader Station	9	Oct-04 to Jun-05	yes	1/9	no	16-Jun-05	no



Table 5629 - 2: Water Quality Results

SOURCE:		Building 5629 - Mayo Grader Station			GCDWQ Criteria		
Location/ Resident		Mayo					
Address							
Treatment		None					
Disinfection		None					
Source of Water		On-site well					
Purpose of Sampling		Base Line	Base Line	Additional Sampling			
Sample Location				Kitchen faucet			
Date Sampled		29-Sep-04	8-Jun-05	17-Aug-05	Lower	Upper Limit	
Physical Tests (ALS)					AO	MAC	AO
Colour (CU)		<5	<5.0				15
Conductivity (uS/cm)			884				8.5
Total Dissolved Solids		422	483				500
Hardness CaCO3		362	369		AO >200 = poor, > 500 unacceptable ^A		
pH		7.92	8.1		6.5		8.5
Turbidity (NTU)		1.5	0.51			1	5
UV Absorbance				0.0100			
% UV Transmittance				97.7			
Dissolved Anions (ALS)							
Alkalinity-Total CaCO3		278	274				
Chloride Cl		79.8	100	112			250
Fluoride F		0.07	0.075			1.5	
Silicate SiO4							
Sulphate SO4		21.8	22.3				500
Nitrate Nitrogen N		0.2	0.22	0.261		10	
Nitrite Nitrogen N		<0.05	<0.10	<0.0010		1	
Ammonia Nitrogen N				0.023			
Total Phosphate PO4							
Total Metals (ALS)							
Aluminium T-Al		<0.005	<0.040			0.1	
Antimony T-Sb		<0.0002	<0.0010			0.006	
Arsenic T-As		0.0009	0.0007			0.025	
Barium T-Ba		0.254	0.224			1	
Boron T-B		0.008	<0.20			5	
Cadmium T-Cd		<0.00001	<0.00040			0.005	
Calcium T-Ca			109				
Chromium T-Cr		0.0022	<0.0040			0.05	
Copper T-Cu		0.016	0.0207			1	
Iron T-Fe		0.04	0.077				0.3
Lead T-Pb		0.0007	<0.0020			0.01	
Magnesium T-Mg			23.4				
Manganese T-Mn		<0.005	<0.0040				0.05
Mercury T-Hg			<0.00020			0.001	
Potassium T-K			1.78				
Selenium T-Se			<0.0020			0.01	
Sodium T-Na		22.1	21.8				200
Uranium T-U		0.0013	0.00119			0.02	
Vanadium T-V							
Zinc T-Zn		0.023	<0.10				5
Organic Parameters							
Tannin and Lignin				0.18			
Total Organic Carbon C				1.49			
Polycyclic Aromatic Hydrocarbons							
Acenaphthene				<0.000050			
Acenaphthylene				<0.000050			
Acridine				<0.000050			
Anthracene				<0.000050			
Benzo(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				7.76	6.5		8.5
TDS (ppm)				393			500
EC (uS/cm)				787			
Temperature (°C)				12.2			
Free Available Chlorine							

Notes:

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

/uS/cm, 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)



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SMALL PUBLIC WATER SYSTEM ASSESSMENT

PART A EBA Site Inspection

Inspector: Ryan Martin, Luke Lebel

Date August 17, 2005

WELL ID #	Owner	Location Description
5629	YTG	Mayo Grader Station

1. Well Location and Potential Contaminant Sources

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

Mayo

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

Mayo Grader Station compound

c. GPS location: N 7054099 E 456418 elev 508m $\pm 10m$

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 _____

Mayo Grader Station

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

g. Nearest building, specify In enclosure attached to maintenance garage

h. Distance from well to building _____

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

j. Distance from well to nearest point of known field: Tank at ~14m. Field < 26m as close as 15m possibly

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

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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
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 ~7 m

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: Waste Oil AST; Distance from well to Potential Source 1: ~22m

Potential Source 2: Soil; Distance from well to Potential Source 2: >80m

Potential Source 3: Tar tanks; Distance from well to Potential Source 3: >80m

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

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2. Well and Wellhead information:

- a. When was well installed? Year unknown 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 _____ ☒ No
- f. Well casing: Diameter 15 cm Material: ☒ steel ☐ plastic ☐ concrete
- g. Depth of well: 12.515 m bg ☒ measured (if possible) ☐ reported ☐ from log
- h. Static water level below ground: 7.39 m bg
☒ measured (if possible) ☐ reported ☐ from log ☐ flowing
- i. (If granular) Is the well completed: ☐ open end casing ☐ with a well screen
☐ with slotted pipe ☒ unknown other _____
- j. (If bedrock) Does the well have a liner? ☐ yes ☐ No ☐ steel ☐ plastic
- k. If there is a well screen: length _____ slot size(s) _____
Location of screen: from _____ to _____ from log reported
- l. Is there a sump below the screen? ☐ Yes ☒ No unlikely, unknown
- 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,

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- i. Is the well head below grade? describe in detail no, ~ 0.1 m 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 Access possible
- v. Does the well casing have a proper seal cap? ☐ Yes ☒ No

If no, describe condition None present

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...) _____

4. Aquifer Supplying This Well:

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

likely

- 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 _____

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d. Date installed: _____ By: _____

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

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

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

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

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

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

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

If yes, describe: Heat trace. Pump located inside

l. Comments on pump installation: _____

6. Conclusions

a. Comments on overall installation:

This well is not equipped with a cap

b. Recommendations: _____

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PART B: EBA Site Inspection

Inspector: BELT ALASSER

Date AUG 17/05

WELL ID #	Owner	Location Description
5629	YTG	MAYO GRADER STATION

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: PRESSURE TANK

Where is it located?

Comments: COMPRESSOR ROOM

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: _____

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Overall Tank

What are the tank size and dimensions?

What material is the tank constructed of? _____

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

Comments: _____

Tank Inlet, Outlet and Lid

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

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

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

Is the water tank drain accessible? YES NO

WATER TANK AND WATER QUALITY CONDITION

Are there signs of staining or biofouling? YES NO

Comments: _____

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

Comments: _____

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

Have there been any bacteriological analyses conducted previously? YES NO

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

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

8. Conclusions

a. Comments on overall installation:

THIS IS A OLD STYLE JET PUMP SYSTEM THAT HAS
A BAD PIPING CONFIGURATION THAT WILL DRIVE
YOU MAD SHOULD IT EVER LOOSE SUCTION

b. Recommendations:

WHEN WELL HEAD UPGRADES ARE DONE, CHANGE
THE PUMP TO A SUBMERSIBLE PUMP CONFIGURATION.
INSTALL 5 MICRON PREFILTER AND 8 GALLON
PER MINUTE UV SYSTEM (NSF55 CERTIFIED).



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

Spill Report Information

Spill #	7613
Jurisdiction	Yukon
Community	Mayo
Address	
Highway	
Milepost	
Feature	Mayo
Location and Cause	WPYR tank farm - failure of loading hose
Latitude	63.613333333333
Longitude	-135.87916666667
Incident Date	8/26/1976 10:00:00 PM
Lead Agency	Department of Indian Affairs and Northern Development
Other Agency	
Company(s)	White Pass & Yukon Route
Amount	1512
Units	Litres
Quantity	Actual
Release Description	Spilled
Additional Quantitit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Furnace Oil
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	spill dyked off immediately - contaminated area 15' x 150' - cleaned-up (contaminants removed to Mayo dump)



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Spill Report Information

Spill #	7718
Jurisdiction	Yukon
Community	Mayo
Address	
Highway	
Milepost	
Feature	Mayo
Location and Cause	tank farm - tank overfilled
Latitude	63.613333333333
Longitude	-135.87916666667
Incident Date	8/22/1977 9:00:00 AM
Lead Agency	Environment Canada - Environmental Protection Service
Other Agency	Department of Indian Affairs and Northern Development
Company(s)	White Pass & Yukon Route
Amount	3742
Units	Litres
Quantity	Actual
Release Description	Spilled
Additional Quantit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Fuel Oil
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	no fuel recovered - possible contamination of groundwaters but not known - suggests action be taken as too many spills with no recovery in area



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Spill Report Information

Spill #	9130
Jurisdiction	Yukon
Community	Mayo
Address	
Highway	
Milepost	
Feature	Mayo
Location and Cause	White Pass yard - garage caught on fire - explosion ensued
Latitude	63.616666666667
Longitude	-135.884444444444
Incident Date	11/26/1991
Lead Agency	Yukon Government - Fire Marshall
Other Agency	
Company(s)	White Pass
Amount	
Units	
Quantity	Unknown
Release Description	Burned
Additional Quantitit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Hydrocarbons
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	fuel or propane truck exploded inside building - building consumed - used 756,000L water - water runoff contained in ditch - oil and fuel in water



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Spill Report Information

Spill #	9703
Jurisdiction	Yukon
Community	Mayo
Address	
Highway	
Milepost	
Feature	Mayo
Location and Cause	North 60 Petroleum Bulk Plant - overfill of bulk storage tank - miscommunication between truck operator and plant operator
Latitude	63.6134
Longitude	-135.8793
Incident Date	1/15/1997 6:40:00 PM
Lead Agency	Yukon Government - Public Safety
Other Agency	Environment Canada - Environmental Protection Service
Company(s)	North 60 Petroleum
Amount	1000
Units	Litres
Quantity	Estimate
Release Description	Spilled
Additional Quantitit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Diesel
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	300 L recovered - EC recommended excavation of contaminated soil and installation of monitoring wells - fuel discrepancy of 22,000 L reported by Mayo plant - not verified



Environment
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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 #	9947
Jurisdiction	Yukon
Community	Mayo
Address	
Highway	
Milepost	
Feature	Mayo
Location and Cause	North 60 Petroleum Tank Farm - overfill of storage tank
Latitude	63.6134
Longitude	-135.8793
Incident Date	12/10/1999 5:10:00 PM
Lead Agency	Environment Canada - Environmental Protection Service
Other Agency	
Company(s)	North 60 Petroleum
Amount	
Units	
Quantity	Unknown
Release Description	Spilled
Additional Quantitit	negligible amount
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Diesel
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	overfill caused product to run down sides of tank and small amount to ground at base of tank within berm - no loss noted in records check - minimal amount spilled - no action



Photo 044: 5629 Wellhead enclosure.



Photo 033: 5629 Well enclosure and wellhead in pit.

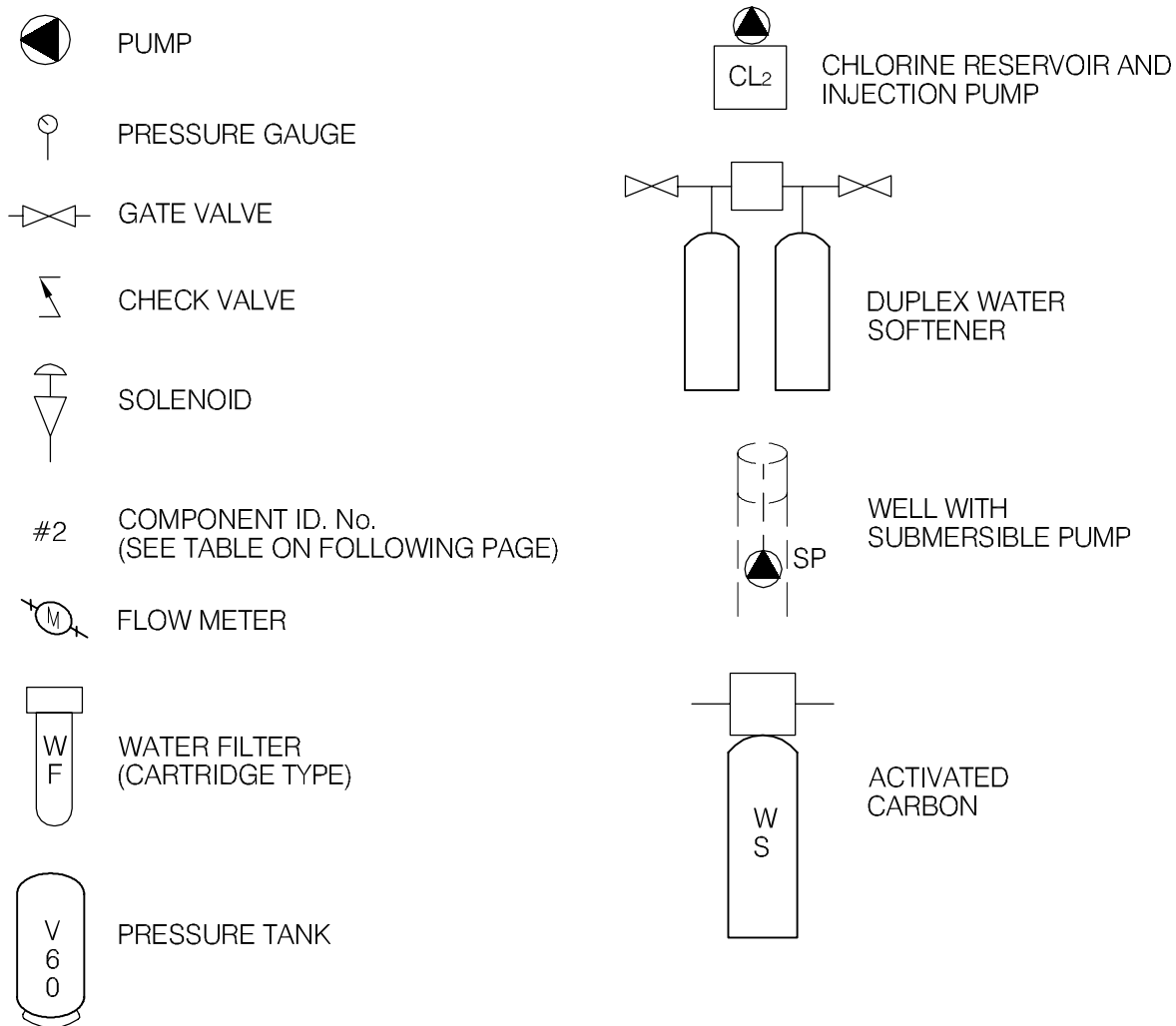


Photo 042: 5629 Wellhead – note that there was no well cap at the time of assessment.



Photo 192: 5629 Grader station pressure tank and jet pump.

LEGEND



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CLIENT

Yukon
Highways and Public Works
Property Management Branch

PROJECT

SMALL PUBLIC WATER SYSTEMS ASSESSMENT
WESTERN REGION

TITLE

SCHEMATIC SYSTEM
LEGEND

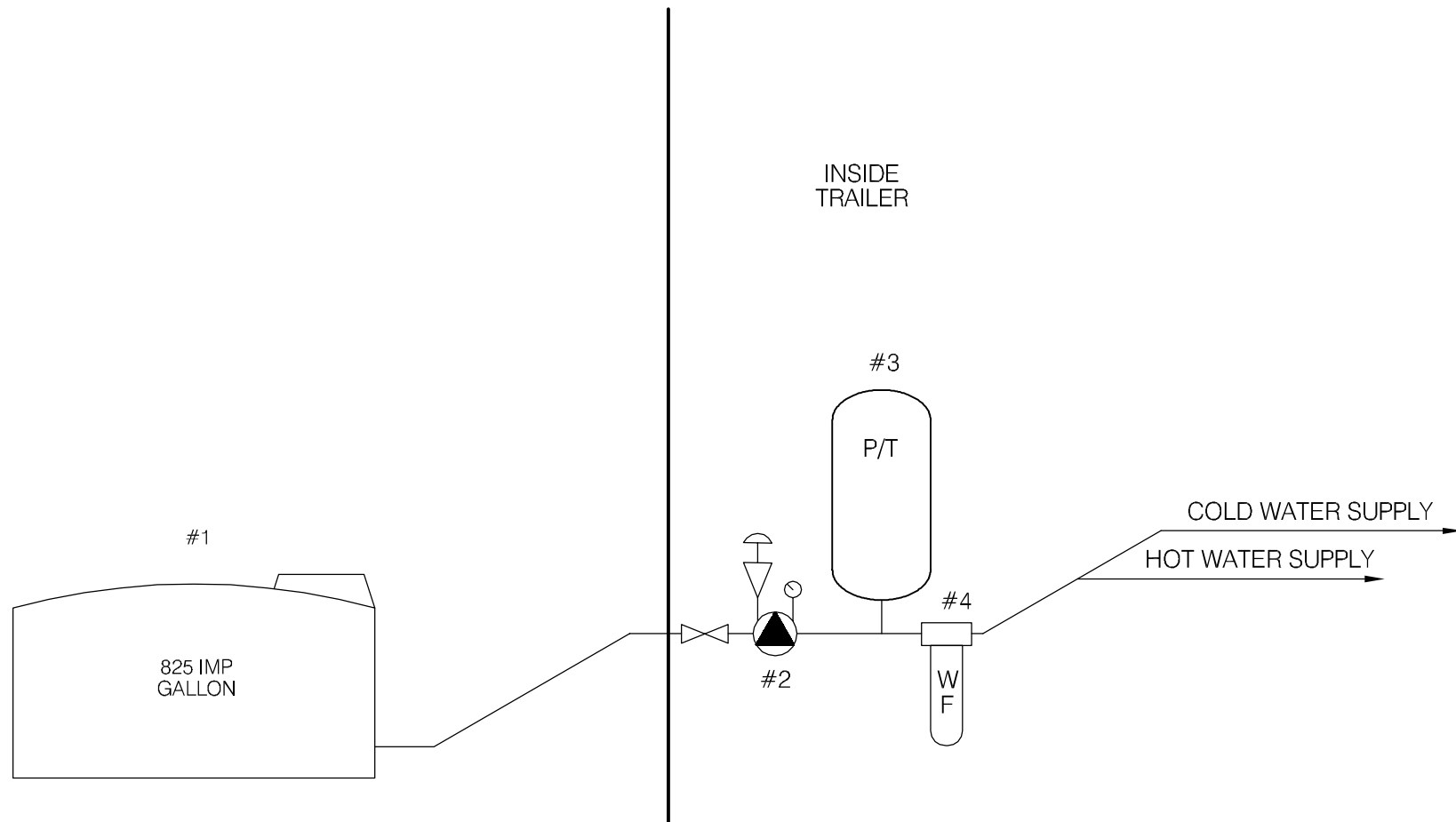
DATE APRIL 2006

DWN. JSB

CHKD. RMM

FILE NO. 1260002

DRWG. LEGEND



SCHEMATIC PRODUCED BY BERT ALBISSER OF AQUA TECH SUPPLIES 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.: 5636 DAY USE BUILDING - MAYO, YT.					
DATE	SEPT. 2005	DWN.	JSB	CHKD.	RMM	FILE NO.	1260002.004	DWG.:	FIGURE 5636-B

Northern Region – Mayo Day Use Building
Building # 5636

DISTRIBUTION & TREATMENT SYSTEM DATA

Item	Description	Manufacturer	Model	Part No.	Serial No.	Size
1	STORAGE TANK	PEMBINA PLASTICS	825 IMP.			825 I. GALLONS
2	JET PUMP.	MONKRECH	JKC-2			1/2 HP.
3	PRESSURE TANK	RED LION	JR-15			4.5 GALLON
4	INLINE FILTER	AMETER	10" / 3/4"			
5						
6						
7						
8						
9						
10						

Table 5636 - 2: Water Quality Results

SOURCE:	Building 5636 - Mayo ATB Day Use Building	GCDWQ Criteria		
Location/ Resident	Mayo			
Address				
Treatment	None			
Disinfection	None			
Source of Water	Water delivery			
Purpose of Sampling	Base Line			
Sample Location				
Date Sampled	N/A	Lower	Upper Limit	
Field Chemistry (EBA)		AO	MAC	AO
pH	8.31	6.5		8.5
TDS (ppm)	94			500
EC (uS/cm)	190			500
Temperature (°C)	15.1			
Free Available Chlorine	0.02			

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)



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SMALL PUBLIC WATER SYSTEM ASSESSMENT

PART A: EBA Site Inspection

Inspector: Ryan Martin, Luke Lebel

Date August 17, 2005

WELL ID #	Owner	Location Description
5636	YTG	Mayo ATB Day Use Building

1. Well Location and Potential Contaminant Sources

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

Mayo

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

Mayo Airport

c. GPS location: N 7054867 E 456503 elv 509m ± 8m
of water storage tank

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 _____

Day Use Building → on water delivery

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

g. Nearest building, specify Water Storage Tank Located Outside Building

h. Distance from well to building _____

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

j. Distance from well to nearest point of known field: _____

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

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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/a*

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

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

Tank is unlocked, located outside

Entrance by animals? ☒ Yes ☐ No

vermin proof fill. No vent

p. Is well site subject to flooding? ☐ Yes ☐ No *n/a*

q. Is the well site well drained? ☐ Yes ☐ No *n/a*

r. Is there a buried fuel tank on the property? ☐ Yes ☒ No *unlikely*

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: Fire Retard Tanks; Distance from well to Potential Source 1: _____

Potential Source 2: AST; Distance from well to Potential Source 2: _____

Potential Source 3: chemical storage; 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

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2. Well and Wellhead information:

a. When was well installed? Year n/a - water delivery Month _____

b. Type: ☐ drilled ☐ dug ☐ sand point ☐ other n/a

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

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

e. Surface casing: ☐ Yes Diameter n/a ☐ No

f. Well casing: Diameter n/a Material: ☐ steel ☐ plastic ☐ concrete

g. Depth of well: n/a ☐ measured (if possible) ☐ reported ☐ from log

h. Static water level below ground: n/a

☐ 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 n/a

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

k. If there is a well screen: length n/a slot size(s) _____

Location of screen: from _____ to _____ from log reported

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

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

☐ in a wooden enclosure other, describe Tank is located outside building

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

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. n/a

If yes is there treatment or disinfection ☐ Yes ☒ No

Explain (filtration, disinfection etc...) _____

4. Aquifer Supplying This Well:

- a. The aquifer is: ☐ bedrock ☐ granular sediment ☐ unknown n/a
- b. Does water level and/or well capacity show seasonal fluctuation? ☐ Yes ☐ No n/a

5. Pump Installation:

- a. Is the ^{System} 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 _____
- f. Drop pipe for submersible pump: ☐ steel ☐ plastic
- g. Pump delivers water to: ☒ pressure tank ☐ elevated tank ☐ other
- h. Are there automatic pump controls: ☒ Yes ☐ No
- i. Is there provision for taking water samples before water reaches storage? ☐ Yes ☐ No $\frac{1}{4}$
- 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: Seasonal facility
- l. Comments on pump installation: _____

6. Conclusions

- a. Comments on overall installation:

System is on water delivery

TDS 94 ppm

EC 190 μS

pH 8.31

Temp 15.1°C

FAC 0.02 mg/L

- b. Recommendations:

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PART B: EBA Site Inspection

Inspector: _____

Date _____

WELL ID #	Owner	Location Description
5636	YTG	HAIR DAY USE BUILDING

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
MAYO TOWN WATER
- 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: OUTDOORS.

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: Poly TANK OUTDOOR

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?

825 HORIZONTAL CYLINDRICAL 84" x 40" HIGH

What material is the tank constructed of? POLY ETHYLENE

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: EXPOSED TO DIRECT SUNLIGHT

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 TYPICAL OUTDOOR TEMPORARY
CAMP SET UP.

b. Recommendations:

INSTALL DUPLEX INLINE FILTER 10 AND 1 MICRON
± 5 GPM NSF55 CERTIFIED UV SYSTEM.



Photo 033: 5636 Day use area and garage.



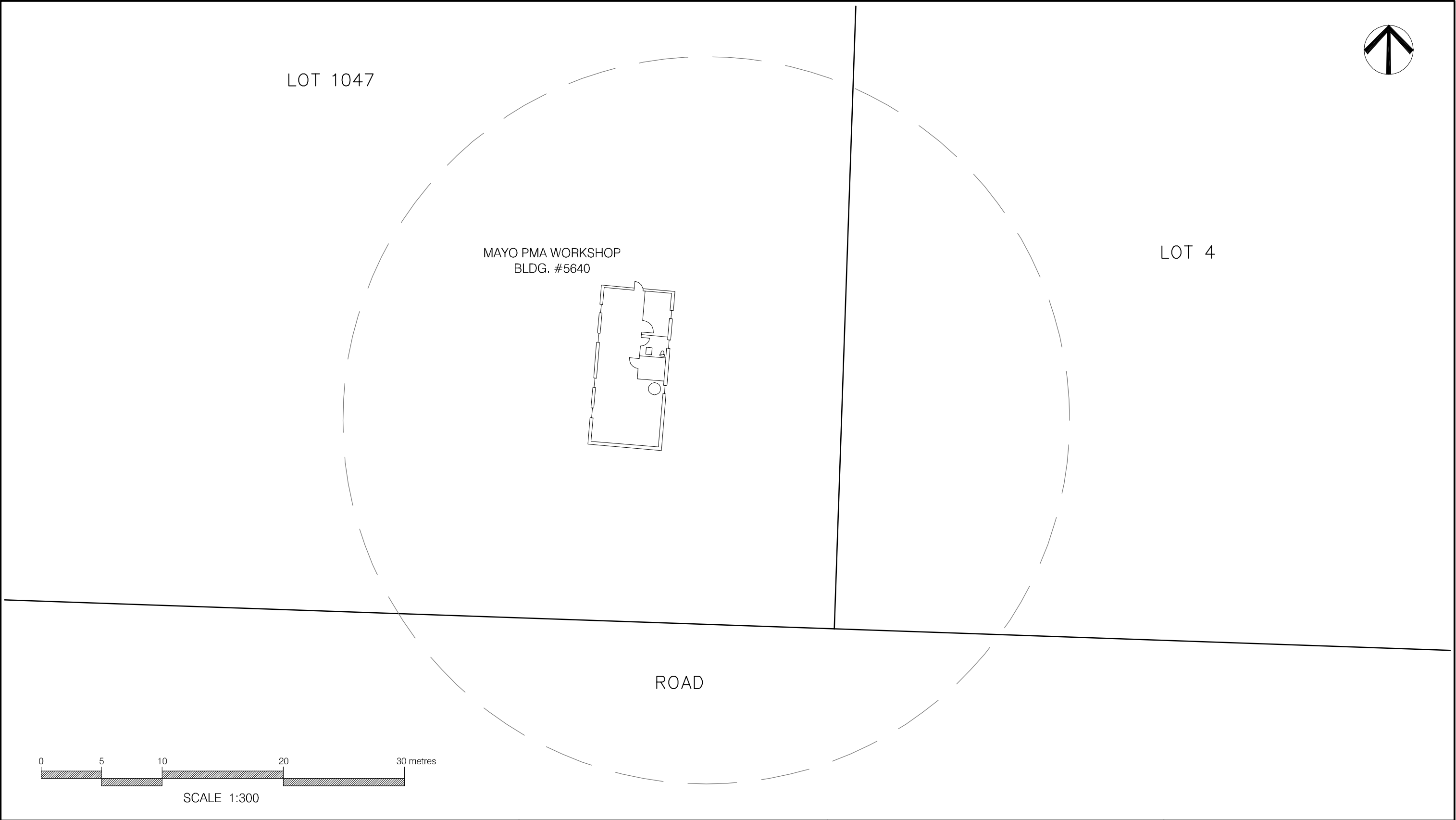
Photo 029: 5636 Seasonal water holding tank.



Photo 190: 5636 Jet pump and pressure tank.



Photo 036: 5636 Potential well location to service day use area and crew quarters.



NOTES:

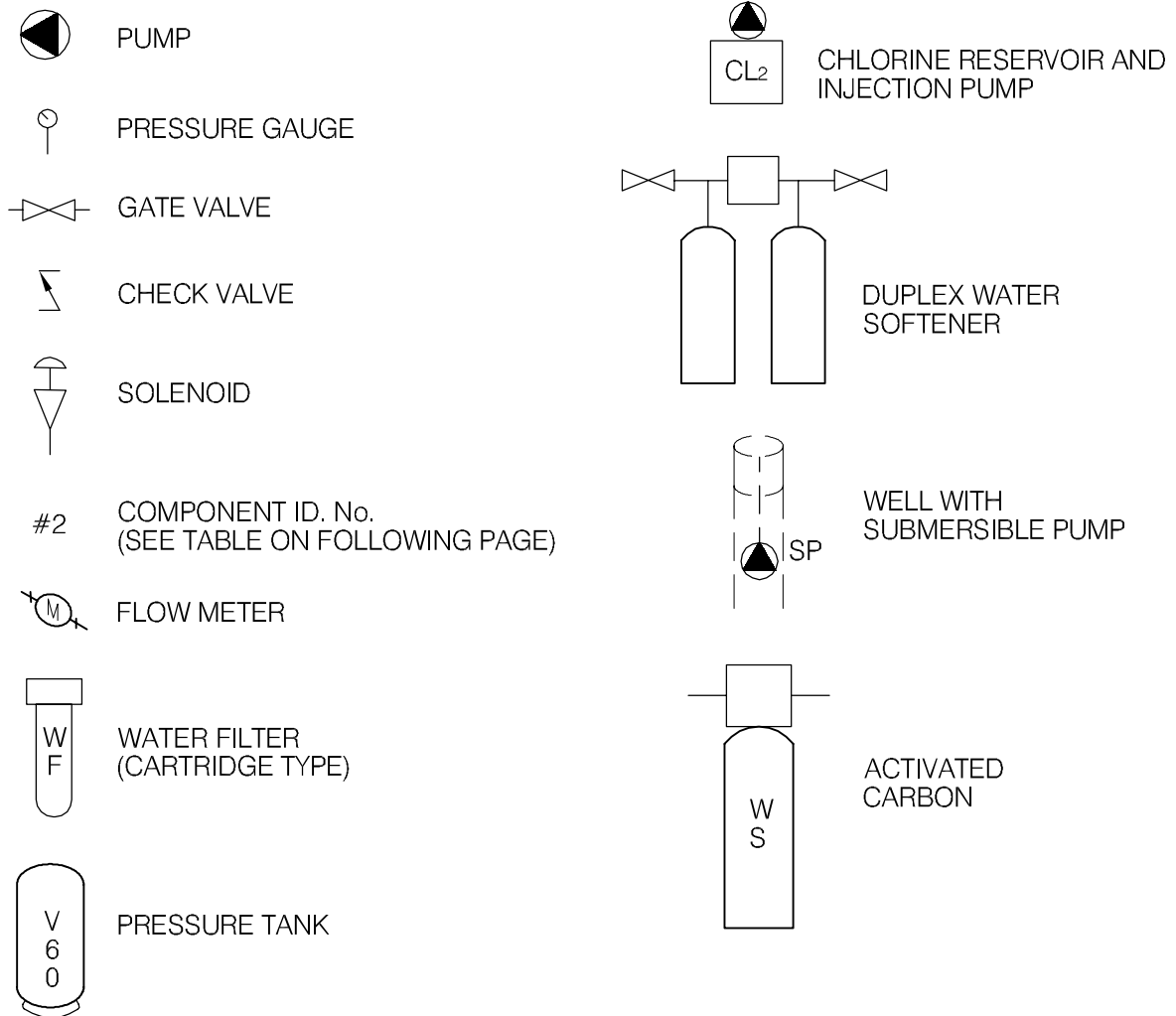
1. UTM COORDINATES OBTAINED WITH A HAND HELD GPS USING NAD83 SYSTEM AND ARE CONSIDERED TO BE ACCURATE TO 10.0 m, APPROXIMATELY.



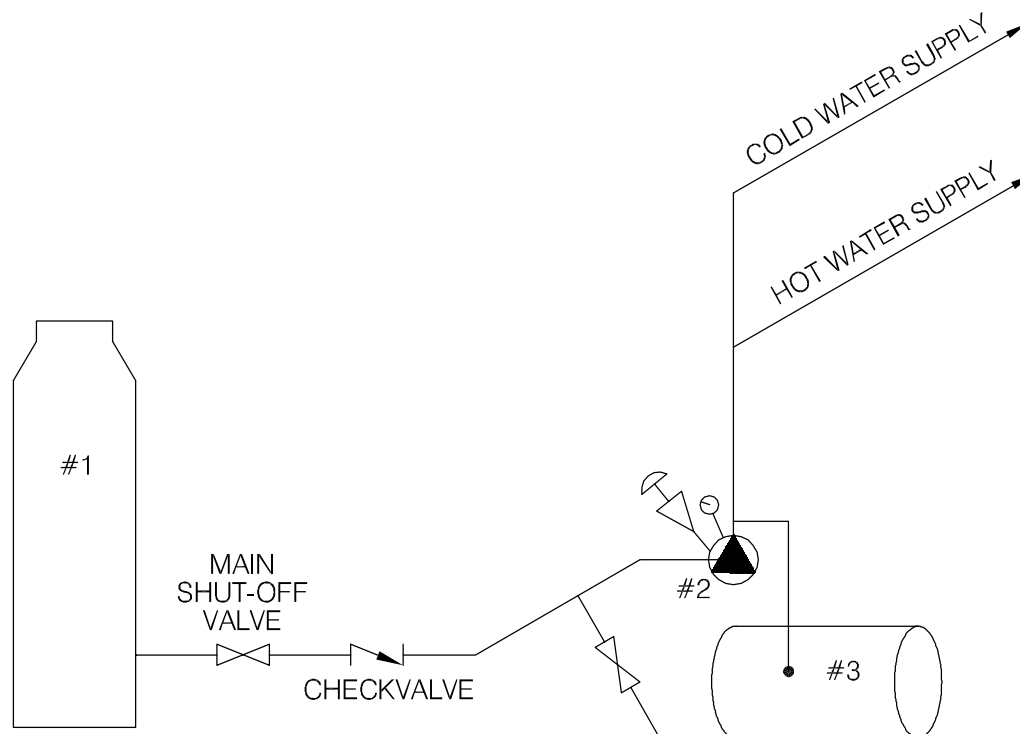
30 m RADIUS FROM WATER WELL FOR CONSIDERATION OF PROXIMITY TO POTENTIAL CONTAMINANT SOURCES.

							SMALL PUBLIC WATER SYSTEMS ASSESSMENT NORTHERN REGION	
						DESIGNED BY: R. MARTIN	 Highways and Public Works Property Management Branch	
						DRAWN BY: J. BUYCK		
						DATE: SEPT. 2005		
						SCALE: AS SHOWN		
						PROJECT No.: 1260002.004	GOVERNMENT OF YUKON HIGHWAYS & PUBLIC WORKS	
						ACAD FILENAME: 004-NORTHERN REGION	MAYO PMA WORKSHOP BUILDING # 5640 SITE LOCATION DIAGRAM WELL ID: 5640	
							REVISION ISSUE	0
							FIGURE No.	FIGURE 5640-A

LEGEND



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



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

 EBA Engineering Consultants Ltd.			PROJECT SMALL PUBLIC WATER SYSTEMS ASSESSMENT NORTHERN REGION	
CLIENT 			TITLE WATER SYSTEM DISTRIBUTION/TREATMENT SCHEMATIC SYSTEM ID.: 5640 PMA WORKSHOP - MAYO, YT.	
DATE SEPT. 2005	DWN. JSB	CHKD. RMM	FILE NO. 1260002.004	DWG.: FIGURE 5640-B

Northern Region – PMA Shop
Building # 5640

DISTRIBUTION & TREATMENT SYSTEM DATA

Item	Description	Manufacturer	Model	Part No.	Serial No.	Size
1	STORAGE TANK.	N/A	270 Gallon	CYLINDRICAL		
2	JET Pump	MONARCH	MJS-33			1/3HP
3	PRESSURE TANK	N/A	GALVANIZED	(OLD STYLE)		
4						
5						
6						
7						
8						
9						
10						

Table 5640 - 2: Water Quality Results

SOURCE:	Building 5640 - Mayo PMA Shop	GCDWQ Criteria		
Location/ Resident	Mayo			
Address				
Treatment	None			
Disinfection	None			
Source of Water	Water delivery			
Purpose of Sampling	Base Line			
Sample Location				
Date Sampled	N/A	Lower	Upper Limit	
Field Chemistry (EBA)		AO	MAC	AO
pH	8.21	6.5		8.5
TDS (ppm)	102			500
EC (uS/cm)	207			500
Temperature (°C)	20.3			
Free Available Chlorine	0.01			

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)



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SMALL PUBLIC WATER SYSTEM ASSESSMENT

PART A: EBA Site Inspection

Inspector: Ryan Martin, Luke Lebel

Date August 17, 2005

WELL ID #	Owner	Location Description
5640	YTG	Mayo PMA workshop

1. Well Location and Potential Contaminant Sources

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

Mayo

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

Mayo Grader Station Compound

c. GPS location:

7054007

456481

elev. 507

(Rill pipe)

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 _____

PMA workshop

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

g. Nearest building, specify n/a

h. Distance from well to building _____

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

j. Distance from well to nearest point of known field: _____

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

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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/a*

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

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
Inside building

Entrance by animals? ☐ Yes ☒ No
There is no vermin screen on overflow

p. Is well site subject to flooding? ☐ Yes ☐ No *n/a*

q. Is the well site well drained? ☐ Yes ☐ No *n/a*

r. Is there a buried fuel tank on the property? ☐ Yes ☒ No *unlikely*

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: _____; Distance from well to Potential Source 1: _____

Potential Source 2: _____; Distance from well to Potential Source 2: _____

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

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2. Well and Wellhead information:

- a. When was well installed? Year water delivery Month _____
- b. Type: ☐ drilled ☐ dug ☐ sand point ☐ other n/a
- c. Is there a drillers log for the well: ☐ Yes ☐ No n/a
- d. Is there a surface seal to 6 m ☐ Yes ☐ No ☐ unknown ☐ unlikely n/a
- e. Surface casing: ☐ Yes Diameter n/a ☐ No
- f. Well casing: Diameter n/a Material: ☐ steel ☐ plastic ☐ concrete
- g. Depth of well: n/a ☐ measured (if possible) ☐ reported ☐ from log
- h. Static water level below ground: n/a
☐ 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 n/a
- j. (If bedrock) Does the well have a liner? ☐ yes ☐ No ☐ steel ☐ plastic
- k. If there is a well screen: length _____ slot size(s) _____
Location of screen: from _____ to _____ from log reported
- l. Is there a sump below the screen? ☐ Yes ☐ No n/a
- m. Is the ~~well head~~ ^{water storage tank}: ☐ 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,

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- i. Is the well head below grade? describe in detail n/a
- ii. Are there signs of ponding on the enclosure(e.g. water stains, etc.)? ☐ Yes ☐ No n/a
- iii. Is the wellhead enclosed by fiberglass insulations? ☐ Yes ☐ No n/a
- iv. Any evidence of rodents? Specify n/a
- v. Does the well casing have a proper seal cap? ☐ Yes ☐ No n/a

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. n/a

If yes is there treatment or disinfection ☐ Yes ☒ No

Explain (filtration, disinfection etc...) _____

4. Aquifer Supplying This Well:

- a. The aquifer is: ☐ bedrock ☐ granular sediment ☐ unknown n/a
- b. Does water level and/or well capacity show seasonal fluctuation? ☐ Yes ☐ No n/a

5. Pump Installation:

- a. Is the ^{system} 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 _____

f. Drop pipe for submersible pump: ☐ steel ☐ plastic *n/a*

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: Inside heated building

l. Comments on pump installation: _____

6. Conclusions

a. Comments on overall installation:

There is no vermin screen on the overflow pipe. This system
is on water delivery.

TDS 102 ppm

EC 207 μ S

pH 8.21

Temp 20.3°C

FAC 0.01 mg/L

b. Recommendations: _____

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PART B: EBA Site Inspection

Inspector: BERT ALBISSER

Date AUG 17/05

WELL ID #	Owner	Location Description
5640	YTG	MAYO PMA SHOP

6. Water Treatment

- a. Is well water treated? ☒ Yes ☐ No; Type of treatment:
TOWN WATER
- ☒ 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: 270 GALLON CYLINDRICAL

Where is it located?

Comments: SHOP AREA

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: _____

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Overall Tank

What are the tank size and dimensions?

270 Gallons - 36" x 84"

What material is the tank constructed of? POLYETHYLENE

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:

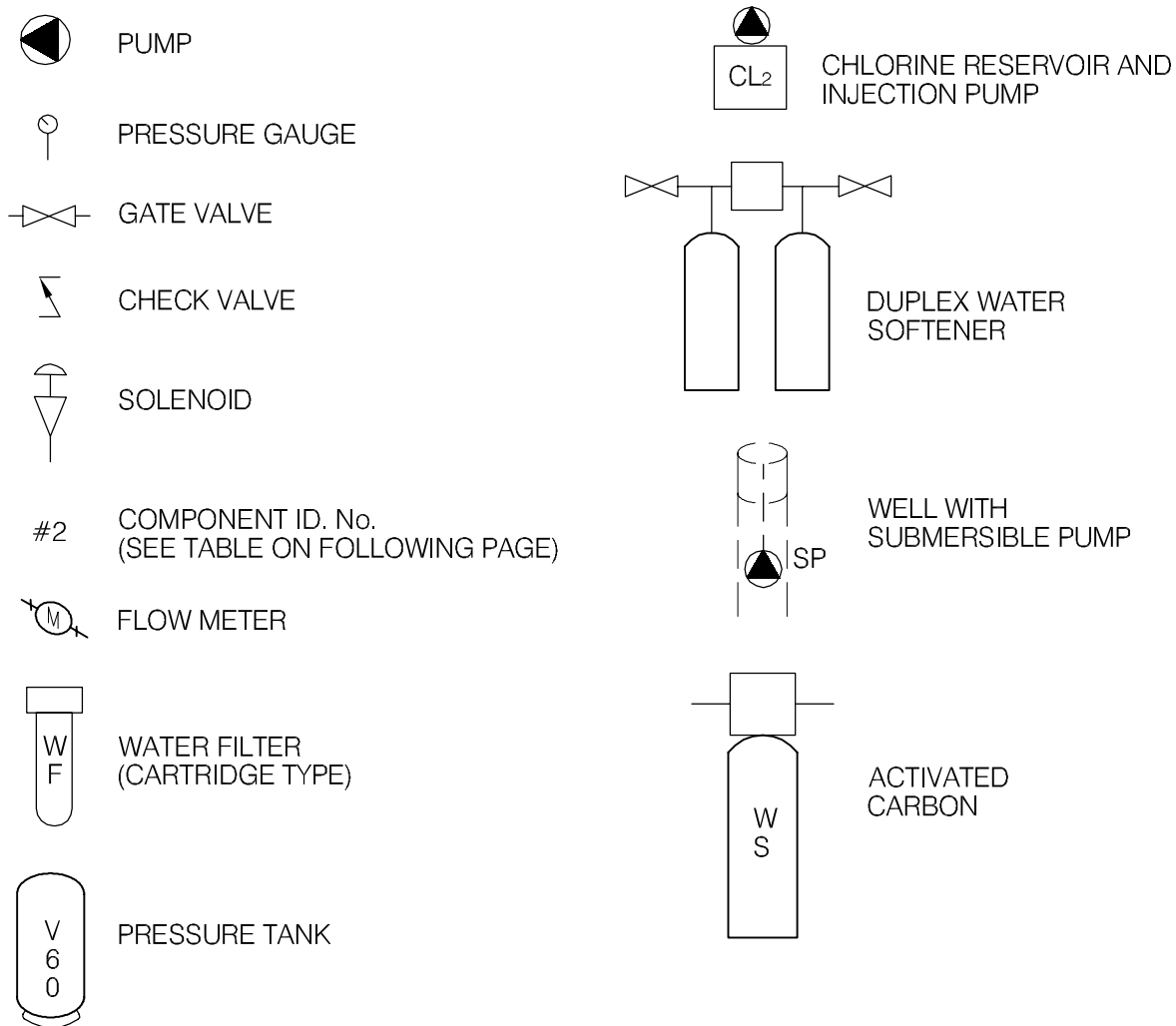
THIS IS A TYPICAL TEMPORARY WATER SYSTEM

b. Recommendations:

INSTALL DUPLEX INLINE FILTRATION - 30 & 5 MICRON
FOLLOWED BY 5 GPM NSF60 CERTIFIED UV
STERILIZER ON DISCHARGE OF PUMP.

**Photo 037:** 5640 Water fill and AST.**Photo 038:** 5640 PMA building.**Photo 191:** 5640 Water tank and jet pump.

LEGEND



EBA Engineering Consultants Ltd.

CLIENT

Yukon
Highways and Public Works
Property Management Branch

PROJECT

SMALL PUBLIC WATER SYSTEMS ASSESSMENT
WESTERN REGION

TITLE

SCHEMATIC SYSTEM
LEGEND

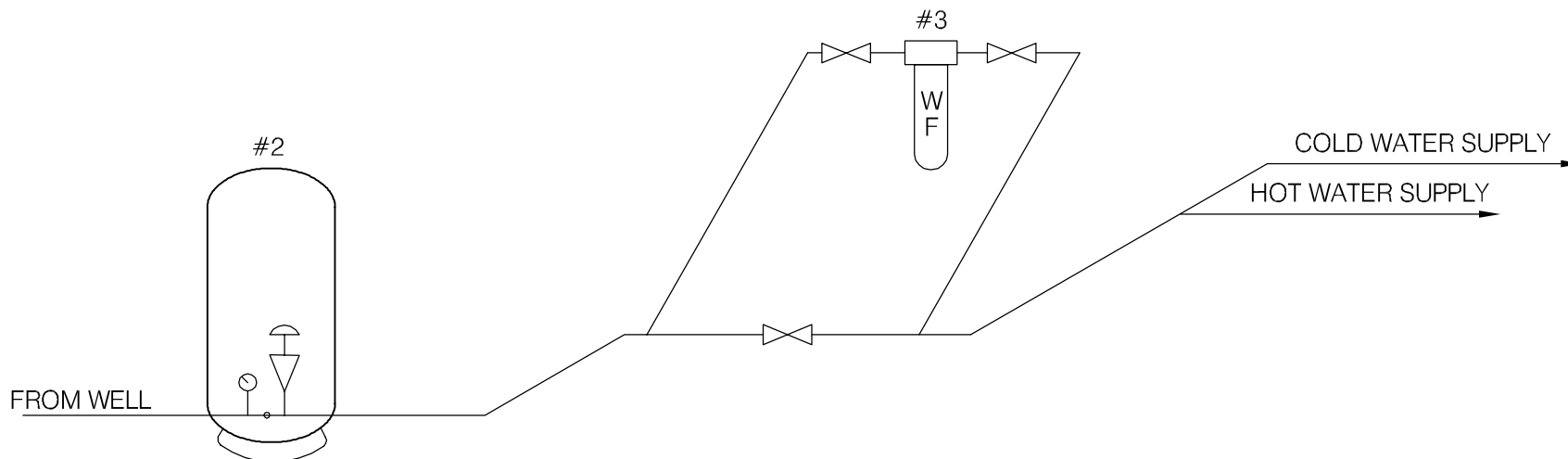
DATE APRIL 2006

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.: 5650 WILDLIFE WORKSHOP - MAYO, YT.						
DATE	SEPT. 2005	DWN.	JSB	CHKD.	RMM	FILE NO.	1260002.004	DWG.:	FIGURE 5650-B

Northern Region – Mayo Wildlife Workshop
Building # 5650

DISTRIBUTION & TREATMENT SYSTEM DATA

Item	Description	Manufacturer	Model	Part No.	Serial No.	Size
1	SUB Pump	?				?
2	PRESSURE TANK	Wen x Trol	WX-201			
3	INLINE FILTER	AMETEK	10" BB			10" x 1"
4						
5						
6						
7						
8						
9						
10						

TABLE 5650 - 1: SUMMARY OF BACTERIOLOGICAL RESULTS

		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?
Building #	Building Name							
5650	Mayo Wildlife Workshop	8	Oct-04 to Jun-05	no	0/8**	no	9-Jun-05	no

* Two out of eight samples were rejected due to high turbidity



Table 5650 - 2: Water Quality Results

SOURCE:		Building 5650 - Mayo Wildlife Workshop			GCDWQ Criteria		
Location/ Resident Address		Mayo					
Treatment		Filtration					
Disinfection		None					
Source of Water		On-site well					
Purpose of Sampling		Base Line	Base Line	Additional Sampling Kitchen faucet			
Sample Location							
Date Sampled		27-Sep-04	8-Jun-05	17-Aug-05	Lower	Upper Limit	
Physical Tests (ALS)					AO	MAC	AO
Colour (CU)		>60	<5.0				15
Conductivity (uS/cm)			638				
Total Dissolved Solids		338	354				500
Hardness CaCO3		273	280	282	AO >200 = poor, > 500 unacceptable ^A		
pH		8.01	8.14		6.5		8.5
Turbidity (NTU)		96.1	22.7			1	5
UV Absorbance				0.046			
% UV Transmittance				90			
Dissolved Anions (ALS)							
Alkalinity-Total CaCO3		268	269				
Chloride Cl		12	13.9				250
Fluoride F		0.09	0.1			1.5	
Silicate SiO4				8.4			
Sulphate SO4		41.8	44.9				500
Nitrate Nitrogen N		0.01	<0.10			10	
Nitrite Nitrogen N		<0.005	<0.10			1	
Ammonia Nitrogen N							
Total Phosphate PO4				0.0072			
Total Metals (ALS)							
Aluminum T-Al		<0.005	<0.010	<0.010		0.1	
Antimony T-Sb		<0.0002	<0.00050	<0.00050		0.006	
Arsenic T-As		0.0087	0.0142	0.00828		0.025	
Barium T-Ba		1.53	1.38	1.44		1	
Boron T-B		0.011	<0.10	<0.10		5	
Cadmium T-Cd		<0.00001	<0.00020	<0.00020		0.005	
Calcium T-Ca			87.9	90			
Chromium T-Cr		0.0018	<0.0020	<0.0020		0.05	
Copper T-Cu		0.002	<0.0010	<0.0010		1	
Iron T-Fe		6.53	4.3	5.5			0.3
Lead T-Pb		0.0003	<0.0010	<0.0010		0.01	
Magnesium T-Mg			14.6	14.3			
Manganese T-Mn		0.683	0.626	0.677			0.05
Mercury T-Hg			<0.00020	<0.00020		0.001	
Potassium T-K			12.6	16.8			
Selenium T-Se			<0.0010	<0.0010		0.01	
Sodium T-Na			9.3	9.5			200
Uranium T-U		0.0006	0.00081	0.00051		0.02	
Vanadium T-V				<0.030			
Zinc T-Zn		0.004	<0.050	<0.050			5
Dissolved Metals							
Aluminum D-Al				<0.010		0.1	
Antimony D-Sb				<0.00050		0.006	
Arsenic D-As				0.00177		0.025	
Barium D-Ba				1.31		1.0	
Boron D-B				<0.10		5	
Cadmium D-Cd				<0.00020		0.005	
Calcium D-Ca				89.7			
Chromium D-Cr				<0.0020		0.05	
Copper D-Cu				<0.0010			1.0
Iron D-Fe				<0.030			0.3
Lead D-Pb				<0.0010		0.01	
Magnesium D-Mg				14.2			
Manganese D-Mn				0.657			0.05
Mercury D-Hg				<0.00020		0.001	
Potassium D-K				16.8			
Selenium D-Se				<0.0010		0.01	
Sodium D-Na				9.5			200
Uranium D-U				0.00051		0.02	
Vanadium D-V				-			
Zinc D-Zn				<0.050			5.0
Organic Parameters							
Tannin and Lignin				0.38			
Total Organic Carbon C				4.04			
Field Chemistry (EBA)							
pH				7.88	6.5		8.5
TDS (ppm)				291			500
EC (uS/cm)				580			
Temperature (°C)				7.88			
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)



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SMALL PUBLIC WATER SYSTEM ASSESSMENT

PART A: EBA Site Inspection

Inspector: Ryan Martin, Luke Lebel

Date August 17, 2005

WELL ID #	Owner	Location Description
5650	YTG	Mayo wildlife workshop

1. Well Location and Potential Contaminant Sources

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

Mayo

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

c. GPS location: N 7053891 E 456556 elev 511m $\pm$ 8m

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 _____

Mayo wildlife workshop

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

g. Nearest building, specify wildlife workshop

h. Distance from well to building ~4m

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

j. Distance from well to nearest point of known field: ~16m to tank, field between 6m and 28m

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

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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 enclosure damp

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

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

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: 3e+ fuel Drums; Distance from well to Potential Source 1: ~34m

Potential Source 2: AST; Distance from well to Potential Source 2: ~7m

Potential Source 3: Vehicle Parking (Boats); Distance from well to Potential Source 3: ~2m

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

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2. Well and Wellhead information:

- a. When was well installed? Year unknown 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 _____ ☒ No
- f. Well casing: Diameter 15cm Material: ☒ steel ☐ plastic ☐ concrete
- g. Depth of well: unknown ☐ measured (if possible) ☐ reported ☐ from log
- h. Static water level below ground: 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 unknown slot size(s) _____
Location of screen: from _____ to _____ from log reported
- l. Is there a sump below the screen? ☐ Yes ☐ No unknown
- 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,

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- i. Is the well head below grade? describe in detail ~1.0m bg
- 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
- 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...) filtration

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 _____

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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

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: _____

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PART B: EBA Site Inspection

Inspector: BERT ALBISSER

Date AUG 17/05

WELL ID #	Owner	Location Description
5650	YTG	MAYO WILDLIFE SHOR

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: PRESSURE TANK

Where is it located?

Comments: SHOP AREA

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: _____

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Overall Tank

What are the tank size and dimensions?

What material is the tank constructed of? _____

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

Comments: _____

Tank Inlet, Outlet and Lid

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

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

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

Is the water tank drain accessible? YES NO

WATER TANK AND WATER QUALITY CONDITION

Are there signs of staining or biofouling? YES NO

Comments: _____

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

Comments: _____

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

Have there been any bacteriological analyses conducted previously? YES NO

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

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

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8. Conclusions :

a. Comments on overall installation:

THE INSTALLATION IS SATISFACTORY
THE PRESSURE TANK IS WATER LOGGED - IT NEEDS TO
BE REPLACED.

b. Recommendations:



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

Spill Report Information

Spill #	7613
Jurisdiction	Yukon
Community	Mayo
Address	
Highway	
Milepost	
Feature	Mayo
Location and Cause	WPYR tank farm - failure of loading hose
Latitude	63.613333333333
Longitude	-135.87916666667
Incident Date	8/26/1976 10:00:00 PM
Lead Agency	Department of Indian Affairs and Northern Development
Other Agency	
Company(s)	White Pass & Yukon Route
Amount	1512
Units	Litres
Quantity	Actual
Release Description	Spilled
Additional Quantit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Furnace Oil
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	spill dyked off immediately - contaminated area 15' x 150' - cleaned-up (contaminants removed to Mayo dump)



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Spill Report Information

Spill #	7718
Jurisdiction	Yukon
Community	Mayo
Address	
Highway	
Milepost	
Feature	Mayo
Location and Cause	tank farm - tank overfilled
Latitude	63.613333333333
Longitude	-135.87916666667
Incident Date	8/22/1977 9:00:00 AM
Lead Agency	Environment Canada - Environmental Protection Service
Other Agency	Department of Indian Affairs and Northern Development
Company(s)	White Pass & Yukon Route
Amount	3742
Units	Litres
Quantity	Actual
Release Description	Spilled
Additional Quantitit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Fuel Oil
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	no fuel recovered - possible contamination of groundwaters but not known - suggests action be taken as too many spills with no recovery in area



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Spill Report Information

Spill #	7727
Jurisdiction	Yukon
Community	Mayo
Address	
Highway	
Milepost	
Feature	Mayo
Location and Cause	tank farm - tank overfilled
Latitude	63.613333333333
Longitude	-135.87916666667
Incident Date	3/28/1977 9:00:00 AM
Lead Agency	Environment Canada - Environmental Protection Service
Other Agency	
Company(s)	White Pass & Yukon Route
Amount	1512
Units	Litres
Quantity	Actual
Release Description	Spilled
Additional Quantit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Gasoline
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	spill within dyke - none reported outside dyke - cleaned-up



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Spill Report Information

Spill #	9130
Jurisdiction	Yukon
Community	Mayo
Address	
Highway	
Milepost	
Feature	Mayo
Location and Cause	White Pass yard - garage caught on fire - explosion ensued
Latitude	63.616666666667
Longitude	-135.884444444444
Incident Date	11/26/1991
Lead Agency	Yukon Government - Fire Marshall
Other Agency	
Company(s)	White Pass
Amount	
Units	
Quantity	Unknown
Release Description	Burned
Additional Quantitit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Hydrocarbons
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	fuel or propane truck exploded inside building - building consumed - used 756,000L water - water runoff contained in ditch - oil and fuel in water



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91782 Alaska Highway, Whitehorse, YT Y1A 5B7

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Spill Report Information

Spill #	9703
Jurisdiction	Yukon
Community	Mayo
Address	
Highway	
Milepost	
Feature	Mayo
Location and Cause	North 60 Petroleum Bulk Plant - overfill of bulk storage tank - miscommunication between truck operator and plant operator
Latitude	63.6134
Longitude	-135.8793
Incident Date	1/15/1997 6:40:00 PM
Lead Agency	Yukon Government - Public Safety
Other Agency	Environment Canada - Environmental Protection Service
Company(s)	North 60 Petroleum
Amount	1000
Units	Litres
Quantity	Estimate
Release Description	Spilled
Additional Quantitit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Diesel
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	300 L recovered - EC recommended excavation of contaminated soil and installation of monitoring wells - fuel discrepancy of 22,000 L reported by Mayo plant - not verified



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Spill Report Information

Spill #	9947
Jurisdiction	Yukon
Community	Mayo
Address	
Highway	
Milepost	
Feature	Mayo
Location and Cause	North 60 Petroleum Tank Farm - overfill of storage tank
Latitude	63.6134
Longitude	-135.8793
Incident Date	12/10/1999 5:10:00 PM
Lead Agency	Environment Canada - Environmental Protection Service
Other Agency	
Company(s)	North 60 Petroleum
Amount	
Units	
Quantity	Unknown
Release Description	Spilled
Additional Quantitit	negligible amount
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Diesel
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	overfill caused product to run down sides of tank and small amount to ground at base of tank within berm - no loss noted in records check - minimal amount spilled - no action

**Photo 033:** 5650 Wildlife Workshop (northeast side of building).**Photo 057:** 5650 On site AST.**Photo 056:** 5650 Wellhead enclosure.**Photo 194:** 5650 Water system. (pressure tank and filter)



WELL 5653
N 7 054 513
E 456 406
DRILLERS REPORT
NO.: n/a

Grassy Field

Fence

MAYO AIRPORT
TERMINAL
BUILDING
BLDG. #5653

Airport Apron

Gravel Parking

UST Heating Oil
Fill & Vent

Standby Diesel
Generator

Septic Tank

Electrial Supplies

Likely Location
of Septic Field

NOT EXACTLY
AS SHOWN



SCALE 1:300

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.

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

MAYO TERMINAL BUILDING
BUILDING # 5653
SITE LOCATION DIAGRAM
WELL ID: 5653

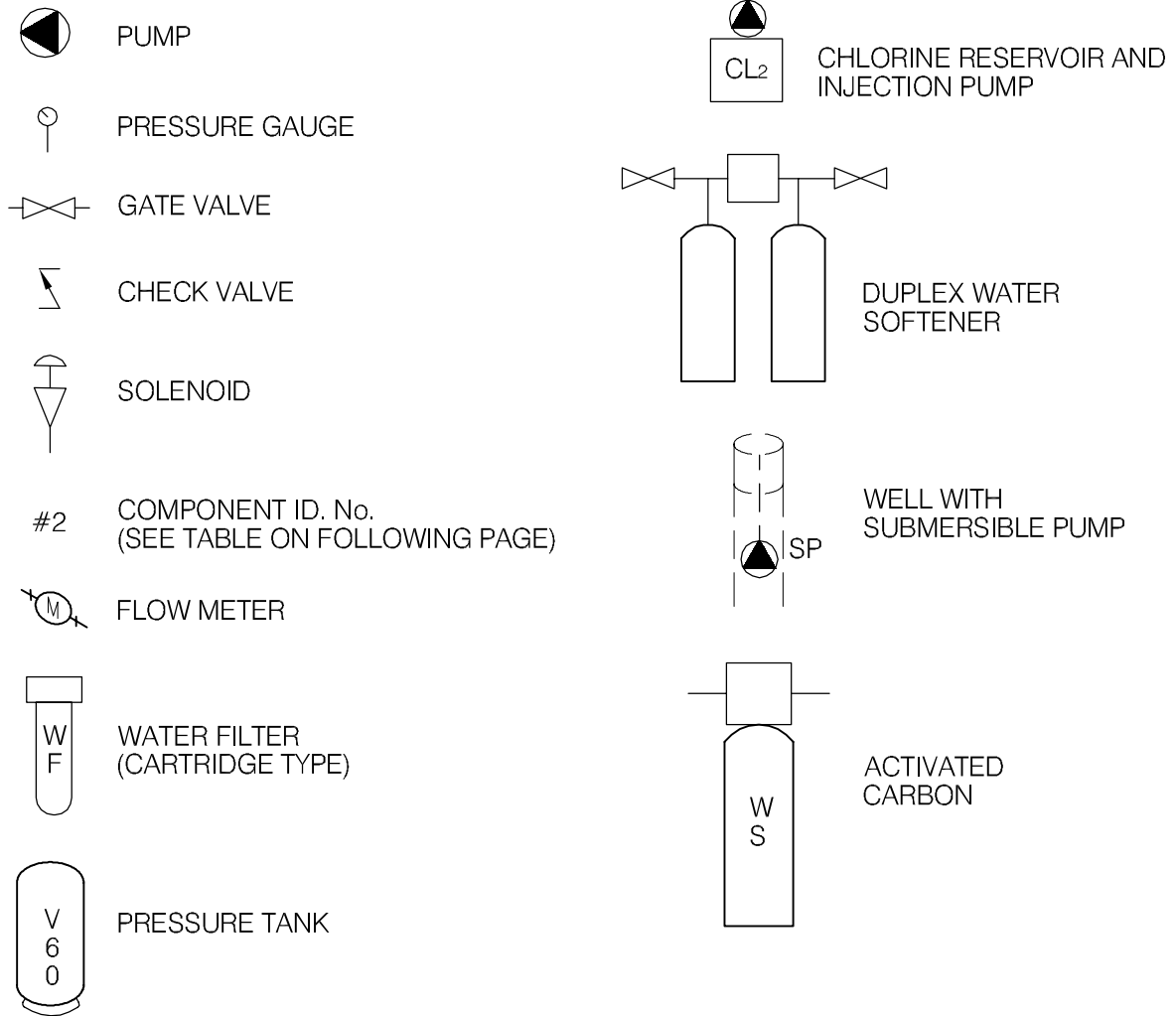
REVISION ISSUE

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FIGURE No.

FIGURE 5653-A

LEGEND



EBA Engineering Consultants Ltd.

CLIENT

Yukon
Highways and Public Works
Property Management Branch

PROJECT

SMALL PUBLIC WATER SYSTEMS ASSESSMENT
WESTERN REGION

TITLE

SCHEMATIC SYSTEM
LEGEND

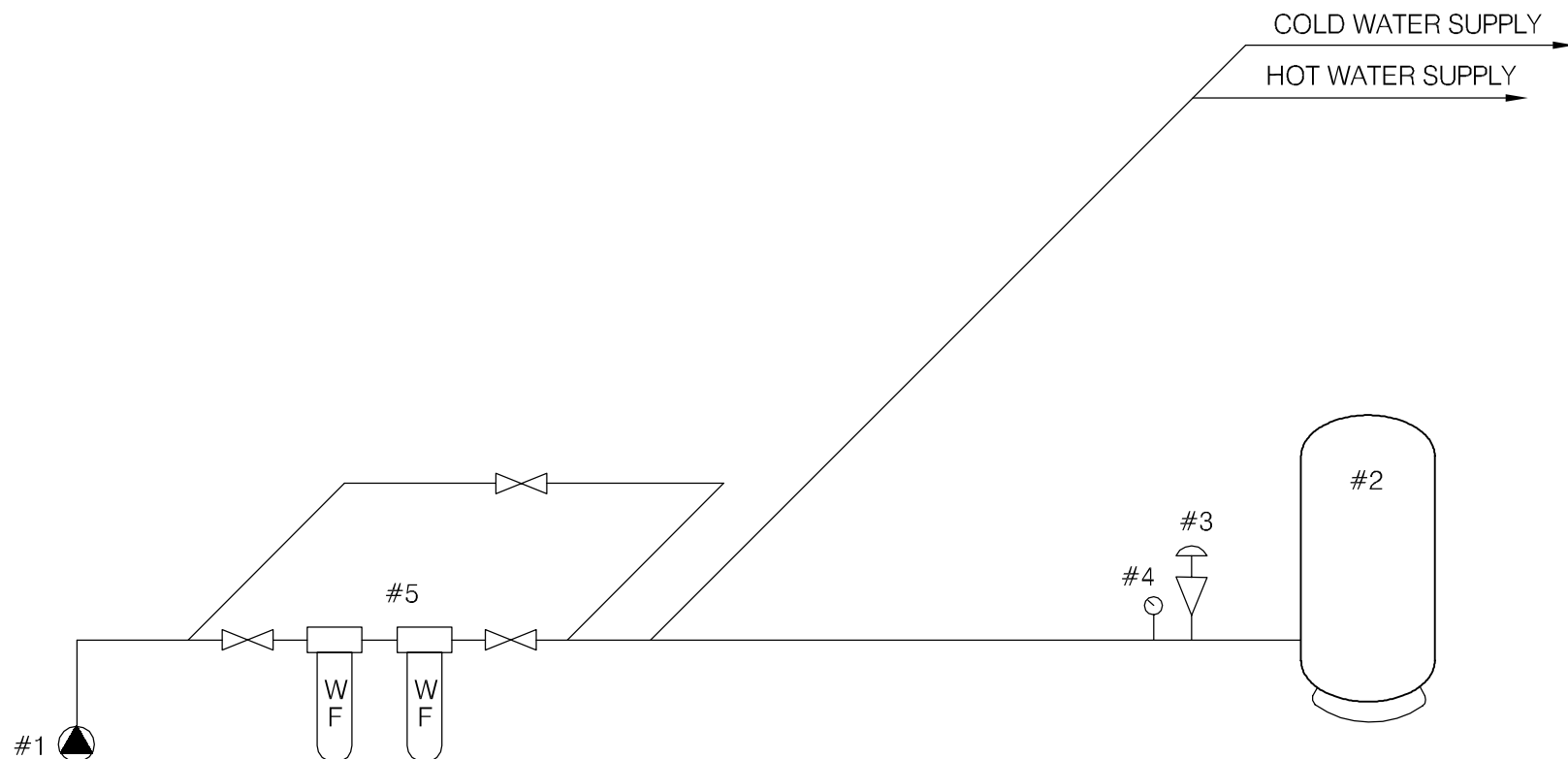
DATE APRIL 2006

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 			TITLE WATER SYSTEM DISTRIBUTION/TREATMENT SCHEMATIC SYSTEM ID.: 5653 AIR TERMINAL BUILDING - MAYO, YT.	
DATE SEPT. 2005	DWN. JSB	CHKD. RMM	FILE NO. 1260002.004	DWG.: FIGURE 5653-B

**Northern Region – Airport Terminal Building
Building # 5653**

DISTRIBUTION & TREATMENT SYSTEM DATA

Item	Description	Manufacturer	Model	Part No.	Serial No.	Size
1	SUB PUMP	MONARCH	SB5EX			3/4HP - 4"
2	PRESSURE TANK	CHALLENGER	PC66			20 GALLON
3	PRESSURE SWITCH	SQUARE	FSG-2			2HP - 1/4" FPT
4	PRESSURE GAUGE	MARSH	0-100-2"			2" - 1/4" FPT
5	INLINE FILTER	ENVIRO GUARD	5 MICRON	SEP & 30 MILLION GAC		10" - 3/4"
6						
7						
8						
9						
10						

TABLE 5653- 1: SUMMARY OF BACTERIOLOGICAL RESULTS

		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?
Building #	Building Name							
5653	Mayo Airport Terminal Building	9	Oct-04 to Jun-05	yes	1/9	no	9-Jun-05	no



Table 5653 - 2: Water Quality Results

SOURCE:		Building 5653 - Mayo Airport Terminal Building		GCDWQ Criteria		
Location/ Resident		Mayo				
Address						
Treatment		Filtration				
Disinfection		None				
Source of Water		On-site well				
Purpose of Sampling		Base Line	Additional Sampling			
Sample Location			Washroom faucet			
Date Sampled		27-Sep-04	17-Aug-05	Lower	Upper Limit	
Physical Tests (ALS)				AO	MAC	AO
Colour (CU)		>60	<5.0			15
Conductivity (uS/cm)			652			
Total Dissolved Solids		388	436			500
Hardness CaCO3		349	333	AO >200 = poor, > 500 unacceptable ^A		
pH		8.14	8.15	6.5		8.5
Turbidity (NTU)		23.5	65.4		1	5
UV Absorbance			0.027			
% UV Transmittance			94			
Dissolved Anions (ALS)						
Alkalinity-Total CaCO3		313	296			
Chloride Cl		<0.5	<0.50			250
Fluoride F		0.11	0.121		1.5	
Silicate SiO4			11.4			
Sulphate SO4		72.8	85.8			500
Nitrate Nitrogen N		<0.01	<0.10		10	
Nitrite Nitrogen N		<0.005	<0.10		1	
Ammonia Nitrogen N						
Total Phosphate PO4			0.0794			
Total Metals (ALS)						
Aluminum T-Al		<0.005	<0.010		0.1	
Antimony T-Sb		<0.0002	<0.00050		0.006	
Arsenic T-As		0.0756	0.0575		0.025	
Barium T-Ba		0.037	0.033		1	
Boron T-B		0.011	<0.10		5	
Cadmium T-Cd		<0.00001	<0.00020		0.005	
Calcium T-Ca			83			
Chromium T-Cr		0.0019	<0.0020		0.05	
Copper T-Cu		<0.001	<0.0010		1	
Iron T-Fe		2.62	3.77			0.3
Lead T-Pb		<0.0001	<0.0010		0.01	
Magnesium T-Mg			30.7			
Manganese T-Mn		0.272	0.289			0.05
Mercury T-Hg			<0.00020		0.001	
Potassium T-K			2.04			
Selenium T-Se			<0.0010		0.01	
Sodium T-Na		8.7	9.6			200
Uranium T-U		<0.0005	0.00042		0.02	
Vanadium T-V			<0.030			
Zinc T-Zn		0.026	0.196			5
Dissolved Metals						
Arsenic D-As			0.0200		0.025	
Iron D-Fe			<0.030			0.3
Manganese D-Mn			0.273			0.05
Organic Parameters						
Tannin and Lignin			0.41			
Total Organic Carbon C			2.17			
Field Chemistry (EBA)						
pH			8.13	6.5		8.5
TDS (ppm)			324			500
EC (uS/cm)			649			
Temperature (°C)			5.6			
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)



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SMALL PUBLIC WATER SYSTEM ASSESSMENT

PART A: EBA Site Inspection

Inspector: Ryan Martin, Luke Lebel

Date August 17, 2005

WELL ID #	Owner	Location Description
5653	YTG	Mayo Airport Terminal Building

1. Well Location and Potential Contaminant Sources

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

Mayo

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

Mayo Airport

c. GPS location: N 7054513 E 456406 elev 508m $\pm$ 12m

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 _____

Mayo Airport Terminal Building

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

g. Nearest building, specify Terminal building

h. Distance from well to building ~3m

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

j. Distance from well to nearest point of known field: Tank @ ~34m, field >34m (if present)

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

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- 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

Service lines only. Septic tank is pumped once per year. There may be a field, but unknown

- 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

~63m from cemetery

- 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 *~18 m*

- 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: *Bulk Fuel Storage*; Distance from well to Potential Source 1: *>60m*

Potential Source 2: _____; Distance from well to Potential Source 2: _____

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 *unlikely*

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

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2. Well and Wellhead information:

- a. When was well installed? Year unknown 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 _____ ☒ No
- f. Well casing: Diameter 15 cm Material: ☒ steel ☐ plastic ☐ concrete
- g. Depth of well: 38.100 m bc ^{could be pump} ☒ measured (if possible) ☐ reported ☐ from log
- h. Static water level below ground: 7.700 m bc
☒ measured (if possible) ☐ reported ☐ from log ☐ flowing
- i. (If granular) Is the well completed: ☐ open end casing ☐ with a well screen
☐ with slotted pipe ☒ unknown other _____
- j. (If bedrock) Does the well have a liner? ☐ yes ☐ No ☐ steel ☐ plastic
- k. If there is a well screen: length _____ slot size(s) _____
Location of screen: from _____ to _____ from log reported
- l. Is there a sump below the screen? ☐ Yes ☐ No unknown
- 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,

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- i. Is the well head below grade? describe in detail ~ 1.2m bg
- 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 has been removed
- iv. Any evidence of rodents? Specify Access possible
- v. Does the well casing have a proper seal cap? ☐ Yes ☒ No

If no, describe condition No cap - only garbage bag above well casing

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...) _____

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 _____

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- d. Date installed: _____ By: _____
- e. For submersible pump, depth of setting below surface _____
- f. Drop pipe for submersible pump: ☐ steel ☒ plastic
- g. Pump delivers water to: ☒ pressure tank ☐ elevated tank ☐ other
- h. Are there automatic pump controls: ☒ Yes ☐ No
- i. Is there provision for taking water samples before water reaches storage? ☒ Yes ☐ No
But directly against 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: Has been disconnected / removed

- 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 ALBISSE

Date AUG 17 / 05

WELL ID #	Owner	Location Description
5653	YTG	MAYO AIR PORT

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: PRESSURE TANK

Where is it located?

Comments: FURNACE ROOM

Is the room in which the water tank is located heated to maintain an optimum temperature of 4°C for stored water?

YES NO

Comments: _____

Are there windows in the add-on that may allow direct sunlight onto the water holding tank? YES

NO

Comments: _____

Are there other heat sources near the tank? YES NO

Comments: _____

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

Comments: _____

Overall Tank

What are the tank size and dimensions?

What material is the tank constructed of? _____

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

Comments: _____

Tank Inlet, Outlet and Lid

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

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

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

Is the water tank drain accessible? YES NO

WATER TANK AND WATER QUALITY CONDITION

Are there signs of staining or biofouling? YES NO

Comments: _____

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

Comments: _____

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

Have there been any bacteriological analyses conducted previously? YES NO

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

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

8. Conclusions

a. Comments on overall installation:

THE WATER SYSTEM IS OLD AND JUDGING BY
SCUM AND RUST-BUILDUP IN JANITORIAL SINK IN
TURBINE ROOM, HEAVILY SCALED UP WITH CALCIUM
& RUST DEPOSIT.

b. Recommendations:

INSTALL COMMERCIAL TREATMENT SYSTEM AS
DICTATED BY THE CHEMICAL ANALYSIS.
BASED ON MY KNOWLEDGE I WOULD RECOMMEND
DUPLEX SOFTENER SYSTEM, SMALL COMMERCIAL
RO SYSTEM WITH LARGE PRESSURE TANK.



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

Spill Report Information

Spill #	7613
Jurisdiction	Yukon
Community	Mayo
Address	
Highway	
Milepost	
Feature	Mayo
Location and Cause	WPYR tank farm - failure of loading hose
Latitude	63.613333333333
Longitude	-135.87916666667
Incident Date	8/26/1976 10:00:00 PM
Lead Agency	Department of Indian Affairs and Northern Development
Other Agency	
Company(s)	White Pass & Yukon Route
Amount	1512
Units	Litres
Quantity	Actual
Release Description	Spilled
Additional Quantit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Furnace Oil
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	spill dyked off immediately - contaminated area 15' x 150' - cleaned-up (contaminants removed to Mayo dump)



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Spill Report Information

Spill #	7718
Jurisdiction	Yukon
Community	Mayo
Address	
Highway	
Milepost	
Feature	Mayo
Location and Cause	tank farm - tank overfilled
Latitude	63.613333333333
Longitude	-135.87916666667
Incident Date	8/22/1977 9:00:00 AM
Lead Agency	Environment Canada - Environmental Protection Service
Other Agency	Department of Indian Affairs and Northern Development
Company(s)	White Pass & Yukon Route
Amount	3742
Units	Litres
Quantity	Actual
Release Description	Spilled
Additional Quantitit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Fuel Oil
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	no fuel recovered - possible contamination of groundwaters but not known - suggests action be taken as too many spills with no recovery in area



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Spill Report Information

Spill #	7727
Jurisdiction	Yukon
Community	Mayo
Address	
Highway	
Milepost	
Feature	Mayo
Location and Cause	tank farm - tank overfilled
Latitude	63.613333333333
Longitude	-135.879166666667
Incident Date	3/28/1977 9:00:00 AM
Lead Agency	Environment Canada - Environmental Protection Service
Other Agency	
Company(s)	White Pass & Yukon Route
Amount	1512
Units	Litres
Quantity	Actual
Release Description	Spilled
Additional Quantit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Gasoline
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	spill within dyke - none reported outside dyke - cleaned-up



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Spill Report Information

Spill #	9130
Jurisdiction	Yukon
Community	Mayo
Address	
Highway	
Milepost	
Feature	Mayo
Location and Cause	White Pass yard - garage caught on fire - explosion ensued
Latitude	63.616666666667
Longitude	-135.884444444444
Incident Date	11/26/1991
Lead Agency	Yukon Government - Fire Marshall
Other Agency	
Company(s)	White Pass
Amount	
Units	
Quantity	Unknown
Release Description	Burned
Additional Quantitit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Hydrocarbons
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	fuel or propane truck exploded inside building - building consumed - used 756,000L water - water runoff contained in ditch - oil and fuel in water



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Spill Report Information

Spill #	9703
Jurisdiction	Yukon
Community	Mayo
Address	
Highway	
Milepost	
Feature	Mayo
Location and Cause	North 60 Petroleum Bulk Plant - overfill of bulk storage tank - miscommunication between truck operator and plant operator
Latitude	63.6134
Longitude	-135.8793
Incident Date	1/15/1997 6:40:00 PM
Lead Agency	Yukon Government - Public Safety
Other Agency	Environment Canada - Environmental Protection Service
Company(s)	North 60 Petroleum
Amount	1000
Units	Litres
Quantity	Estimate
Release Description	Spilled
Additional Quantitit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Diesel
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	300 L recovered - EC recommended excavation of contaminated soil and installation of monitoring wells - fuel discrepancy of 22,000 L reported by Mayo plant - not verified



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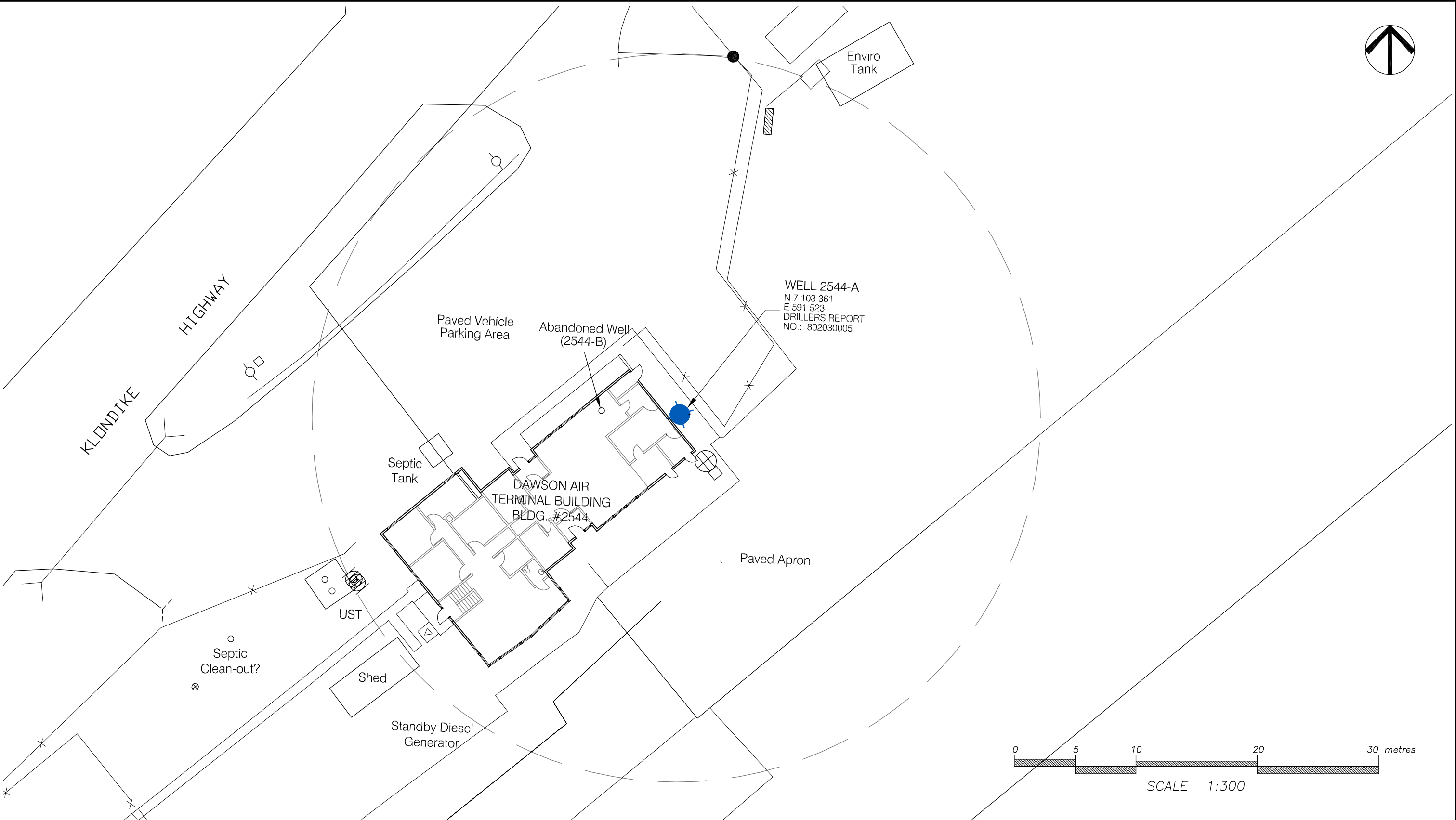
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Spill Report Information

Spill #	9947
Jurisdiction	Yukon
Community	Mayo
Address	
Highway	
Milepost	
Feature	Mayo
Location and Cause	North 60 Petroleum Tank Farm - overfill of storage tank
Latitude	63.6134
Longitude	-135.8793
Incident Date	12/10/1999 5:10:00 PM
Lead Agency	Environment Canada - Environmental Protection Service
Other Agency	
Company(s)	North 60 Petroleum
Amount	
Units	
Quantity	Unknown
Release Description	Spilled
Additional Quantitit	negligible amount
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Diesel
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	overfill caused product to run down sides of tank and small amount to ground at base of tank within berm - no loss noted in records check - minimal amount spilled - no action

**Photo 0187:** 5653 Mayo Airport wellhead enclosure.**Photo 0189:** 5653 Pressure tank and pump controls.**Photo 027:** 5653 Mayo Airport Terminal Building.**Photo 007:** 5653 Septic tank (front) and bulk fuel storage (back).



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.**

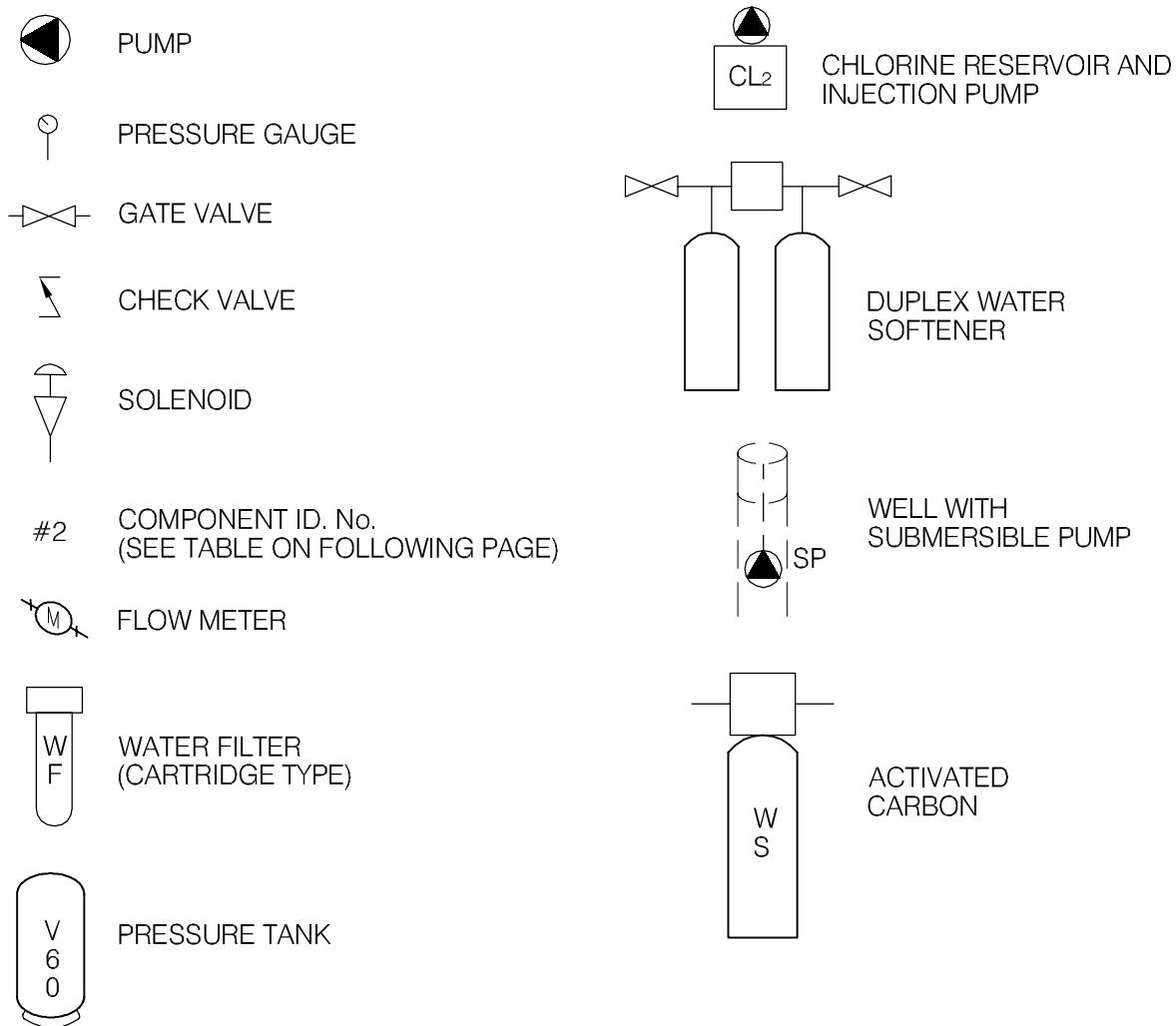
DESIGNED BY: R. MARTIN
DRAWN BY: J. BUYCK
DATE: SEPT. 2005
SCALE: AS SHOWN
PROJECT No.: 1260002.004
ACAD FILENAME: 004-NORTHERN REGION

CLIENT:

Highways and Public Works
Property Management Branch

SMALL PUBLIC WATER SYSTEMS ASSESSMENT NORTHERN REGION	
GOVERNMENT OF YUKON HIGHWAYS & PUBLIC WORKS	
DAWSON AIR TERMINAL BUILDING BUILDING # 2544 SITE LOCATION DIAGRAM WELL ID: 2544	REVISION ISSUE 0 FIGURE No. FIGURE 2544-A

LEGEND



EBA Engineering Consultants Ltd.

CLIENT

Yukon
Highways and Public Works
Property Management Branch

PROJECT

SMALL PUBLIC WATER SYSTEMS ASSESSMENT
WESTERN REGION

TITLE

SCHEMATIC SYSTEM
LEGEND

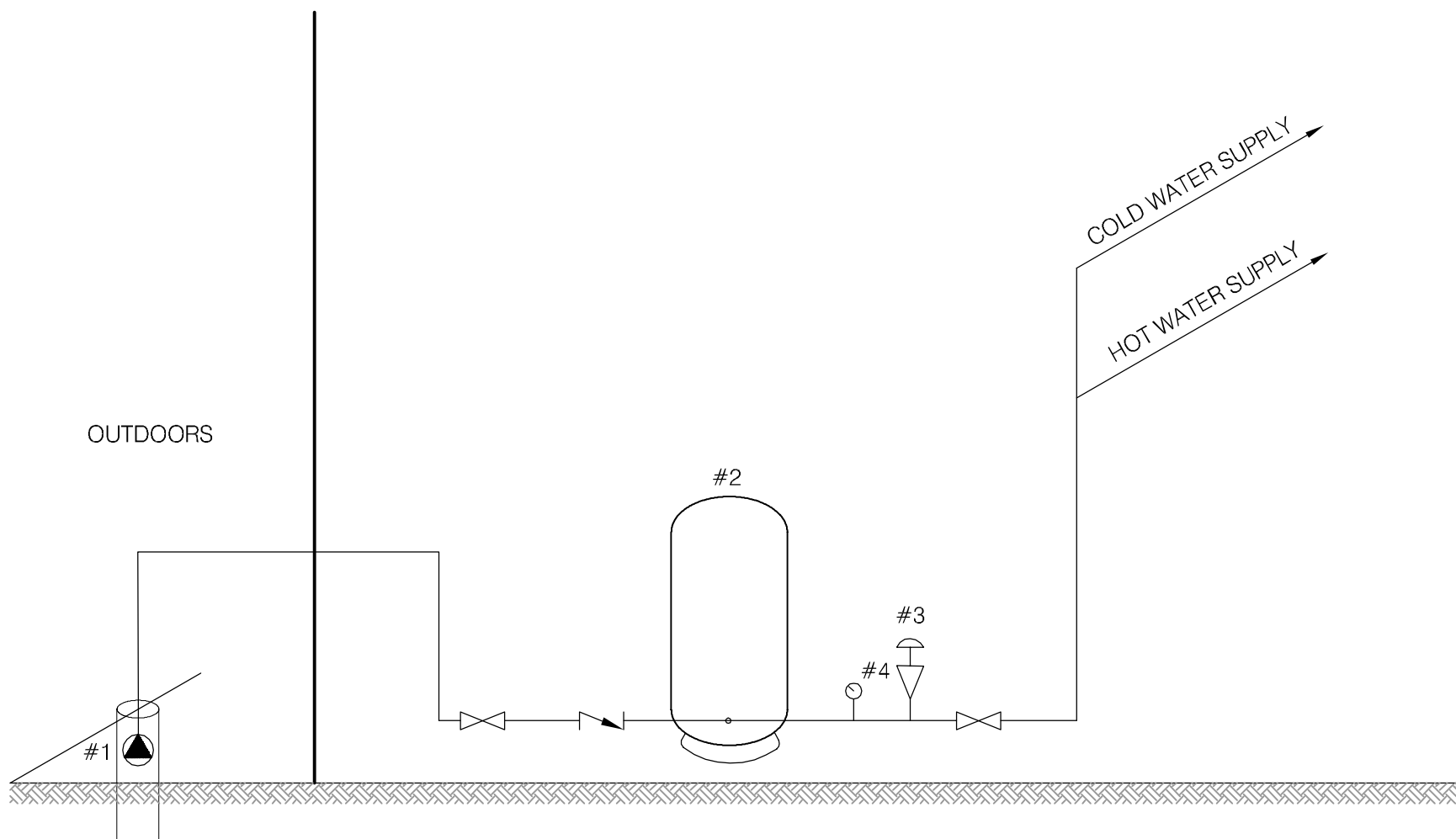
DATE APRIL 2006

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.: 2544 AIR TERMINAL BUILDING - DAWSON, YT.						
DATE	SEPT. 2005	DWN.	JSB	CHKD.	RMM	FILE NO.	1260002.004	DWG.:	FIGURE 2544-B

**Northern Region – Dawson City Air Terminal Building
Building # 2544**

DISTRIBUTION & TREATMENT SYSTEM DATA

Item	Description	Manufacturer	Model	Part No.	Serial No.	Size
1	SUB. Pump	N/A	4" - 1/2 HP			1/2 HP.
2	PRESSURE TANK	CHALLENGER	PC 144			44 GALLON
3	PRESSURE SWITCH	SQUARE D	FSG-2			2 HP - 1/4 FT
4	PRESSURE GAUGE	MARSH	0-100 PSI			2" - 1/4 FT.
5						
6						
7						
8						
9						
10						

TABLE 2544 - 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?
2544	Dawson City Airport Terminal Building	7	Oct-04 to Jun-05	no	0/7	no	9-Jun-05	no



Table 2544 - 2: Water Quality Results

SOURCE:		Building 2544 - Dawson City Airport Terminal Building			GCDWQ Criteria		
Location/ Resident		Dawson City					
Address							
Treatment		None					
Disinfection		None					
Source of Water		On-site well					
Purpose of Sampling		Base Line	Base Line	Additional Sampling			
Sample Location							
Date Sampled		29-Sep-04	8-Jun-05	19-Aug-05	Lower	Upper Limit	
Physical Tests (ALS)					AO	MAC	AO
Colour (CU)		<5	<5.0				15
Conductivity (uS/cm)			326				
Total Dissolved Solids		187	191				500
Hardness CaCO3		170	163		AO >200 = poor, > 500 unacceptable ^A		
pH		7.4	7.41		6.5		8.5
Turbidity (NTU)		0.4	0.15			1	5
UV Absorbance				0.025			
% UV Transmittance				94.4			
Dissolved Anions (ALS)							
Alkalinity-Total CaCO3		112	108				
Chloride Cl		2	1.79				250
Fluoride F		0.05	0.066			1.5	
Silicate SiO4							
Sulphate SO4		55.3	61.5				500
Nitrate Nitrogen N		0.3	0.94			10	
Nitrite Nitrogen N		<0.05	<0.10			3.4	
Ammonia Nitrogen N							
Total Phosphate PO4							
Total Metals (ALS)							
Aluminum T-Al		<0.005	<0.010			0.1	
Antimony T-Sb		0.0003	<0.00050			0.006	
Arsenic T-As		0.0027	0.00243			0.025	
Barium T-Ba		0.018	<0.020			1	
Boron T-B		0.006	<0.10			5	
Cadmium T-Cd		0.00003	<0.00020			0.005	
Calcium T-Ca			44.3				
Chromium T-Cr		0.0009	<0.0020			0.05	
Copper T-Cu		0.153	0.339			1	
Iron T-Fe		0.02	<0.030				0.3
Lead T-Pb		<0.0001	<0.0010			0.01	
Magnesium T-Mg			12.7				
Manganese T-Mn		0.023	0.0046				0.05
Mercury T-Hg			<0.00020			0.001	
Potassium T-K			0.55				
Selenium T-Se			<0.0010			0.01	
Sodium T-Na		2.4	<2.0				200
Uranium T-U		<0.0005	0.00011			0.02	
Vanadium T-V							
Zinc T-Zn		0.013	<0.050				5
Organic Parameters							
Tannin and Lignin				<0.10			
Total Organic Carbon C				1.71			
Field Chemistry (EBA)							
pH					6.5		8.5
TDS (ppm)							500
EC (uS/cm)							
Temperature (°C)							
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)



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SMALL PUBLIC WATER SYSTEM ASSESSMENT

PART A: EBA Site Inspection

Inspector: Ryan Martin, Luke Lebel

Date August 19, 2005

WELL ID #	Owner	Location Description
2544	YTG	Dawson City Airport Terminal Building

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,

Dawson City Airport

c. GPS location: N 7103361 E 591523 elev 375m $\pm$ 9m

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 _____

Airport Terminal Building

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

g. Nearest building, specify Terminal building

h. Distance from well to building ~4m

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

j. Distance from well to nearest point of known field: _____

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

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- 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

Septic tank @ ~28m

- 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

Enclosure is unlocked, but is inside airport secure area

Entrance by animals? ☒ Yes ☐ No

Access possible, but unlikely

- 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 ~36m

- 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: AST 1; Distance from well to Potential Source 1: ~30m

Potential Source 2: AST 2+3; Distance from well to Potential Source 2: 760m

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? 1 (possibly 2) ☐ in use ☒ abandoned ☐ require proper sealing

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2. Well and Wellhead information:

- a. When was well installed? Year 1988 Month September
- 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 15 cm Material: ☒ steel ☐ plastic ☐ concrete
- g. Depth of well: 40 ft ☐ measured (if possible) ☐ reported ☒ from log
- h. Static water level below ground: 15.5 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 2.5 ft slot size(s) 18 slot
Location of screen: from 37.5 ft to 40 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,

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- i. Is the well head below grade? describe in detail ~ 0.45m 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
- iv. Any evidence of rodents? Specify No, but 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...) _____

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 _____

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: Insulation + heat trace

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 ALBISER

Date AUG 19/05

WELL ID #	Owner	Location Description
2544	YTG	DAWSON CITY AIRPORT

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: PRESSURE TANK

Where is it located?

Comments: CRAWL SPACE

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: _____

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Overall Tank

What are the tank size and dimensions?

What material is the tank constructed of? _____

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

Comments: _____

Tank Inlet, Outlet and Lid

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

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

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

Is the water tank drain accessible? YES NO

WATER TANK AND WATER QUALITY CONDITION

Are there signs of staining or biofouling? YES NO

Comments: _____

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

Comments: _____

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

Have there been any bacteriological analyses conducted previously? YES NO

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

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

8. Conclusions

a. Comments on overall installation:

THIS INSTALLATION IS OF GOOD QUALITY AND
WORKMANSHIP.

b. Recommendations:

INSTALL TREATMENT AS DICTATED BY WATER
QUALITY ANALYSIS, SUITABLE FOR UV SYSTEM.
INSTALL 10 GPM UV SYSTEM (NSF55 CERTIFIED)

Les.
Travis
Lorrey

P.O. Box 2106
Whitehorse, Yukon
Phone: 667-4795

rown Clay - br cl
lue Clay - bl cl
and - sd
andy Clay - sdy cl
oft Shale - s shl
ard Rock - hd rk
andstone - ss
ine Gravel- f gr
oulders - bdrs

MIDNIGHT SUN

Job (Month) (Day) (Year)

Started..1464..4...19.73.

DRILLING CO. LTD. Completed. 4464.6... 19.73..

Invoice No.....

NAME AND ADDRESS OF CLIENT	DESCRIPTION OF WORK	LOCATION OF WORK
V.T.G.	WATER WELL	Sec. <u> </u> Twp. <u> </u> Rge. <u> </u> W.
		DAWSON CITY AIRPORT

[illegible][illegible]

SIGNATURES

For Midnight Sun.....

For Client.....

DRILLER GORDON TORGERSON



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Spill Report Information

Spill #	8219
Jurisdiction	Yukon
Community	Dawson City
Address	
Highway	
Milepost	
Feature	Dawson City
Location and Cause	Airport - bulk tank overfill due to operator error
Latitude	64.045361
Longitude	-139.123528
Incident Date	8/10/1982 6:30:00 AM
Lead Agency	Environment Canada - Environmental Protection Service
Other Agency	
Company(s)	White Pass & Yukon Route
Amount	0.83
Units	Tonnes (Metric)
Quantity	Actual
Release Description	Spilled
Additional Quantitit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Aviation Fuel (Jet A Or B)
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	not located near surface water - should be little damage except to vegetation in vicinity of tank - most fuel expected to evaporate within a few hours



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Spill Report Information

Spill #	8221
Jurisdiction	Yukon
Community	Dawson City
Address	
Highway	
Milepost	
Feature	Dawson City
Location and Cause	Airport - overfill of fuel tank on aircraft
Latitude	64.045361
Longitude	-139.123528
Incident Date	8/17/1982 2:00:00 PM
Lead Agency	Environment Canada - Environmental Protection Service
Other Agency	
Company(s)	White Pass & Yukon Route
Amount	0.5
Units	Tonnes (Metric)
Quantity	Estimate
Release Description	Spilled
Additional Quantitit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Aviation Fuel (Jet A Or B)
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	not located near surface water - little likelihood of damage due to volume and volatility - peat used to soad up small puddle on tarmac



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Spill Report Information

Spill #	8807
Jurisdiction	Yukon
Community	Dawson City
Address	
Highway	
Milepost	
Feature	Dawson City
Location and Cause	Airport - fuel valve opened on unattended fuel truck - suspect it was intentional
Latitude	64.045361
Longitude	-139.123528
Incident Date	6/20/1988 9:00:00 AM
Lead Agency	Environment Canada - Environmental Protection Service
Other Agency	Yukon Government - Highways
Company(s)	McKenzie Petroleum
Amount	0.23
Units	Tonnes (Metric)
Quantity	Actual
Release Description	Spilled
Additional Quantitit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Diesel
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	most absorbed into ground - drinking water well 45m away - groundwater table 4m below surface - sand applied to puddles and removed to landfill



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Spill Report Information

Spill #	8829
Jurisdiction	Yukon
Community	Dawson City
Address	
Highway	
Milepost	
Feature	Dawson City
Location and Cause	Airport - apparent spill of fuel on a gravel tarmac behind terminal - two areas appear to have fuel residue
Latitude	64.045361
Longitude	-139.123528
Incident Date	6/29/1988 9:10:00 AM
Lead Agency	Environment Canada - Environmental Protection Service
Other Agency	Yukon Government - other
Company(s)	
Amount	
Units	
Quantity	Unknown
Release Description	Spilled
Additional Quantitit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Hydrocarbons
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	source of spill unknown - suspect from oil spill previous week - oil reappearing - advised to clean-up using sorbent cloth



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Spill Report Information

Spill #	9204
Jurisdiction	Yukon
Community	Dawson City
Address	
Highway	
Milepost	
Feature	Dawson City
Location and Cause	Airport - 200 m NE of airport terminal building - overfill of underground storage tank - human error
Latitude	64.045361
Longitude	-139.123528
Incident Date	3/13/1992 8:00:00 PM
Lead Agency	Environment Canada - Environmental Protection Service
Other Agency	
Company(s)	White Pass Transportation Ltd
Amount	3500
Units	Litres
Quantity	Actual
Release Description	Spilled
Additional Quantitit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Aviation Fuel (Jet A Or B)
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	fuel overflowed onto snow packed ground - contaminated snow removed to Quigley dump - clean-up inspected by YTG Fire Marshall



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Spill Report Information

Spill #	9447
Jurisdiction	Yukon
Community	Dawson City
Address	
Highway	
Milepost	
Feature	Dawson City
Location and Cause	Airport - contamination of soil around UST's - unknown if tanks leaking or due to refueling practices
Latitude	64.045361
Longitude	-139.123528
Incident Date	9/21/1994
Lead Agency	Environment Canada - Environmental Protection Service
Other Agency	
Company(s)	YTG Aviation & Marine Branch
Amount	
Units	
Quantity	Unknown
Release Description	Chronic Discharge
Additional Quantit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Aviation Fuel (Jet A Or B)
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	contaminated soil excavated and landfarmed



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Spill Report Information

Spill #	9455
Jurisdiction	Yukon
Community	Dawson City
Address	
Highway	
Milepost	
Feature	Dawson City
Location and Cause	Airport - domestic fuel storage tank at Transport Canada residence - fuel line failed
Latitude	64.045361
Longitude	-139.123528
Incident Date	7/12/1994 4:04:00 PM
Lead Agency	Municipality - identified in Community
Other Agency	
Company(s)	Transport Canada
Amount	1000
Units	Litres
Quantity	Actual
Release Description	Spilled
Additional Quantitit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Furnace Oil
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	contractor Klondike Mechanical doing clean-up - Transport Canada will contact City of Dawson to ensure clean-up to standard



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Spill Report Information

Spill #	9914
Jurisdiction	Yukon
Community	Dawson City
Address	
Highway	
Milepost	
Feature	Dawson City
Location and Cause	Airport - on apron at North 60 Petro trailer - valve on trailer not closed properly
Latitude	64.045361
Longitude	-139.123528
Incident Date	5/19/1999 5:00:00 AM
Lead Agency	Yukon Government - Environmental Programs
Other Agency	
Company(s)	Sumit Air
Amount	
Units	
Quantity	Unknown
Release Description	Spilled
Additional Quantitit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Diesel
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	volume spilled not noted in file - flying fuel into camps - valve not closed properly after loading - loader and dump truck ready for clean-up - no further information on file



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Spill Report Information

Spill #	0203
Jurisdiction	Yukon
Community	Dawson City
Address	
Highway	
Milepost	
Feature	Dawson City
Location and Cause	Airport - truck roll over - think it was a B-train
Latitude	64.045361
Longitude	-139.123528
Incident Date	1/19/2002 11:30:00 AM
Lead Agency	Yukon Government - Highways
Other Agency	
Company(s)	
Amount	
Units	
Quantity	Unknown
Release Description	
Additional Quantitit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Hydrocarbons
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	limited info on initial report to spill line due to poor phone connection - person reporting taking pictures - YG-EMO coordinating response - no other info on file



Photo 088: 2544 Dawson City Air Terminal Building.



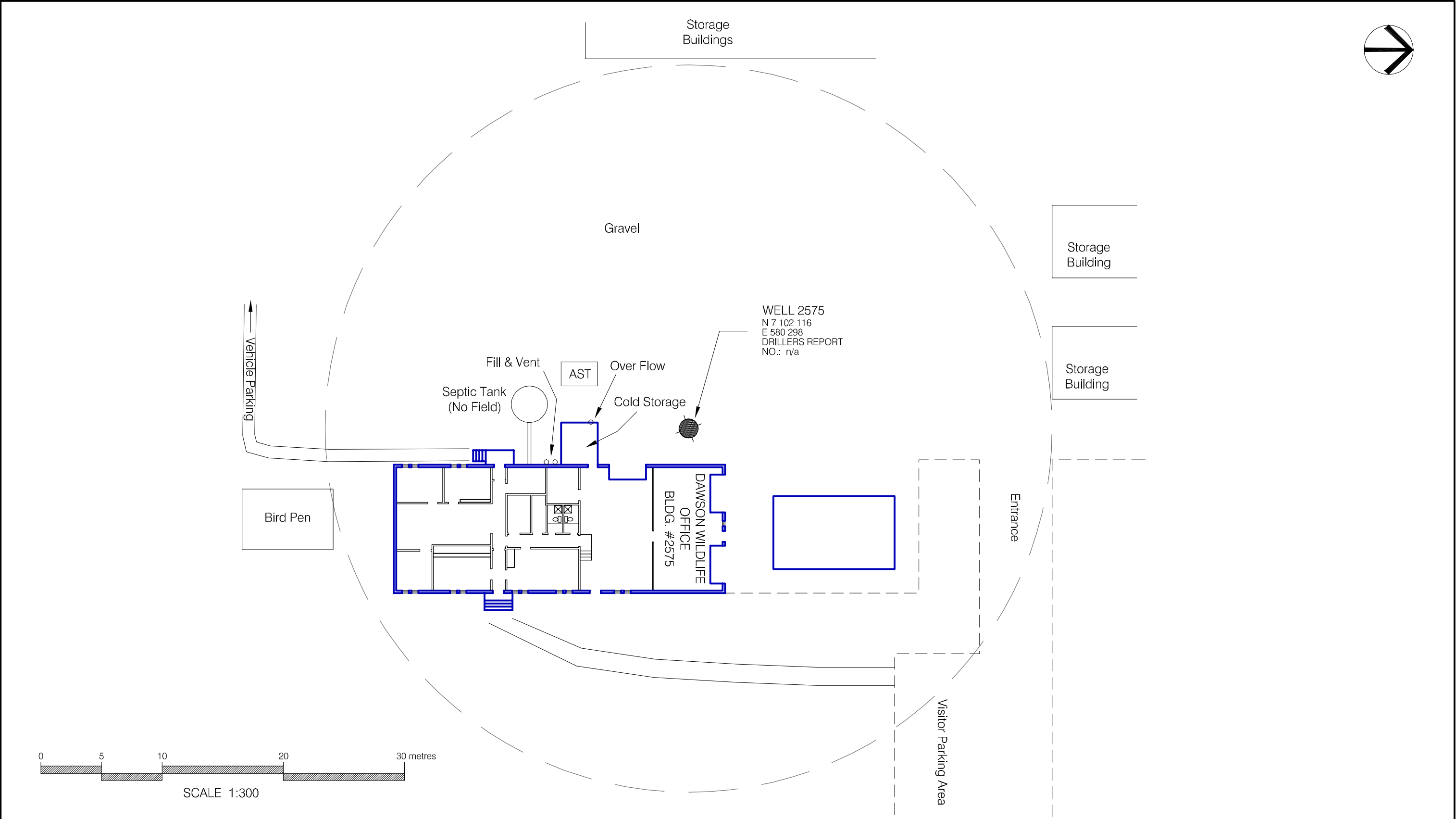
Photo 089: 2544 Enviro ASTs for bulk fuel storage.



Photo 090: 2544 Wellhead.



Photo 234: 2544 Abandoned well (bottom) pressure tank & pump controls (top).



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

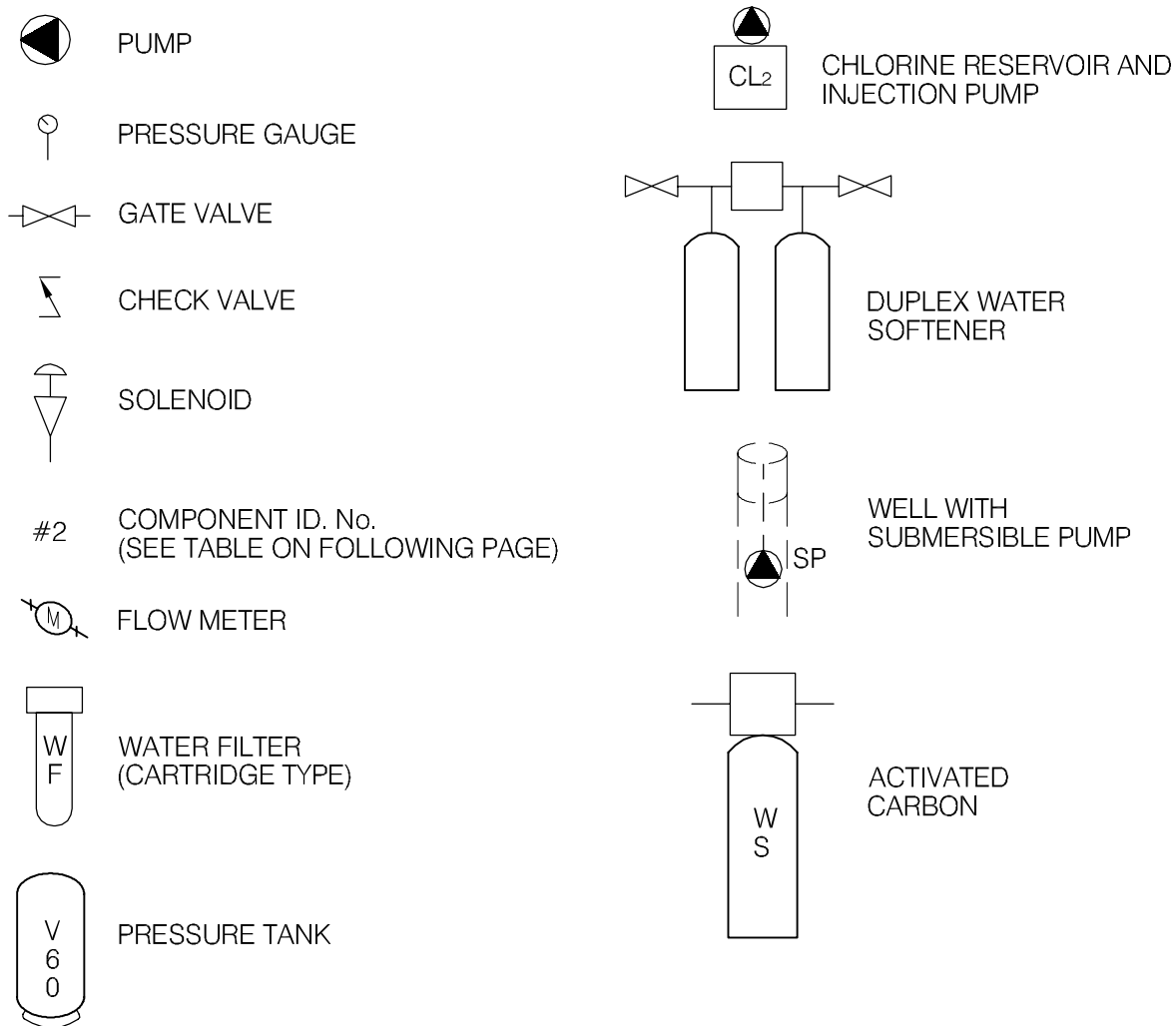
SMALL PUBLIC WATER SYSTEMS ASSESSMENT
NORTHERN REGION

GOVERNMENT OF YUKON
HIGHWAYS & PUBLIC WORKS

DAWSON WILDLIFE OFFICE
BUILDING # 2575
SITE LOCATION DIAGRAM
WELL ID: 2575

REVISION	ISSUE
	0
FIGURE No.	
FIGURE 2575-A	

LEGEND



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CLIENT

Yukon
Highways and Public Works
Property Management Branch

PROJECT

SMALL PUBLIC WATER SYSTEMS ASSESSMENT
WESTERN REGION

TITLE

SCHEMATIC SYSTEM
LEGEND

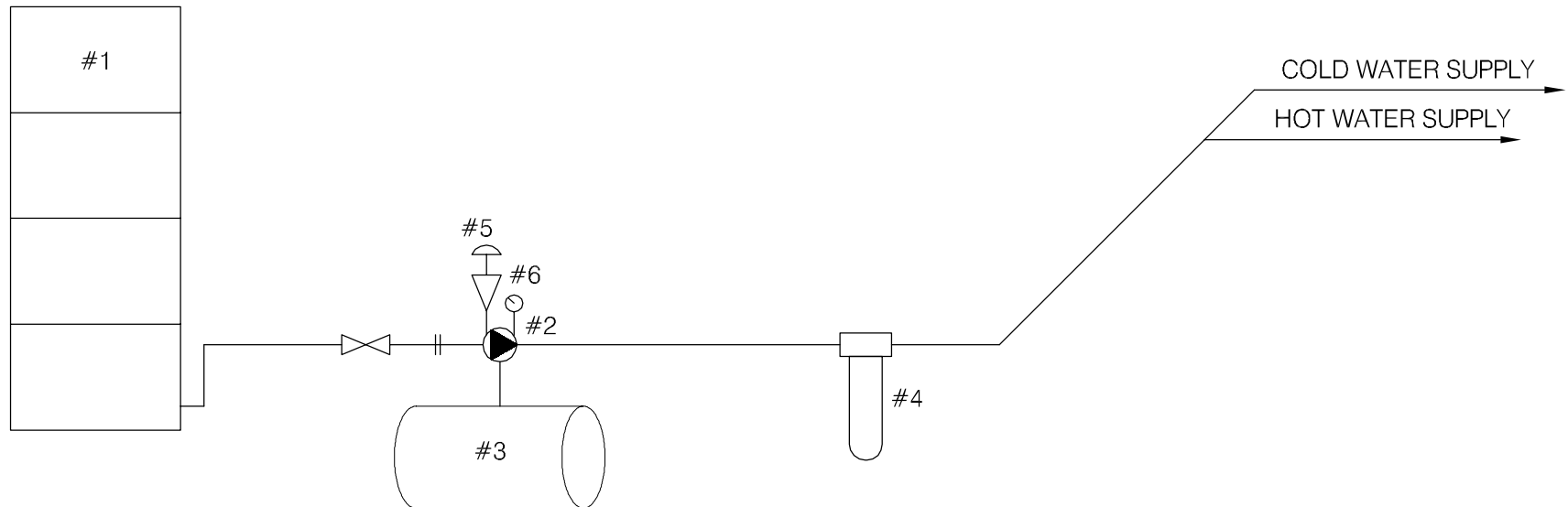
DATE APRIL 2006

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.: 2575 WILDLIFE OFFICE - DAWSON, YT.					
DATE SEPT. 2005		DWN. JSB		CHKD. RMM		FILE NO. 1260002.004		DWG.: FIGURE 2575-B	

Northern Region – Dawson City Wildlife Office
Building # 2575

DISTRIBUTION & TREATMENT SYSTEM DATA

Item	Description	Manufacturer	Model	Part No.	Serial No.	Size
1	WATER STORAGE	N/A	FG VERTICAL			48" x 8' 600 GALLON
2	JET PUMP	MONARCH	MJC-50		4601	1/2 HP.
3	PRESSURE TANK	JET-RITE	JR44HS			8.5 GALLON
4	INLINE FILTER	RAINFRESH	10"			3/4" x 10"
5	PRESSURE SWITCH	SONAGE D	FSG-2			2HP - 1/4" FIP
6	PRESSURE GAUGE	MARSH	0-100 PSI			2" - 1/4" FIP
7						
8						
9						
10						

TABLE 2575 - 1: SUMMARY OF BACTERIOLOGICAL RESULTS

		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?
Building #	Building Name							
2575	Dawson City Wildlife Office	8	Oct-04 to Jun-05	no	0/8	no	9-Jun-05	no



Table 2575 - 2: Water Quality Results

SOURCE:		Building 2575 - Dawson City Wildlife Office		GCDWQ Criteria		
Location/ Resident		Dawson City				
Address						
Treatment		N/A				
Disinfection		N/A				
Source of Water		Water Delivery				
Purpose of Sampling		Base Line	Additional Sampling			
Sample Location						
Date Sampled		8-Jun-05	N/A	Lower	Upper Limit	
Physical Tests (ALS)				AO	MAC	AO
Colour (CU)		<5.0				15
Conductivity (uS/cm)		297				
Total Dissolved Solids		178				500
Hardness CaCO3		145		AO >200 = poor, > 500 unacceptable ^A		
pH		7.9		6.5		8.5
Turbidity (NTU)		0.65			1	5
UV Absorbance						
% UV Transmittance						
Dissolved Anions (ALS)						
Alkalinity-Total CaCO3		105				
Chloride Cl		2.56				250
Fluoride F		0.085			1.5	
Silicate SiO4						
Sulphate SO4		53.7				500
Nitrate Nitrogen N		0.25			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		0.00013			0.025	
Barium T-Ba		0.079			1	
Boron T-B		<0.10			5	
Cadmium T-Cd		<0.00020			0.005	
Calcium T-Ca		39.7				
Chromium T-Cr		<0.0020			0.05	
Copper T-Cu		0.637			1	
Iron T-Fe		0.047				0.3
Lead T-Pb		0.0023			0.01	
Magnesium T-Mg		11				
Manganese T-Mn		0.0212				0.05
Mercury T-Hg		<0.00020			0.001	
Potassium T-K		0.73				
Selenium T-Se		<0.0010			0.01	
Sodium T-Na		2.2				200
Uranium T-U		0.0007			0.02	
Vanadium T-V						
Zinc T-Zn		<0.050				5
Field Chemistry (EBA)						
pH			7.88	6.5		8.5
TDS (ppm)			146			500
EC (uS/cm)			295			
Temperature (°C)			16.4			
Free Available Chlorine			0.19			

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)



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SMALL PUBLIC WATER SYSTEM ASSESSMENT

PART A: EBA Site Inspection

Inspector: Ryan Martin, Luke Lebel

Date August 19, 2005

WELL ID #	Owner	Location Description
2575	YTG	Dawson City wildlife office

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,

Calison Subdivision

c. GPS location: N 7102116 E 580298 elev 344m ± 9m

d. Is there electric power? ☐ Yes ☒ No

e. Is there outside water access? ☒ Yes ☐ No

From delivery water supply, not from well

f. Does the well system have:

☐ 15 or more service connections to a piped distribution system? If so how many _____

well is abandoned, no longer in use. System is on water delivery

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

g. Nearest building, specify wildlife office

h. Distance from well to building ~3m

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

j. Distance from well to nearest point of known field: Septic holding tank at ~15m

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

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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. No cap. Evidence of mouse droppings and feathers

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 *unlikely*

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: AST; Distance from well to Potential Source 1: ~9m

Potential Source 2: Dredge pond; Distance from well to Potential Source 2: ~65m

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

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2. Well and Wellhead information:

- a. When was well installed? Year unknown 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 _____ ☒ No
- f. Well casing: Diameter 15cm Material: ☐ steel ☐ plastic ☐ concrete
- g. Depth of well: 9.375m b.c ^{could be pump} ☐ measured (if possible) ☐ reported ☐ from log
- h. Static water level below ground: 7.180m b.c
☒ measured (if possible) ☐ reported ☐ from log ☐ flowing
- i. (If granular) Is the well completed: ☐ open end casing ☐ with a well screen
☐ with slotted pipe ☒ unknown other _____
- j. (If bedrock) Does the well have a liner? ☐ yes ☐ No ☐ steel ☐ plastic
- k. If there is a well screen: length _____ slot size(s) _____
Location of screen: from _____ to _____ from log reported
- l. Is there a sump below the screen? ☐ Yes ☐ No unknown
- 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,

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- i. Is the well head below grade? describe in detail No, ~0.7m 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 Mouse droppings and feathers present
- v. Does the well casing have a proper seal cap? ☐ Yes ☒ No

If no, describe condition None present

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 n/a

Explain (filtration, disinfection etc...) water from delivery is likely chlorinated at source

4. Aquifer Supplying This Well:

- a. The aquifer is: ☐ bedrock ☒ granular sediment ☐ unknown
likely
- b. Does water level and/or well capacity show seasonal fluctuation? ☐ Yes ☐ No n/a

5. Pump Installation:

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

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

g. Pump delivers water to: ☐ pressure tank ☐ elevated tank ☐ other
none - not hooked up

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: _____

l. Comments on pump installation: _____

6. Conclusions

a. Comments on overall installation:

This system is currently on water delivery. There is an abandoned well on the property that is not properly sealed

b. Recommendations: _____

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PART B: EBA Site Inspection

Inspector: BERT ALBISSEL

Date AUG 19 / 05

WELL ID #	Owner	Location Description
<u>2575</u>	<u>YTG</u>	<u>DAWSON CITY WILDLIFE SHED</u> <u>CALLISON SUB DIVISION</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: FIBRE GLASS SECTIONAL

Where is it located?

Comments: FURNACE ROOM

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?

4' x 8' HIGH ROUND SECTIONAL

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: CLOSED TANK, NO ACCESS

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:

THE INSTALLATION MEETS ALL REQUIREMENT WITH
THE EXCEPTION OF ACCESS TO THE TANK
FOR INSPECTION & CLEANING.

b. Recommendations:

INSTITUTE REGULAR SCHEDULED FREE CHLORINE
TESTING & REPORTING. ASSURE TRUCK DELIVERY
RESIDUAL IS 0.5 PPM FREE CHLORINE.
INSTALL ACCESS TO TANK FOR INSPECTION
& CLEANING. SOURCE FOR WATER DELIVERY
SHOULD BE CITY OF DAWSON WATER SYSTEM.



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91782 Alaska Highway, Whitehorse, YT Y1A 5B7

PH: 867.667.3400 FAX: 867.667.7962

Spill Report Information

Spill #	9122
Jurisdiction	Yukon
Community	Dawson City
Address	
Highway	
Milepost	
Feature	Dawson City
Location and Cause	Callison Bulk Plant - heavy equip lost control and collided with tanker - pushed it over 1.5m bank - ruptured
Latitude	64.034444444444
Longitude	-139.36472222222
Incident Date	9/1/1991 2:00:00 PM
Lead Agency	Yukon Government - Public Safety
Other Agency	
Company(s)	Tesoro Canada
Amount	6800
Units	Litres
Quantity	Estimate
Release Description	Spilled
Additional Quantitit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Diesel
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	accident not Tesoro's fault - most fuel recovered or pumped off - contaminated soil piled in yard - no immediate threat to environment or public safety



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Spill Report Information

Spill #	9228
Jurisdiction	Yukon
Community	Dawson City
Address	
Highway	
Milepost	
Feature	Dawson City
Location and Cause	Callison Subdivision - Klondike Transport property - 500 ga storage tank being removed - tipped over and spilled residual oil
Latitude	64.034444444444
Longitude	-139.36472222222
Incident Date	7/23/1992
Lead Agency	Environment Canada - Environmental Protection Service
Other Agency	
Company(s)	Petro Canada (McKenzie)
Amount	100
Units	Litres
Quantity	Estimate
Release Description	Spilled
Additional Quantit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Diesel
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	material to be removed to a suitable location for spreading



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Spill Report Information

Spill #	9509
Jurisdiction	Yukon
Community	Dawson City
Address	
Highway	
Milepost	
Feature	Dawson City
Location and Cause	Callison Subdivision lot - line from truck pumping off fuel disconnected at camlock
Latitude	64.034444444444
Longitude	-139.36472222222
Incident Date	4/18/1995 2:30:00 AM
Lead Agency	
Other Agency	
Company(s)	White Pass
Amount	200
Units	Litres
Quantity	Estimate
Release Description	Spilled
Additional Quantitit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Furnace Oil
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	soaked up spill - removed contaminated material and burned at dumpsite



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Spill Report Information

Spill #	9714
Jurisdiction	Yukon
Community	Dawson City
Address	
Highway	
Milepost	
Feature	Dawson City
Location and Cause	Callison Subdivision - 2nd approach from Whse - 1 block off highway on left - improper fuel storage and overfill of tanker truck
Latitude	64.0370706
Longitude	-139.35275575
Incident Date	4/21/1997
Lead Agency	Yukon Government - Renewable Resources
Other Agency	
Company(s)	North 60 Petroleum
Amount	
Units	
Quantity	Unknown
Release Description	
Additional Quantitit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Hydrocarbons
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	Fire Chief in Dawson also reported on overfill of trucks and that there were pools of fuel on ground - no one responding - EC contacted YG-RR - YG-RR to start investigation



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Spill Report Information

Spill #	9933
Jurisdiction	Yukon
Community	Dawson City
Address	
Highway	
Milepost	
Feature	Dawson City
Location and Cause	Callison Subdivision - John Van Every's yard - release of bulk storage tank contents
Latitude	64.0347
Longitude	-139.3649
Incident Date	8/15/1999
Lead Agency	Yukon Government - Environmental Programs
Other Agency	Environment Canada - Environmental Protection Service
Company(s)	Northern Cross (Yukon) Ltd.
Amount	8500
Units	Litres
Quantity	Estimate
Release Description	
Additional Quantit	200 L anhydrous ammonia
Concentration	3
Concentration Unit	%
Phase	Liquid
Major Contaminant	Brackish Water
2nd Contaminant	Calcium Chloride
3rd Contaminant	Anhydrous Ammonia
4th Contaminant	
Outcome	contaminant was released by sub-contractor without permission of Northern Cross - hazards not known - 2Km to Klondike River - shallow ground water - YG-EP investigating



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Spill Report Information

Spill #	0144
Jurisdiction	Yukon
Community	Dawson City
Address	
Highway	
Milepost	
Feature	Dawson City
Location and Cause	Callison Subdivision - no further information on exact location - leaking truck out of Inuvik
Latitude	64.0347
Longitude	-139.3649
Incident Date	8/26/2001
Lead Agency	Yukon Government - Environmental Programs
Other Agency	
Company(s)	
Amount	50
Units	Gallons (US, liquid)
Quantity	Estimate
Release Description	Leaked
Additional Quantit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Waste Oil
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	cleaned-up by Kluane Frieght Lines - overseen by Fire Dept - product in secure barrell to be shipped - no further information on file



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Spill Report Information

Spill #	0211
Jurisdiction	Yukon
Community	Dawson City
Address	
Highway	
Milepost	
Feature	Dawson City
Location and Cause	Callison Subdivision - parked tanker trailer (Earl MacKenzie's) - vandalism - no further details on exact location
Latitude	64.03653782
Longitude	-139.34772962
Incident Date	5/5/2002 8:44:00 PM
Lead Agency	Yukon Government - Renewable Resources
Other Agency	
Company(s)	Earl MacKenzie
Amount	2000
Units	Litres
Quantity	Estimate
Release Description	Spilled
Additional Quantitit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Diesel
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	fuel had not yet entered surface water - ran into ditch and through to culverts - YG-RR CO Tory Hunter responding - no further information on file



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Spill Report Information

Spill #	0335
Jurisdiction	Yukon
Community	Dawson City
Address	
Highway	
Milepost	
Feature	Dawson City
Location and Cause	Callison Subdivision - Yukon Energy Substation - mechanical failure
Latitude	64.03767917
Longitude	-139.35259699
Incident Date	10/21/2003 2:30:00 PM
Lead Agency	Municipality - identified in Community
Other Agency	
Company(s)	Yukon Energy
Amount	100
Units	Litres
Quantity	Estimate
Release Description	Spilled
Additional Quantitit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Hydraulic Oil
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	less than 100 L but more than 50 L - spill contained inside building - floor surface metal - absorbent pads used to clean up spill - no further information on file



Photo 077: 2575 Environmental office facing south.



Photo 075: 2575 Wellhead enclosure.

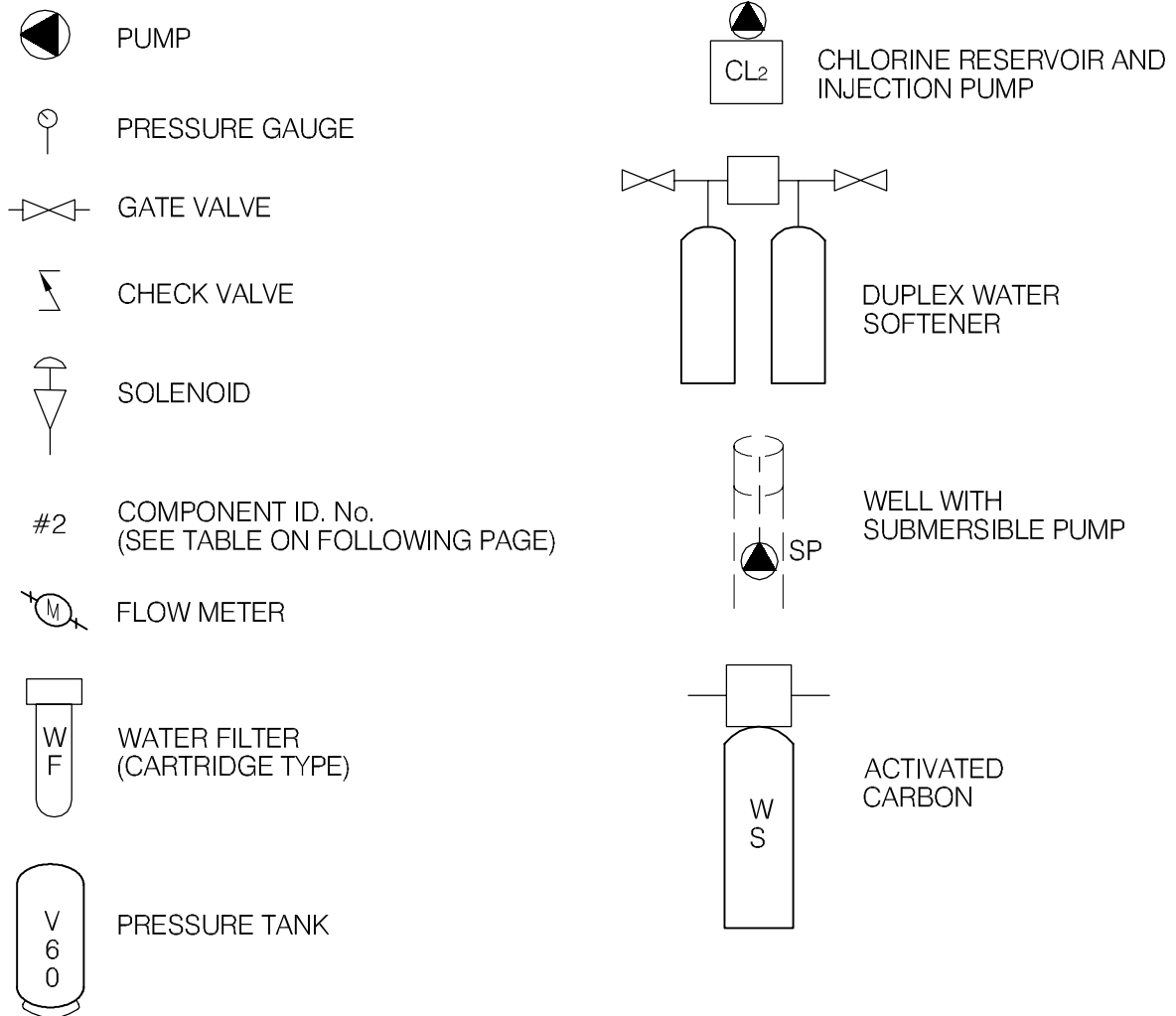


Photo 223: 2575 Jet pump, pump controls and inline filter.

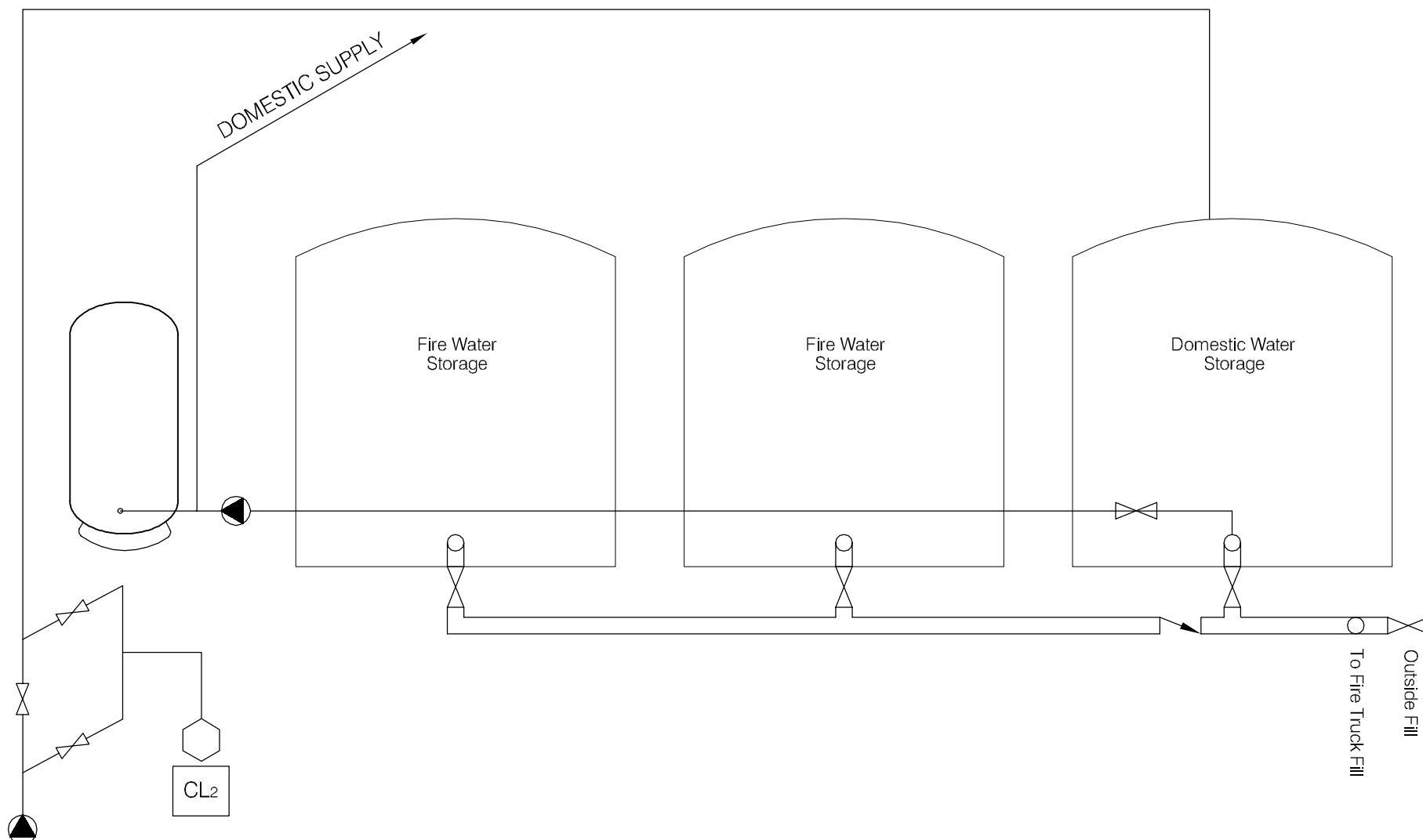


Photo 225: 2575 Water storage tank.

LEGEND



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

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

		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?
Building #	Building Name							
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 (°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 (°C) and Turbidity (NTU)

< = Less than the detection limit indicated.

AO = Aesthetic Objective

MAC = Maximum Acceptable Concentration (Health Based)



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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 E 592363 elev 379m $\pm$ 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 ~13m

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

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

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

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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

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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,

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- 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 _____

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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: _____

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PART B: EBA Site Inspection

Inspector: BERT ALBISER

Date AUG 19/05

WELL ID #	Owner	Location Description
<u>2592</u>	<u>YTG</u>	<u>KLONDIKE VALLEY FIREHALL</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:

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: _____

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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 ☒

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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



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 4/92 TIME: _____

COMPANY: MURPHY CONST. 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: ENCLOSURE

(1) SKETCH OF WELL

(2) DRAIN 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)

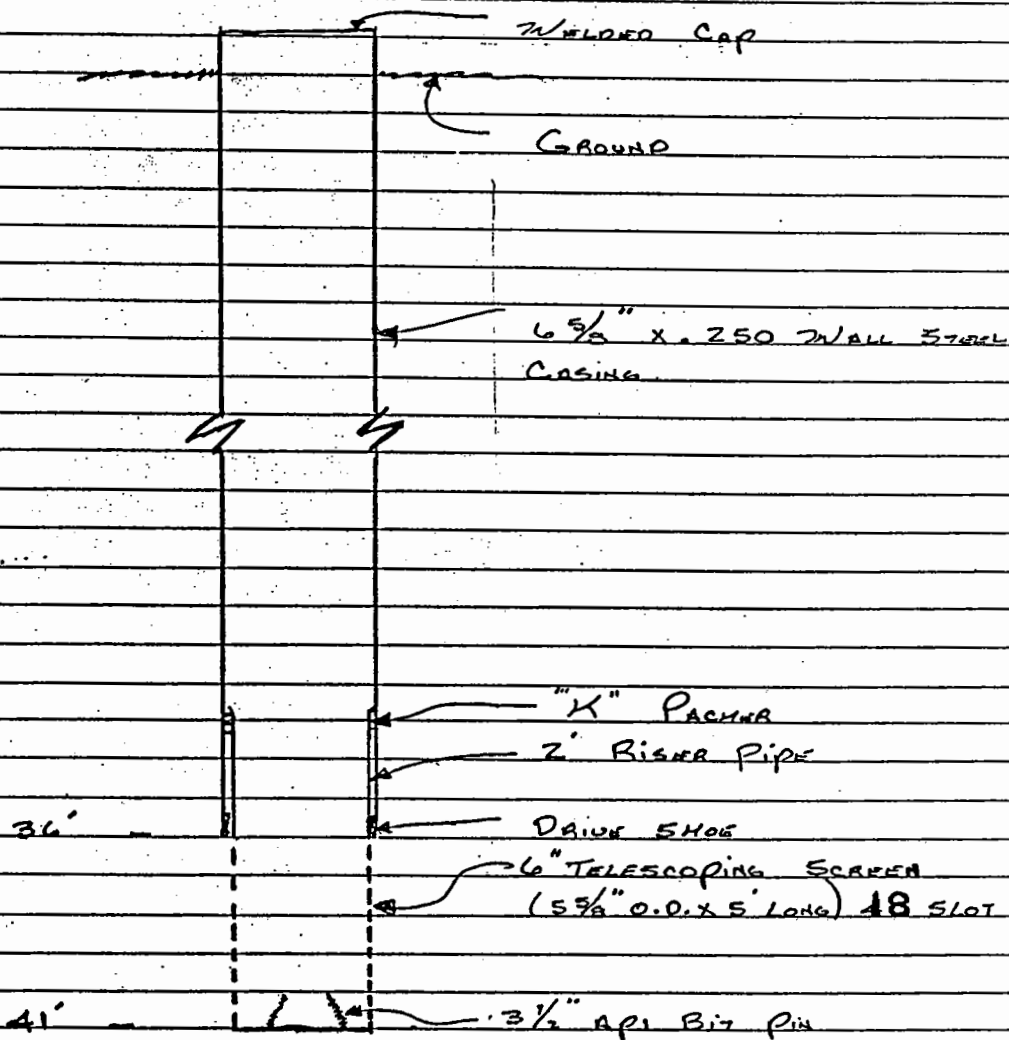


Midnight Sun Drilling Co. Ltd.

E Nov 3/92

PAGE NO _____

SUBJECT Water Well Rock Cavern Fire Hall





Midnight Sun Drilling Co. Ltd.

DATE Nov 3/92

PAGE NO

PROJECT MURPHY CONSTRUCTION ROCK CREEK FIREHALL

Pump

- 1/2 H.P. 230 VOLT SK10B5E-SP MONARCH
Pump Suction Size AT 34'



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: *Stutts*

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 1992Sample Rock Creek Fire HallReport No. 500-81Received: 15 September 1992Lab 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	nfi	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/LPhenol <0.001 mg/L Total Sulphide <0.05 mg/L Copper (Cu) 0.005 mg/LArsenic (As) <0.0002 mg/L Mercury (Hg) <0.0001 mg/LIron 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

J. D. Haz
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 (gpm)	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

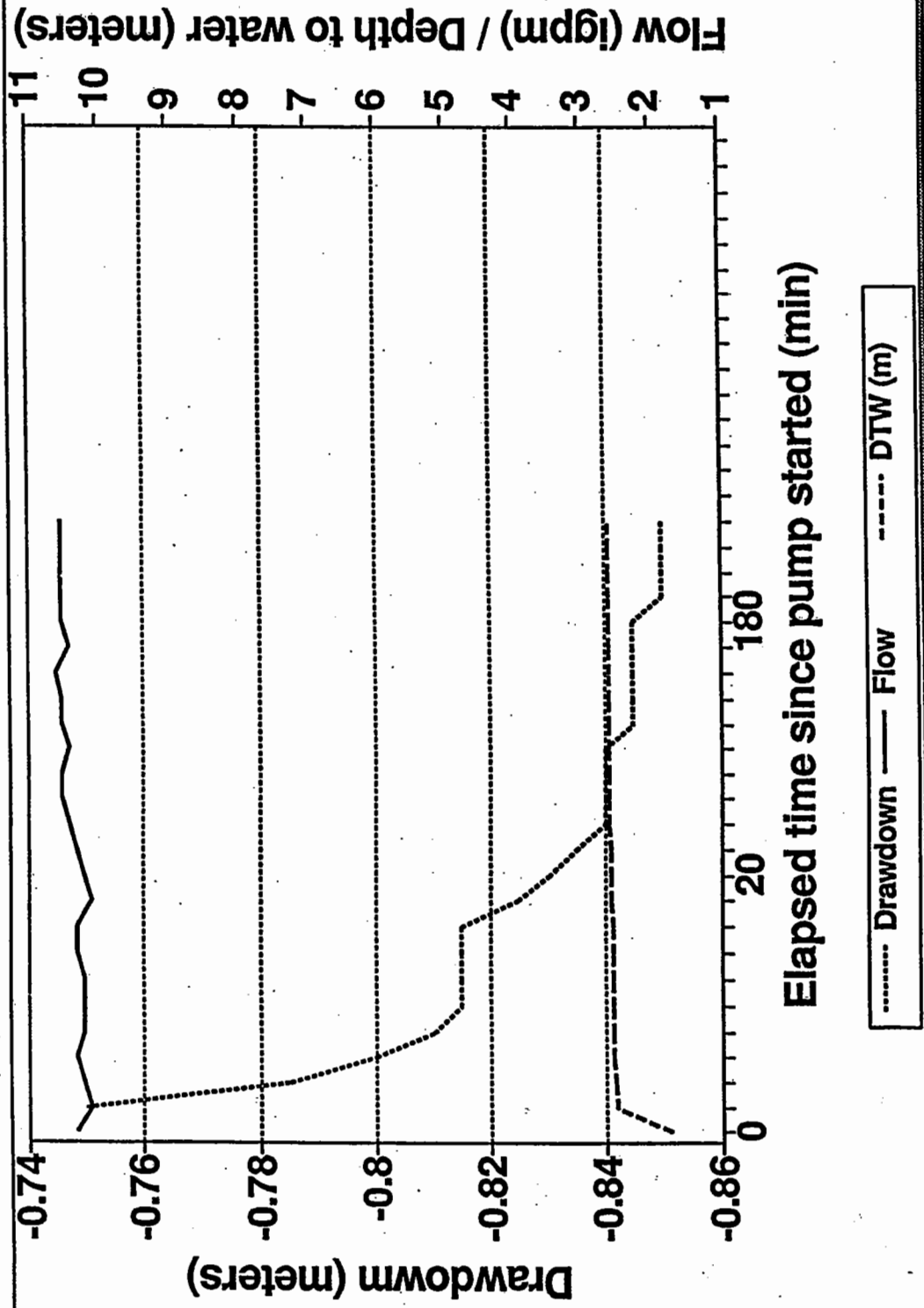
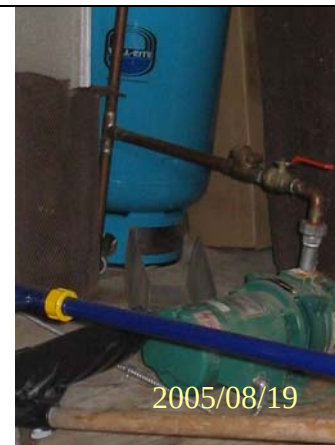
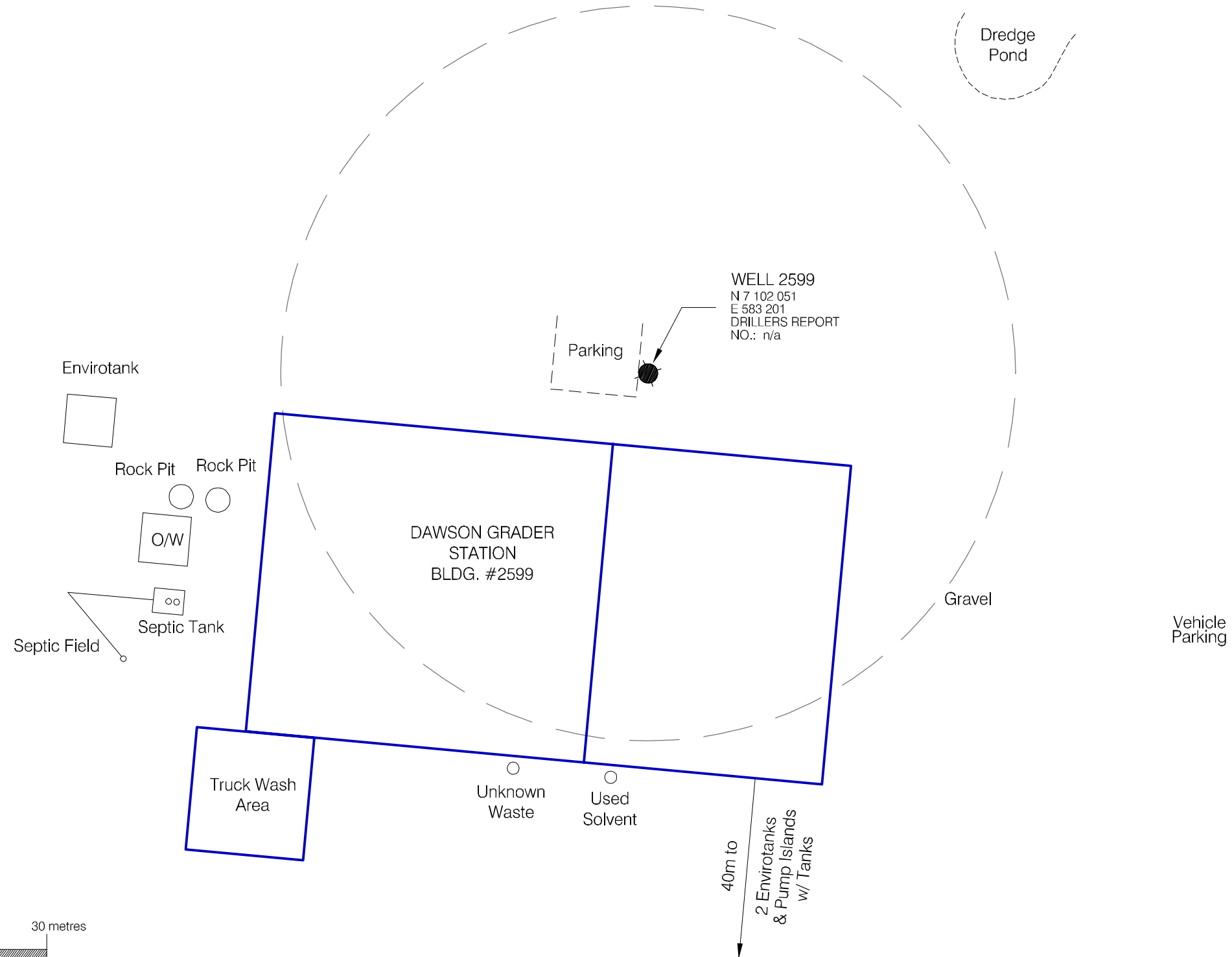


**Photo 093:** 2592 Klondike Valley Fire Hall**Photo 096:** 2592 Water filling station.**Photo 236:** 2592 Chlorination system, flow meter, and associated plumbing.**Photo 237:** 2592 Jet pump and pressure tank.



SCALE 1:400

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.

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



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

DAWSON GRADER STATION
BUILDING # 2599
SITE LOCATION DIAGRAM
WELL ID: 2599

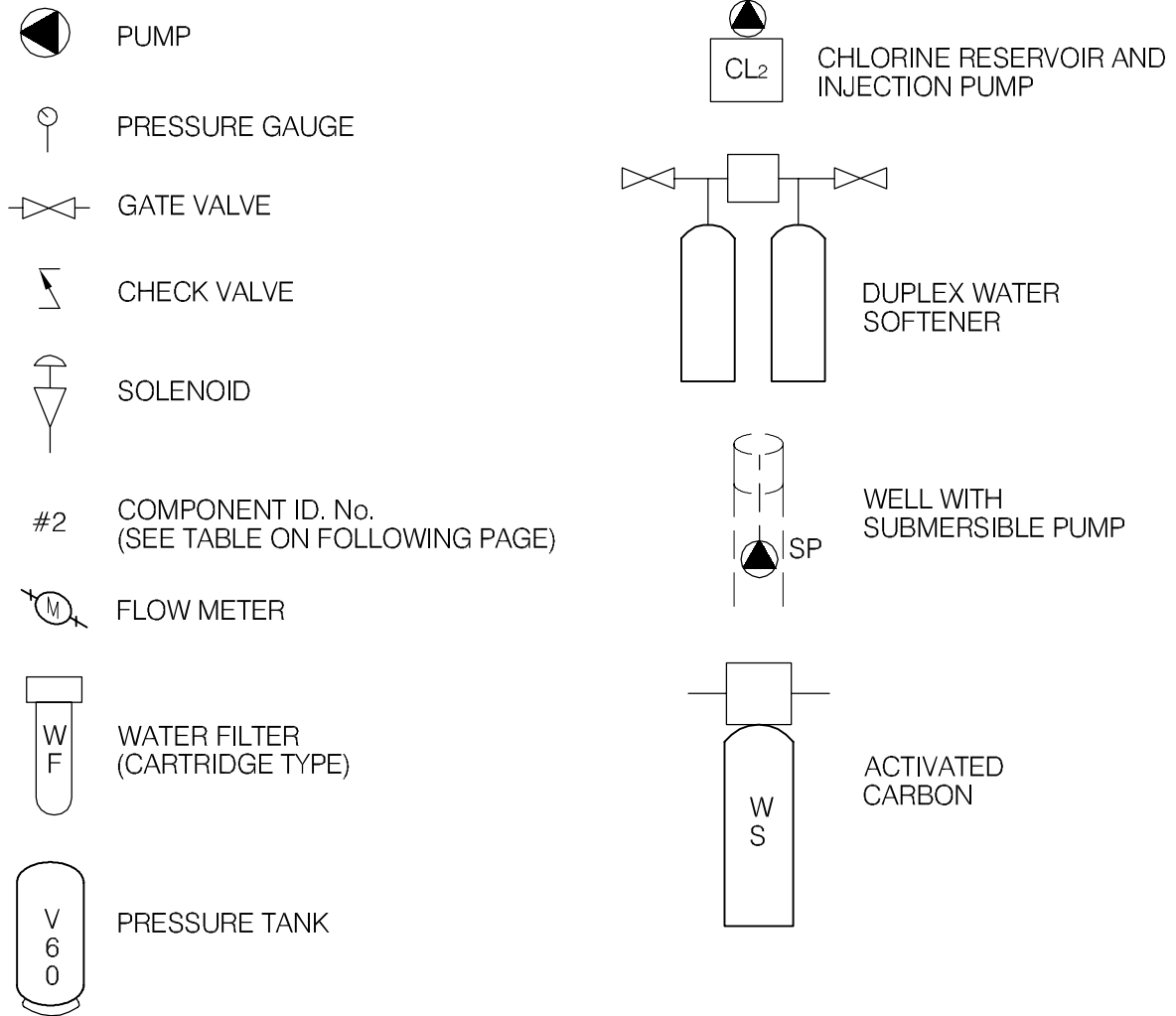
REVISION ISSUE

0

FIGURE No.

FIGURE 2599-A

LEGEND



EBA Engineering Consultants Ltd.

CLIENT



PROJECT

SMALL PUBLIC WATER SYSTEMS ASSESSMENT
WESTERN REGION

TITLE

SCHEMATIC SYSTEM
LEGEND

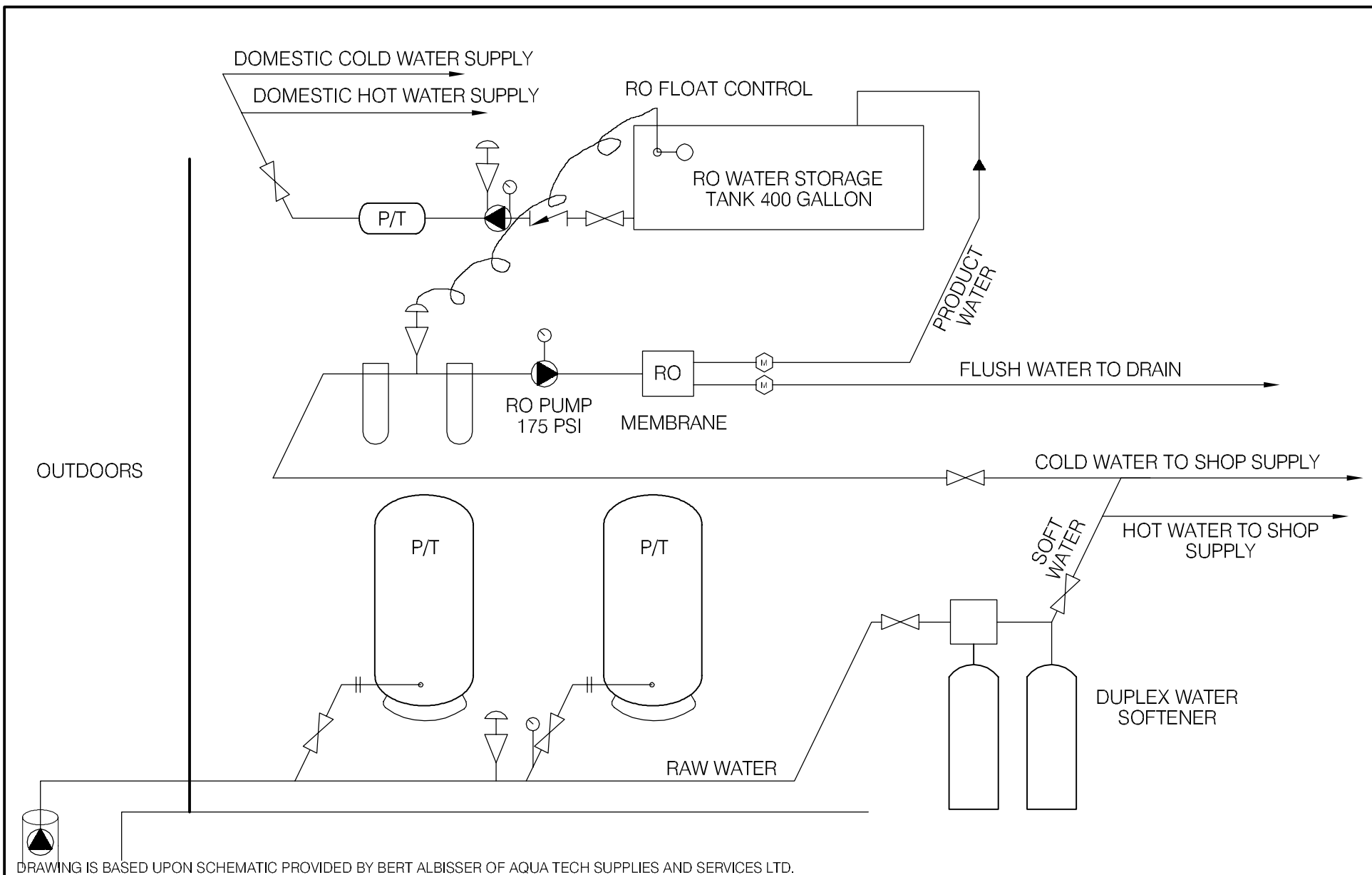
DATE APRIL 2006

DWN. JSB

CHKD. RMM

FILE NO. 1260002

DRWG. LEGEND



 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.: 2599 DAWSON GRADER STATION - DAWSON, YT.						
DATE	SEPT. 2005	DWN.	JSB	CHKD.	RMM	FILE NO.	1260002.004	DWG.:	FIGURE 2599-B

Northern Region – Dawson City Grader Station
Building # 2599

DISTRIBUTION & TREATMENT SYSTEM DATA

Item	Description	Manufacturer	Model	Part No.	Serial No.	Size
1	SUB PUMP	N/A	N/A			4"
2	PRESSURE TANKS	CON-AIRE	SCA 220	X 2		
3	PRESSURE SWITCH	SQUARE D	FSG 2			
4	PRESSURE GAUGE	WINTERS	0-100 4"			
5	WATER SOFTENER	AQUA TECH	AQUA 9500 98000-MI			90K DUPLEX
6	RO. SYSTEM	AQUA TECH	U566LT 1800			22000 GPD
7	STORAGE TANK	N/A.				
8	JET PUMP					
9	PRESSURE TANK					
10	INLINE FILTER					

TABLE 2599 - 1: SUMMARY OF BACTERIOLOGICAL RESULTS

		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?
Building #	Building Name							
2599	Dawson City Grader Station	8	Oct-04 to Jun-05	no	0/8	no	9-Jun-05	no



Table 2599 - 2: Water Quality Results

SOURCE:		Building 2599 - Dawson City Grader Station				GCDWQ Criteria		
Location/ Resident		Dawson City						
Address								
Treatment		Softener, filtration, reverse osmosis	None	Softener, filtration	Softener, filtration, reverse osmosis			
Disinfection		None						
Source of Water								
Purpose of Sampling		Base Line	Base Line	Additional Sampling	Additional Sampling			
Sample Location				faucet (Non- Potable)	Washroom			
Date Sampled		29-Sep-04	8-Jun-05	19-Aug-05	19-Aug-05			
Physical Tests (ALS)						AO	MAC	AO
Colour (CU)		<5	8.5					15
Conductivity (uS/cm)			386					
Total Dissolved Solids		<1	243	<1.3				500
Hardness CaCO3		<0.9	185			AO >200 = poor, > 500 unacceptable ^A		
pH		6.14	7.96			6.5		8.5
Turbidity (NTU)		0.3	41.1	1.22			1	5
UV Absorbance				0.109				
% UV Transmittance				77.8				
Dissolved Anions (ALS)								
Alkalinity-Total CaCO3		<5	134					
Chloride Cl		<0.5	0.99					250
Fluoride F		<0.05	0.112				1.5	
Silicate SiO4				13.8				
Sulphate SO4		<0.2	72.7					500
Nitrate Nitrogen N		<0.1	<0.10				10	
Nitrite Nitrogen N		<0.05	<0.10				3.4	
Ammonia Nitrogen N								
Total Phosphate PO4				0.0159				
Total Metals (ALS)								
Aluminum T-Al		<0.005	0.092	<0.020			0.1	
Antimony T-Sb		<0.0002	<0.00050	<0.0010			0.006	
Arsenic T-As		0.0047	0.0864	0.047	0.00457		0.025	
Barium T-Ba		<0.001	0.165	<0.040			1	
Boron T-B		0.002	<0.10	<0.20			5	
Cadmium T-Cd		<0.00001	<0.00020	<0.00040			0.005	
Calcium T-Ca			48.7	<0.20				
Chromium T-Cr		<0.0005	<0.0020	<0.0040			0.05	
Copper T-Cu		0.259	0.0423	0.0097			1	
Iron T-Fe		<0.01	8.39	0.171				0.3
Lead T-Pb		0.0039	0.0174	<0.0020			0.01	
Magnesium T-Mg			15.3	<0.20				
Manganese T-Mn		<0.005	0.651	<0.0040				0.05
Mercury T-Hg			<0.00020	<0.00020			0.001	
Potassium T-K			0.81	172				
Selenium T-Se			<0.0010	<0.0020			0.01	
Sodium T-Na		<0.4	4.3	<2.0				200
Uranium T-U		<0.0005	0.00189	0.00084			0.02	
Vanadium T-V				<0.030				
Zinc T-Zn		0.019	0.134	<0.10				5
Dissolved Metals								
Aluminum D-Al				<0.020			0.1	
Antimony D-Sb				<0.0010			0.006	
Arsenic D-As				0.0441			0.025	
Barium D-Ba				<0.040			1.0	
Boron D-B				<0.20			5	
Cadmium D-Cd				<0.00040			0.005	
Calcium D-Ca				<0.20				
Chromium D-Cr				<0.0040			0.05	
Copper D-Cu				0.0138				1.0
Iron D-Fe				0.043				0.3
Lead D-Pb				<0.0020			0.01	
Magnesium D-Mg				<0.20				
Manganese D-Mn				<0.0040				0.05
Mercury D-Hg				<0.00020			0.001	
Potassium D-K				172				
Selenium D-Se				<0.0020			0.01	
Sodium D-Na				<2.0				200
Uranium D-U				0.0008			0.02	
Vanadium D-V				<0.030				
Zinc D-Zn				<0.10				5.0
Organic Parameters								
Tannin and Lignin				0.24				
Total Organic Carbon C				4.61				
Field Chemistry (EBA)								
pH				7.81	7.83	6.5		8.5
TDS (ppm)				267	3			500
EC (uS/cm)				535	6			
Temperature (°C)				1.1	17.2			
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)



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SMALL PUBLIC WATER SYSTEM ASSESSMENT

PART A: EBA Site Inspection

Inspector: Ryan Martin, Luke Lebel

Date August 19, 2005

WELL ID #	Owner	Location Description
2599	YTG	Dawson City Grader Station

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 7102051 E 583201 elev 343m $\pm 10m$

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 _____

Grader Station

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

g. Nearest building, specify Grader Station

h. Distance from well to building ~6m

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

j. Distance from well to nearest point of known field: 50 m

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

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- 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

Tank @ ~42m, Rock pits @ ~36m

- 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, but unlikely

- 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: ASTs; Distance from well to Potential Source 1: ~44m

Potential Source 2: Fuelling station; Distance from well to Potential Source 2: ~74m

Potential Source 3: Drums; Distance from well to Potential Source 3: ~33m

Potential Source 4: Oil/water separator; Distance from well to Potential Source 4: ~40m

- t. Are there other wells on this property? ☐ Yes ☒ No unlikely

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

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2. Well and Wellhead information:

- a. When was well installed? Year unknown 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 _____ ☒ No
- f. Well casing: Diameter 15 cm Material: ☐ steel ☐ plastic ☐ concrete
- g. Depth of well: unknown ☐ measured (if possible) ☐ reported ☐ from log
- h. Static water level below ground: 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 unknown
- j. (If bedrock) Does the well have a liner? ☐ yes ☐ No ☐ steel ☐ plastic
- k. If there is a well screen: length _____ slot size(s) _____
Location of screen: from _____ to _____ from log reported
- l. Is there a sump below the screen? ☐ Yes ☐ No unknown
- 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,

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- i. Is the well head below grade? describe in detail ~ 2.3 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
- 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 or disinfection ☒ Yes ☐ No

Explain (filtration, disinfection etc...) softener for regular water + RO for drinking water

4. Aquifer Supplying This Well:

- a. The aquifer is: ☐ bedrock ☒ granular sediment ☐ unknown
likely
- 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 _____

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d. Date installed: _____ By: _____

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

f. Drop pipe for submersible pump: ☐ steel ☐ plastic *unknown*

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
But tap against 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: Styrofoam insulation + heat trace

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 ALBISSEER

Date AUG 19/05

WELL ID #	Owner	Location Description
<u>2599</u>	<u>YTG</u>	

6. Water Treatment

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

☐ chlorination ☒ iron and or manganese removal ☒ other REVERSE OSMOSIS

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: PRESSURE TANKS & R.O. WATER STORAGE TANK

Where is it located? RO TANK UNDER REAR STAIRWELL

Comments: PRESSURE TANKS UNDER FRONT STAIRWELL

Is the room in which the water tank is located heated to maintain an optimum temperature of 4°C for stored water?

☒ YES ☐ NO

Comments: _____

Are there windows in the add-on that may allow direct sunlight onto the water holding tank? YES

☒ NO

Comments: _____

Are there other heat sources near the tank? YES ☒ NO

Comments: _____

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

Comments: _____

Overall Tank

What are the tank size and dimensions?

What material is the tank constructed off? 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: _____

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

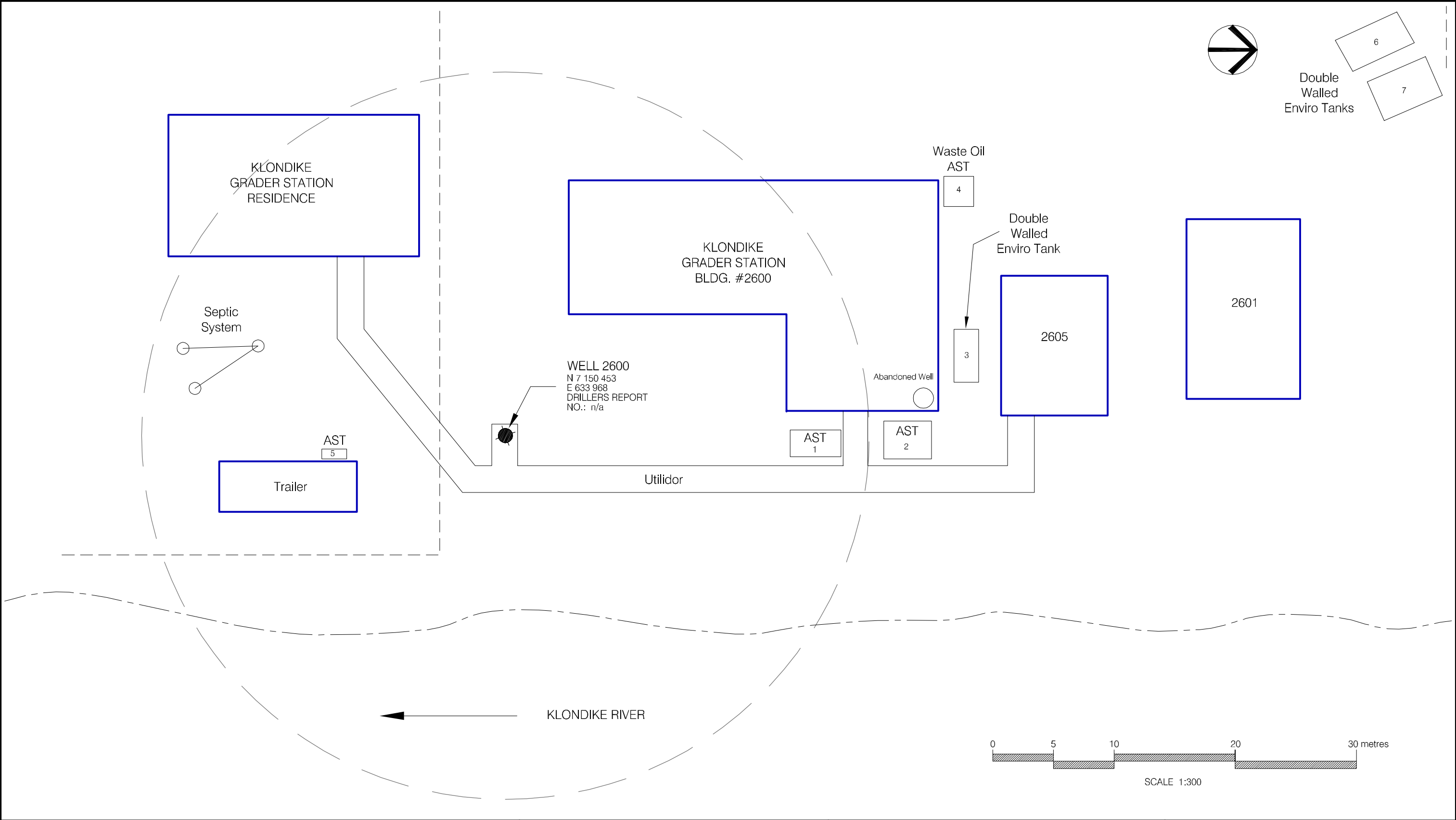
a. Comments on overall installation:

THIS INSTALLATION IS IN GOOD ORDER

b. Recommendations:

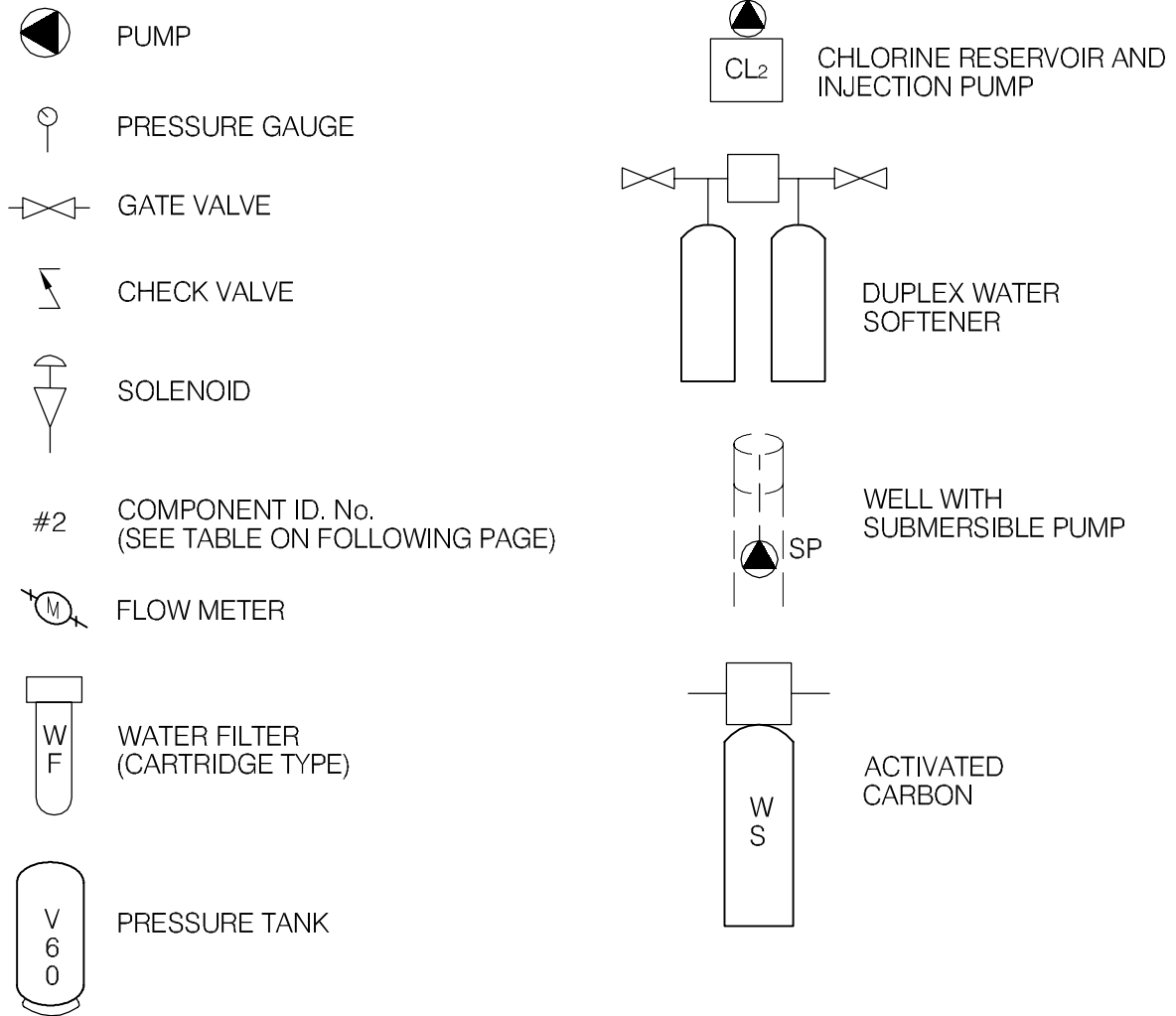
INSTALL FILTRATION AND UV SYSTEM (WFF-55)
ON DOMESTIC LOOP.

**Photo 087:** 2599 Wellhead enclosure.**Photo 086:** 2599 Wellhead in pit.**Photo 230:** 2599 Pressure tank, pump controls and softener system.**Photo 234:** 2599 Reverse osmosis system (front) water storage tank (back)



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.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						

LEGEND



EBA Engineering Consultants Ltd.

CLIENT



PROJECT

SMALL PUBLIC WATER SYSTEMS ASSESSMENT
WESTERN REGION

TITLE

SCHEMATIC SYSTEM
LEGEND

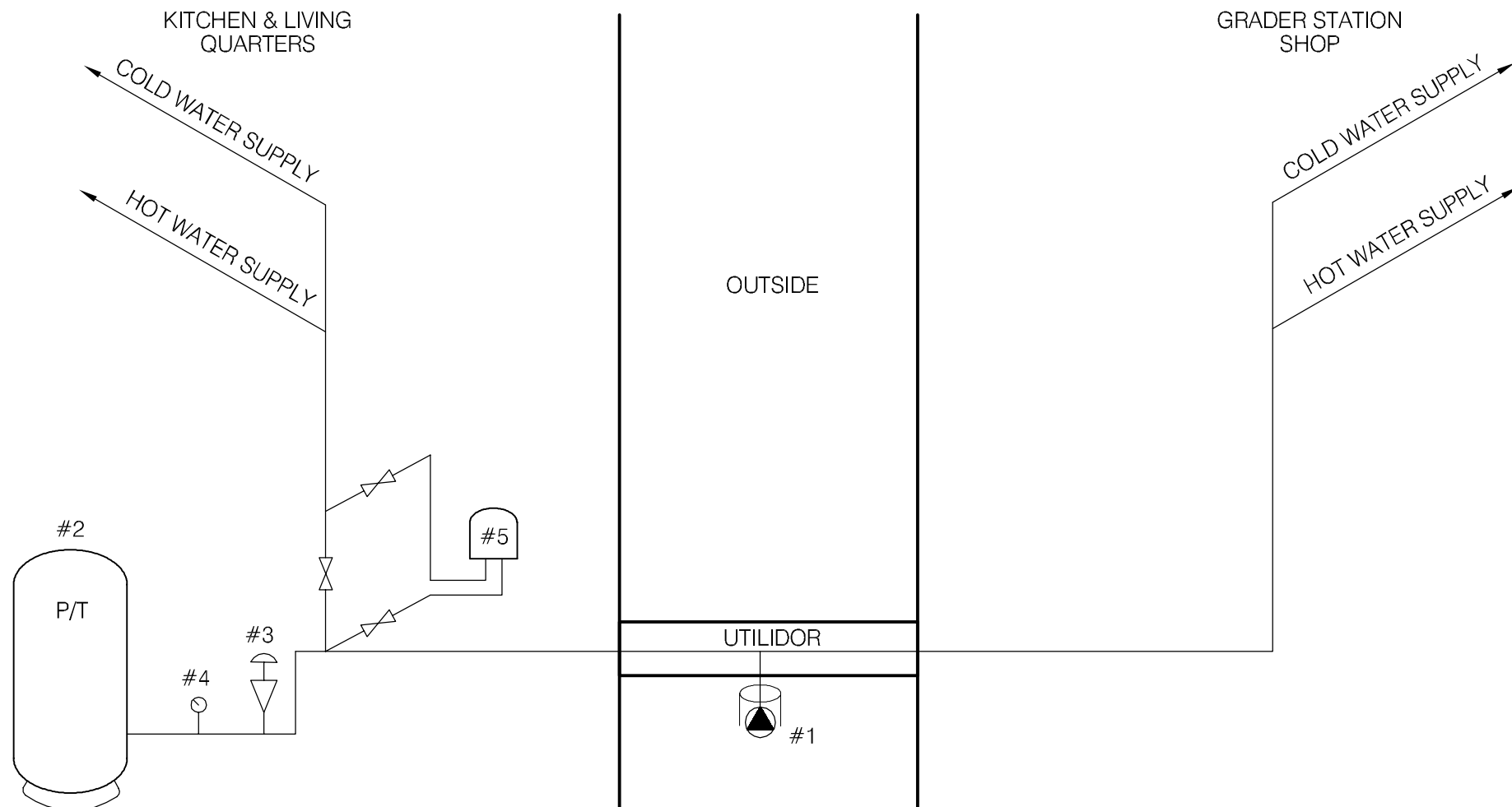
DATE APRIL 2006

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.: 2600 KLONDIKE GRADER STATION - DAWSON, YT.						
DATE	SEPT. 2005	DWN.	JSB	CHKD.	RMM	FILE NO.	1260002.004	DWG.:	FIGURE 2600-B

Northern Region – Dempster Grader Station
Building # 2600

DISTRIBUTION & TREATMENT SYSTEM DATA

Item	Description	Manufacturer	Model	Part No.	Serial No.	Size
1	SUB. PUMP	MONARCH	RS12SIDE			4" - 1Hp.
2	PRESSURE TANK	CHALLENGER	PC122			122L
3	PRESSURE SWITCH	SQUARE D	GSG-2			5HP - 1/4" FIP
4	PRESSURE GAUGE	MARSH	0-100 PSI			2" - 1/4" FIP
5	INLINE FILTER	HARMSCO	HIF-7	(LID AND CHANGE OUT CLUSTER MISSING).		
6						
7						
8						
9						
10						

TABLE 2603 - 1: SUMMARY OF BACTERIOLOGICAL RESULTS

		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?
Building #	Building Name							
2603	Living Complex Klondike	6	Sept-04 to Jun-05	yes	2/6	no	9-Jun-05	yes



Table 2600 - 2: Water Quality Results

SOURCE:		Building 2600 - Klondike Grader Station			GCDWQ Criteria		
Location/ Resident		Dempster Highway					
Address							
Treatment		None					
Disinfection		None					
Source of Water		On-site well					
Purpose of Sampling		Base Line	Base Line	Additional Sampling			
Sample Location				Washroom faucet			
Date Sampled		29-Sep-04	8-Jun-05	18-Aug-05	Lower	Upper Limit	
Physical Tests (ALS)					AO	MAC	AO
Colour (CU)		29	<5.0	<5.0			15
Conductivity (uS/cm)			432				
Total Dissolved Solids		239	259				500
Hardness CaCO3		201	201		AO >200 = poor, > 500 unacceptable ^A		
pH		8.02	8.20		6.5		8.5
Turbidity (NTU)		13.0	12.5	18.6		1	5
UV Absorbance				0.005			
% UV Transmittance				98.9			
Dissolved Anions (ALS)							
Alkalinity-Total CaCO3		166	173				
Chloride Cl		2.1	2.64				250
Fluoride F		0.18	0.22			1.5	
Silicate SiO4							
Sulphate SO4		56.7	60.9				500
Nitrate Nitrogen N		<0.1	<0.10			10	
Nitrite Nitrogen N		<0.05	<0.10			1	
Ammonia Nitrogen N							
Total Phosphate PO4							
Total Metals (ALS)							
Aluminum T-Al		0.008	<0.010			0.1	
Antimony T-Sb		<0.0002	<0.00050			0.006	
Arsenic T-As		0.003	0.00261			0.025	
Barium T-Ba		0.083	0.071			1	
Boron T-B		0.021	<0.10			5	
Cadmium T-Cd		<0.00001	<0.00020			0.005	
Calcium T-Ca			51.2				
Chromium T-Cr		0.0011	<0.0020			0.05	
Copper T-Cu		<0.001	<0.0010			1	
Iron T-Fe		0.74	1.39	1.32			0.3
Lead T-Pb		<0.0001	<0.0010			0.01	
Magnesium T-Mg			17.7				
Manganese T-Mn		0.138	0.142	0.138			0.05
Mercury T-Hg			<0.00020			0.001	
Potassium T-K			0.83				
Selenium T-Se			<0.0010			0.01	
Sodium T-Na		10.9	11.3				200
Uranium T-U		<0.0005	0.00025			0.02	
Vanadium T-V							
Zinc T-Zn		<0.001	<0.050				5
Dissolved Metals							
Iron D-Fe				<0.030			0.3
Manganese D-Mn				0.133			0.05
Organic Parameters							
Tannin and Lignin				0.27			
Total Organic Carbon C				0.74			
Polycyclic Aromatic Hydrocarbons							
Acenaphthene				<0.000050			
Acenaphthylene				<0.000050			
Acridine				<0.000050			
Anthracene				<0.000050			
Benzo(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				8.1	6.5		8.5
TDS (ppm)				203			500
EC (uS/cm)				406			
Temperature (°C)				7.1			
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)



SMALL PUBLIC WATER SYSTEM ASSESSMENT**PART A: EBA Site Inspection**Inspector: Ryan Martin, Luke LebelDate August 18, 2005

WELL ID #	Owner	Location Description
2600	YTG	Klondike Grader Station

1. Well Location and Potential Contaminant Sources

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

Dempster Highway

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

Km 65 Dempster Highwayc. GPS location: N 7150453 E 633968 elv 974m ±8m UTM Zone 7d. Is there electric power? ☒ Yes ☐ Noe. 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, living complex, generating station☐ 5 or more delivery sites on a trucked distribution system? If so how many _____g. Nearest building, specify Maintenance garageh. Distance from well to building ~10mi. If there is an effluent disposal field, is its location known? ☒ Yes ☐ Noj. Distance from well to nearest point of known field: ~25mk. Well location relative to field: ☐ upslope ☐ downslope ☒ lateral

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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
Unlocked enclosure

Entrance by animals? ☐ Yes ☒ No
Access possible. Mouse droppings observed. No cap on well

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 *unlikely*

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: AST 1; Distance from well to Potential Source 1: ~20m

Potential Source 2: AST 2; Distance from well to Potential Source 2: ~30m

Potential Source 3: AST 3; Distance from well to Potential Source 3: ~35m

Potential Source 4: River; Distance from well to Potential Source 4: ~15m

AST 4 @ ~40m, AST 5 @ ~15m, AST 6+7 @ ~60m

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

Dug well (abandoned) @ ~35m. Various monitoring wells

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

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2. Well and Wellhead information:

- a. When was well installed? Year 1988 Month September
- 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 15 cm Material: ☒ steel ☐ plastic ☐ concrete
- g. Depth of well: 47 ft ☐ measured (if possible) ☐ reported ☒ from log
- h. Static water level below ground: 3.55 m bc
☒ measured (if possible) ☐ reported ☒ from log ☐ flowing
12 ft from log
- 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 4 ft slot size(s) 25 slot
Location of screen: from unknown, likely 43 ft to 47 ft to 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,

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- i. Is the well head below grade? describe in detail ~0.15 m 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 Yes. Mouse droppings in insulation
- v. Does the well casing have a proper seal cap? ☐ Yes ☒ No
- If no, describe condition None present. Well is open

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...) _____

4. Aquifer Supplying This Well:

- a. The aquifer is: ☒ bedrock ☒ granular sediment ☐ unknown
overburden well into broken bedrock
- 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 _____

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d. Date installed: _____ By: _____

e. For submersible pump, depth of setting below surface 4.70 m bc

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

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

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

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

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

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

If yes, describe: Heat trace and 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 ALBISSEER

Date AUG 18/05

WELL ID #	Owner	Location Description
<u>2600</u>	<u>YTG</u>	<u>DEMPSTON GRADER STATION</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: PRESSURE TANK

Where is it located?

Comments: RESIDENTIAL COMPLEX MECHANICAL ROOM

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: _____

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Overall Tank

What are the tank size and dimensions?

What material is the tank constructed of? _____

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

Comments: _____

Tank Inlet, Outlet and Lid

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

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

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

Is the water tank drain accessible? YES NO

WATER TANK AND WATER QUALITY CONDITION

Are there signs of staining or biofouling? YES NO

Comments: _____

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

Comments: _____

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

Have there been any bacteriological analyses conducted previously? YES NO

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

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

8. Conclusions

a. Comments on overall installation:

THIS IS A PROFESSIONAL INSTALLATION WITH
THE EXCEPTION OF THE WELL HEAD.

b. Recommendations:

LIFT PUMP, CLEAN & SUPER CHLORINATE THE
WELL. INSTALL WATER TREATMENT TO SUIT
THE WATER QUALITY ANALYSIS FOLLOWED
BY 5 MICRON FILTER AND 15 GPM
UV SYSTEM (NECESS CERTIFIED) RETRANGE
PIPING TO SUIT TREATMENT SYSTEM.

Les
trouis
Laurry



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 #	0124
Jurisdiction	Yukon
Community	
Address	
Highway	Klondike Highway
Milepost	M 41
Feature	North Klondike River
Location and Cause	Klondike Camp - leaking fuel filter on generator
Latitude	64.4529
Longitude	-138.215
Incident Date	5/19/2001
Lead Agency	Yukon Government - Environmental Programs
Other Agency	
Company(s)	YTG Highways
Amount	
Units	
Quantity	Unknown
Release Description	Leaked
Additional Quantitit	
Concentration	
Concentration Unit	
Phase	Liquid
Major Contaminant	Diesel
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	no further info on file



Photo 069: 2600 Klondike grader station facing southeast.



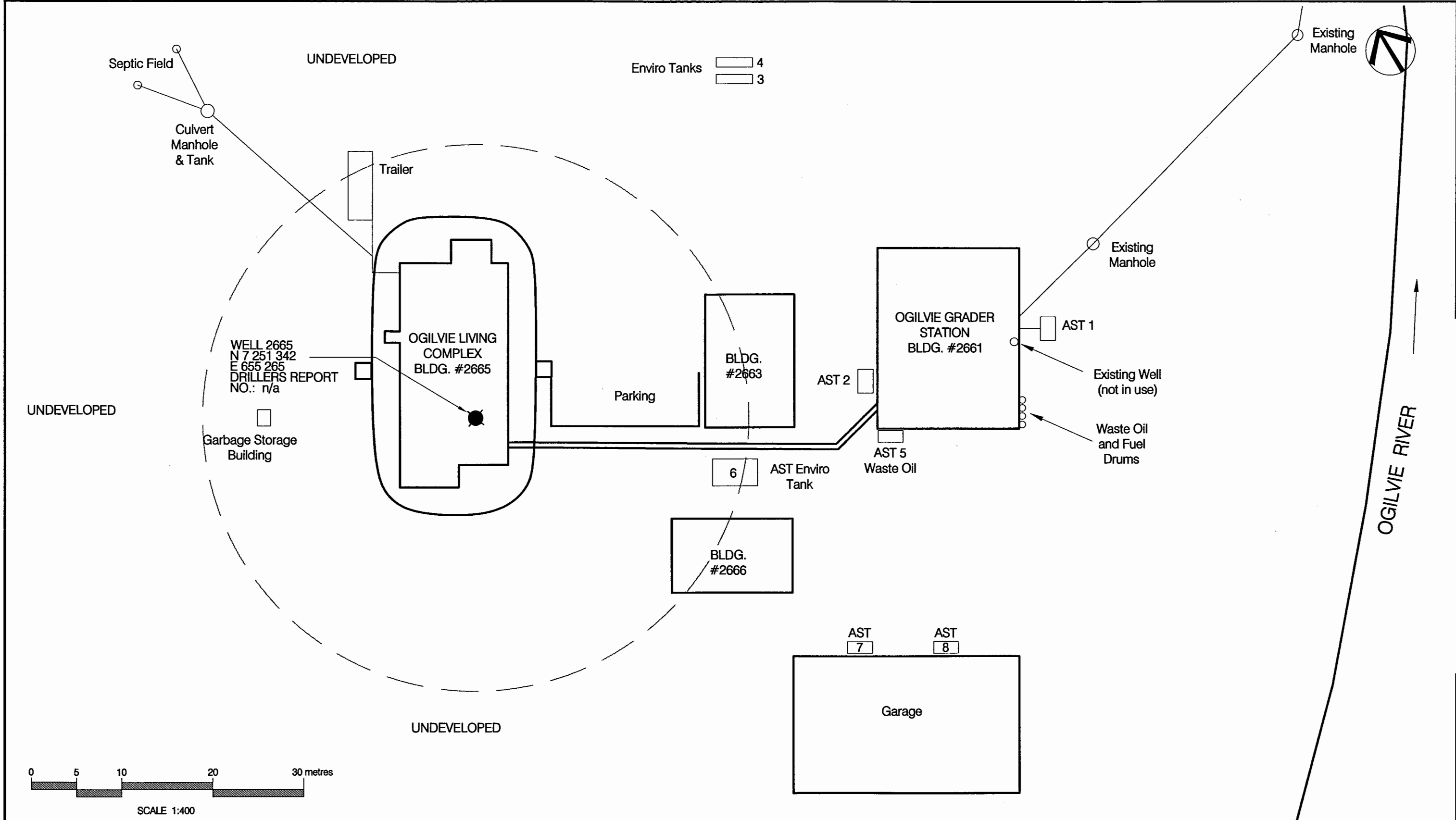
Photo 067: 2600 Wellhead with surrounding enclosure and utilidor.



Photo 065: 2600 Wellhead – note that at the time of the assessment there was no well cap and evidence of mice around the wellhead.



Photo 196: 2600 Abandoned dug well.



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			

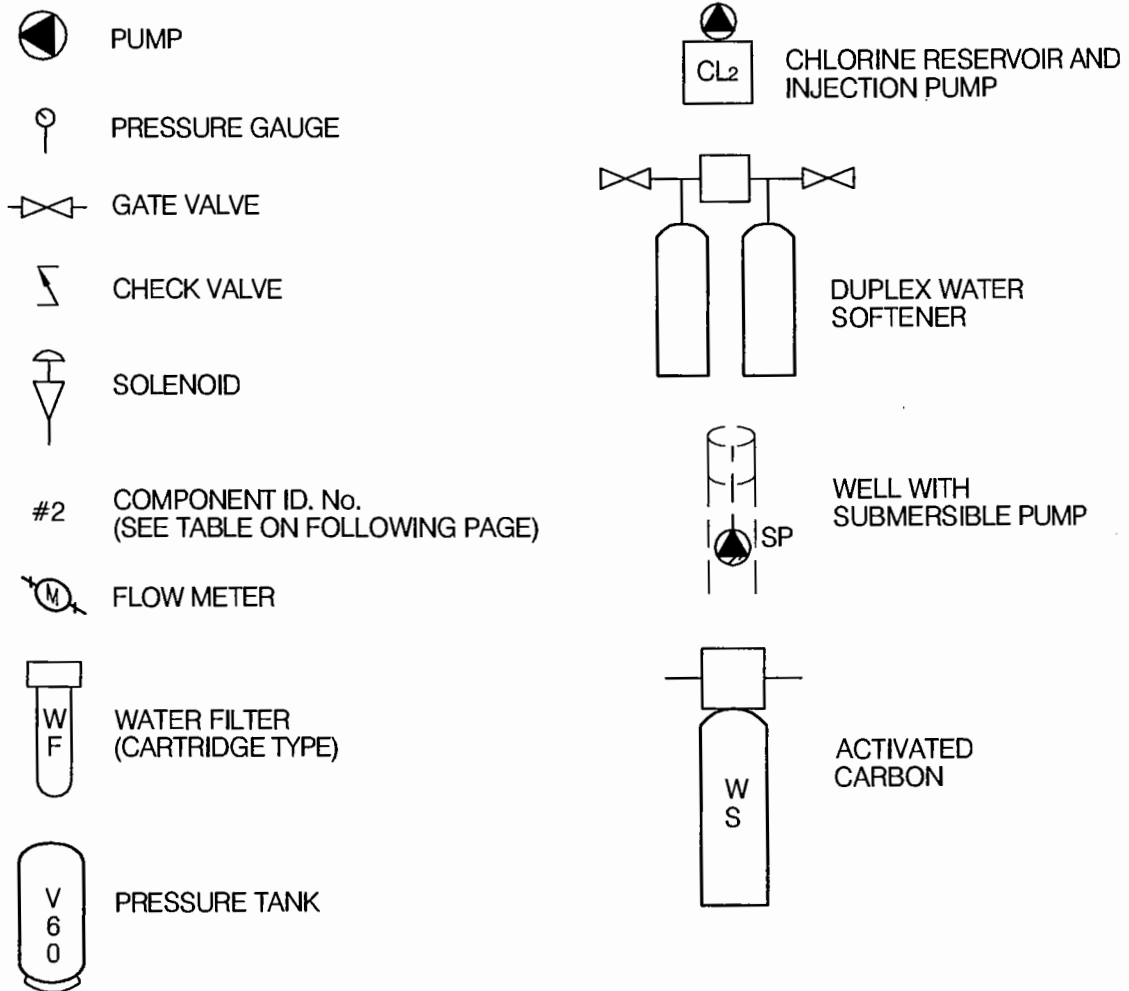
EBA Engineering Consultants Ltd.

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	
OGILVIE GRADER STATION & LIVING COMPLEX BUILDING # 2665 SITE LOCATION DIAGRAM WELL ID: 2665	REVISION ISSUE 0 FIGURE No. FIGURE 2665-A

LEGEND



 **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

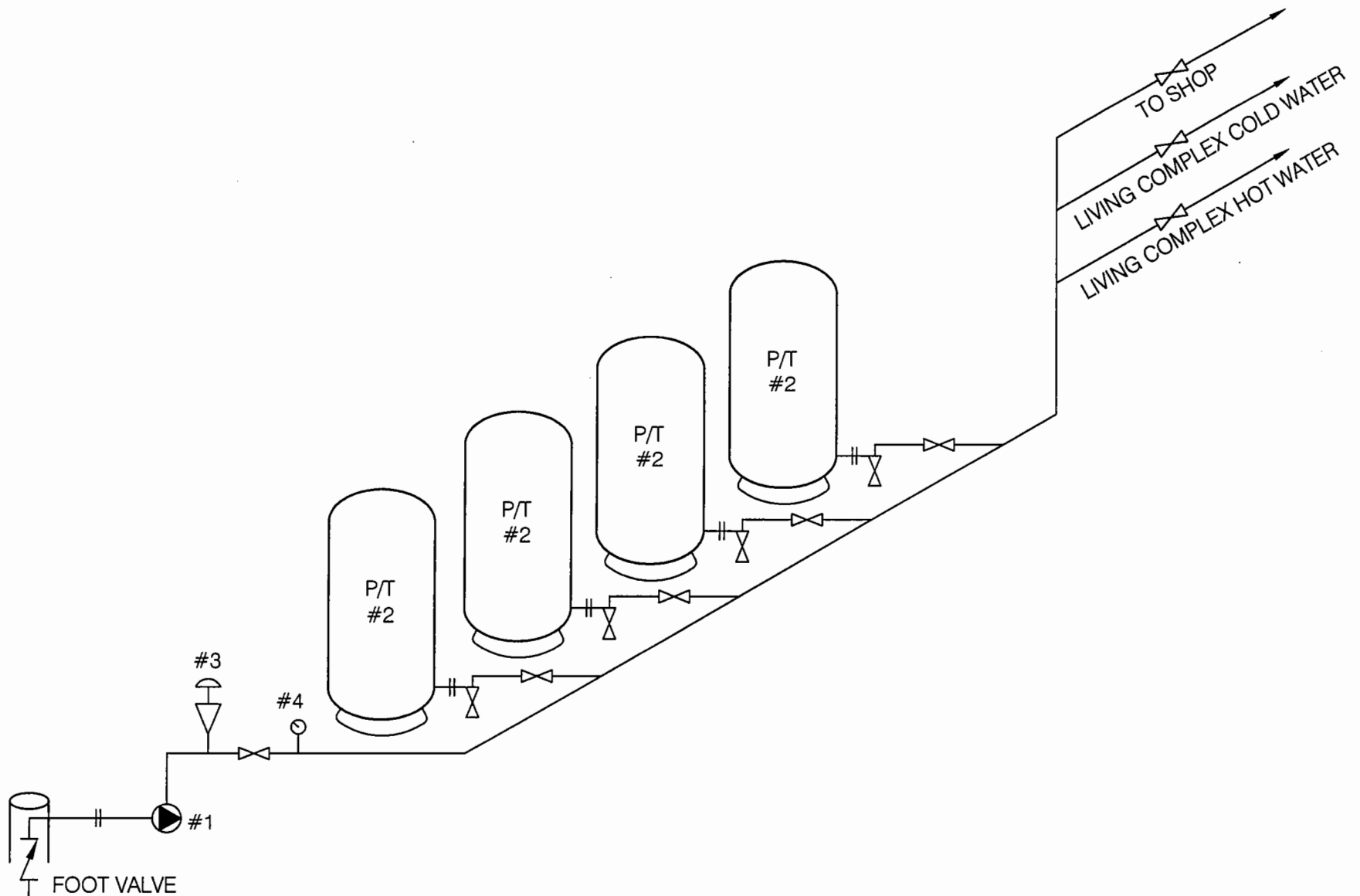
CHKD. RMM

FILE NO.

1260002

DRWG.

LEGEND



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



EBA Engineering Consultants Ltd.

CLIENT



Highways and Public Works
Property Management Branch

PROJECT

SMALL PUBLIC WATER SYSTEMS ASSESSMENT
NORTHERN REGION

TITLE

WATER SYSTEM DISTRIBUTION/TREATMENT
SCHEMATIC SYSTEM ID.: 2661
OGILVIE GRADER STATION - DAWSON, YT.

DATE

SEPT. 2005

DWN.

JSB

CHKD.

RMM

FILE NO.

1260002.004

DWG.:

FIGURE 2661-B

Northern Region – Ogilvie Grader Station
Building # 2661

DISTRIBUTION & TREATMENT SYSTEM DATA

Item	Description	Manufacturer	Model	Part No.	Serial No.	Size
1	JET PUMP	MONARCH	SERIES 70	-1		1/3 HP.
2	PRESSURE TANK	WELLX TROL	Wx-102			4.5 GALLON
3	SUB. PUMP	MONARCH				1/2 HP-4"
4	PRESSURE TANK	CHALLENGER	PC 111			111L
5	PRESSURE SWITCH	SQUARE D	FSG-2			
6	PRESSURE GAUGE	MARSH	0-100 PSI			2" - 1/4 FIP
7						
8						
9						
10						

Northern Region – Ogilvie Living Complex
Building # 2665

DISTRIBUTION & TREATMENT SYSTEM DATA

Item	Description	Manufacturer	Model	Part No.	Serial No.	Size
1	JET PUMP	MONARCH	MJC-100			1Hp.
2	PRESSURE TANKS(4)	MONARCH	M302			
3	PRESSURE SWITCH	SQUARE D	FSG-2			2HP- 1/4" FIP
4	PRESSURE GAUGE	WINTERS	0-100			4" 1/4" FIP
5						
6						
7						
8						
9						
10						

TABLE 2661/2665 - 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?
2661	Ogilvie Grader Station	6	Oct-04 to Jun-05	no	0/6	no	9-Jun-05	no
2665	Ogilvie Living Complex	6	Sept-04 to Jun-05	yes	1/6	no	9-Jun-05	yes



Table 2661/2665 - 2: Water Quality Results

SOURCE:	Building 2661 - Ogilvie Grader Station	Building 2665 - Ogilvie Living Complex			GCDWQ Criteria		
Location/ Resident	Ogilvie	Ogilvie					
Address							
Treatment	None	None					
Disinfection	None	None					
Source of Water	Abandoned Well at Maintenance Building	On-site well (shared with 2661)					
Purpose of Sampling	Base Line	Base Line	Base Line	Additional Sampling			
Sample Location				Washroom faucet			
Date Sampled	8-Jun-05	29-Sep-04	8-Jun-05	18-Aug-05	Lower	Upper Limit	
Physical Tests (ALS)					AO	MAC	AO
Colour (CU)	<5.0	<5.0	<5.0				15
Conductivity (uS/cm)	267		465				
Total Dissolved Solids	160	270	279				500
Hardness CaCO3	126	231	228		AO >200 = poor, > 500 unacceptable ^A		
pH	7.92	7.98	8.10		6.5		8.5
Turbidity (NTU)	0.33	0.2	0.1			1	5
UV Absorbance				0.037			
% UV Transmittance				91.8			
Dissolved Anions (ALS)							
Alkalinity-Total CaCO3	89.4	178	169				
Chloride Cl	2.12	4.7	6.25				250
Fluoride F	0.092	0.08	0.094			1.5	
Silicate SiO4							
Sulphate SO4	48.2	67.8	73.0				500
Nitrate Nitrogen N	0.2	<0.1	<0.10			10	
Nitrite Nitrogen N	<0.10	<0.05	<0.10			1	
Ammonia Nitrogen N							
Total Phosphate PO4							
Total Metals (ALS)							
Aluminum T-Al	<0.010	<0.005	<0.010			0.1	
Antimony T-Sb	<0.00050	<0.0002	<0.00050			0.006	
Arsenic T-As	0.00016	0.0002	0.00011			0.025	
Barium T-Ba	0.069	0.115	0.091			1	
Boron T-B	<0.10	0.02	<0.10			5	
Cadmium T-Cd	<0.00020	<0.00001	<0.00020			0.005	
Calcium T-Ca	34.6		63.4				
Chromium T-Cr	<0.0020	0.0011	<0.0020			0.05	
Copper T-Cu	0.0567	0.053	0.039			1	
Iron T-Fe	<0.030	0.01	<0.030				0.3
Lead T-Pb	<0.0010	0.0003	<0.0010			0.01	
Magnesium T-Mg	9.56		16.9				
Manganese T-Mn	0.0156	<0.005	<0.0020				0.05
Mercury T-Hg	<0.00020		<0.00020			0.001	
Potassium T-K	0.67		0.55				
Selenium T-Se	<0.0010		<0.0010			0.01	
Sodium T-Na	2.2	9.9	9				200
Uranium T-U	0.00053	0.002	0.00184			0.02	
Vanadium T-V							
Zinc T-Zn	<0.050	0.018	<0.050				5
Organic Parameters							
Tannin and Lignin				0.28			
Total Organic Carbon C				1.9			
Field Chemistry (EBA)							
pH				8.17	6.5		8.5
TDS (ppm)				223			500
EC (uS/cm)				446			
Temperature (°C)				7.4			
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)



PART A: EBA Site Inspection

Date August 18, 2005

WELL ID #	Owner	Location Description
2665	YTG	Ogilvie Grader Station Living Complex

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

Ogilvie

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

Km 195 Dempster Highway

c. GPS location: N 7251342 E 625265 elv 609m $\pm$ 13m UTM zone 7

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 _____
Living complex, maintenance garage, generating station

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

g. Nearest building, specify Located in basement of living complex

h. Distance from well to building

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

j. Distance from well to nearest point of known field: _____

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

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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 Entrance by animals? ☒ Yes ☐ No
located inside locked building

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: _____; Distance from well to Potential Source 1: _____

Potential Source 2: _____; Distance from well to Potential Source 2: _____

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

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2. Well and Wellhead information:

- a. When was well installed? Year unknown Month _____
- b. Type: ☐ drilled ☒ dug ☐ sand point ☐ other _____
- c. Is there a drillers log for the well: ☐ Yes ☐ No n/a
- d. Is there a surface seal to 6 m ☐ Yes ☒ No ☐ unknown ☐ unlikely
- e. Surface casing: ☐ Yes Diameter _____ ☒ No
- f. Well casing: Diameter 85cm Material: ☒ ^{galvanized} steel ☐ plastic ☐ concrete
- g. Depth of well: ~5.6m by ☒ measured (if possible) ☐ reported ☐ from log
- h. Static water level below ground: ~3.6m by
☒ 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 n/a slot size(s) _____
Location of screen: from _____ to _____ 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,

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- i. Is the well head below grade? describe in detail top of well ~ 1.6m 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
- iv. Any evidence of rodents? Specify No
- v. Does the well casing have a proper seal cap? ☒ Yes ☐ No

If no, describe condition Tight fitting wooden lid

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...) _____

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
unknown

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 n/a

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

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

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

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

But tap is directly against 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: located inside heated building

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 ALBISER

Date AUG. 18/05

WELL ID #	Owner	Location Description
<u>2665</u>	<u>VTG</u>	<u>OGILVIE GRADER STATION</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: PRESSURE TANKS

Where is it located?

Comments: UTILITY ROOM IN BASEMENT

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: _____

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Overall Tank

What are the tank size and dimensions?

What material is the tank constructed of? _____

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

Comments: _____

Tank Inlet, Outlet and Lid

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

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

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

Is the water tank drain accessible? YES NO

WATER TANK AND WATER QUALITY CONDITION

Are there signs of staining or biofouling? YES NO

Comments: _____

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

Comments: _____

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

Have there been any bacteriological analyses conducted previously? YES NO

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

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

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8. Conclusions

a. Comments on overall installation:

THIS IS CONSIDERED A SURFACE WATER SUPPLY.
THE SYSTEM IS MECHANICALLY SOUND - I SUSPECT
TWO OF THE PRESSURE TANKS ARE WATER LOGGED.

b. Recommendations:

REPAIR OR REPLACE THE DEFECTIVE PRESSURE TANKS.
INSTALL A SUITABLE TREATMENT SYSTEM IF THE
WATER ANALYSIS INDICATES THAT IT IS NEEDED.
INSTALL 10:1 MICRON IN LINE FILTRATION
FOLLOWED BY A 20 GPM UV SYSTEM (NSFSS
CERTIFIED

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SMALL PUBLIC WATER SYSTEM ASSESSMENT

PART A: EBA Site Inspection

Inspector: Ryan Martin, Luke Lebel

Date August 18, 2005

WELL ID #	Owner	Location Description
2661	YTO	Ogilvie Grader Station Abandoned well

1. Well Location and Potential Contaminant Sources

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

Ogilvie

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

km 195 Dempster Highway

c. GPS location: N 7251301 E 625315 elv 604 m $\pm$ 10m UTM zone 7

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 _____

Well Abandoned

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

g. Nearest building, specify located inside maintenance garage

h. Distance from well to building _____

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

j. Distance from well to nearest point of known field: _____

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

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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
Inside locked building

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: _____; Distance from well to Potential Source 1: _____

Potential Source 2: _____; Distance from well to Potential Source 2: _____

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

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2. Well and Wellhead information:

- a. When was well installed? Year unknown Month _____
- b. Type: ☐ drilled ☒ dug ☐ sand point ☐ other _____
- c. Is there a drillers log for the well: ☐ Yes ☐ No n/a
- d. Is there a surface seal to 6 m ☐ Yes ☒ No ☐ unknown ☐ unlikely
- e. Surface casing: ☐ Yes Diameter _____ ☒ No
- f. Well casing: Diameter ~1 m Material: ☒ steel ☐ plastic ☐ concrete
galvanized steel culvert (likely)
- g. Depth of well: 5.54 m bg ☒ measured (if possible) ☐ reported ☐ from log
- h. Static water level below ground: 3.35 m bg
☒ 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 n/a slot size(s) _____
Location of screen: from _____ to _____ from log reported
- l. Is there a sump below the screen? ☐ Yes ☐ No n/a
- 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,

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i. Is the well head below grade? describe in detail No

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 Access possible

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

If no, describe condition lid over well, but there are open holes for drop pipe

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 n/a

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
unknown

5. Pump Installation:

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

b. Type of pump: ☐ hand ☐ electric submersible ☒ jet No longer in use

☐ 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 n/a
- f. Drop pipe for submersible pump: ☒ steel ☒ plastic
- g. Pump delivers water to: ☒ pressure tank ☐ elevated tank ☐ other
- h. Are there automatic pump controls: ☐ Yes ☒ No
- i. Is there provision for taking water samples before water reaches storage? ☐ Yes ☒ No
- j. Is there a water meter on the system? ☐ Yes ☒ No
- k. Is the pump and piping protected from freezing? ☒ Yes ☐ No

If yes, describe: located inside heated building

- l. Comments on pump installation: _____

6. Conclusions

- a. Comments on overall installation:

This is a dug well. This well is no longer in use. The
maintenance garage is supplied by the well in the living
complex.

- b. Recommendations: _____

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PART B: EBA Site Inspection

Inspector: BERT ALMEIDA

Date AUG 18/05

WELL ID #	Owner	Location Description
<u>2661</u>	<u>UTC</u>	<u>OGILVIE GARDEN STATION</u>

6. Water Treatment

THIS SYSTEM IS NO LONGER IN SERVICE!

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:

Where is it located?

Comments: _____

Is the room in which the water tank is located heated to maintain an optimum temperature of 4°C for stored water?

YES NO

Comments: _____

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

Comments: _____

Are there other heat sources near the tank? YES NO

Comments: _____

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

Comments: _____

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Overall Tank

What are the tank size and dimensions?

What material is the tank constructed of? _____

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

Comments: _____

Tank Inlet, Outlet and Lid

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

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

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

Is the water tank drain accessible? YES NO

WATER TANK AND WATER QUALITY CONDITION

Are there signs of staining or biofouling? YES NO

Comments: _____

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

Comments: _____

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

Have there been any bacteriological analyses conducted previously? YES NO

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

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

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8. Conclusions

a. Comments on overall installation:

THIS SYSTEM IS OBSOLETE.

b. Recommendations:

REMOVE EQUIPMENT AND DECOMMISSION THE
WATER WELL



Environment
Canada

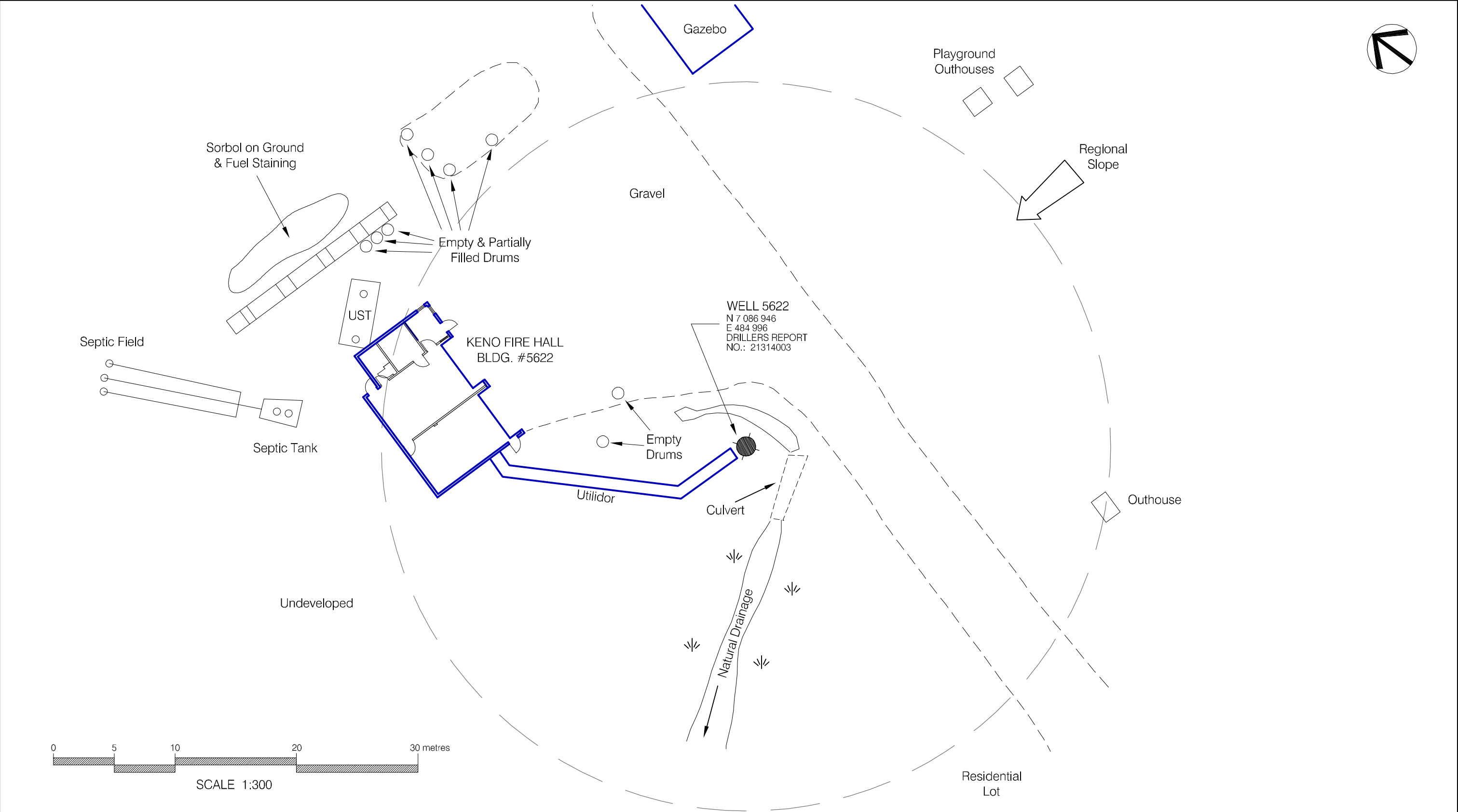
Environnement
Canada

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

Spill Report Information

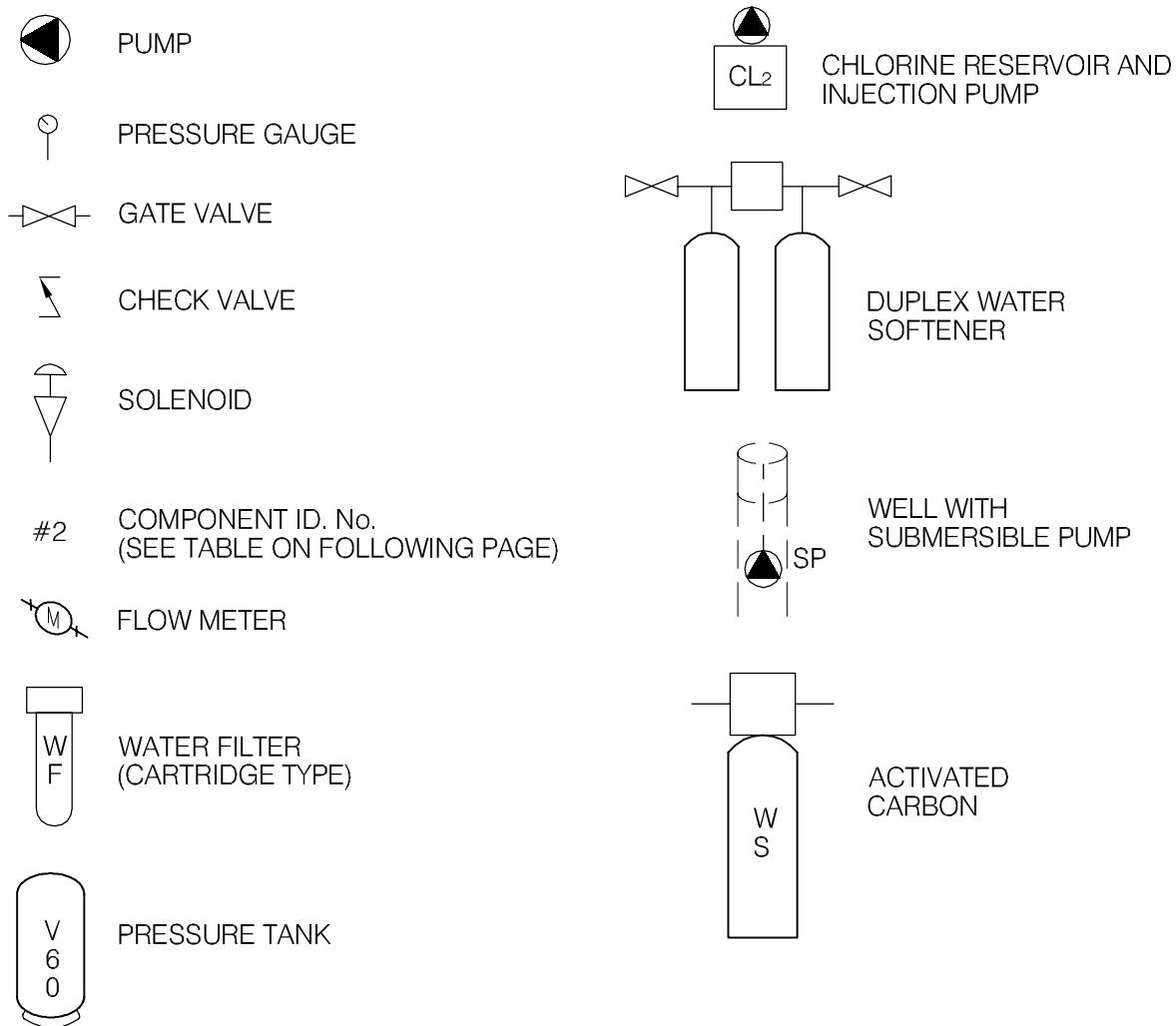
Spill #	9851
Jurisdiction	Yukon
Community	
Address	
Highway	Dempster Highway
Milepost	KM 197
Feature	Ogilvie River
Location and Cause	Quarry site on right hand side - Ogilvie River flooded banks due to high rainfall event - stock pile washed into river
Latitude	65.38021979
Longitude	-138.29201973
Incident Date	6/22/1998
Lead Agency	Department of Indian Affairs and Northern Development
Other Agency	
Company(s)	YTG Highways
Amount	220
Units	Tonnes (Metric)
Quantity	Actual
Release Description	Flooded
Additional Quantit	
Concentration	
Concentration Unit	
Phase	Solid
Major Contaminant	Calcium Chloride
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Outcome	river came down old channel and washed entire stock pile into river - no fish kill observed - no residues downstream - new stock pile moved above new high water mark

**Photo 206:** 2661 Olgilvie grader station.**Photo 205:** 2665 Olgilvie living complex.**Photo 210:** 2665 Fueling station.**Photo 213:** 2665 On site sewage disposal for grader station.



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.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					</

LEGEND



EBA Engineering Consultants Ltd.

CLIENT

Yukon
Highways and Public Works
Property Management Branch

PROJECT

SMALL PUBLIC WATER SYSTEMS ASSESSMENT
WESTERN REGION

TITLE

SCHEMATIC SYSTEM
LEGEND

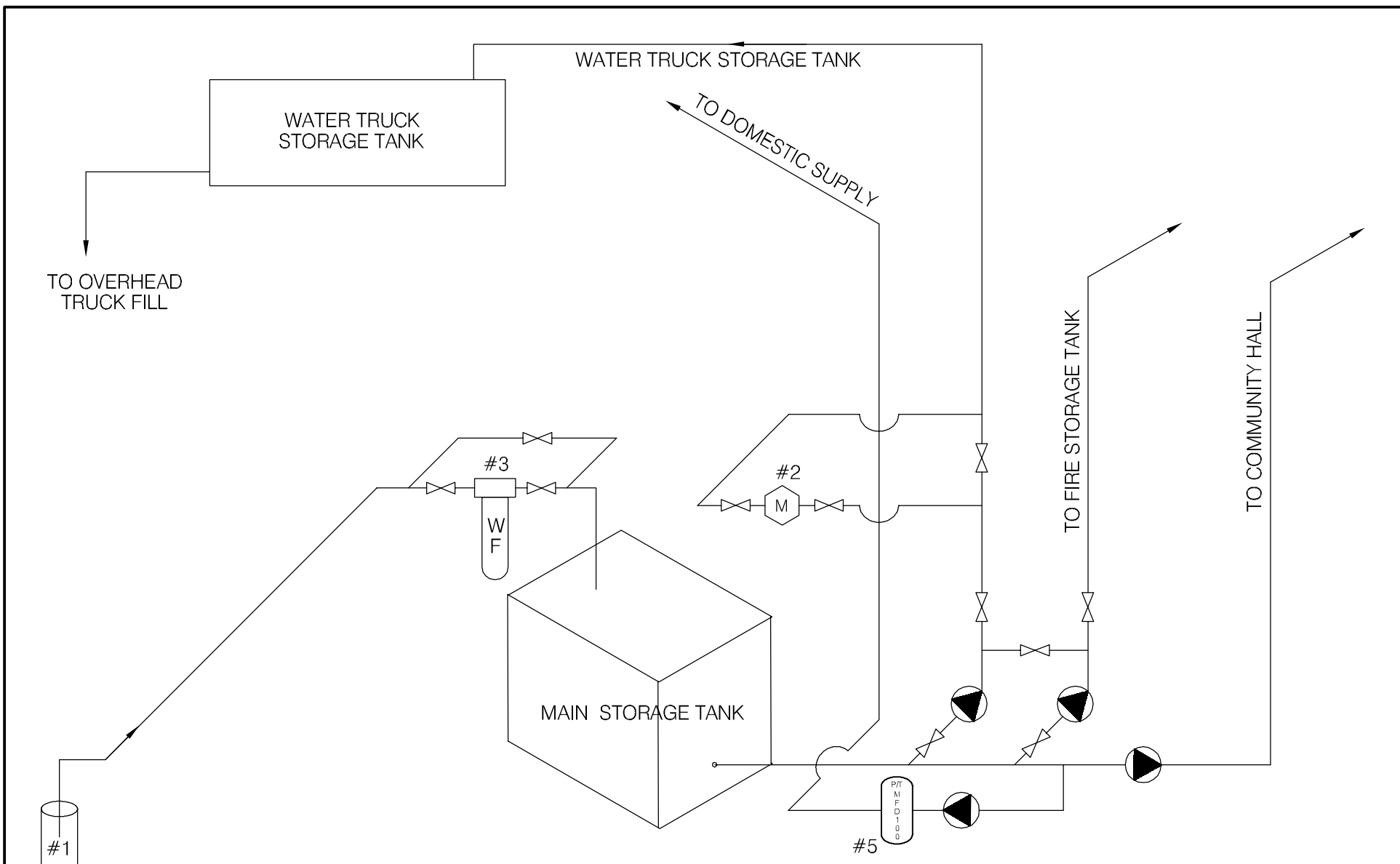
DATE APRIL 2006

DWN. JSB

CHKD. RMM

FILE NO. 1260002

DRWG. LEGEND



SCHEMATIC PRODUCED BY BERT ALBISSER OF AQUA TECH SUPPLIES 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.: 5622 KENO FIRE HALL - KENO, YT.						
DATE	SEPT. 2005	DWN.	JSB	CHKD.	RMM	FILE NO.	1260002.004	DWG.:	FIGURE 5622-B

Northern Region – Keno Firehall
Building # 5622

DISTRIBUTION & TREATMENT SYSTEM DATA

Item	Description	Manufacturer	Model	Part No.	Serial No.	Size
1	SUB PUMP	GRUNDFOS	KSQ15C-290	96033888	P10049	3"
2	INLINE FILTER	AMETEK	1 1/2" BB			10" BB
3	FILTER CARTRIDGE	PENTEK	CP5BB			10" BB
4	JET PUMP	MONARCH	JKS-1			1/3HP.
5	PRESSURE TANK	RED LION	MFD-100			20 GALLON
6						
7						
8						
9						
10						

TABLE 5622 - 1: SUMMARY OF BACTERIOLOGICAL RESULTS

		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?
Building #	Building Name							
5622	Keno City Fire Hall	3	Feb-05 to Jun-05	no	0/3	no	9-Jun-05	no



Table 5622 - 2: Water Quality Results

SOURCE:		Building 5622 - Keno City Fire Hall			GCDWQ Criteria		
Location/ Resident		Keno					
Address							
Treatment		None					
Disinfection		Chlorination (manual)					
Source of Water		On-site well					
Purpose of Sampling		Base Line	Base Line	Additional Sampling			
Sample Location				Washroom faucet			
Date Sampled		2-Jul-04	8-Jun-05	17-Aug-05	Lower	Upper Limit	
Physical Tests (ALS)					AO	MAC	AO
Colour	(CU)	5	<5.0				15
Conductivity	(uS/cm)	559	583				
Total Dissolved Solids		360	361				500
Hardness	CaCO3	297	272		AO >200 = poor, > 500 unacceptable ^A		
pH		7.85	7.96		6.5		8.5
Turbidity	(NTU)	0.26	3.24			1	5
UV Absorbance							
% UV Transmittance							
Dissolved Anions (ALS)							
Alkalinity-Total	CaCO3	156	158				
Chloride	Cl	9.6	7.62				250
Fluoride	F	0.038	0.046			1.5	
Silicate	SiO4						
Sulphate	SO4	120	124				500
Nitrate Nitrogen	N	1.66	1.37			10	
Nitrite Nitrogen	N	0.1	<0.10			1	
Ammonia Nitrogen	N			0.048			
Total Phosphate PO4							
Total Metals (ALS)							
Aluminium	T-Al	0.01	<0.010			0.1	
Antimony	T-Sb		<0.00050			0.006	
Arsenic	T-As	0.003	0.00188			0.025	
Barium	T-Ba	0.157	0.138			1	
Boron	T-B	0.1	<0.10			5	
Cadmium	T-Cd	0.00099	0.00092			0.005	
Calcium	T-Ca	88	79.9				
Chromium	T-Cr	0.002	<0.0020			0.05	
Copper	T-Cu	0.01	0.011			1	
Iron	T-Fe	0.03	0.085				0.3
Lead	T-Pb	0.001	<0.0010			0.01	
Magnesium	T-Mg	18.7	17.6				
Manganese	T-Mn	0.0025	0.0039				0.05
Mercury	T-Hg	0.0002	<0.00020			0.001	
Potassium	T-K	0.35	0.28				
Selenium	T-Se	0.0037	0.0023			0.01	
Sodium	T-Na	2.6	2.5				200
Uranium	T-U	0.0116	0.00953			0.02	
Vanadium	T-V						
Zinc	T-Zn	0.224	0.163				5
Organic Parameters							
Tannin and Lignin							
Total Organic Carbon C				0.58			
Field Chemistry (EBA)							
pH				8.12	6.5		8.5
TDS (ppm)				317			500
EC (uS/cm)				635			
Temperature (°C)				7.4			
Free Available Chlorine				0.00			

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)



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SMALL PUBLIC WATER SYSTEM ASSESSMENT

PART A: EBA Site Inspection

Inspector: Ryan Martin, Luke Lebel

Date August 16, 2005

WELL ID #	Owner	Location Description
5622	YTG	Keno Fire Hall

1. Well Location and Potential Contaminant Sources

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

Keno City

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

Keno City

c. GPS location: N 7086946 E 484996 elev 942m

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 _____

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

g. Nearest building, specify Keno City Fire Hall

h. Distance from well to building ~18 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: Tank at 36m, field > 36m

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

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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

Unfastened, 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

Drainage ditch runs beside wellhead enclosure

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 31 m

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: Drainage Ditch; Distance from well to Potential Source 1: 2 m

Potential Source 2: Out houses; Distance from well to Potential Source 2: 30, 32 and 36 m

Potential Source 3: Empty Drums; Distance from well to Potential Source 3: ~10 m

Potential Source 4: Partly filled drums; Distance from well to Potential Source 4: ~32 m

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

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

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2. Well and Wellhead information:

- a. When was well installed? Year 1987 Month August
- 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 to 15 cm to 36 cm to 55 m (to bedrock) Material: ☒ steel ☐ plastic ☐ concrete
- g. Depth of well: 93 m ☐ measured (if possible) ☒ reported ☒ from log
- h. Static water level below ground: 55 m
☐ 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 n/a - bedrock well
- j. (If bedrock) Does the well have a liner? ☐ yes ☒ No ☐ steel ☐ plastic
- k. If there is a well screen: length n/a slot size(s) _____
Location of screen: from _____ to _____ 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,

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- i. Is the well head below grade? describe in detail No, ~0.25m 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, 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...) No,

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 _____

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d. Date installed: _____ By: _____

e. For submersible pump, depth of setting below surface 91 m

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

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 + Heater

l. Comments on pump installation: _____

6. Conclusions

a. Comments on overall installation:

b. Recommendations: _____

EBA Engineering Consultants Ltd.

Creating and Delivering Better Solutions

PART B: EBA Site Inspection

Inspector: BERT ALBISER

Date AUG 16/05

WELL ID #	Owner	Location Description
5622	YTG	KENO CITY, VT

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: LARGE FIBRE GLASS TANK

Where is it located?

Comments: WATER TRUCK GARAGE

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?

75 x 75 x 144 "

What material is the tank constructed of? FIBRE GLASS COVERED Plywood

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:

THE SYSTEM IS IN REASONABLY GOOD CONDITION.
THE TANK IS RELATIVELY CLEAN WITH SOME
IRON OXIDE AT THE BOTTOM. THE CHLORINATOR
SYSTEM IS NOT IN SERVICE. THERE IS NO
CHLORINE INJECTION PUMP ON SITE.
THE PRESSURE TANK IS WATER LOGGED; THIS
CAUSES THE JET PUMP TO SHORT CYCLE.
THE TANK LID IS LOOSE.

b. Recommendations:

CLEAN THE STORAGE TANK, DISINFECT IT.
INSTALL CHLORINE INJECTION PUMP WITH
FLOW METER TO EFFECT PROPORTIONAL
CHLORINATION.
INSTITUTE FREE CHLORINE RESIDUAL TESTING
AT REGULAR INTERVALS.

interact

• **Printers**

**Photo 015:** 5622 Keno Fire Hall facing west.**Photo 017:** 5622 Wellhead.**Photo 179:** 5622 Main water storage tank.**Photo 184:** 5622 Booster pumps.