Selkirk First Nation

SFN COMMUNITY WELL PROTECTION PLAN

Prepared For:
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2007-500
March 26, 2008

VISTA TEK LTD

Our File: 2007-500

March 26, 2008

Selkirk First Nation
P.O. Box 40
Pelly Crossing, YT
YOB 1P0

PERMIT TO PRACTICE
Signature
Date 7/4/08
PERMIT NUMBER: PP062
Association of Professional Engineers of Yukon

Attention: Mr. Danny Van Bibber, Manager Municipal Works

Re: SFN Well Head Protection Plan

Please find enclosed six copies of the above noted report as well as three copies of the well protection plan wall chart.

We have enjoyed working with you on this project and would like to extend our appreciation to yourself and the entire community project team for the assistance provided in the completion of this work.

If you should have any questions or require additional information on the above, please contact the undersigned directly at 393-3458.

PROFESSIONAL ENGINEER YUKON TERRITORY

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EXECUTIVE SUMMARY

Between November 2007 and March 2008, the Selkirk First Nation (SFN) developed a Well Head Protection Plan for their new community wells, PW05-1 and BW06-1. A Well Head Protection Plan involves the delineation a capture zone (the area of an aquifer from which groundwater will be derived in a predefined amount of time) for the community well and the use of protection measures to manage activities within the zone. SFN retained Vista Tek Ltd., along with sub-consultants JC Environmental Consulting and Golder and Associates Ltd., to prepare the plan.

Based on the well logs, PW05-1 was drilled to a depth of 38.1 m and the screen was set from 25.9 to 28.9 m below ground. EBA calculated that the aquifer transmissivity ranged from 1543 m2/day to 4688 m2/day. BW06-1 was drilled to a depth of 33.5 m and a screen was set between 29.4 and 32.5 m. EBA calculated that the aquifer transmissivity ranged from 750 m2/day to 3000 m2/day.

Based on the hydrogeologic analysis, the capture zone for wells is estimated to be 154m wide extending northeast from wells to the plateau above the community.

Based on information collected during the development of the protection plan, the following Areas of Potential Environmental Concern (APEC's) were identified within the capture zone for PW05-1 and BW06-1:

- CU- Casual Use and;
- PSNK- Potential Spills North Klondike Highway

The Community Planning Team developed the following management strategies to help manage the risks associated with the APEC's:

- Signage on the trails and roads which intersect the well capture zones
- Community education to reduce discharge of pollutants
- Inspection of septic tanks on annual basis
- Highway uses – activities such as spills, construction, accidents, etc should be closely monitored
- Inspection of undeveloped area to the north of the well sites on annual basis
- Weekly inspection of areas adjacent to well heads

Additional management strategies are located in section 8.0 Conclusions.

1.0 INTRODUCTION

This report summarizes the results of the initial phases in the development of a Well Head Protection Plan (WHPP) for the two new community wells recently constructed for the Selkirk First Nation (SFN), located in Willow Creek Subdivision, Pelly Crossing, Yukon (Figure 1). These wells will be used as the water supply for the new small diameter piped water system and bulk water truck fill station currently being constructed for the community.

The existing community well at the truck fill station has been found to be deficient and is at risk for contamination. With the commissioning of the new water supply system, this well will be decommissioned. As such the wellhead protection plan is based on the new community wells.

As a preventative measure, and with financial support from Indian and Northern Affairs First Nation Water Management Strategy, SFN requested that Vista Tek Ltd. complete a Well Head Protection Plan for the wells.

A Well Head Protection Plan involves the delineation of a capture zone (the area of an aquifer from which groundwater will be derived in a predefined amount of time) for the community well and the use of protection measures to manage activities within the zone. The well head protection plan is considered essential for the protection of the water quality in the area of the new community wells.

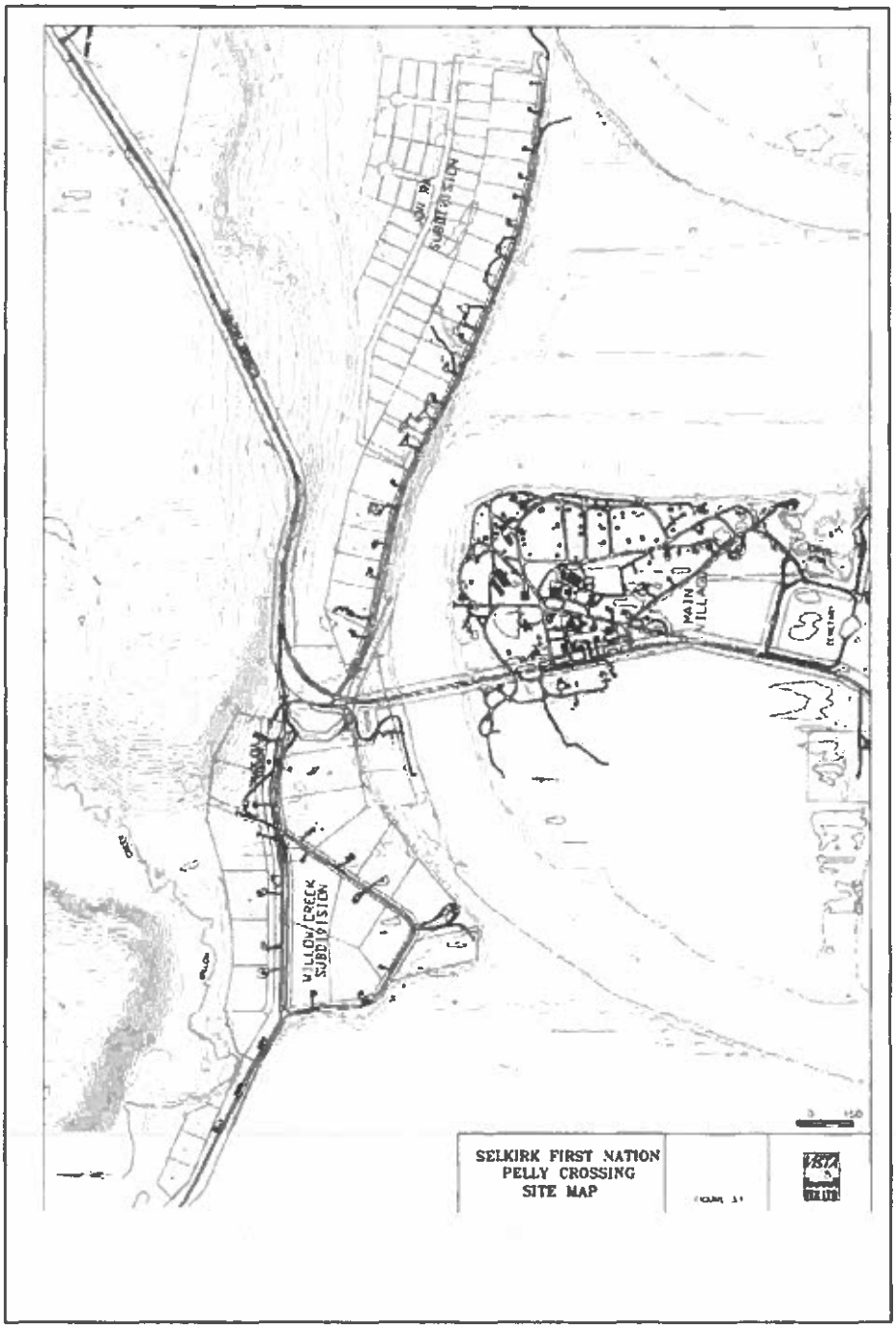

Figure 1 - Site Map

2.0 SCOPE OF WORK

In order to prepare the Well Head Protection Plan, Vista Tek Ltd. followed guidelines found in the British Columbia Ministry of Environment (BC MoE) Well Protection Tool Kit (BC MoE, 2000) and the Government of Ontario Groundwater Studies 2001/02 Technical Terms of Reference (Ontario Ministry of the Environment, November 2001).

The BC MoE Well Protection Toolkit consists of a six-step process to assist communities that utilize groundwater to better manage and protect their drinking water sources. The six steps outlined in the Well Protection Toolkit are defined as follows:

1. Form a Community Planning Team
2. Define the Well Protection Area
3. Identify Potential Contaminants
4. Develop Management Strategies
5. Develop Contingency Plans
6. Monitor Results and On-Going Evaluation of the Plan

Vista Tek Ltd. was retained to complete Steps 1 through 4 of the Well Protection Toolkit, with the scope of work consisting of the following:

- Gather and review available information on PW05-1 and BW06-1 and the underlying aquifer in which the wells were completed, such that aquifer recharge and discharge areas can be determined.
- Estimate the extent of short-duration time-of-travel zones for PW05-1and BW06-1 at the proposed pumping rate for the well.
- Collect background information to conduct a contaminant inventory.
- Conduct a field reconnaissance to provide information regarding the contaminant inventory within the time of travel capture zones.

- Prepare a large scale wall map depicting the capture zone and potential contaminants
- Develop management strategies and assist the SFN with community education
- Prepare a report summarizing Steps 1 through 4 with preliminary recommendations for additional work

3.0 BACKGROUND

3.1 Physical Setting

Pelly Crossing is located 290 km north of Whitehorse at the confluence of the Pelly River and the Klondike Highway. It is located within the Boreal Cordillera eco-zone. The Boreal Cordillera ecozone lies generally south of the Tintina Trench, is within the scattered-permafrost zone, and is underlain by a complex mixture of sedimentary, volcanic, intrusive and metamorphic bedrock. Most of the ecozone lies within the Yukon drainage system, and has predominantly boreal white and black spruce forest, sub alpine spruce-willow-birch, and alpine tundra at the higher elevations.

This region is characterized by relatively high annual precipitation, ranging from 500 to 700 mm. The heaviest precipitation occurs in fall and early winter, and coincides with the time that active storm tracks traverse the regions. In Pelly Crossing, winters are long and cold with a daily mean temperature in January, the coldest month of, -27.5°C. The summers are short and warm with mean high temperature in July of 15.5°C. The number of frost free days averages 145 per year. The mean annual rainfall in Pelly Crossing is 198 mm and mean annual snowfall is 113 cm for a total yearly precipitation of 310 mm.

There are three subdivisions that make up the community and they are the Main Village, John Ra Subdivision, and Willow Creek Subdivision. There are approximately 400 people that live in the community. Homes and community buildings in the Main Village area are supplied by individual and community wells. Homes in the Jon Ra subdivision are supplied by trucked water, and homes in Willow Creek are supplied by wells.

Wells in the Main Village area have reported E.Coli and Fecal Coliform contamination. It is expected that by the end of 2008, that the wells in the Main Village area will be

decommissioned and residents and community buildings placed on the new piped water system, with the rest of the community placed on piped water by 2010.

3.2 Geology and Hydrogeology

The community is located in a heavily wooded area which consists of a relatively flat glacial fluvial plain comprised of relatively fine silty sands overlying sands, gravels and cobbles. No permafrost has been reported in the community and freeze penetration is approximately 2 to 4m in the well draining sand and gravel soils.

Ground water is found at approximately 6m below ground surface on the south side of the Pelly River and approximately 19m on the North side of the river.

The Pelly River is a ground water recharge zone and subsurface water generally flows towards the river in a westerly direction on both sides of the river.

On the north side of the river, in the study area, the ground water source is the Willow Creek water shed and flows in a south west direction towards the Pelly River. The aquifer in which the production and back up wells are located is generally characterized as an unconfined aquifer located in sands and gravels. Although the ground water table is approximately 19m below the surface, the lack of an impermeable layer above the aquifer in conjunction with fast draining sands and gravels results in a condition where contaminants which are deposited on the surface can migrate rapidly into the ground water aquifer.

For this reason, management of the community well capture zone is critical in ensuring the long-term water quality for the community.

Although there are a number of residential wells in the area, most do not have documentation on soils and hydrogeology. The best sources of information are the

existing well at the truck fill station and detailed logging and testing data for the two new wells.

Stratigraphy as described in the completion report by EBA for PW05-1 is as follows:

Depth (m-bg)	Soil Description
0.0 m to 11.9 m	SAND AND GRAVEL – brown, dry to moist, trace
11.9 m to 13.7 m	SAND – fine, trace medium sand, trace silt.
13.7 m to 15.2 m	SILTY SAND – trace medium sand, fining downwards. 15.2 m to 15.5 m BOULDER
15.5 m to 24.4 m	SAND AND GRAVEL – well graded sand, fine gravel, trace silt.
24.4 m to 29.9 m	SAND AND GRAVEL – coarse sand, gravel is sub angular to sub rounded.
29.9 m to 33.5 m	SILTY SAND AND GRAVEL – fining downwards.
33.5 m to 38.1 m	SILTY CLAY (TILL) – trace coarse sand.
38.1 m to 41.1 m	BEDROCK – clayey sandstone, soft.

Stratigraphy as described in the completion report by EBA for BW06-1 is as follows:

Depth (mbgl)	Soil Description
0.0 m to 7.6 m	SAND – brown, dry to moist, trace silt.
7.6 m to 16.8 m	SAND AND GRAVEL – fine, trace medium sand,
16.8 m to 20.4 m	GRAVEL – medium to coarse sand, trace silt.
20.4 m to 21.0 m	CLAY - silty, brown, dry.
21.0 m to 33.5 m	GRAVEL – well graded sand, fine gravel.

4.0 SFN NEW COMMUNITY WELLS

4.1 Well Details

The Selkirk First Nation currently operates a community well at the Willow Creek Truck fill station. In 2005, EBA Engineering Consultants were hired to perform hydrogeological assessments on the current truck fill well. The results are included in the report, "Community Water Well Assessment Willow Creek Subdivision, Pelly Crossing, Yukon."(2005).

Due to deficiencies in the well's construction as well as a high potential for contamination, it was recommended that this well be decommissioned and replaced with a new production well and back-up well for the proposed new piped water system and truck fill.

In July 2005, a new production well was drilled by Double D Drilling Ltd. It was drilled to a depth of 38.1 m and the screen was set from 25.9 to 28.9 m below ground. EBA calculated that the aquifer transmissivity ranged from 1543 m2/day to 4688 m2/day. The safe sustainable yield of the well is 4.9 L/s, which is sufficient to meet the demands of the new piped water system.

The well water was tested for and met all Canadian Drinking Water Quality Guidelines (CDWQG). As well, in March 2007 water quality samples were collected and analyzed for semi-volatile compounds using capillary gas chromatograph-mass selective detector (GC/MS scan) (report located in Appendix A). The GC/MS scan is capable of detecting small concentrations of potential contaminants in water. All chemical and physical water quality guidelines were met.

In 2006, a back up well was drilled up gradient of the production well in Willow Creek. According to the Well Completion Report, prepared by EBA;

> "The back-up well, BW06-01, is sited in a location such that compliance with applicable guidance document setbacks from potential sources of contamination have been satisfied. BW06-01 was drilled between September 27 and October 10, 2006 by Double D Drilling of Terrace, BC. BW06-01 has been constructed and tested in accordance with INAC guidelines for well construction, and is capable of supplying the village with potable drinking water. This new well can supply 4.1 L/s (54 Igpm) which is 2 times the desired flow rate of 1.9 L/s (26 Igpm)." (i)

Water from the back up well meets all health and aesthetic parameters under the Canadian Drinking Water Quality Guidelines.

Figure 2, from the EBA Well Completion report for the back-up well BW06-01, shows the location of the production well, the back-up well and existing well at the truck fill station.

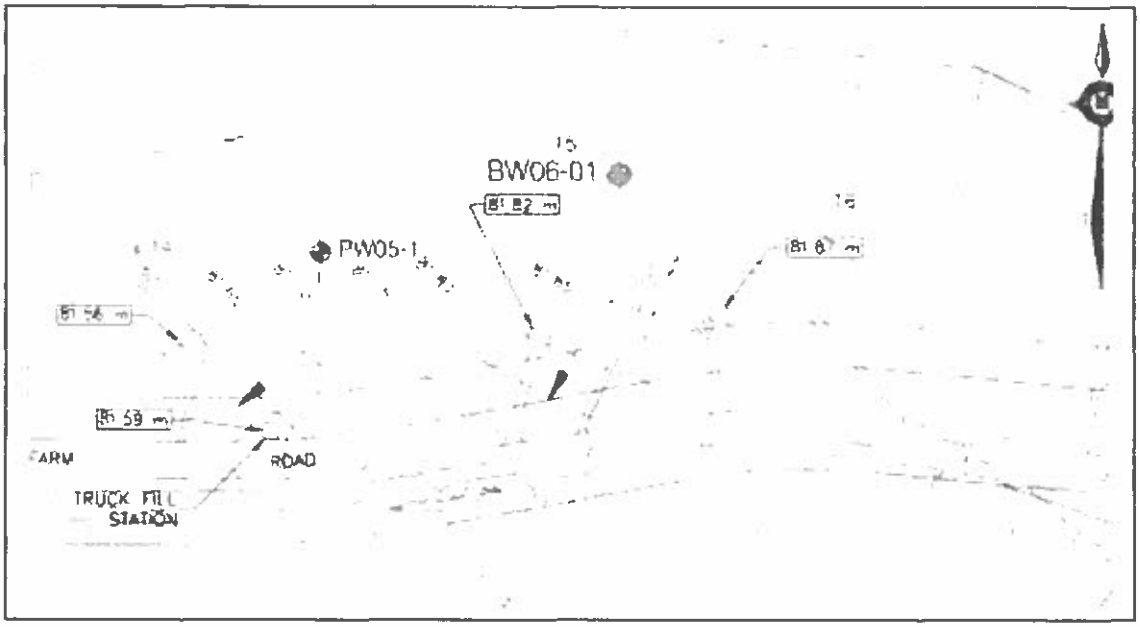

Figure 2 - Location of current community well at truck fill, production well, and back-up well. *Source: EBA report "Well Completion Report Community Backup Well- Pelly Crossing Yukon." 2006*

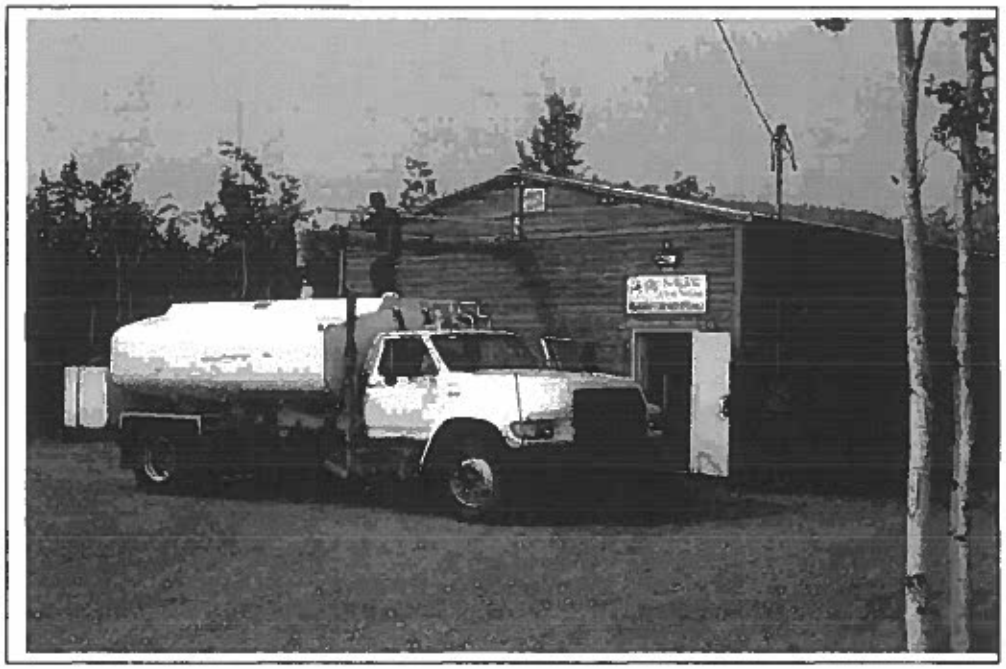

Figure 3 - Existing Willow Creek Truck Fill Station.

5.0 THE COMMUNITY PLANNING TEAM

During the first community meeting held in Pelly Crossing to discuss the Well Head Protection Plan, the community planning team was developed and consists of Danny VanBibber (SFN Capital), Richard Baker (Elder, SFN Capital), Juanita Wood (SFN Executive Director), Beverly Brown (SFN Lands), Maria VanBibber (Elder), Stanley Johnson (Chief Elder), and Margerite Johnson (Elder). As the plan was developed, Kevin Rumsey (Indian and Northern Affairs), Pat Paslawski (Government of Yukon Department of Environment), and Greg Tone (Government of Yukon, Department of Environmental Health) were invited to participate on the planning team.

Table 1 summarizes the dates and outcomes of each community meeting held in Pelly Crossing for the Well Head Protection Plan.

Table 1 - Community Meetings Summary

Date of meeting	Accomplishments
October 10, 2007	Created community planning team consisting of Danny VanBibber (SFN Capital), Richard Baker (Elder, SFN Capital), Beverly Brown (SFN Lands), Maria VanBibber (Elder), Jillian Chown (JC Environmental). In subsequent meetings Stanley Johnson (Chief Elder), and Margerite Johnson (Elder) and Juanita Wood (SFN Executive Director) joined the team.
November 29, 2007	Second community meeting held to present draft protection map. Areas of potential environmental concern were identified through site reconnaissance survey, review of existing reports, review of contaminated sites and spills records from Government of Yukon and Environment Canada, and meeting with SFN staff.
March 19, 2008	Third community meeting. Posted large scale draft protection zone map on wall. Began developing management strategies for Areas of Potential Environmental Concern (APEC).
March 30, 2008	Final community meeting to present final map to community.

6.0 THE WELL PROTECTION AREA

6.1 Chosen Delineation Method

There are a number of methods that can be used to delineate a capture zone for a well. The capture zone is the surface area that recharges groundwater entering a well or is the area in which a spill on the surface may eventually affect the water being pumped from a well.

The methods recommended by BCMOE, et al, in their "Well Protection Toolkit" were applied for this evaluation. The methods include:

- Arbitrary fixed radius (AFR)
- Calculated fixed radius (CFR)
- Analytical Equations
- Hydrogeological Mapping
- Numerical Modeling

Each method is described briefly in the following sections.

6.1.1 Arbitrary Fixed Radius (AFR)

The AFR is based on drawing an arbitrary circle of fixed radius around the well. BCMOE guidelines recommend a radius of 300m. YTG EHS regulations require a minimum protection zone of 60m around any community well.

The advantages of this method are that it does not require any technical analysis and the area identified is small enough so that capture zone management does not become unduly difficult.

The primary disadvantage is that the radius is purely arbitrary and does not take into account subsurface or hydrogeologic conditions for a particular well. This method is normally only used if no well or hydrogeologic information is available.

As there is considerable data available for the new community wells, the project team eliminated this method from further consideration.

6.1.2 Calculated Fixed Radius

This method is similar to the AFR in that a fixed radius boundary is established to delineate the capture zone around the well. The difference from AFR is the hydrogeologic data from the well development are used to define the radius that reflects existing conditions at the well site.

The circular area is calculated based on the volume of water pumped from the well over 1, 5 and 10 year periods. The method assumes a sand and gravel aquifer that is applicable for this well.

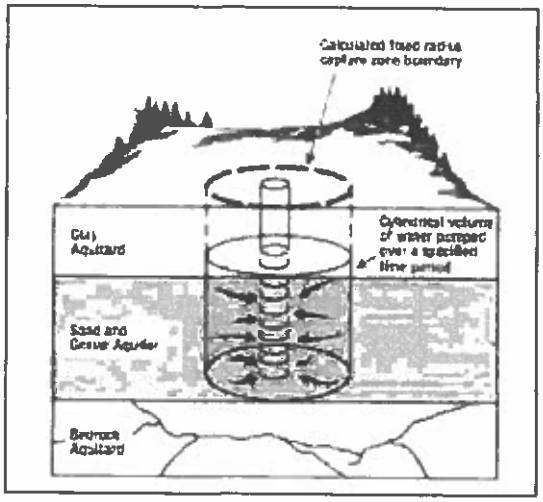

Figure 4 - CFR Model ***from BCMOE Well Protection Toolkit***

Based on data from the new wells, the CFR for both wells is calculated as follows:

$R = (10038\ Q\ t/(n\ b))^{.5}$

Q = flow, t = travel time n= porosity 0.3 (assumed sand and gravel aquifer)

B = aquifer thickness

$R_1 = (10038 * 2 * 1/(.25 * 14))^{.5}$

R_1 = 76 m for a 1 year travel time

R_5 = 380 m

R_{10} = 800 m

It is interesting to note that the one year travel time CFR of 76m compares well with the AFR set by YTG EHS of 60 m.

6.1.3 Analytical Methods

Analytical methods provide a more refined method of defining the capture zone as they take into account the affect of the movement of ground water. The capture zone developed by this method reflects this movement by identifying that contaminants considerably up stream of the well may enter the ground water supply and that down stream contaminants will have less of an impact on the well.

In order to use this method, more detailed hydrogeologic information is required including pumping rates, aquifer transmissivity and water table slope. As well, the method is generally limited to sand and gravel aquifers.

As the data required for this method is available for the SFN community wells and the aquifer is composed of sand and gravel, the project team selected this method for estimating the community well capture zone.

The full analysis is presented in the following section.

6.1.4 Hydrogeologic Mapping

This method is applicable if sufficient data is available on aquifers, aquitards and groundwater levels which are used to generate ground water contours which are used to map ground water flow. There are no wells or hydrogeologic data available up gradient of the two new wells.

Considerable additional data would need to be collected in order to implement this method for the SFN wells and the project team identified that the additional fieldwork was not warranted at this time.

6.1.5 Numerical Modeling

Numerical modeling uses computer models of ground water flow system to determine capture zones and requires considerable amounts of data, technical analysis and interpretation to develop.

The project team determined that the level of effort was not warranted at this time for the SFN community wells.

6.2 Model Results and Discussion

After review of the various options available the project team determined that there is sufficient data to use analytical equations for developing a model for the capture zone for the new community well.

It must be noted that hydrogeological analysis provides an estimate only of the capture zone as many factors can affect ground water movement. For this reason any models which are developed must be viewed as general indicators only of the subsurface water movement.

The analytical method is applicable for a sloping water table. Figure 5 provides a schematic of the mathematical model that is used to determine the capture zone based on water table slope and other hyrdogeological data.

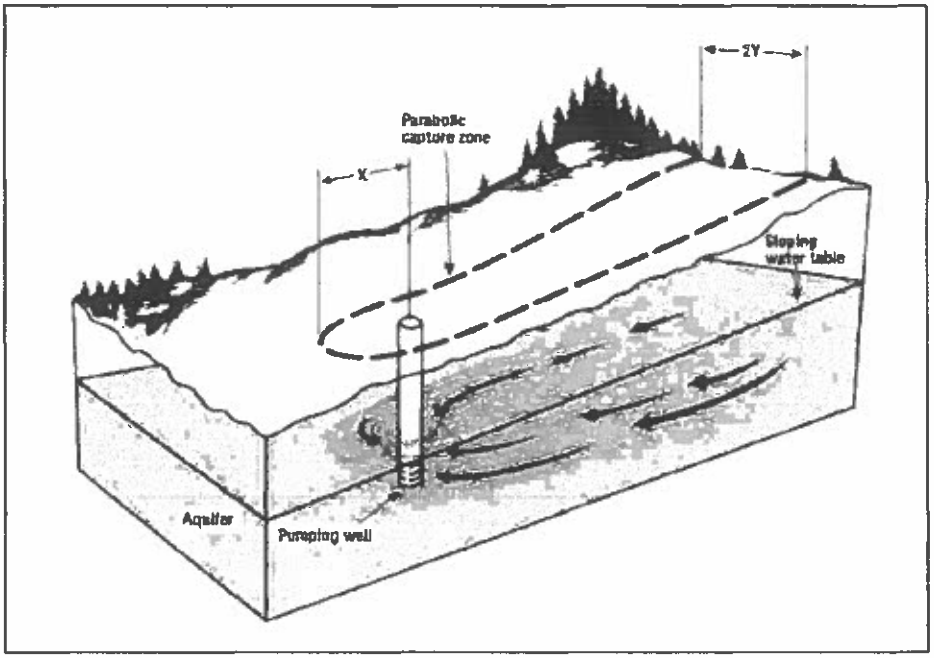

Figure 5 – Analytical Equation Capture Zone Model ***from BCMOE Well Protection Toolkit***

The slope of the water table was determined previously by measuring water levels in a number of residential wells surrounding the new community well as is depicted in figure 6.

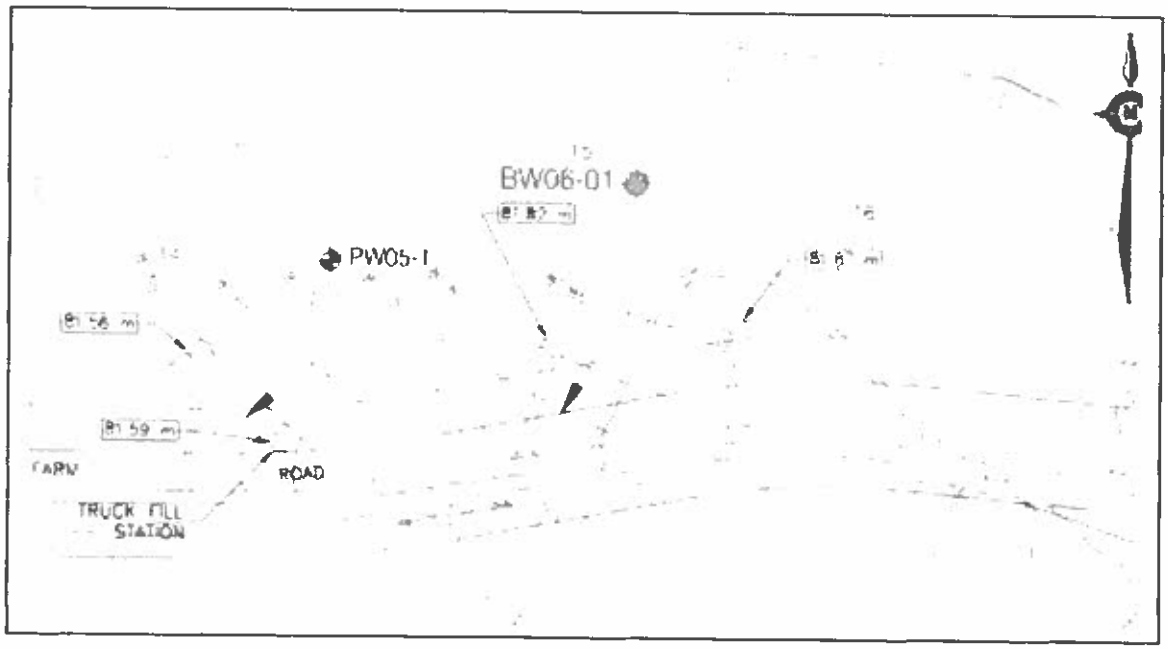

Figure 6 – Predicted Ground Water Flow Direction

Source: EBA report "Well Completion Report Community Backup Well- Pelly Crossing Yukon." 2006

As can be seen from figure 6, the predicted ground water flow direction is generally from the northeast. The recharge area is located with the Willow Creek watershed to the north and north east of the wells and ultimate discharge is to the Pelly River, located approximately 750 m to the south of the wells.

Detailed information on subsurface conditions was collected during the development of the community wells and is summarized in figures 7 and 8.

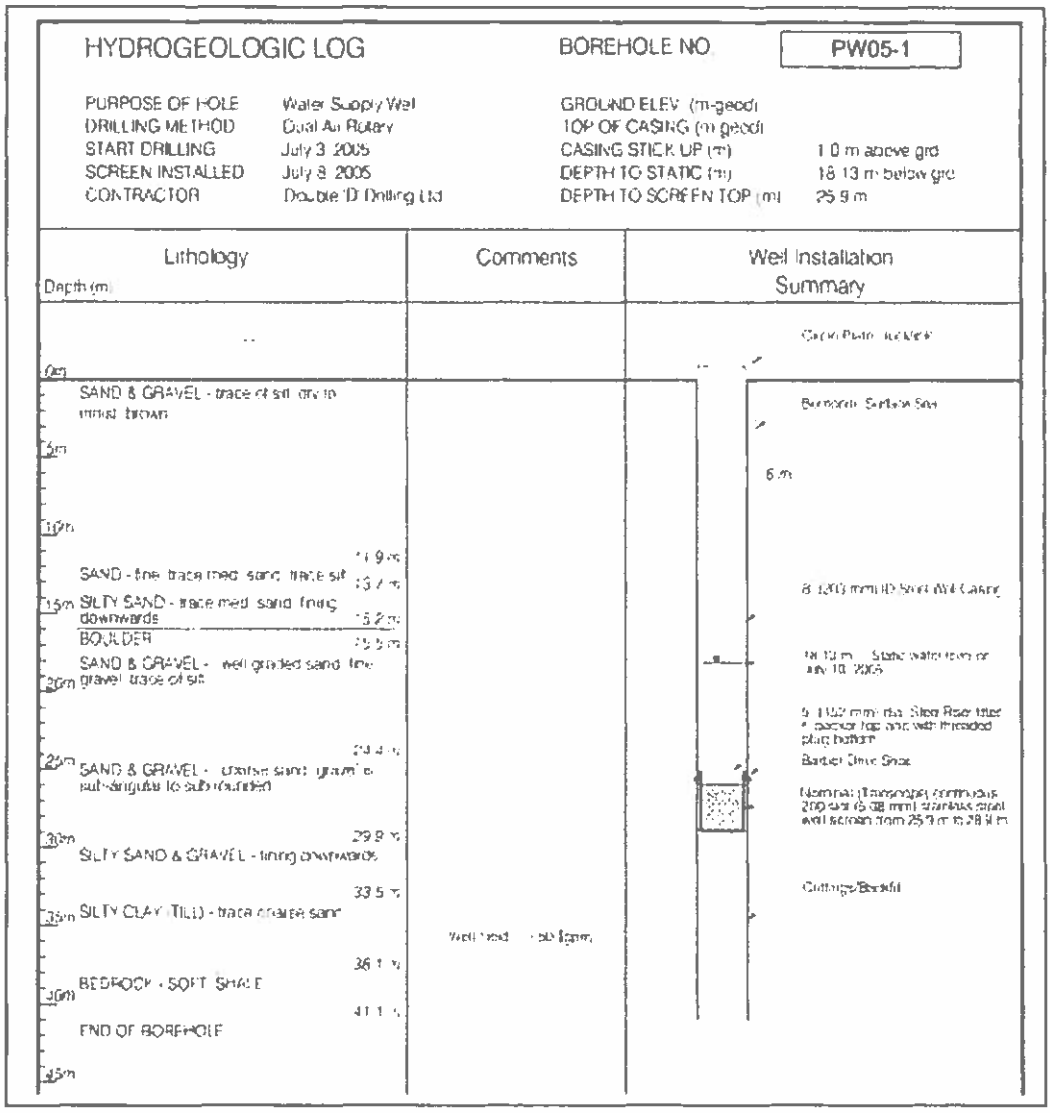

Figure 7 – Summary of Hydrogeologic Data

Source: EBA report " Preliminary Hydrogeological Assessment and Well Completion Report- Pelly Crossing Yukon". 2005

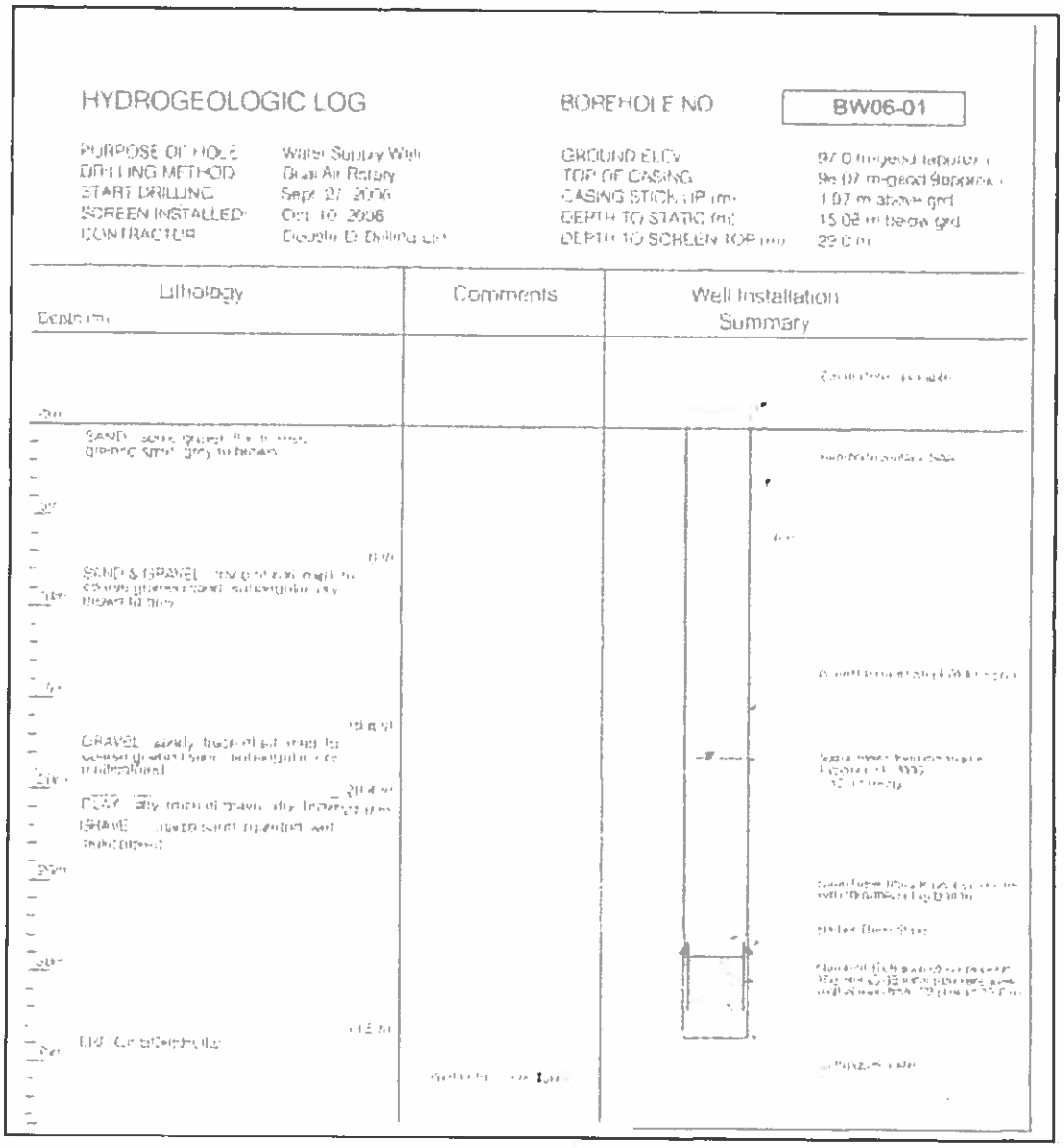

Figure 8 – Summary of Hydrogeologic Data Backup Well

Source: EBA report "Well Completion Report, Community Backup Well- Pelly Crossing Yukon:" 2006

The borehole data indicates that soils are predominantly sand and gravel to depth with a water table approximately 15 to 18m below the surface at the well. The sand and gravel aquifer provides for rapid transmission of water that provides relatively high well yields.

There is no impermeable boundary between the surface and the ground water table at PW05-1 and only a thin layer of gravely clay at BW06-1. These conditions are of concern as they will also rapidly transmit any surface contaminants to the ground water table and hence the community water supply.

Hydrogeologic data from tests completed on the community well were used in conjunction from the analytical equations in the Well Protection Toolkit to determine the extent of the predicted capture zone for the community well and are presented in table 2.

Table 2 – Capture Zone Data

SFN COMMUNITY WELL
CAPTURE ZONE ANALYSIS

I =	0.0015 m/m	hydraulic gradient
Q =	2 L/s	pumping rate @ 40 years
n =	0.25	porosity sand and gravel
T =	aquifer transmitivity (m2/s)	
K =	hyd conductivity (T/ aquifer thickness) (m/year)	

Y = Q/2000TI 1/2 width of upstream capture zone (m)

X = Y/n down gradient capture zone boundry (m)

d_{TOT} = tKI/n distance to 1, 5 & 10 travel boundry (m)
t = time in years

Capture Zone Calculations

Location	*PW-05-1*	*PW-05-1*	*BU-06-1*	*BU-06-1*	*Geo Mean*
T (m2/day)	1543	4688	750	3000	2008.6
T (m2/sec)	0.0179	0.0543	0.0087	0.0347	0.0232
Q (l/s)	2	2	2	2	2
I (m/m)	0.0015	0.0015	0.0015	0.0015	0.0015
Y (m)	**37.3**	**12.3**	**76.8**	**19.2**	**28.7**
X (m)	**11.9**	**3.9**	**24.4**	**6.1**	**9.1**

Travel Boundry Calculations

Location	*PW-05-1*	*PW-05-1*	*BU-06-1*	*BU-06-1*	*Geo Mean*
K (m/s)	0.0031	0.0098	0.002	0.00051	0.002359
K (m/year)	97762	309053	63072	16083	74405
d_{TOT} 1 year(m	**587**	**1854**	**378**	**97**	**446**
d_{TOT} 5 year(m	**2933**	**9272**	**1892**	**483**	**2232**
d_{TOT} 10 year(r	**5866**	**18543**	**3784**	**965**	**4464**

PW-05-1 Travel Distance Aquifer = 15.37 m thick

Location	*PW-05-1*	*PW-05-1*	*Geo Mean*
K (m/s)	0.001162	0.003530	0.001430
K (m/year)	36642	111329	45103
d_{TOT} 1 year(m	**220**	**668**	**271**
d_{TOT} 5 year(m	**1099**	**3340**	**1353**
d_{TOT} 10 year(r	**2199**	**6680**	**2706**

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The first step in the analysis was to determine the extents of the capture zone. Using data from well testing and equations provided by the Well Protection Tool Kit, it was determined that the capture zone could be from 24 to 152m wide and extend from 4 to 24m down gradient of the well. The variation in the capture zone is based on the variability of hydrogeological data.

In reviewing these data, the project team identified that the management zone would also be impacted by regulatory requirements, in particular the YTG EHS exclusion zone radius of 60m (120m capture zone width) for a community well. In order to provide the highest factor of safety, the team decided to use a capture zone width of 154m for establishing the capture zones for both wells (PW05-1 and BW06-1). This width also reflects reflect regulatory requirements of 120m, the inherent variability in ground water modeling and the lack of detailed geotechnical data for wells upstream of the community well.

In summary the team decided to use a capture zone width of 154m extending 77m downstream of the wells.

The projected capture zone from PW05-1 intersects BW06-1 and the flow direction turns slightly north at this point. The capture zone is slightly larger in the vicinity of the two wells as the capture zones overlap.

The next step in the analysis was to determine the time that it would take for a contaminant spilled in the capture zone to travel to the well. Test data from the new community wells was used to estimate the distance upstream of the well it would take contaminants to reach each well in one, five and ten years.

Using the data from the hydrogeologic report on the well resulted in extremely long travel distances. Review of the data with EBA (per. Com. R. Martin, EBA Engineering

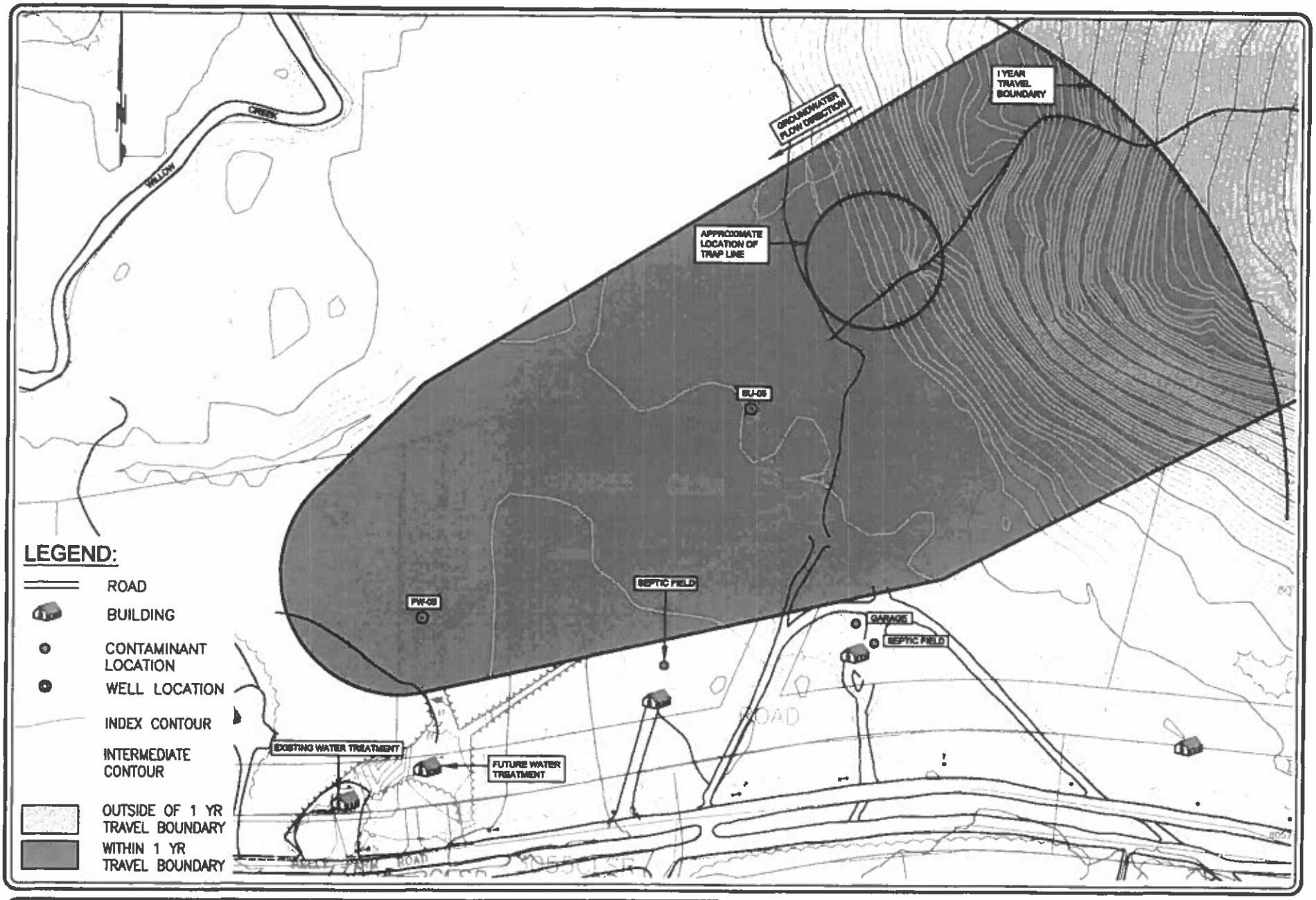
Ltd.) identified that the format required for INAC reporting did not accurately represent the full aquifer available for recharge. Travel distances were recalculated using the full aquifer thickness of 16m resulting in a travel distance of approximately 271m per year.

The results of the capture zone analysis are summarized graphically in figure 9 that indicates a 154m wide capture path extending in a north east direction to the escarpment northeast of Willow Creek subdivision. The capture zone is wider in the area of the two wells where the capture zones overlap.

Extrapolating the capture zone beyond the one year travel time boundary with any accuracy is difficult due the abrupt change in topography with the escarpment directly to the north of the wells and the lack of any hydrogeological data in this area. Figure 10 provides a graphical depiction of the estimated capture zone to the ten year travel boundary based on topographical analysis. This depiction should be viewed as having limited accuracy.

The extrapolation is useful in that it identifies that activity on the Willow Creek plateau should be managed carefully as spills may impact on the community water supply. It also identifies that spills on the Klondike Highway and the air strip to the north of the community could also impact on the community wells. Consideration should be given to posting signs on the highway and the airstrip warning the area is the community drinking water source and to report all spills immediately.

Figure 9 – Estimated Capture Zone and Travel Boundaries



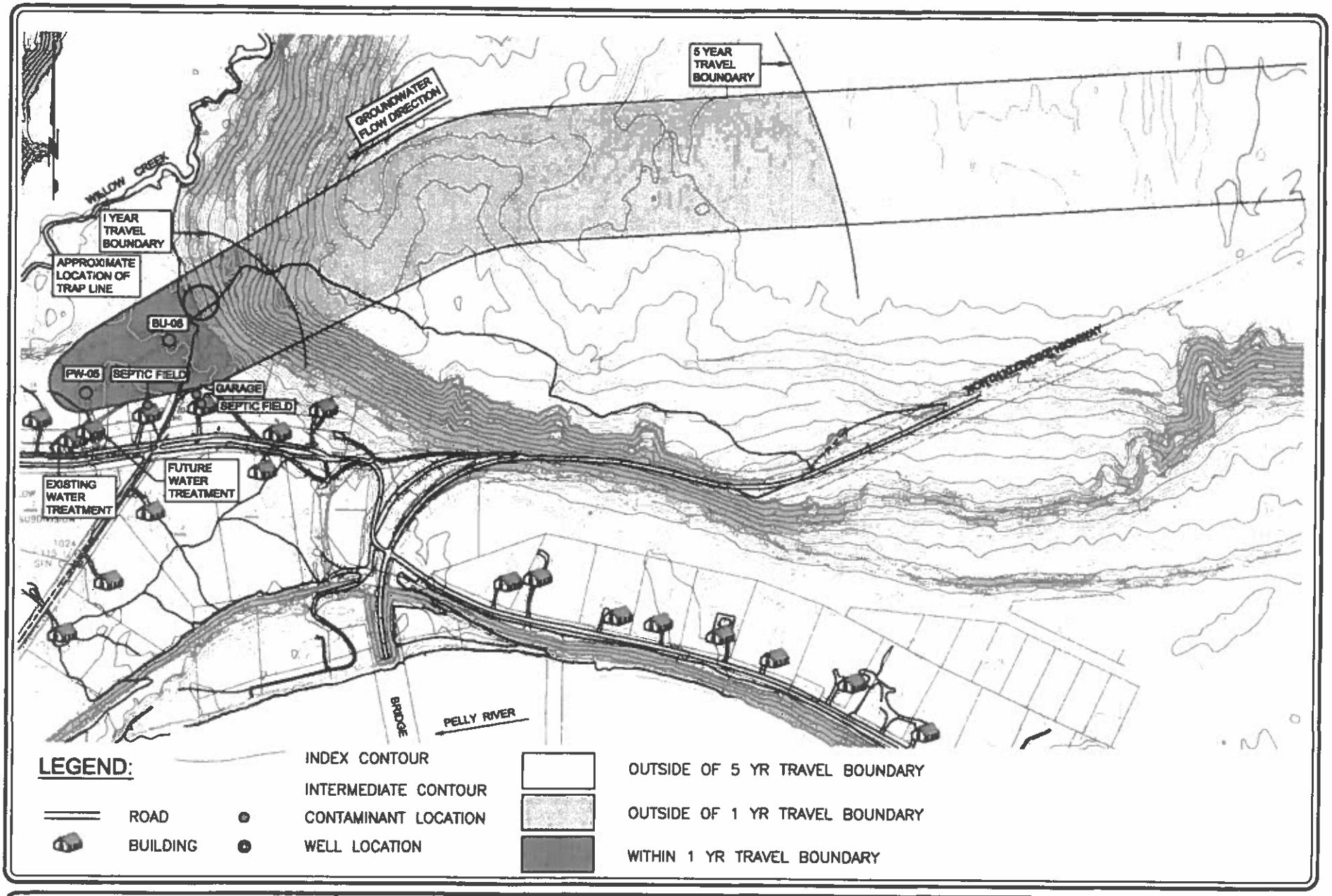
Selkirk First Nation

WELL PROTECTION PLAN
CAPTURE ZONE
PELLY CROSSING, YUKON

VISTA TEK LTD

DRAWN	S.ENGENDALE
SCALE	1:2500
DATE	APRIL 14, 2009
PROJECT No.	0220
DRAWING	0220-001_01
SHEET	1 OF 1

Figure 10 – Extrapolated capture zone to 10-year travel time boundary – estimate only



Selkirk First Nation

WELL PROTECTION PLAN
CAPTURE ZONE
PELLY CROSSING, YUKON

VISTA TEK LTD

SCALE	1:10000
DATE	APRIL 14, 2008
PROJECT No.	8030
DRAWING	8030-001_R1
VER.	ISSUE
SHEET:	1 OF 1

7.0 POTENTIAL CONTAMINANTS

7.1 Areas of Potential Environmental Concern within the Protection Area

In order to identify Areas of Potential Environmental Concern (APEC) within the Well Head Protection Area, meetings and site reconnaissance visits were conducted with SFN team members, as well Government of Yukon and Environment Canada Spills Report Databases were researched.

7.2 Contaminated Sites and Spills Search, Government of Yukon

Since 2001, the Government of Yukon Department of Environment has maintained the Yukon Spills Report Centre. There were no spills recorded within the Well Head Protection Boundaries. Copies of the Government of Yukon Spills Reports are located in Appendix B.

7.3 Contaminated Sites and Spills Search, Environment Canada

Environment Canada maintained spill records within the Yukon between 1972 and 2001. There were no spills recorded within the Well Head Protection Boundaries. Copies of Environment Canada Spills Reports are located in Appendix B.

7.4 Site Reconnaissance Survey and Meetings with SFN Team Members

Based on information collected during site visits and meetings with SFN team members, the only APEC of significance found within a 10-year travel time in the Well Head Protection Area was Potential Spills on the North Klondike Highway (PSNK).

There is a potential for spills/accidents in the section of the highway to have adverse effects on the water quality of the two community wells.

The project team had identified that a casual user (CU) (i.e. trapper, snowmobiling, ATV user) traversing the Well Head Protection Area might also impact on the water supply system but the volume and types of spills, if any, would be minor.

Two other APECs that were identified were located just outside the Well Head Protection area:

- Septic Field (SF)
  - There is a potential for heavy metals, solvents, fecal coliforms, etc., to enter into aquifer although the field is located outside of the estimated capture zone
- Residential Garage (RG)
  - There is a potential for heavy metals, oils, greases, solvents, hydrocarbons, etc to enter into aquifer although the building is a frame only and has not been used to date and the building is located outside of the estimated capture zone

7.5 Risks associated with each APEC

The only APEC's found within a 10 year travel time in the Well Head Protection Zone were Potential spills on the North Klondike Highway (PSNK) and casual use of the capture area by trappers, snowmobiles or ATVs.

In order to determine the risks associated with these APECs to the new community wells, a risk matrix was developed. In the matrix, two criteria are used to define risk and they are the Exposure Likelihood and the Hazard Consequence.

The Exposure Likelihood defines how likely it is that a consumer will be exposed to an APEC, and it is based on how fast an APEC will travel through the ground and into the well water as follows:

Exposure Likelihood Criteria

Low- Groundwater travel time over 5 years

Medium- Groundwater travel time 1 to 5 years

High- Groundwater travel time 1 year or less

The Hazard Consequence Criteria is based on the likelihood of the APEC causing harm to human health. The Hazard Consequence Criteria used in the Risk Matrix include:

Hazard Consequence Criteria

Low - Small change in water quality; aesthetic water quality guidelines exceeded

Medium- Moderate change in water quality requiring mitigation (treatment of water supply)

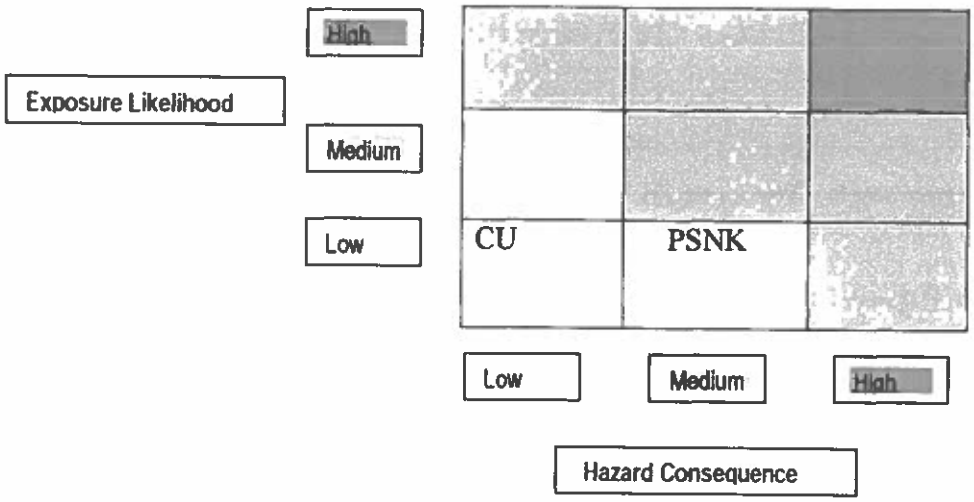
High- Significant change in water quality that cannot be mitigated by treatment or potentially causing acute health concerns

The two APECs (CU- Casual Use and PSNK- Potential Spills North Klondike Highway) for the SFN community wells are ranked in the Risk Matrix in table 3.

Because any potential spills on the North Klondike would take 10 years or more to travel to well, the Exposure Likelihood is considered low. The Hazard Consequence Criteria is ranked medium for this APEC, because any exposure to contaminants found in potential spills on the highway would likely cause moderate change in water quality requiring treatment of water supply. Potential contaminants would have to migrate through several kilometers of sand and gravel (the predominant soil composition in the area) before they would enter into the community wells, and it is likely that most contaminants

would have been naturally degraded, mechanically filtered or evaporated by the time they reached the well. However, a zero risk to human health cannot be assumed and spills on the highway should be promptly acted on to prevent potential future contamination of the well.

Table 3 - Risk Matrix for SFN Community Wells



The two other potential APECs identified during the identification of potential contaminants were residential septic fields directly to the south of the new community wells. As these APECs are not in the estimated capture zone, they are not included in the risk matrix but should be considered in the community management plan.

7.6 Risk Management

In the community planning team meeting held on March 19th[h], 2008, the APEC's and associated risks were discussed and several management strategies were developed for consideration. Table 4 describes the management strategies developed for the APEC's.

Table 4 - APEC's and Potential Management Options.

APEC	Management Option
Septic Fields	Inspect annually, sound and clean out tanks annually, interview home owners to determine if any freeze-ups, blockages, or other problems, fence no traffic areas around fields, educate owner on proper usage and maintenance.
Residential Garage	Home owner education and assistance with management of hazardous wastes
Trap Line and Casual Usage of trails	Community education & signage
Potential Spill North Klondike Highway	Spill plan and signage; RCMP, SFN Public Works and GY to monitor activities on highway and report any unlawful activities, spills or any activities that could pose harm the water supply and environment.
Signage- signs delineating Well Head Protection zone will be made and posted around zone to make public aware of the area. Additionally signs should be posted on Klondike Highway warning of the Well Head Protection area and to report spills. Also, signs will be placed on the access road to Willow Creek near the airport. Signs will be place on Pelly farm road before and after protection zone boundaries.	

Education- pamphlets and community discussions will help spread awareness of the Well Head Protection plan and the APEC's within the protection zone. Education on what activities are permitted within the protection area will be a focus for SFN staff.

Water Quality Testing- additional water quality testing using GC/MS scan on community wells will be conducted annually.

Oil Change Station- Public Works staff identified a need to build an oil change station for residents and tourists passing though Pelly Crossing. Currently, there is no suitable staging area to conduct oil changes in Pelly Crossing.

Hazardous Waste Collection- SFN staff to contact Department of Environment regarding establishing a Hazardous Waste Collection Program.

7.7 Risk Monitoring

Although few potential Areas of Potential Environmental Concern were identified during the development of the well head protection plan, it must be noted that land use activities can change rapidly and monitoring of the protection zone should be an on-going effort by all SFN members.

Monitoring should include:

- Inspection of septic tank on annual basis
- Monitoring of highway uses – activities such as spills, construction, accidents, etc should be closely monitored
- Inspection of undeveloped area to the north of the well sites on annual basis
- Weekly inspection of areas adjacent to well heads

- The well head protection zone should also be included in any future community land use or development plan.

8.0 CONCLUSIONS AND RECOMMENDATIONS

8.1 Conclusions

Based on the hydrologicial analysis for the new community well (PW05-1) and the community back-up well (BW06-1), the capture zone for the wells is approximately154m wide and extends from the wells in a northeast direction.

It is estimated that the ground water in the capture zone travels approximately 271m per year.

The sand and gravel soils in this area result in rapid transmission of surface contaminants and the management area should be protected against uses that may result in spills of hazardous materials.

No contaminant sources were located within the protection zone. Basic management techniques can be applied to reduce the risk from identified contaminant sources located close to the management zone as well as potential future sources.

Accurate projection of the well capture zone beyond the 1-year travel boundary is not possible due to the lack of hydrogeological data.

The estimated capture zone, based on topographic analysis only, indicates that the Klondike Highway may be at the ten-year travel boundary.

8.2 Recommendations

1. A community education plan should be undertaken including posting of the management zone, discussions during community meetings and pamphlets distributed to households to educate residents on the importance of preserving the ground water source for the community.

2. Signs should be posted on the Klondike Highway where it intersects the capture zone to warm motorists that the area is a public water source and to report any spills immediately.

3. The residential septic fields adjacent to the capture zone should be inspected at least once a year.

4. Signs should be posted on trails in the well capture zone warning of that the area is a public water source and to report spills immediately.

5. The areas in the immediate vicinity of the wellheads should be inspected for possible contaminant sources on a weekly basis.

6. The community capital and land use plans should incorporate the well management zone.

7. A community spill contingency plan should be developed and spill response practiced on a yearly basis.

8. Completion of Steps 5 (Develop Contingency Plans) and 6 (Monitor Results and On-going Evaluation of the Plan) of the Well Protection toolkit should be completed.

9. In order to continue to monitor well performance, it is recommended that static and pumping water levels, pumping rates and duration be recorded on a regular basis for PW05-1 and BW06-1. Water levels can be collected either manually or using a permanently installed data logger within the well. The purpose of the data logger is to collect water levels within the well at predetermined intervals. Water levels can then be downloaded monthly for review and analyses. The purpose of the monitoring program is to continue to assess the well efficiency, and determine when well rehabilitation is required.

9.0 REFERENCES

BC Ministry of Environment Website:
http://www.env.gov.bc.ca/wat/gws/well_protection/wellprotect.html Well Protection Toolkit.

EBA Engineering Consultants Ltd. Community Water Well Assessment Willow Creek Subdivision, Pelly Crossing, Yukon. 2005.

EBA Engineering Consultants Ltd. Water Well Completion Report Willow Creek Subdivision, Pelly Crossing, Yukon. 2005.

EBA Engineering Consultants Ltd. Water Well Completion Report Back-up Water Supply Well Willow Creek Subdivision, Pelly Crossing, Yukon. 2007.

Ontario Ministry of Environment, Groundwater Studies - Technical Terms of Reference, November 2001.

Federal–Provincial–Territorial Committee on Drinking Water of the Federal–Provincial–Territorial Committee on Health and the Environment, (April 2004), "Summary of Canadian Drinking Water Quality Guidelines".

Government of Yukon. Drinking Water Regulation. Public Health and Safety Act, Section 24. August, 2007.

Appendix A

Semi-Volatile Water sample results of Willow Creek Community Wells, PW05-01, BW06-01

JC Environmental

April 4, 2007

To: Danny VanBibber
Water/Wastewater Operations Manager
Selkirk First Nation
PO Box 40
Pelly Crossing, YT
Y1A 1P0

Re: Semi-Volatile Water sample results of Willow Creek Community Wells, PW05-01, BW06-01

INTRODUCTION

On March 23, 2007 Jillian Chown (JC Environmental Consulting) and Victor Menkal (Vista Tek Engineering) traveled to Pelly Crossing in order to collect water quality samples from the two new community wells located in the Selkirk First Nation's Willow Creek Subdivision. Water quality samples were collected from two wells, PW05-01 and BW06-01 (back-up well). Samples were analyzed for semi-volatile compounds using capillary gas chromatograph-mass selective detector (GC/MS scan). The GC/MS scan is capable of picking up very small concentrations of potential contaminants in water. The use of the scan was suggested by JC Environmental in order to meet the Government of Yukon Environmental Health Services request to analyze samples for the complete list of parameters listed in Table 4. Guidelines for chemical and physical parameters ,Guidelines for Canadian Drinking Water Quality. The GC/MS scan is capable of detecting the compounds listed in Table 4 of the Guidelines if they are present in the water. Environmental Health Services was in agreement with this suggestion.

METHODS

The first well sampled was PW05-01. Sampling began at 11:30 am. Weather was overcast and 3 degrees Celsius. Well cap was unlocked by sampler and water level of well was taken using a well sounder. Static level was recorded at 20.39 meters from top of well casing. Bottom of well was measured at 38.1 meters from top of well casing. Well volume was calculated to be approximately 520 liters. In order to sample the well, a Redi-Flo 2 well pump was used. After the well was sounded, the pump was placed into well PW05-02. The well was pumped for approximately 1 hour in order to displace 2 well volumes of water. After one hour, a 1 litre amber bottle was filled and sample placed into cooler with ice.

7 Aster Place, Whitehorse YT, Y1A5T2 • Ph: 867.393.4833• jcenvironmental@klondiker.com

Two samples were collected from BW06-01 in order to collect a replicate sample from this well. Methods used to sample PW05-01 were also used to sample BW06-01. The bottom of the well was recorded to be 33.5 m from top of well casing, and the static water level, from the top of the casing, was recorded at 20.4 m. The well pump ran for approximately 1 hour in order to remove 2 well volumes. After one hour of pumping, 2 1 litre amber bottles were filled and place into a cooler with ice.

A trip blank was prepared by the lab, and sent in the cooler from the lab with the other sample bottles. The trip blank was filled with de-ionized water by lab staff. The trip blank remained inside the sample cooler during the entire sampling event, and was sent back to the lab with the other bottles for analysis.

Samples were driven back to Whitehorse that day, and placed on Air North Cargo the next morning.

Results of the analysis are appended to this report.

RESULTS

Samples collected from the two community wells in Willow Creek contained detectable semi-volatile compounds. Results are included in Table 1 below. The only compound detected in well PW05-01 was Butylated Hydroxytoluene , or BHT, a very common compound found in food preservatives and is used as an antioxidant in food, feed, petrol products, rubbers, plastics, oils and soaps. It has a LD50 oral mice of 1040 mg/kg. There is no guideline limit for this compound under the Guidelines for Canadian Drinking Water Quality. BHT was also found in well BW06-01. Also, BW06-01 contained trace amounts of an unknown ketone and p-xylene. Xylene has an Aesthetic Objective under the CDWQ Guidelines of 0.3 mg/L. The concentration found in well BW06-01 is below this limit, at a concentration of 0.00006 mg/L. There are no guideline limits set for ketones. The trip blank contained trace amounts of 2-Pentanone, 4-hydroxy-4 methyl or Diacetone alcohol. This compound is used a laboratory reagent. It does not have a drinking water guideline limit.

Table 1. Semi-volatile results

Well ID	Semi-volatile compounds	Ug/L
PW05-01	Butylated Hydroxytoluene	0.08
Trip Blank	2-Pentanone, 4-hydroxy-4 methyl	0.28
	Unknown oxygenated hydrocarbon	0.15
BW06-01	Unknown ketone	0.26
	Butylated Hydroxytoluene	0.10
	p-xylene	0.06
BW06-01 R	Unknown ketone	0.21
	Butylated Hydroxytoluene	0.06
	p-xylene	0.06

CONCLUSIONS

The two community wells in the Willow Creek Subdivision, PW05-01 and BW06-01, did not exceed any of the chemical and physical parameters listed in Table 4 of the Guidelines for Canadian Drinking Water Quality.

Should you have any further questions, please contact me at 867-393-4833.

Sincerely,

Jillian Chown B.Sc.
JC Environmental Consulting

Bodycote TESTING GROUP

5348O8

Control Number 300576

Bodycote Norwest Labs – A New Bodycote Company

Environmental Sample Information Sheet

NOTE: Proper completion of this form is required in order to proceed with [illegible]
See reverse for your nearest Bodycote Norwest location and proper sampling [illegible]

Billing Address:

Company: Vista Tek Ltd.
Address: 803 Wood Street
Whitehorse YT
QA/QC Report ☑
Attention: Victor Menkal / Jillian Chown
Phone: 867-393-4033
Fax: 867-456-7748
Cell: 867-334-1830
e-mail: jc environmental @ klondiker.com

Report Results:
Fax ☐
Mail ☐
Courier ☐
e-mail ☑
e-Service ☐

Copy of Report To: **Copy of Invoice:** ☐

Company:
Address:
Mail invoice to this address for approval ☐

Attention:
Phone:
Fax:
Cell:
e-mail:

Report Results:
Fax ☐
Mail ☐
Courier ☐
e-mail ☐
e-Service ☐

Information to be included on Report and Invoice

Project ID: Selkirk FN
Project Name: Community Wells
Project Location: Pelly Crossing
Legal Location:
PO#:
Proj. Acct. Code:
Agreement ID:

Upon filling out this section, client accepts that surcharges will be attached to this analysis

RUSH required on: All analysis ☐ or As indicated ☐

Date Required:
Signature:
Bodycote Authorization:

Sample Custody (Please Print)
Sampled by: Jillian Chown
Company JCE Signature Jillian Ch

I authorize Bodycote Norwest to proceed with the work indicated on this form:

Date: 03/23/07 Initial: JC

Received by: Sample Temp. °C

Waybill # 02138262 Date March 24/07

Company Air North Time 9:10 a.m.

Special Instructions / Comments

Metals bottle is preserved.

RECEIVED MAR 27 2007

Condition of containers / coolers upon arrival at lab

☐ Check here if Bodycote Norwest is required to report results directly to a regulatory bo[illegible] (Please include contact information)

☑ Check here if you're testing POTABLE WATER for HUMAN CONSUMPTION.

Please indicate which regulations you are required to meet: _____

	Sample Identification	Location	Depth IN CM M	Date/Time Sampled	Matrix	Sampling Method	Number of Containers ↓	Enter tests above (✔ relevant samples below)
1	House # 26 (Jan Rd)		-	03/23	H2O		1	✓
2	House #26 (Jan Rd)		-	03/23	preserved H2O		1	
3	House #26 (Jan Rd)		-	03/23	H2O		1	✓
4	PW 05-01		-	03/23	H2O		1	
5	Trip Blank		-	03/23	H2O		2	
6	Equipment Blank		-	03/23	H2O		1	
7	BW 06-01		-	03/23	H2O		1	
8	BW 06-01 R		-	03/23	H2O		1	
9			-					
10			-					
11			-					
12			-					
13			-					
14			-					
15			-					

Form No. 0008 (Rev. 03/06)

NOTE: All hazardous samples must be labeled according to WHMIS guidelines.

NORWEST LABS

Report Transmission Cover Page

Norwest Labs
Bay #5, 2712-37 Avenue N.E.
Calgary, AB. T1Y-5L3
Phone: (403) 291-2022
Fax: (403) 291-2021

Bill to: Vista Tek Ltd.
Report to: Vista Tek Ltd.
803 Wood Street
Whitehorse, YT, Canada
Y1A 2G6
Attn: Victor Menkal
Sampled By: Jillian Choun
Company: JCE

Project ID: Selkirk FN
Name: Community Wells
Location: Pelly Crossing
LSD:
P.O.:
Acct. Code:

NWL Lot ID: 534808
Approval Status: Approved
Invoice Frequency: by Lot
COD Status:
Control Number: 300576
Date Received: Mar 27, 2007
Date Reported: Apr 03, 2007
Report Number: 981606

Contact	Company	Address
Victor Menkal	Vista Tek Ltd.	803 Wood Street Whitehorse, YT Y1A 2G6 Phone: (867) 393-3458 Fax: (867) 393-8465 Email: vmenkal@yt.sympatico.ca

Copies	Delivery Strategy	Format
1	Post	

NOTE: **P** indicates a preliminary report is required

_____ # OF PAGES IN THIS TRANSMISSION

Notes to Clients
Lot Notes:
Sample Notes:
Batch Notes:
Method Notes:
Method Result Notes:

Reports associated with this Lot

Id/Format/Reported Date	Id/Format/Reported Date	Id/Format/Reported Date
981606 Env Guideline QC 3-Apr-07		

Comment:
See Methodology and Notes page of Analytical Report for all comments pertaining to this report.

If this report transmission is not satisfactory, please send report requirements to the address at the top of this page.

NORWEST LABS

Sample Custody

Norwest Labs
Bay #6, 2712-37 Avenue N.E.
Calgary, AB. T1Y-5L3
Phone: (403) 291-2022
Fax: (403) 291-2021

Bill to: Vista Tek Ltd.
Report to: Vista Tek Ltd.
803 Wood Street
Whitehorse, YT, Canada
Y1A 2G6
Attn: Victor Menkal
Sampled By: Jillian Choun
Company: JCE

Project
ID: Selkirk FN
Name: Community Wells
Location: Pelly Crossing
LSD:
P.O.:
Acct. Code:

NWL Lot ID: 534808
Control Number: 300576
Date Received: Mar 27, 2007
Date Reported: Apr 03, 2007
Report Number: 981606

Sample Disposal Date: May 03, 2007

All samples will be stored until this date unless other instructions are received. Please indicate other requirements below and return this form to the address or fax number on the upper right of this page.

_____ **Extend Sample Storage Until** _____ **(MM/DD/YY)**

The following charges apply to extended sample storage:

Storage for 1 to 5 samples per month	$ 10.00
Storage for 6 to 20 samples per month	$ 15.00
Storage for 21 to 50 samples per month	$ 30.00
Storage for 51 to 200 samples per month	$ 60.00
Storage for more than 200 samples per month	$ 110.00

_____ **Return Sample, collect, to the address below via:**

_____ Greyhound
_____ Loomis
_____ Purolator
_____ Other (Specify) _____

Name: _____
Company: _____
Address: _____
_____
Phone: _____
Fax: _____
Signature: _____

If no other arrangements have been made, samples will be disposed of on May 03, 2007.

NORWEST LABS

Analytical Report

Norwest Labs
Bay #6, 2712-37 Avenue N.E.
Calgary, AB. T1Y-6L3
Phone: (403) 291-2022
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Name: Community Wells
Location: Pelly Crossing
LSD:
P.O.:
Acct. Code:

NWL Lot ID: 534808
Control Number: 300576
Date Received: Mar 27, 2007
Date Reported: Apr 03, 2007
Report Number: 981606

NWL Number	534808-1
Sample Date	Mar 23, 2007
Sample Description	House #26 (Jon Ra)
Sample Matrix	Water

Analyte		Units	Result	Detection Limit	Guideline Limit	Guideline Comments
Metals Extractable						
Mercury	Extractable	mg/L	<0.0001	0.0001	0.001	Pass
Aluminum	Extractable	mg/L	<0.005	0.005	0.1	Acceptable
Antimony	Extractable	mg/L	<0.0002	0.0002	0.006	Pass
Arsenic	Extractable	mg/L	0.0008	0.0002	0.01	Pass
Barium	Extractable	mg/L	0.022	0.001	1	Pass
Boron	Extractable	mg/L	0.016	0.002	5	Pass
Cadmium	Extractable	mg/L	0.00001	0.00001	0.005	Pass
Chromium	Extractable	mg/L	0.0045	0.0005	0.05	Pass
Copper	Extractable	mg/L	0.011	0.001	1	Acceptable
Lead	Extractable	mg/L	0.0004	0.0001	0.01	Pass
Selenium	Extractable	mg/L	0.0030	0.0002	0.01	Pass
Uranium	Extractable	mg/L	0.0104	0.0005	0.02	Pass
Zinc	Extractable	mg/L	0.017	0.001	5	Acceptable
Physical and Aggregate Properties						
Colour	Apparent, Potable	Colour units	<5	5	15	Acceptable
Turbidity		NTU	0.9	0.1	5	Acceptable
Routine Water						
pH			7.93	-	6.5 - 8.5	Acceptable
Temperature of observed pH		°C	25.1	-		n/a
Electrical Conductivity		µS/cm at 25 C	1060	1		n/a
Calcium	Extractable	mg/L	99.9	0.2		n/a
Magnesium	Extractable	mg/L	85.8	0.1		n/a
Sodium	Extractable	mg/L	10.2	0.4	200	Acceptable
Potassium	Extractable	mg/L	4.8	0.4		n/a
Iron	Extractable	mg/L	0.09	0.03	0.3	Acceptable
Manganese	Extractable	mg/L	0.014	0.005	0.05	Acceptable
Chloride	Dissolved	mg/L	0.6	0.4	250	Acceptable
Fluoride		mg/L	0.16	0.05	1.5	Pass
Nitrate - N		mg/L	0.52	0.01	10	Pass
Nitrite - N		mg/L	<0.005	0.005	1	Pass

NORWEST LABS

Analytical Report

Norwest Labs
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Report Number: 981606

NWL Number	534808-1
Sample Date	Mar 23, 2007
Sample Description	House #26 (Jon Ra)
Sample Matrix	Water

Analyte		Units	Result	Detection Limit	Guideline Limit	Guideline Comments
Routine Water - Continued						
Nitrate and Nitrite - N		mg/L	0.52	0.02	10	Pass
Sulfate (SO4)		mg/L	254	0.9	500	Acceptable
Hydroxide		mg/L	<5	5		n/a
Carbonate		mg/L	<6	6		n/a
Bicarbonate		mg/L	454	5		n/a
P-Alkalinity	as CaCO3	mg/L	<5	5		n/a
T-Alkalinity	as CaCO3	mg/L	372	5		n/a
Total Dissolved Solids		mg/L	679	1	500	Above Aesthetic
Hardness	as CaCO3	mg/L	603	-		Very Hard
Ionic Balance		%	99	-		n/a

Approved by:

R. Shane Harnish, M.Sc
Operations Manager

NORWEST LABS

Norwest Labs
Bay #5, 2712-37 Avenue N.E.
Calgary, AB. T1Y-5L3
Phone: (403) 291-2022
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Methodology and Notes

Bill to: Vista Tek Ltd.
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803 Wood Street
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NWL Lot ID: 534808
Control Number: 300576
Date Received: Mar 27, 2007
Date Reported: Apr 03, 2007
Report Number: 981606

Method of Analysis:

MethodName	Reference		Method	Date Analysis Started	Location
Alkalinity, pH, and EC in water	APHA	*	Conductivity - Laboratory Method, 2510 B	28-Mar-07	Norwest Labs Edmonton
Alkalinity, pH, and EC in water	APHA	*	Electrometric Method, 4500-H+ B	28-Mar-07	Norwest Labs Edmonton
Alkalinity, pH, and EC in water	APHA	*	Titration Method, 2320 B	28-Mar-07	Norwest Labs Edmonton
Anions (Routine) by Ion Chromatography	APHA	*	Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	29-Mar-07	Norwest Labs Edmonton
Chloride in Water	APHA	*	Automated Ferricyanide Method, 4500-Cl- E	30-Mar-07	Norwest Labs Edmonton
Colour (Apparent) in water	APHA	*	Visual Comparison Method, 2120 B	28-Mar-07	Norwest Labs Edmonton
Mercury (Extractable) in water	APHA	*	Cold Vapour Atomic Absorption Spectrometric Method, 3112 B	30-Mar-07	Norwest Labs Edmonton
Metals ICP-MS (Extractable) in water	US EPA	*	Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	29-Mar-07	Norwest Labs Edmonton
Metals Trace (Extractable) in water	APHA	*	Inductively Coupled Plasma (ICP) Method, 3120 B	28-Mar-07	Norwest Labs Edmonton
Turbidity in Water	APHA	*	Nephelometric Method, 2130 B	28-Mar-07	Norwest Labs Edmonton

* Norwest method(s) is based on reference method

References:

APHA	Standard Methods for the Examination of Water and Wastewater
US EPA	US Environmental Protection Agency Test Methods

Comments:

Please direct any inquiries regarding this report to our Client Services group.
Results relate only to samples as submitted

NORWEST LABS

Norwest Labs
Bay #6, 2712-37 Avenue N.E.
Calgary, AB. T1Y-5L3
Phone: (403) 291-2022
Fax: (403) 291-2021

Quality Control

Bill to: Vista Tek Ltd.
Report to: Vista Tek Ltd.
803 Wood Street
Whitehorse, YT, Canada
Y1A 2G6
Attn: Victor Menkal
Sampled By: Jillian Choun
Company: JCE

Project
ID: Selkirk FN
Name: Community Wells
Location: Pelly Crossing
LSD:
P.O.:
Acct. Code:

NWL Lot ID: 534808
Control Number: 300576
Date Received: Mar 27, 2007
Date Reported: Apr 03, 2007
Report Number: 981606

Metals Extractable

Blanks	Units	Measured	Mean	Lower Limit	Upper Limit	Passed QC
Sulfur	mg/L	<0.3	0.0	-0.3	0.3	✓
Mercury	mg/L	<0.0001	0.0000	0.0000	0.0000	✓
Aluminum	ug/L	<5	0	-5	5	✓
Antimony	ug/L	<0.2	0.0	-0.2	0.2	✓
Arsenic	ug/L	<0.2	0.0	-0.2	0.2	✓
Barium	ug/L	<1	0	-1	1	✓
Boron	ug/L	<2	0	-2	2	✓
Cadmium	ug/L	<0.01	0.00	-0.01	0.01	✓
Chromium	ug/L	<0.5	0.0	-0.5	0.5	✓
Copper	ug/L	<1	0	-1	1	✓
Lead	ug/L	<0.1	0.0	-0.1	0.1	✓
Selenium	ug/L	<0.2	0.0	-0.2	0.2	✓
Uranium	ug/L	<0.5	0.0	-0.5	0.5	✓
Zinc	ug/L	<1	0	-1	1	✓
Material Used:	Edmonton Method Blank					
Date Acquired:	Mar 28, 2007					
Acquired By:	Jennifer Persson					

Replicates	Units	Replicate1	Replicate2	% RSD Criteria	Absolute Criteria	Passed QC
Sulfur	mg/L	74.3	75.6	10.0	0.1	✓
Mercury	mg/L	<0.0001	<0.0001	9.9900	0.0003	✓
Material Used:	Edmonton Duplicate					
Date Acquired:	Mar 30, 2007					
Acquired By:	Bryan Morrison					

NORWEST LABS

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Quality Control

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803 Wood Street
Whitehorse, YT, Canada
Y1A 2G6
Attn: Victor Menkal
Sampled By: Jillian Choun
Company: JCE

Project
ID: Selkirk FN
Name: Community Wells
Location: Pelly Crossing
LSD:
P.O.:
Acct. Code:

NWL Lot ID: 534808
Control Number: 300576
Date Received: Mar 27, 2007
Date Reported: Apr 03, 2007
Report Number: 981606

Metals Extractable (Continued...)

Control Sample		Units	Measured	Mean	Lower Limit	Upper Limit	Passed QC
Mercury		mg/L	0.0008	0.0008	0.0006	0.0010	✓
Material Used:	Edmonton Digestion Check						
Date Acquired:	Mar 30, 2007						
Acquired By:	Bryan Morrison						
Sulfur		mg/L	48.9	49.8	44.8	54.8	✓
Mercury		mg/L	0.0028	0.0031	-0.0239	0.0301	✓
Material Used:	Metals High						
Date Acquired:	Mar 30, 2007						
Acquired By:	Bryan Morrison						
Sulfur		mg/L	1	1.0	0.9	1.2	✓
Mercury		mg/L	0.0008	0.0009	0.0007	0.0011	✓
Aluminum		ug/L	920	1000	850	1150	✓
Antimony		ug/L	42.1	40.0	34.0	46.0	✓
Arsenic		ug/L	40.7	40.0	34.0	46.0	✓
Barium		ug/L	198	200	170	230	✓
Boron		ug/L	367	400	340	460	✓
Cadmium		ug/L	1.96	2.00	1.70	2.30	✓
Chromium		ug/L	99.4	100.0	85.0	115.0	✓
Copper		ug/L	194	200	170	230	✓
Lead		ug/L	20.3	20.0	17.0	23.0	✓
Selenium		ug/L	39.8	40.0	34.0	46.0	✓
Uranium		ug/L	97.5	100.0	85.0	115.0	✓
Zinc		ug/L	204	200	170	230	✓
Material Used:	Metals Low						
Date Acquired:	Mar 28, 2007						
Acquired By:	Jennifer Persson						
Aluminum		ug/L	50	50	43	58	✓
Antimony		ug/L	2.2	2.0	1.7	2.3	✓
Arsenic		ug/L	2.0	2.0	1.7	2.3	✓
Barium		ug/L	10	10	9	12	✓
Boron		ug/L	20	20	17	23	✓
Cadmium		ug/L	0.10	0.10	0.09	0.12	✓
Chromium		ug/L	5.1	5.0	4.3	5.8	✓
Copper		ug/L	10	10	9	12	✓
Lead		ug/L	1.0	1.0	0.9	1.2	✓
Selenium		ug/L	1.9	2.0	1.7	2.3	✓
Uranium		ug/L	5.0	5.0	4.3	5.8	✓
Zinc		ug/L	10	10	9	12	✓
Material Used:	Metals Trace						
Date Acquired:	Mar 28, 2007						
Acquired By:	Jennifer Persson						

NORWEST LABS

Quality Control

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Bill to: Vista Tek Ltd.
Report to: Vista Tek Ltd.
803 Wood Street
Whitehorse, YT, Canada
Y1A 2G6
Attn: Victor Menkal
Sampled By: Jillian Choun
Company: JCE

Project
ID: Selkirk FN
Name: Community Wells
Location: Pelly Crossing
LSD:
P.O.:
Acct. Code:

NWL Lot ID: 534808
Control Number: 300576
Date Received: Mar 27, 2007
Date Reported: Apr 03, 2007
Report Number: 981606

Physical and Aggregate Properties

Blanks		Units	Measured	Mean	Lower Limit	Upper Limit	Passed QC
Turbidity		NTU	<0.1	0.1	0.0	0.2	✓
Material Used:	Edmonton Method Blank						
Date Acquired:	Mar 28, 2007						
Acquired By:	Eman Ismaeel						
Turbidity		NTU	<0.1	0.0	0.0	0.0	✓
Material Used:	Straylight Standard						
Date Acquired:	Mar 28, 2007						
Acquired By:	Eman Ismaeel						

Replicates		Units	Replicate1	Replicate2	% RSD Criteria	Absolute Criteria	Passed QC
Turbidity		NTU	3.3	3.3	10.0	0.2	✓
Material Used:	Edmonton Duplicate						
Date Acquired:	Mar 28, 2007						
Acquired By:	Eman Ismaeel						

Control Sample		Units	Measured	Mean	Lower Limit	Upper Limit	Passed QC
Turbidity		NTU	2220	2283.0	2056.8	2509.2	✓
Material Used:	Turbidity High						
Date Acquired:	Mar 28, 2007						
Acquired By:	Eman Ismaeel						
Turbidity		NTU	7730	7856.0	7022.0	8690.0	✓
Material Used:	Turbidity Ultra High						
Date Acquired:	Mar 28, 2007						
Acquired By:	Eman Ismaeel						
Turbidity		NTU	173	167.0	150.1	183.9	✓
Material Used:	Water High						
Date Acquired:	Mar 28, 2007						
Acquired By:	Eman Ismaeel						
Turbidity		NTU	15.4	15.2	13.7	16.7	✓
Material Used:	Water Low						
Date Acquired:	Mar 28, 2007						
Acquired By:	Eman Ismaeel						
Turbidity		NTU	1.5	1.5	1.3	1.6	✓
Material Used:	Water Trace						
Date Acquired:	Mar 28, 2007						
Acquired By:	Eman Ismaeel						

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Quality Control

Bill to: Vista Tek Ltd.
Report to: Vista Tek Ltd.
803 Wood Street
Whitehorse, YT, Canada
Y1A 2G6
Attn: Victor Menkal
Sampled By: Jillian Choun
Company: JCE

Project
ID: Selkirk FN
Name: Community Wells
Location: Pelly Crossing
LSD:
P.O.:
Acct. Code:

NWL Lot ID: 534808
Control Number: 300576
Date Received: Mar 27, 2007
Date Reported: Apr 03, 2007
Report Number: 981606

Routine Water

Blanks	Units	Measured	Mean	Lower Limit	Upper Limit	Passed QC
Calcium	mg/L	<0.2	0.0	-0.2	0.2	✓
Magnesium	mg/L	<0.1	0.0	-0.1	0.1	✓
Sodium	mg/L	<0.4	0.0	-0.4	0.4	✓
Potassium	mg/L	<0.4	0.0	-0.4	0.4	✓
Iron	mg/L	<0.03	0.00	-0.03	0.03	✓
Manganese	mg/L	<0.005	0.000	-0.005	0.005	✓
Chloride	mg/L	<0.4	0.2	-0.3	0.7	✓
Fluoride	mg/L	<0.05	0.00	-0.05	0.05	✓
Nitrate - N	mg/L	<0.01	0.00	-0.01	0.01	✓
Nitrite - N	mg/L	<0.005	0.000	-0.005	0.005	✓
Material Used:	Edmonton Method Blank					
Date Acquired:	Mar 28, 2007					
Acquired By:	Kali Hicks					

Replicates	Units	Replicate1	Replicate2	% RSD Criteria	Absolute Criteria	Passed QC
Calcium	mg/L	3.2	3.2	10.0	0.6	✓
Magnesium	mg/L	0.6	0.6	10.0	0.4	✓
Sodium	mg/L	351	347	10.0	1.2	✓
Potassium	mg/L	2.5	2.5	10.0	1.2	✓
Iron	mg/L	0.30	0.28	9.99	0.05	✓
Manganese	mg/L	0.049	0.048	9.990	0.010	✓
Chloride	mg/L	<0.4	<0.4	10.0	0.5	✓
Nitrate - N	mg/L	1.07	1.07	9.99	0.01	✓
Nitrite - N	mg/L	0.058	0.057	9.990	0.010	✓
Material Used:	Edmonton Duplicate					
Date Acquired:	Mar 28, 2007					
Acquired By:	Kali Hicks					

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Quality Control

Bill to: Vista Tek Ltd.
Report to: Vista Tek Ltd.
803 Wood Street
Whitehorse, YT, Canada
Y1A 2G6
Attn: Victor Menkal
Sampled By: Jillian Choun
Company: JCE

Project
ID: Selkirk FN
Name: Community Wells
Location: Pelly Crossing
LSD:
P.O.:
Acct. Code:

NWL Lot ID: 534808
Control Number: 300576
Date Received: Mar 27, 2007
Date Reported: Apr 03, 2007
Report Number: 981606

Routine Water (Continued...)

Control Sample		Units	Measured	Mean	Lower Limit	Upper Limit	Passed QC
Chloride		mg/L	2140	2087.0	1875.2	2298.8	✓
Material Used:	Chloride High						
Date Acquired:	Mar 30, 2007						
Acquired By:	Christa Stuckless						
Calcium		mg/L	247	250.0	225.0	275.0	✓
Magnesium		mg/L	99.4	100.0	90.0	110.0	✓
Sodium		mg/L	251	250.0	225.0	275.0	✓
Potassium		mg/L	252	250.0	225.0	275.0	✓
Iron		mg/L	9.82	10.00	9.01	10.99	✓
Manganese		mg/L	2.45	2.500	2.260	2.740	✓
Material Used:	Metals High						
Date Acquired:	Mar 28, 2007						
Acquired By:	Alvin Kwan						
Calcium		mg/L	5.0	5.0	4.5	5.5	✓
Magnesium		mg/L	2.0	2.0	1.8	2.2	✓
Sodium		mg/L	5.2	5.0	4.4	5.6	✓
Potassium		mg/L	5.0	5.0	4.5	5.5	✓
Iron		mg/L	0.21	0.20	0.18	0.22	✓
Manganese		mg/L	0.052	0.050	0.045	0.055	✓
Material Used:	Metals Low						
Date Acquired:	Mar 28, 2007						
Acquired By:	Alvin Kwan						
pH			9.17	9.19	9.07	9.31	✓
Electrical Conductivity		dS/m at 25 C	2.74	2.735	2.616	2.854	✓
Chloride		mg/L	80.5	81.0	76.4	85.6	✓
Fluoride		mg/L	9.88	9.95	9.26	10.64	✓
Nitrate - N		mg/L	9.93	10.00	9.51	10.49	✓
Nitrite - N		mg/L	9.88	10.000	9.562	10.438	✓
P-Alkalinity		mg/L	429	486	394	577	✓
T-Alkalinity		mg/L	1010	1003	953	1053	✓
Material Used:	Water High						
Date Acquired:	Mar 28, 2007						
Acquired By:	Stef Pavlvshvn						

NORWEST LABS

Quality Control

Norwest Labs
Bay #6, 2712-37 Avenue N.E.
Calgary, AB. T1Y-5L3
Phone: (403) 291-2022
Fax: (403) 291-2021

Bill to: Vista Tek Ltd.
Report to: Vista Tek Ltd.
803 Wood Street
Whitehorse, YT, Canada
Y1A 2G6
Attn: Victor Menkal
Sampled By: Jillian Choun
Company: JCE

Project
ID: Selkirk FN
Name: Community Wells
Location: Pelly Crossing
LSD:
P.O.:
Acct. Code:

NWL Lot ID: 534808
Control Number: 300576
Date Received: Mar 27, 2007
Date Reported: Apr 03, 2007
Report Number: 981606

Routine Water (Continued...)

Control Sample	Units	Measured	Mean	Lower Limit	Upper Limit	Passed QC
pH		6.86	6.88	6.81	6.95	✓
Electrical Conductivity	dS/m at 25 C	0.079	0.076	0.071	0.081	✓
Chloride	mg/L	15.0	14.9	13.2	16.6	✓
Fluoride	mg/L	0.52	0.51	0.43	0.58	✓
Nitrate - N	mg/L	0.52	0.50	0.44	0.56	✓
Nitrite - N	mg/L	0.531	0.495	0.437	0.553	✓
P-Alkalinity	mg/L	42	46	13	80	✓
T-Alkalinity	mg/L	130	127	118	136	✓

Material Used: Water Low
Date Acquired: Mar 28, 2007
Acquired By: Stef Pavlvshvn

NORWEST LABS

Analytical Report

Norwest Labs
Bay 9, 2712-37 Avenue N.E.
Calgary, AB. T1Y-5L3
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Attn: Victor Menkal

Sampled by: Jillian Choun
JCE

Project ID: Selkirk FN
Name: Community Wells
Location: Pelly Crossing
LSD:
P.O.:

NWL Lot ID: 534808
Control Number: 300576
Date Received: Mar 27, 2007
Date Reported: Apr 2, 2007
Report Number: 981606

NWL Number: 534806-2
Sample Date: Mar 23, 2007
Sample Description: PW 05-01

Analyte	CAS Number	Units	Approximate Results	Retention Time	Match Quality
QUALITATIVE GC/MS SCAN FOR SEMI-VOLATILE COMPOUNDS - WATER					
Butylated Hydroxytoluene	128-37-0	ug/L	0.08	13.46	94
Total of all peaks detected (blank subtracted)		ug/L	0.08		

The sample was extracted then assessed as per EPA Method 8270, with a capillary gas chromatograph-mass selective detector. Spectral data was collected for each sample and compared to an 80,000 compound spectral library. A match quality was determined and ranked as best out of 100. Spectral data was also manually reviewed.

The 1 largest peaks that had acceptable match quality when checked against the library are shown here. Compounds are listed in descending order of peak area, which is generally proportional to concentration. Approximate concentrations are calculated using naphthalene response for all the compounds. Compounds which were also seen in a method blank were not reported

Please note that the GC/MS identifications are based primarily on the cross matching of library spectra and a visual review of the matches. True confirmation can only be attained with the use of analytical standards.

NORWEST LABS

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Analytical Report

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803 Wood Street
Whitehorse, YT, Canada
Y1A 2G6
Attn: Victor Menkal

Sampled by: Jillian Choun
JCE

Project ID: Selkirk FN
Name: Community Wells
Location: Pelly Crossing
LSD:
P.O.:

NWL Lot ID: 534808
Control Number: 300576
Date Received: Mar 27, 2007
Date Reported: Apr 2, 2007
Report Number: 961606

NWL Number: 534808-3
Sample Date: Mar 23, 2007
Sample Description: Trip Blank

Analyte	CAS Number	Units	Approximate Results	Retention Time	Match Quality
QUALITATIVE GC/MS SCAN FOR SEMI-VOLATILE COMPOUNDS - WATER					
2-Pentanone, 4-hydroxy-4-methyl-	128-37-0	ug/L	0.28	4.02	64
Unknown oxygenated hydrocarbon	-	ug/L	0.15	3.69	-
Total of all peaks detected (blank subtracted)		ug/L	0.43		

The sample was extracted then assessed as per EPA Method 8270, with a capillary gas chromatograph-mass selective detector. Spectral data was collected for each sample and compared to an 80,000 compound spectral library. A match quality was determined and ranked as best out of 100. Spectral data was also manually reviewed.

The 2 largest peaks that had acceptable match quality when checked against the library are shown here. Compounds are listed in descending order of peak area, which is generally proportional to concentration. Approximate concentrations are calculated using naphthalene response for all the compounds. Compounds which were also seen in a method blank were not reported

Please note that the GC/MS identifications are based primarily on the cross matching of library spectra and a visual review of the matches. True confirmation can only be attained with the use of analytical standards.

NORWEST LABS

Analytical Report

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Sampled by: Jillian Choun
JCE

Project ID: Selkirk FN
Name: Community Wells
Location: Pelly Crossing
LSD:
P.O.:

NWL Lot ID: 534808
Control Number: 300576
Date Received: Mar 27, 2007
Date Reported: Apr 2, 2007
Report Number: 981606

NWL Number: 534808-5
Sample Date: Mar 23, 2007
Sample Description: BW 06-01

Analyte	CAS Number	Units	Approximate Results	Retention Time	Match Quality
QUALITATIVE GC/MS SCAN FOR SEMI-VOLATILE COMPOUNDS - WATER					
Unknown ketone?	-	ug/L	0.26	8.00	-
Unknown	-	ug/L	0.13	21.10	-
Butylated Hydroxytoluene	128-37-0	ug/L	0.10	13.46	91
p-Xylene	106-42-3	ug/L	0.06	4.55	87
Total of all peaks detected (blank subtracted)		ug/L	0.55		

The concentrations of compounds found in the sample were very low - this made identifications generally poor.

The sample was extracted then assessed as per EPA Method 8270, with a capillary gas chromatograph-mass selective detector. Spectral data was collected for each sample and compared to an 80,000 compound spectral library. A match quality was determined and ranked as best out of 100. Spectral data was also manually reviewed.

The 4 largest peaks that had acceptable match quality when checked against the library are shown here. Compounds are listed in descending order of peak area, which is generally proportional to concentration. Approximate concentrations are calculated using naphthalene response for all the compounds. Compounds which were also seen in a method blank were not reported

Please note that the GC/MS identifications are based primarily on the cross matching of library spectra and a visual review of the matches. True confirmation can only be attained with the use of analytical standards.

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Sampled by: Jillian Choun
JCE

Project ID: Selkirk FN
Name: Community Wells
Location: Pelly Crossing
LSD:
P.O.:

NWL Lot ID: 534808
Control Number: 300576
Date Received: Mar 27, 2007
Date Reported: Apr 2, 2007
Report Number: 981606

NWL Number: 534808-6
Sample Date: Mar 23, 2007
Sample Description: BW 06-01R

Analyte	CAS Number	Units	Approximate Results	Retention Time	Match Quality
QUALITATIVE GC/MS SCAN FOR SEMI-VOLATILE COMPOUNDS - WATER					
Unknown ketone?	-	ug/L	0.21	8.00	-
Unknown	-	ug/L	0.11	21.10	-
Butylated Hydroxytoluene	128-37-0	ug/L	0.06	13.46	91
p-Xylene	106-42-3	ug/L	0.06	4.55	87
Total of all peaks detected (blank subtracted)		ug/L	0.44		

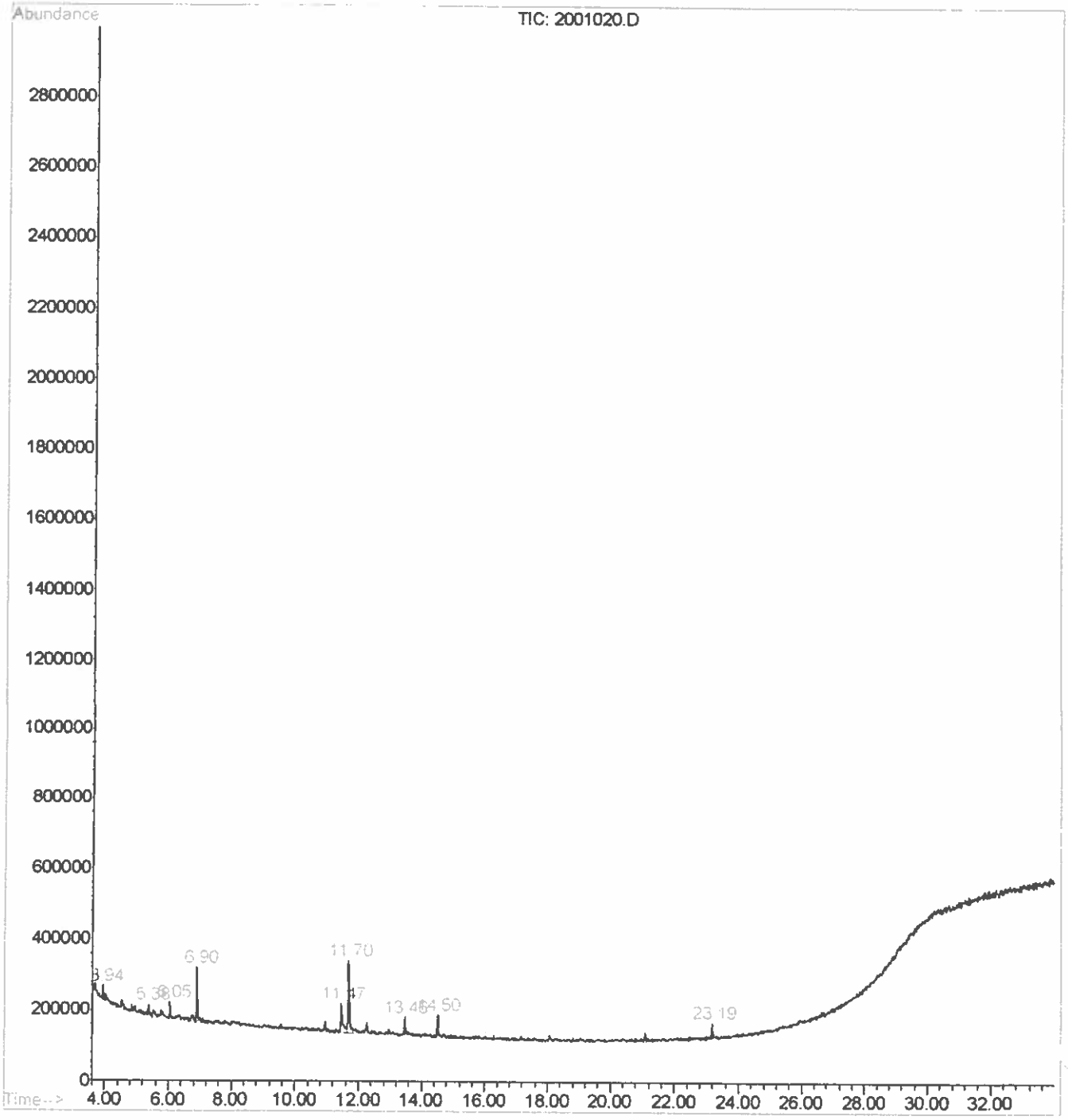
The concentrations of compounds found in the sample were very low - this made identifications generally poor.

The sample was extracted then assessed as per EPA Method 8270, with a capillary gas chromatograph-mass selective detector. Spectral data was collected for each sample and compared to an 80,000 compound spectral library. A match quality was determined and ranked as best out of 100. Spectral data was also manually reviewed.

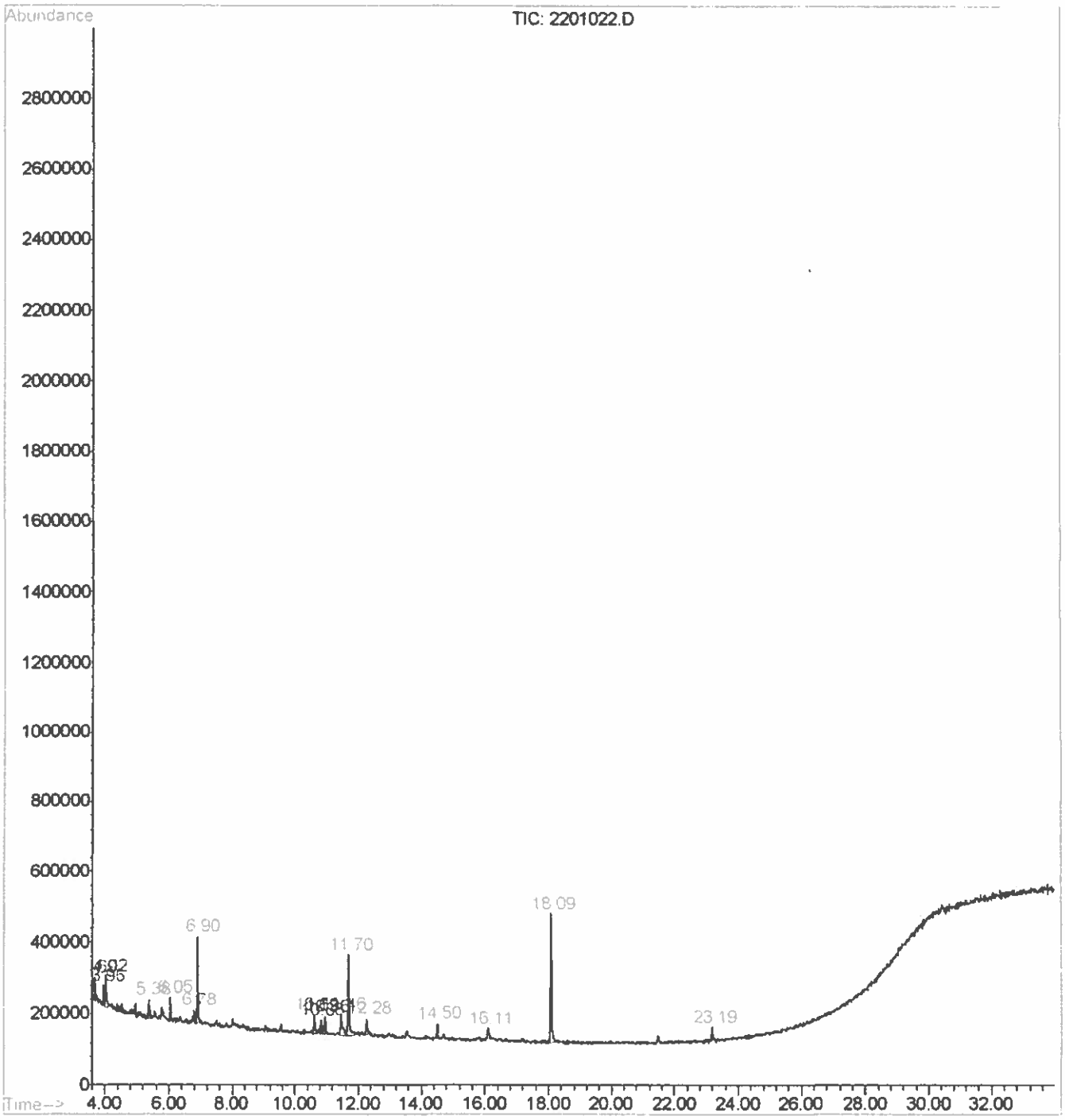
The 4 largest peaks that had acceptable match quality when checked against the library are shown here. Compounds are listed in descending order of peak area, which is generally proportional to concentration. Approximate concentrations are calculated using naphthalene response for all the compounds. Compounds which were also seen in a method blank were not reported

Please note that the GC/MS identifications are based primarily on the cross matching of library spectra and a visual review of the matches. True confirmation can only be attained with the use of analytical standards.

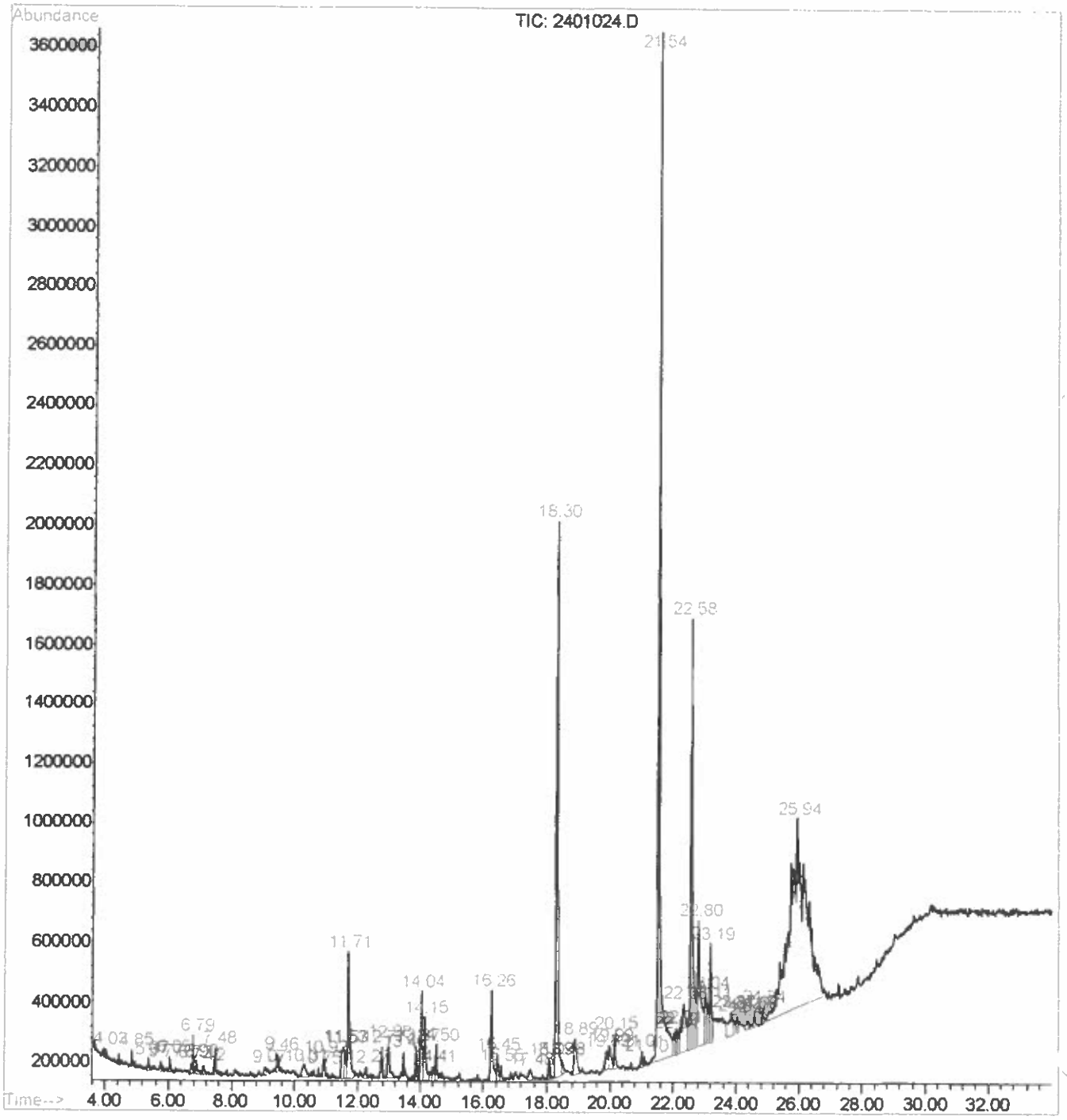
File : C:\HPCHEM\4\DATA\07-0330M\2001020.D
Operator : MSQS GC
Acquired : 31 Mar 2007 5:44 am using AcqMethod COMSQSCN
Instrument : MSQS GC-F
Sample Name: MSQS Vista Tek 534808-2W
Misc Info : FV=1
Vial Number: 20



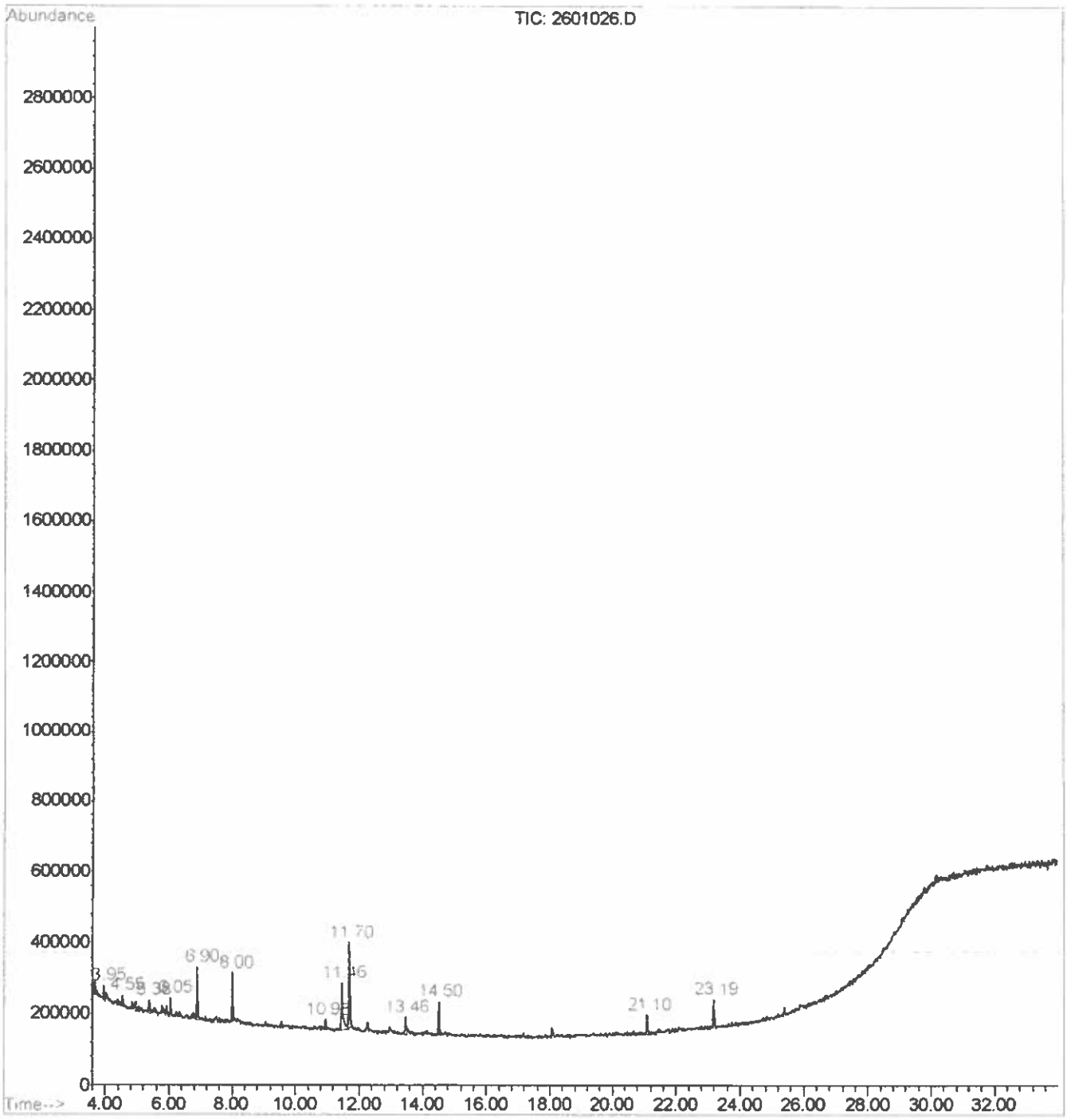
File : C:\HPCHEM\4\DATA\07-0330M\2201022.D
Operator : MSQS GC
Acquired : 31 Mar 2007 7:12 am using AcqMethod COMSQSCN
Instrument : MSQS GC-F
Sample Name: MSQS Vista Tek 534808-3W
Misc Info : FV=1
Vial Number: 22



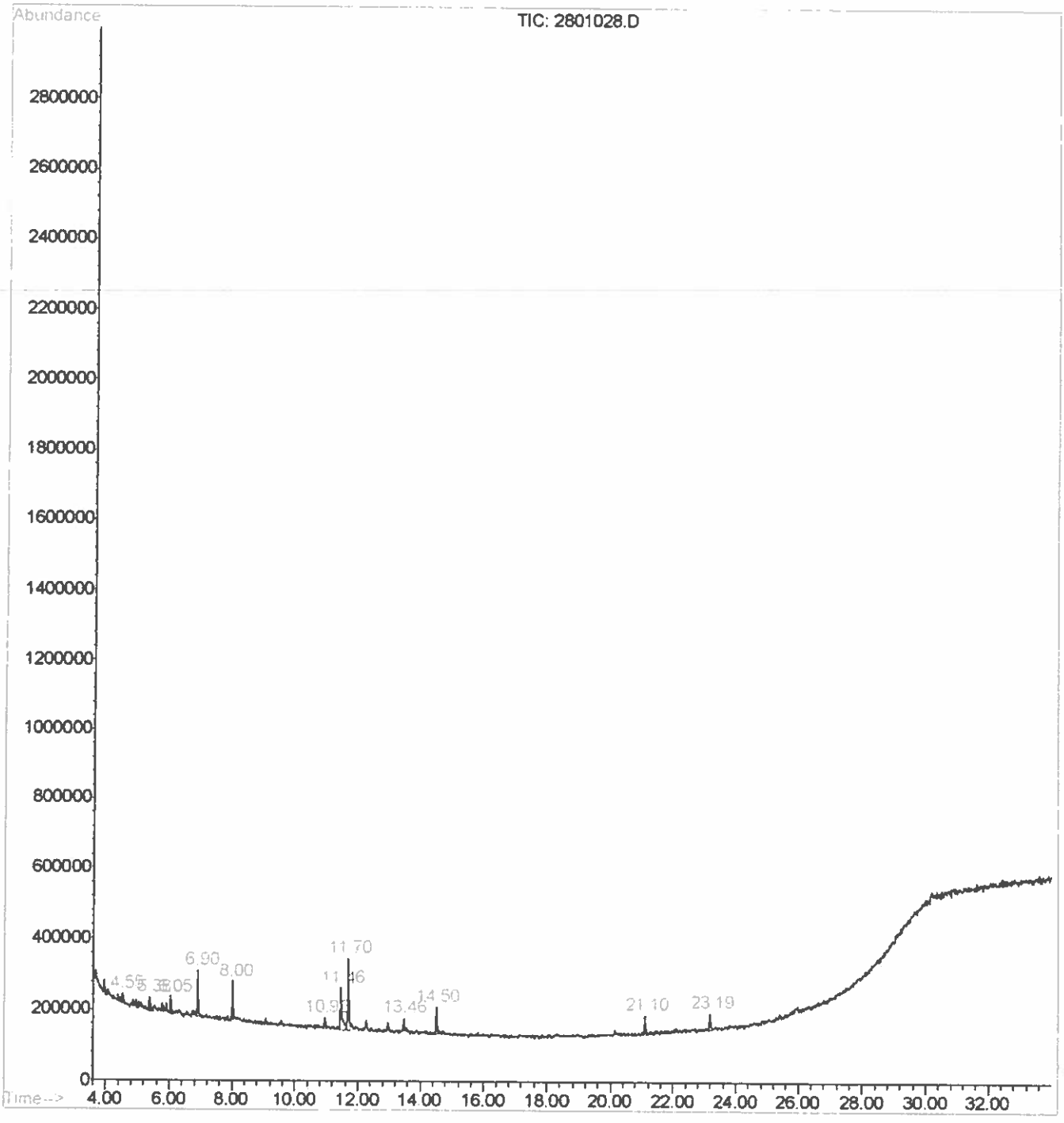
File : C:\HPCHEM\4\DATA\07-0330M\2401024.D
Operator : MSQS GC
Acquired : 31 Mar 2007 8:41 am using AcqMethod COMSQSCN
Instrument : MSQS GC-F
Sample Name: MSQS Vista Tek 534808-4W
Misc Info : FV=1
Vial Number: 24



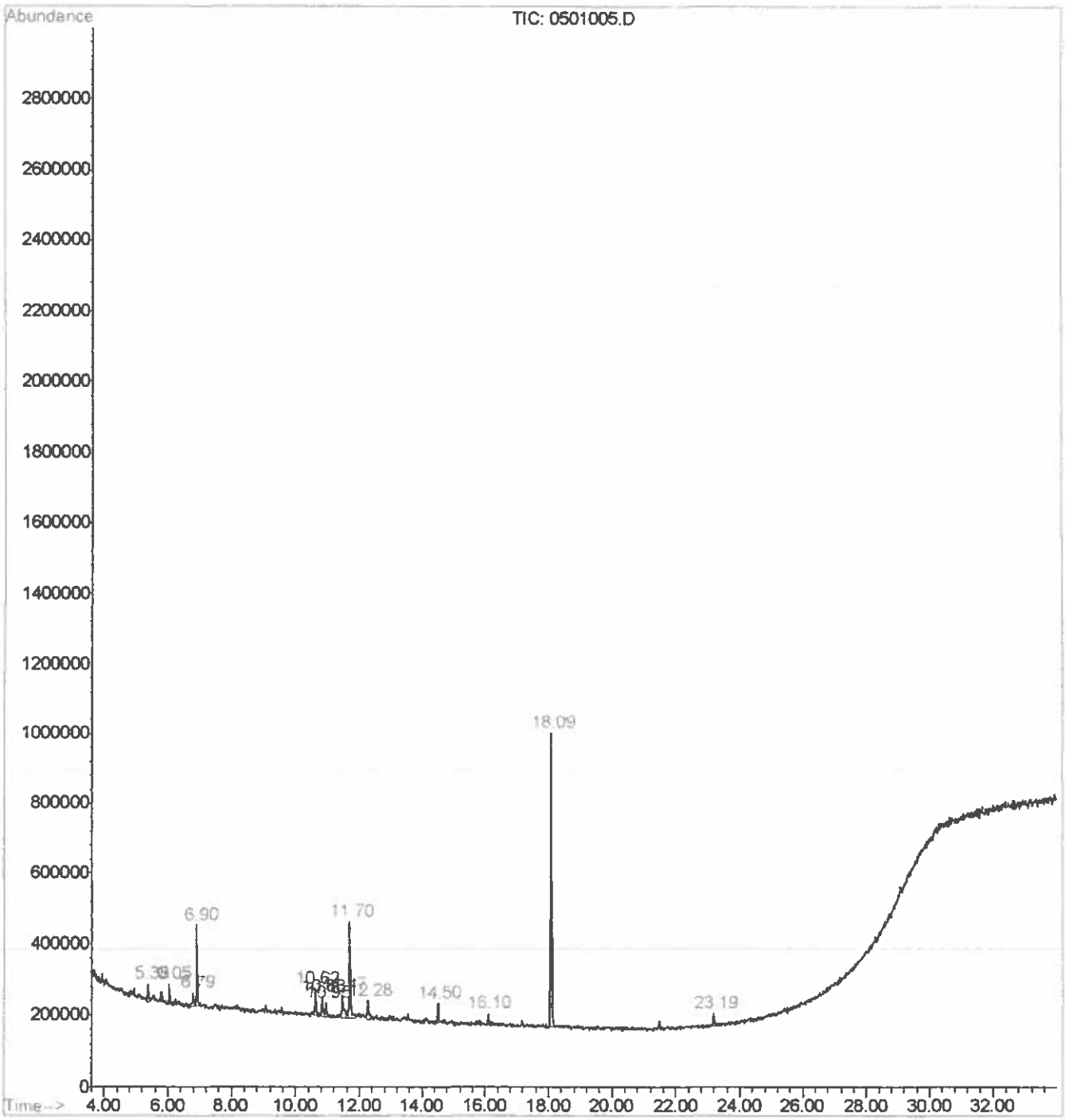
File : C:\HPCHEM\4\DATA\07-0330M\2601026.D
Operator : MSQS GC
Acquired : 31 Mar 2007 10:09 am using AcqMethod COMSQSCN
Instrument : MSQS GC-F
Sample Name: MSQS Vista Tek 534808-5W
Misc Info : FV=1
Vial Number: 26



File : C:\HPCHEM\4\DATA\07-0330M\2801028.D
Operator : MSQS GC
Acquired : 31 Mar 2007 11:38 am using AcqMethod COMSQSCN
Instrument : MSQS GC-F
Sample Name: MSQS Vista Tek 534808-6W
Misc Info : FV=1
Vial Number: 28



File : C:\HPCHEM\4\DATA\07-0330M\0501005.D
Operator : MSQS GC
Acquired : 30 Mar 2007 6:38 pm using AcqMethod COMSQSCN
Instrument : MSQS GC-F
Sample Name: MSQS MB-W
Misc Info : FV=1
Vial Number: 5



Appendix B

Spill Report from Environment Canada and Government of Yukon

Environment Canada | Environnement Canada

Emergencies Program - Yukon Section
91782 Alaska Highway, Whitehorse, YT Y1A 5B7
PH: 867.667.3400 FAX: 867.667.7962

Spill Report Information

Spill #	7503
Jurisdiction	Yukon
Community	Pelly Crossing
Address	
Highway	Klondike Highway
Milepost	M 167.4
Feature	Pelly Crossing
Location / Cause	truck left road and overturned
Incident Date	4/24/1975 9:00:00 AM
Lead Agency	Department of Indian Affairs and Northern Development
Other Agency	Environment Canada - Environmental Protection Service
Major Contaminant	Fire Retardant
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Amount	13230
Units	Litres
Concentration	
Units	
Quantity	Estimate
Addl Quanitity Info	
Phase	Liquid
Release	Spilled
Outcome	Fire Trol LC - mixed with water in ditch and overflowed into wooded area - no material entered a water course - no clean-up possible

Environment Canada Environnement Canada

Emergencies Program - Yukon 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 / Cause	overturned home heating fuel storage tank - garbage truck backed into supporting stand
Incident Date	12/31/1986 2:00:00 PM
Lead Agency	Environment Canada - Environmental Protection Service
Other Agency	RCMP
Major Contaminant	Furnace Oil
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Amount	1890
Units	Litres
Concentration	
Units	
Quantity	Estimate
Addl Quanitity Info	
Phase	Liquid
Release	Spilled
Outcome	fuel spilled onto frozen ground and snow/ice cover - flushed with water, dispersed over wider area - band adv clean-up complete April 2, 87 - cont snow, ice, soil to Pelly Dump

Environment Canada Environnement Canada

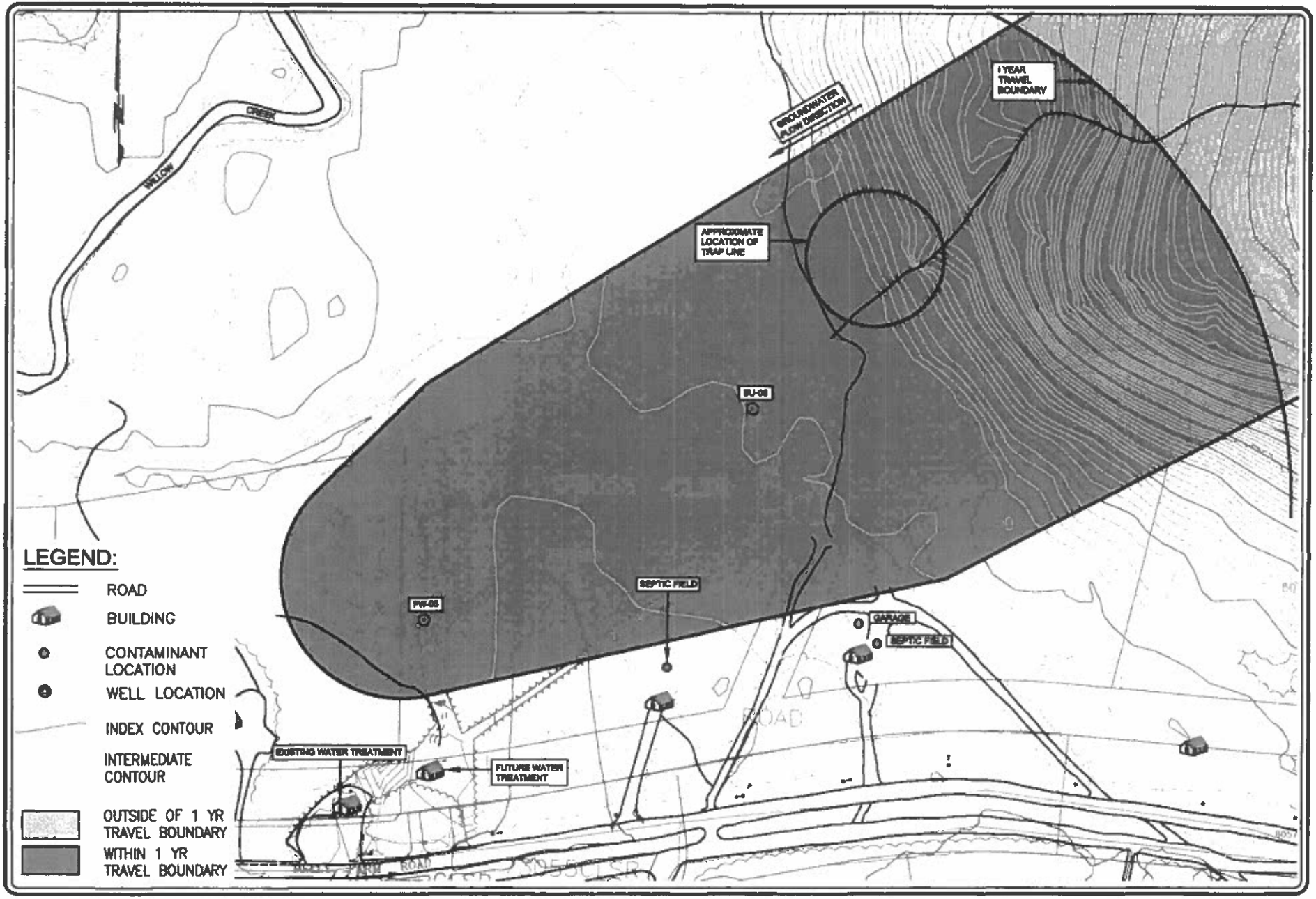
Emergencies Program - Yukon Section
91782 Alaska Highway, Whitehorse, YT Y1A 5B7
PH: 867.667.3400 FAX: 867.667.7962

Spill Report Information

Spill #	9840
Jurisdiction	Yukon
Community	Pelly Crossing
Address	
Highway	
Milepost	
Feature	Pelly Crossing
Location / Cause	Pelly Crossing School - valve opened intentionally on heating fuel tank - tank drained
Incident Date	9/11/1998
Lead Agency	Yukon Government - Renewable Resources
Other Agency	
Major Contaminant	Furnace Oil
2nd Contaminant	
3rd Contaminant	
4th Contaminant	
Amount	
Units	
Concentration	
Units	
Quantity	Unknown
Addl Quanitity Info	
Phase	Liquid
Release	
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

Appendix C

Maps of Well Head Protection Area

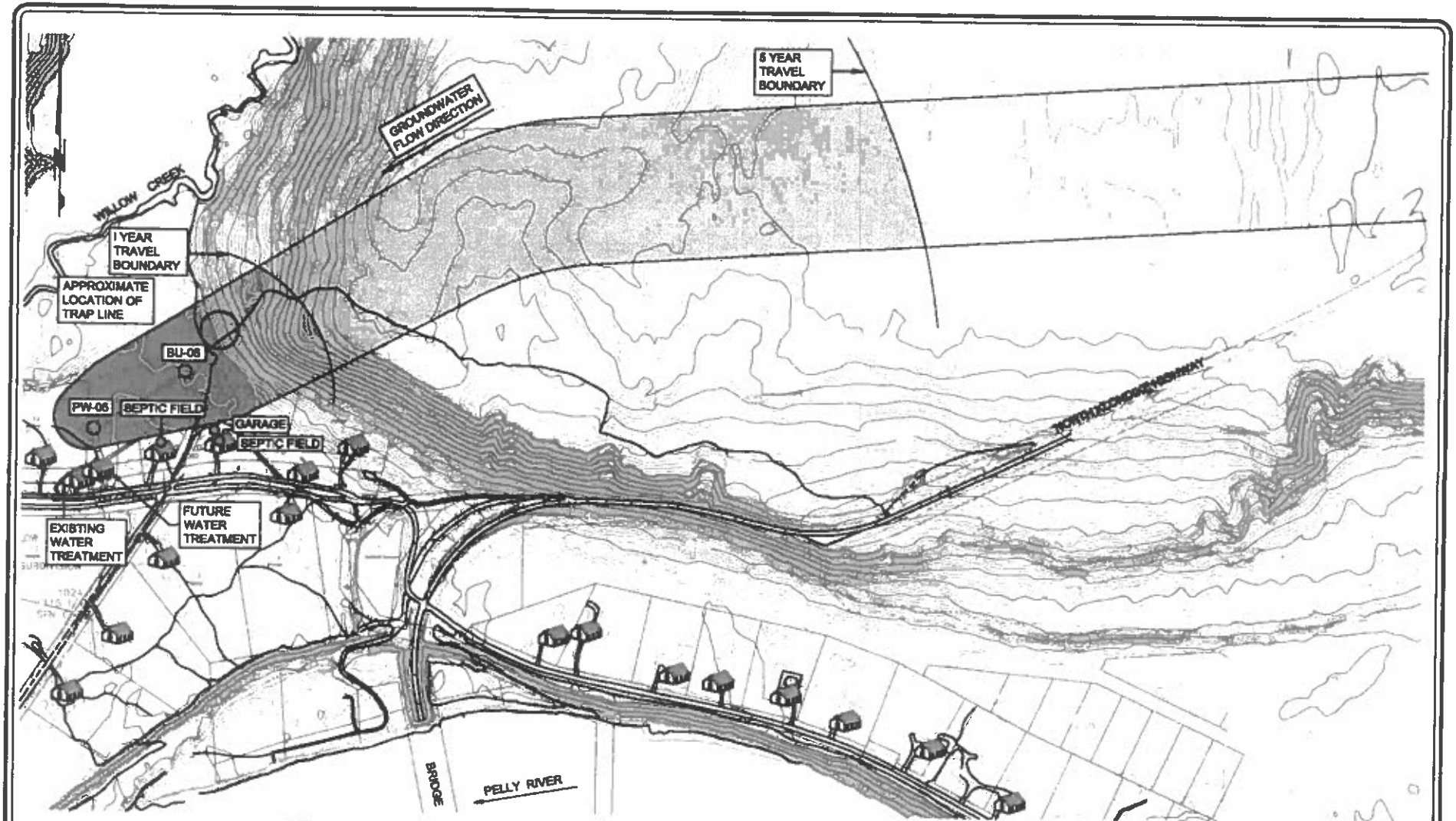


Selkirk First Nation

WELL PROTECTION PLAN
CAPTURE ZONE
PELLY CROSSING, YUKON

VISTA TEK LTD

SCALE:	1:2500
DATE:	APRIL 14, 2009
PROJECT No:	6520
DRAWING:	6520-001_R1
SHEET:	1 OF 1



Selkirk First Nation

WELL PROTECTION PLAN
CAPTURE ZONE
PELLY CROSSING, YUKON

VISTA TEK LTD

SCALE	1:10000
DATE	APRIL 14, 2009
PROJECT NO.	8030
DRAWING	8030-001_01
REV.	0
SHEET	1 OF 1