NORTECH

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March 24, 2008

Markel Underwriting Managers, Inc
310 Highway 35 South
Red Bank, New Jersey 07701-5921

ATTN: Terrance J. Dahl, Esq.
Environmental Claims Specialist

RE: Aquifer Characterization Program Results
578 Canoro Road, North Pole, Alaska

Dear Mr. Dahl:

NORTECH Environmental Engineering, Health, and Safety is pleased to provide the following update on activities related to the ongoing release investigation at 578 Canoro Road in North Pole, Alaska (the Site). This letter report summarizes the results of the aquifer characterization efforts completed at this time. The work conducted during this program included two primary activities: a geophysical survey of the site conducted in October and November, 2007, and a drinking water well search and sampling program of surrounding properties conducted in December 2007 and January 2008. This report includes a summary of the activities and findings to date and outlines recommendations to continue the characterization and remediation of the release.

Background

In late November 2006, Badger Fuel personnel inadvertently delivered approximately 470 gallons of heating oil under pressure to the drinking water well at the Site. An estimated 250 to 300 gallons of fuel was reportedly recovered during the initial response by Fairbanks Pumping and Thawing. A large diameter recovery well was installed adjacent to the former water well and all contaminated soil above the groundwater smear zone was removed during the excavation effort to install this recovery well. Fairbanks Pumping and Thawing and ***NORTECH*** also cleaned and flushed the house distribution system and laboratory results indicated the house system met ADEC drinking water standards. A temporary holding tank and replacement water system parts (softener, filters, etc) were installed to provide water to the house.

NORTECH conducted initial site characterization efforts between November 2006 and March 2007 at the site. These activities included the installation of seven groundwater monitoring wells, groundwater elevation monitoring, and soil and groundwater sampling and analysis. Groundwater elevation monitoring and laboratory sampling data indicated that the hydraulic gradient was generally to the west across the site, but the heating oil appeared to be moving to the east. This was considered to be due to the pressurized injection of heating oil approximately 20 feet below the surface of the groundwater and some characteristics of the aquifer that could not be identified through the standard soil boring and monitoring well data collected at the site. An aquifer characterization program was recommended to determine the nature of the subsurface features that were controlling the motion of both the released product and groundwater. A subsequent groundwater monitoring event in July 2007 confirmed the February results and recommendations.

Objectives

The objectives for the aquifer characterization program were identified in ***NORTECH***'s work plan dated March 28, 2007. This plan was approved by Markel Underwriting Managers (Markel) and ADEC in October 2007. The objectives of the aquifer characterization are summarized as follows:

- Complete soil borings and a ground penetrating radar survey to determine the subsurface soil stratigraphy
- Identify the impacts of stratigraphy on the flow and transport of hydrocarbon contamination in the subsurface environment
- Identify appropriate locations for the installation of a new domestic water supply well at the site
- Identify the appropriate location for placement of more effective product recovery well(s)
- Identify locations for additional monitoring wells as necessary to fill data gaps in the characterization
- Assess potential remediation strategies and associated cleanup timeframes
- Develop a multi-year groundwater monitoring program

This work plan was approved by ADEC on October 15, 2007 with several comments. Additional clarification of ADEC's comments was completed via email. ADEC's approval and the follow-up emails are attached and the following activities were added to the approved scope of work undertaken after clarification with ADEC:

- Complete a drinking water well search in the vicinity of the Site
- Sample nearby down-gradient drinking water wells for BTEX by EPA 524.2 (drinking water method)
- Run DRO analysis of the sample collected from the shallow down-gradient drinking water well located at 579 Canoro Rd
- Complete full suite VOC analysis for raw water after installation of the new drinking water well at the Site

Aquifer Characterization Field Activities and Results

NORTECH contracted with GeoTek Alaska (GTA) to complete the geophysical survey at the Site. This geophysical survey consisted of three main components: ground penetrating radar (GPR), continuous direct push core soil borings, and soil electrical conductivity (EC) measurements. The goal of these activities was to acquire adequate subsurface data to determine the location and migration pathways of the petroleum beneath the Site. GTA provided ***NORTECH*** with a detailed report on the GPR and soil conductivity results, which is included as an attachment.

This program included approximately 1,600 linear feet of GPR data collection at the site along eight north-south, and seven east-west oriented profile lines (Figure 2). The GPR data was collected using standard techniques for this type of work and a summary of the GPR methodology is included in the GTA report. Primary GPR reflections are generated by physical surfaces in the sub-surface environment (stratal surfaces and unconformities) which produce GPR signal contrasts. Thus the GPR provides a means of identifying and graphically displaying chronologic, and stratigraphic, subsurface sequences. Data interpretation can provide additional information regarding identified strata such as whether a sequence originated in a depositional and/or erosional environment. However, soil type cannot be directly determined through the interpretation of GPR reflection correlation patterns.

The GPR data gathered at the site was interpreted to include five chronostratigraphic sequences. The characteristics of these sequences that most directly impact the environmental issues at the site are summarized below. Significantly more detail is provided in the GTA report.

- Sequence 1 – This sequence is approximately 5-7 feet thick. This sequence is interpreted to consist of soils associated with the construction of the property near the surface (clearing and/or grading) underlain by low energy alluvial sediments (typically silt) of river floodplain depositional origins at the base of the sequence.
- Sequence 2 – This sequence ranges from approximately 4-10 feet thick. This sequence is interpreted to consist of gently sloping depositional surfaces typically associated with low energy floodplain and overbank alluvial deposits.
- Sequence 3 – This sequence varies in thickness from approximately 5-20 feet and generally thickens to the west and southwest within the project area. This sequence is interpreted to be sediments originating from both bank erosion and point bar deposition, and most likely represents the migration of a former river meander across the site.
- Sequence 4 - A sequence of varying thickness from approximately 0-26 feet thick, which generally thins to the west and southwest within the project area. Numerous dipping reflections identified in this sequence are interpreted to be associated with sediments deposited on the slip-off slope of a point bar within a meander channel of a river.

- Sequence 5 – A sequence providing the base of interpretation for the stratigraphic sequences in the project area. The depth and potential structure of this sequence were not defined due to the deterioration of the GPR signal.

Although the GPR interpretation provides clues to the depositional environment, the specific physical characteristics of the soil (size, porosity, etc) can not be positively identified. A total of 10 soil boring locations (see Figure 2) were selected based on a preliminary analysis of the GPR data. Visual, olfactory, and field screening observations were made by collecting continuous soil cores to aid the interpretation of the geophysical data and understand the migration of contaminants. Soil borings were hydraulically advanced to a depth of 35 feet using the standard Geoprobe MacroCore system.

Headspace field screening was completed using a Photovac 2020 photoionization detector (PID) in general accordance with ADEC's UST Manual and Standard Sampling Procedures guidance (the SSP). While a correlation of PID and laboratory results is generally site specific, ***NORTECH***'s experience is that PID results below 20 parts per million (ppm) are generally within the normal background concentrations of natural soils. PID results greater than 20 ppm and less than 100 ppm are considered to be elevated above normal background concentrations and laboratory results may or may not exceed ADEC Cleanup Level. PID results greater than 100 ppm are considered contaminated and laboratory results will typically exceed the standard ADEC Cleanup Levels. Soil boring logs recording the field observations for each soil boring are attached.

In general, the boring logs showed the subsurface strata is comprised predominantly of coarse sand and gravel deposits with interspersed thin lenses of fine sand, silty sand, or organic containing strata. Groundwater was approximately 13.5 to 16 feet below grade, depending on the relative surface elevation. In general, the soil boring observations correlated well with and supported the GPR interpretation of the stratigraphic sequences. Saturated sequences appeared loose and highly porous with a small amount of silt. The location of the thin silt lenses, including the material between Sequence 3 and Sequence 4, was generally not maintained due to the disturbance of the thin layers during the soil sample collection. The presence of silt in the cores from these depths confirmed that the lenses were present. The following is a brief summary of the field screening results and other important observations:

- SB01 had an oily sheen between approximately 23 and 30 feet bgs
    - Field screening results greater than 350 ppm extended from 20 feet bgs and to 35 feet
    - Field screening results between 0 and 20 feet bgs were within the background range

- SB02 had elevated field screening readings from 13 feet (the top of the water table) to 35 feet
    - Field screening results were over 100 ppm at most depths and an oily sheen was observed
    - The 20 – 25 foot interval appeared less oily and had PID results that were less than 100 ppm
- SB03 and SB04 had no indications of contamination and field screening results ranged from 0.4 to 6.9 ppm within these two borings
- SB05 had an oily sheen and elevated field screening results between 20 and 25 feet bgs
    - Field screening results in this interval were between 130 and 255 ppm
    - Field screening results in other intervals were less than 10 ppm
- SB06 had an oily sheen between 20 and 35 feet bgs
    - Field screening results were greater than 450 between 20 and 25 feet bgs
    - Intervals more than 25 feet bgs were less oil and field screening results were less than 100 ppm
    - Field screening results between 0 and 20 feet bgs were less than 5 ppm
- SB07, SB08, SB09, and SB10 had no evidence of contamination and field screening results were less than 1 ppm

In addition to the GPR and continuous core soil borings, a total of seven soil electrical conductivity logs were collected to aid the interpretation of the stratigraphy of the site (see Figure 2). EC methodology is described in more detail in the attached GTA report. In general, changes in subsurface conductivity indicate changes in soil material (such as soil particle size, mineralogical composition, soil moisture content, etc.). Although interpretation of EC measurements cannot identify specific soil types, the finer soil particles have higher EC values (clays have a higher EC than silts, silts have a higher EC than sands, etc).

Analysis and interpretation of the EC data included correlating this information with the available GPR and continuous core soil data. In general, the EC data reinforced the interpretation of stratigraphic sequences identified during the GPR survey. This was particularly true in Sequence 3 and Sequence 4 Sequence 3 generally showed a higher conductivity than Sequence 4 with a relatively sharp jump present where the two layers meet. Additionally, higher conductivity measurements were observed within Sequence 4 at structures suspected of being silt lenses and sloping silt layers within the gravel sequence.

Aquifer Characterization Discussion

In a typical petroleum release, contamination generally stays at the groundwater surface and moves in the general direction that this surface slopes. Although the petroleum was injected beneath the groundwater at this location, similar behavior of the petroleum was expected. The initial assumption was that the buoyant force of the petroleum would bring it to the groundwater surface of the porous aquifer and then groundwater flow and gravity would move the contamination with the hydraulic gradient. The initial monitoring well installation and sampling indicated that the subsurface conditions were resulting in the groundwater surface expression of the petroleum up-gradient of the release location instead of at and down-gradient of the release location.

The field observations during the soil borings indicated that contamination is migrating at depth within the aquifer. GPR and EC data indicate that this migration is controlled by confining layers and/or lenses within the aquifer that are acting as ceilings to the upward buoyancy-controlled migration of the contamination. Instead of migrating straight to the groundwater surface, the contamination is migrating along the sloped bottom of a confining layer until a break in the layer allows upward migration again.

Overall, the interface between Sequence 3 and Sequence 4 is the most complete confining layer in the vicinity of the release. Data from SB01 and SB06 indicate that the contamination migrated upward through Sequence 4 to the bottom of this confining layer within a short distance of the injection point. Contamination then migrated along the slope and dip of this interface towards SB05 and then SB02. EC data indicates that the confining power of Sequence 3 weakens in the general vicinity of SB02 and this is confirmed by the groundwater surface expression of free product in SW5. The deterioration of this confining layer in the vicinity of SW5 is evident in the lack of contamination observed in SB09 and SB10.

This data suggests that product recovery and remediation efforts should be focused in the vicinity of SW5. Product appears to be present beneath a number of lenses and recovery efforts should attempt to address depths between the groundwater surface and 35 to 40 feet below the ground surface. Due to the subsurface migration pathways, most free product is expected to eventually migrate to this area. Additional remediation efforts in the vicinity of the source area could also be undertaken to expedite the cleanup process and would be limited to depths more than 20 feet below the ground surface. A free product monitoring and recovery program should be developed based on observations of SW5 and during installation of the new recovery well.

In addition to the migration of contaminants at depth and to the SW5 area, the GPR and EC data provide some insight into the potential migration of contaminants across the groundwater surface. In general, the groundwater surface is at or near the interface of Sequence 2 and Sequence 3. The upper levels of Sequence 3 appear more conductive (generally finer grained) and were observed to be primarily sand instead of the coarse gravel seen in Sequence 4. Therefore, petroleum contaminants would be expected to move slower in Sequence 2 and 3 than Sequence 4. Additionally, the force of gravity over the small hydraulic gradient slope is not as strong as the buoyant force of submerged petroleum, which would indicate horizontal migration at the groundwater surface may be slower than that observed within the submerged Sequence 4.

This data indicates that an additional shallow monitoring well would be useful in the vicinity of SB05 to evaluate the migration of contaminant migration at the surface of the groundwater (see Figure 3). The recovery well is considered an adequate representation of the groundwater surface in the source area. The detection of benzene in SW1 in July 2007 suggests that migration of contaminants in this area may have impacted the property to the south. Additional delineation of potential contamination at the groundwater surface is recommended through the installation of three shallow monitoring wells on this property as shown in Figure 3. GPR, soil boring, and EC data indicate that contamination at depth is unlikely in this area because the contaminated Sequence 4 is minimal or not present in this area. Permission of this property owner will need to be negotiated prior to well installation.

New Drinking Water Well Installation and Sampling
Based on the results of the geophysical surveys at the site, a new drinking water well was sited on the northern edge of the Site. The new well was installed approximately 100 feet to the northeast of the former well. This location meets the known separation distances for the fuel tank and on-site wastewater disposal system. The aquifer characterization program indicated that contamination in this area was unlikely to impact a drinking water well in this area.

Records supplied by the driller indicate that sand and gravel was present at the site to a depth of approximately 65 feet. At approximately 65 feet, silt was encountered and was found to be frozen by 70 feet. The well was drilled to a depth of 210 feet bgs to try to reach a deeper unfrozen layer. Frozen silt encountered from about 65 feet to this depth and further drilling was ceased due to cost considerations and the real possibility of not finding an unfrozen layer above bedrock (estimated to be between 400 and 500 feet bgs in this area). Wells drilled into bedrock in this area are generally unusable due to high dissolved arsenic concentrations.

The well was installed with a six-inch diameter steel casing and is perforated between 49 and 59 feet bgs for water intake. The submersible pump is installed at approximately 21 feet below grade and the pitless adapter is approximately seven feet below grade. The water line to the house is approximately 5-6 feet below grade and is insulated and has heat tape. Static water in the well was approximately 12 feet below grade and well yield was approximately 30 gallons per minute with minimal drawdown.

Raw water testing was completed at the time of the neighborhood drinking water testing program described below. Laboratory analysis indicated that no VOCs were present in the sample collected on January 11, 2008 (see Table 3). This was the first of three monthly events requested by ADEC. The second event was completed on March 8, 2008 and results will be forwarded when available. The third monthly event is planned for April 1, 2008 and quarterly samples are recommended at the end of June, September, and December 2008 to complete the ADEC requested raw water sampling program.

Neighborhood Well Search and Raw Water Sampling

ADEC requested a well search of the vicinity of the Site in approval of the work plan. ***NORTECH*** and ADEC developed an ownership list from the properties in the area shown on Figure 1. A letter was mailed to each owner by ADEC and ***NORTECH*** delivered a copy of the letter to each residence in December 2007. A copy of the letter and contact information was left at residences where direct contact was not made. Table 1 provides a legal description and owner information for each property, as well as information regarding whether a well is present at each property.

A total of 10 wells were identified in the search area (including the new well installed at the Site). Well logs were obtained for several of the properties and other residents were able to provide information regarding their wells, although no well log was identified. This information is also summarized in Table 1. Most wells in this area were 40 to 60 feet in depth and were constructed of six inch diameter steel well casings, similar to the new well at the Site. The well located at 579 Canoro Road (TL-1114) is comprised of a two inch diameter sand point installed to a depth of approximately 20-30 feet bgs. This is style of well is common at older residences in the area and is similar to the original well at 578 Canoro Road.

Based on the results of this well search, six nearby wells were determined to be potentially down-gradient of the release location and were sampled. Figure 1 shows the properties with known wells, approximate well locations, and the six off-site wells that were tested. Domestic water treatment methods ranged from simple sediment filters to resin based water softening systems. Wherever possible, water samples were collected upstream of the water treatment systems or the systems were bypassed. Raw water samples were collected at five of the locations. At 579 Canoro Road (TL-1114), the system was plumbed in such a way that the only access was the taps and water was collected at the bathroom sink. At 560 Ursa Major Road (Lot 3), the spigot for raw water sampling is located in an inaccessible location within the building's crawl space. Treatment system types and raw water accessibility are summarized in Table 2, along with the sample numbers.

On December 20, 2007, a total of eight water samples (including a field duplicate) were collected from the six off-site and the new well at the Site. These were delivered to the office of SGS Environmental Services, Fairbanks, Alaska. These samples were frozen during transportation by SGS to the analytical laboratory in Anchorage, Alaska. After discussion with the laboratory regarding the cause and solution to this issue, a second set of samples was collected and delivered to the Fairbanks office on January 11, 2008. A total of eight water samples (seven primary samples and on duplicate) were collected from the seven wells. Water samples from the off-site wells were submitted to the laboratory for analysis of benzene, toluene, ethylbenzene, and xylenes (BTEX) using method EPA 524.2. The sample and field duplicate from the new on-site water well were analyzed for the full suite of volatile organic compounds (VOCs) using method EPA 524.2. The laboratory results and quality control analysis are shown in Table 3.

Laboratory results show that five of the seven wells tested during this sampling effort (including the new well installed at the subject property) contained no contaminants at or above the laboratory detection limits. Toluene was detected above the laboratory detection limits in two of the samples, CRW-01 (560 Ursa Major Road) and CRW-05 (595 Canoro Road), at concentrations of 0.0008 and 0.0024 mg/L. These levels are several orders of magnitude below the ADEC cleanup level of 1.0 mg/L.

The well at 560 Ursa Major Road is located approximately 210 feet to the south of the release location at the Site. The well at 595 Canoro Road is located approximately 630 feet to the southwest of the release location on the Site. Neither of these wells is in a direction that the contamination appears to be migrating on the Site. Toluene is also less soluble and has a lower migration potential than benzene and would not expected to migrate ahead of benzene contaminants in the groundwater. Additionally, toluene is a common component of many products that are used in domestic water systems, including PVC pipes and fixtures, plumbing cement, tape, and rubber seals and fittings. Overall, the low level of toluene in these samples is not considered a human health concern and the lack of benzene indicates that the presence of toluene is probably not related to the release of heating oil at the Site.

ADEC had requested conducting additional analysis for diesel range organic (DRO) on the sample from the shallow well located at 579 Canoro Road, west and down-gradient of the Site). The DRO sample was mistakenly collected from the new well at the Site and was cancelled after identification of this field sampling error. As a result no DRO sample was collected from the shallow well at 579 Canoro Road during this sampling event. Since benzene is generally more mobile than DRO contaminants in the groundwater environment, the lack of benzene in this well indicates that this well is unlikely to be impacted by the heating oil release at the Site. No additional testing of the well at 579 Canoro Road is recommended at this time. If requested by ADEC, additional sampling of this well for DRO and BTEX contaminants is recommended in concert with another water sampling event at the Site.

A blind field duplicate was collected for quality control purposes from the new domestic supply well installed at the Site. No VOCs were detected at or above the laboratory detection limits in either the primary sample or the duplicate samples, CRW-06 and CRW-07, respectively. These results meet the quality control objectives for this project. The temperature of these samples was also below the preferred temperature range upon receipt at the laboratory in Anchorage. Two sample containers were broken due to freezing, but most did not contain ice. Acceptable sample containers were identified for each analysis and this is not considered a concern. One internal laboratory quality control parameter for one compound was above the quality control objectives and indicated results for this compound may be biased high. This compound was not detected in the samples. Overall, the data is acceptable as used in this report.

Conclusions and Recommendations

This letter report summarizes the characterization efforts completed by ***NORTECH*** at the residence located at 578 Canoro Road (the Site) in North Pole, Alaska. The work conducted during this program included two primary activities: a geophysical survey of the site conducted from in October and November 2007 and a well search and sampling program on nearby properties conducted in December 2007 and January 2008. The geophysical survey included 1,600 lineal feet of GPR data acquisition, ten continuous core soil borings, and seven soil electrical conductivity borings at the Site. This data was used to site a new drinking water well for the Site that was installed in November 2007. The well search and sampling program included identifying drinking water wells in the vicinity of the Site and the collection of samples from selected wells, including the new drinking water well at the Site. This work was performed in accordance with ADEC's comments and approval of the submitted work plan.

Based on the geophysical data that was collected, ***NORTECH*** has arrived at the following conclusions:

- The site is underlain by stratigraphic alluvial sediments deposited in a meandering river environment
- The GPR and EC data logs show the presence of stratigraphic lenses of fine grained sediments intermixed with coarser sediments (sands and gravels) in the vicinity of the petroleum release location
    - The orientation and inclination of the identified fine sediment strata beneath the Site is generally upwards to the east
    - Movement to the north from the release location has also occurred but is limited to the near-source area
    - The fine strata layers are discontinuous and a significant break appears to occur in the vicinity of SW5

- The buoyant force of heating oil combined with the confining characteristics of the fine sediment strata are controlling the movement of heating oil through the saturated groundwater environment
    - The petroleum has risen through the saturated portion of the aquifer to the top of Sequence 4
    - Movement within Sequence 4 has been from the point of introduction to the north and then towards the east
    - The confining strata dissipate in the vicinity of SW5 resulting in the expression of heating oil at the groundwater surface
- The direction of flow of heating oil floating on the groundwater surface is expected to follow the surface gradient
- Movement across the groundwater surface is expected to be slower in the finer media of Sequences 2 and 3

Based on the current drinking water sampling and analysis results, ***NORTECH*** has arrived at the following conclusions:

- Toluene was detected in two off-site wells at concentrations several orders of magnitude below ADEC cleanup levels
- No other contaminants of concern were detected in the wells tested
- No contaminants of concern were detected in the new on-site domestic water supply well installed at the site
- The toluene is not related to the release of heating oil from the Site

Based on this information, ***NORTECH*** has the following recommendations:

- Submit this report to ADEC to document completion of these activities
- A product recovery well should be installed in the vicinity of SW5
- A free product monitoring and recovery program should be developed once the new recovery well is installed and evaluated
- One additional shallow groundwater monitoring well should be installed to evaluate groundwater surface migration of contaminants on the north/east side of the house
- Three new groundwater monitoring wells should be installed to evaluate groundwater surface migration of contaminants on the south side of the Site
- The drinking water testing program at the Site should be continued as per ADEC work plan approval request

Please contact me at your earliest convenience if you have any questions about the data presented in the report or the site in general.

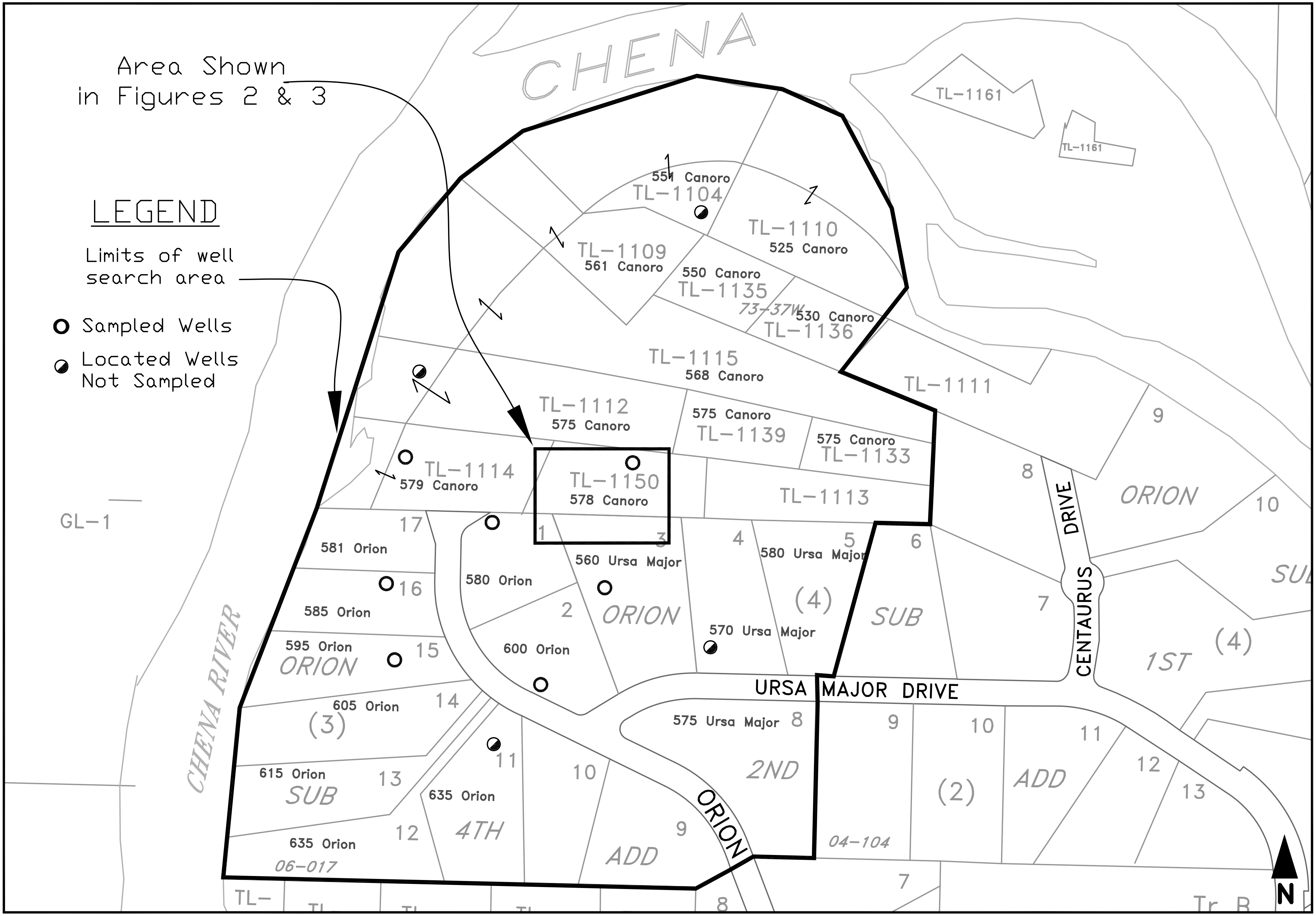
Sincerely,
NORTECH

Peter Beardsley, PE
Environmental Engineer

Attachments:	Figure 1	Vicinity Map
	Figure 2	Geophysical Survey
	Figure 3	Proposed Additional Well Locations
	Table 1	Well Search Results
	Table 2	Sample Location Information
	Table 3	Analytical Results
	Table 4	Groundwater Results – Historical Summary

Copy of GeoTek Alaska Report
Copy of Soil Coring Data Sheets
Copy of Well Log for New Drinking Water Well
Copy of Laboratory Report and Lab Quality Checklist
Copy of Work Plan Approvals and Clarifications

Attachment 1



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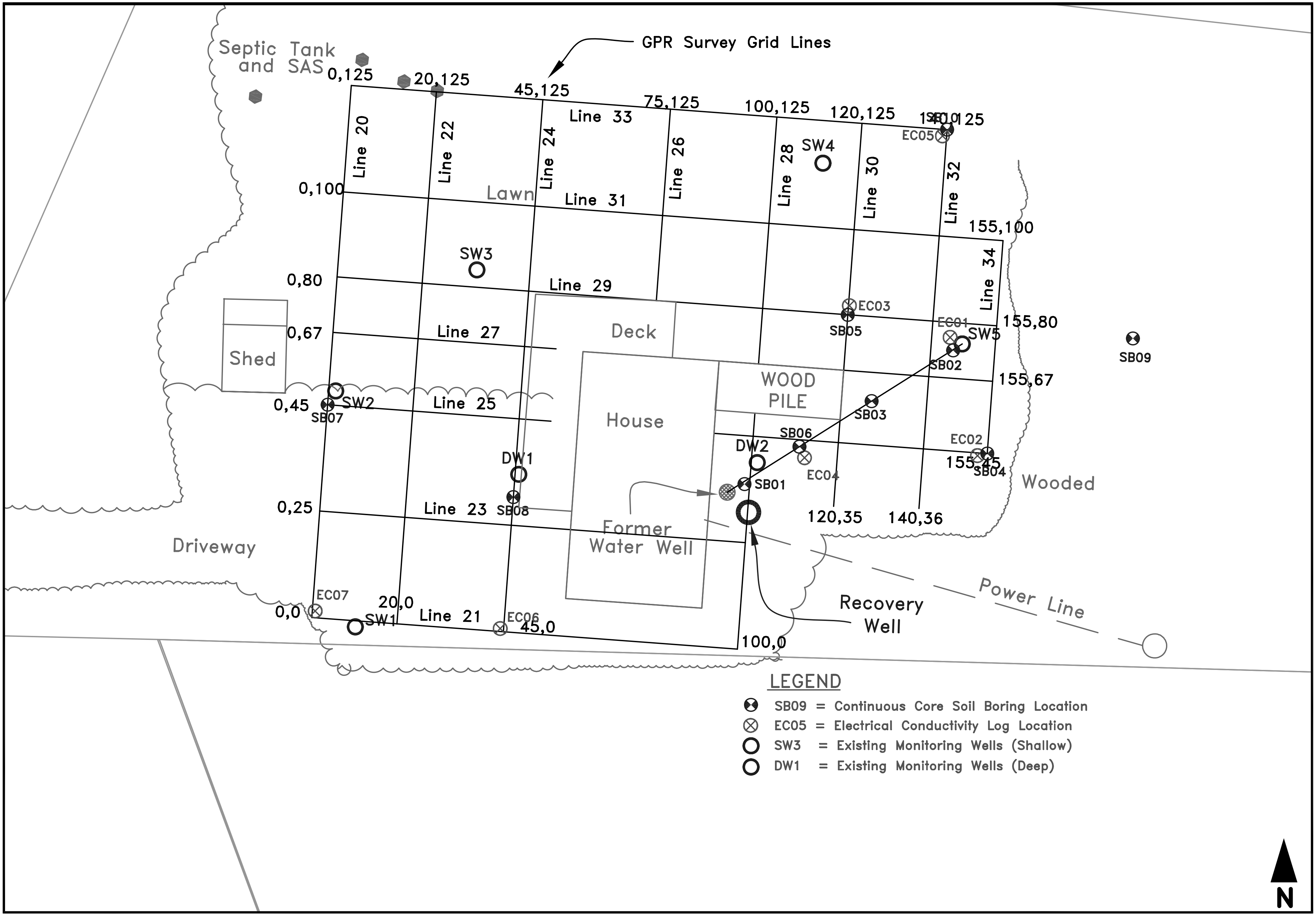
Vicinity Map and Nearby Drinking Water Wells
578 Canoro Road
North Pole, Alaska

DATE: 03/03/08	SCALE: 1"=300'
DESIGN: PLB	PROJECT: 06-1080
DRAWN: PLB	DWG: 061080e(081)

FIGURE
1



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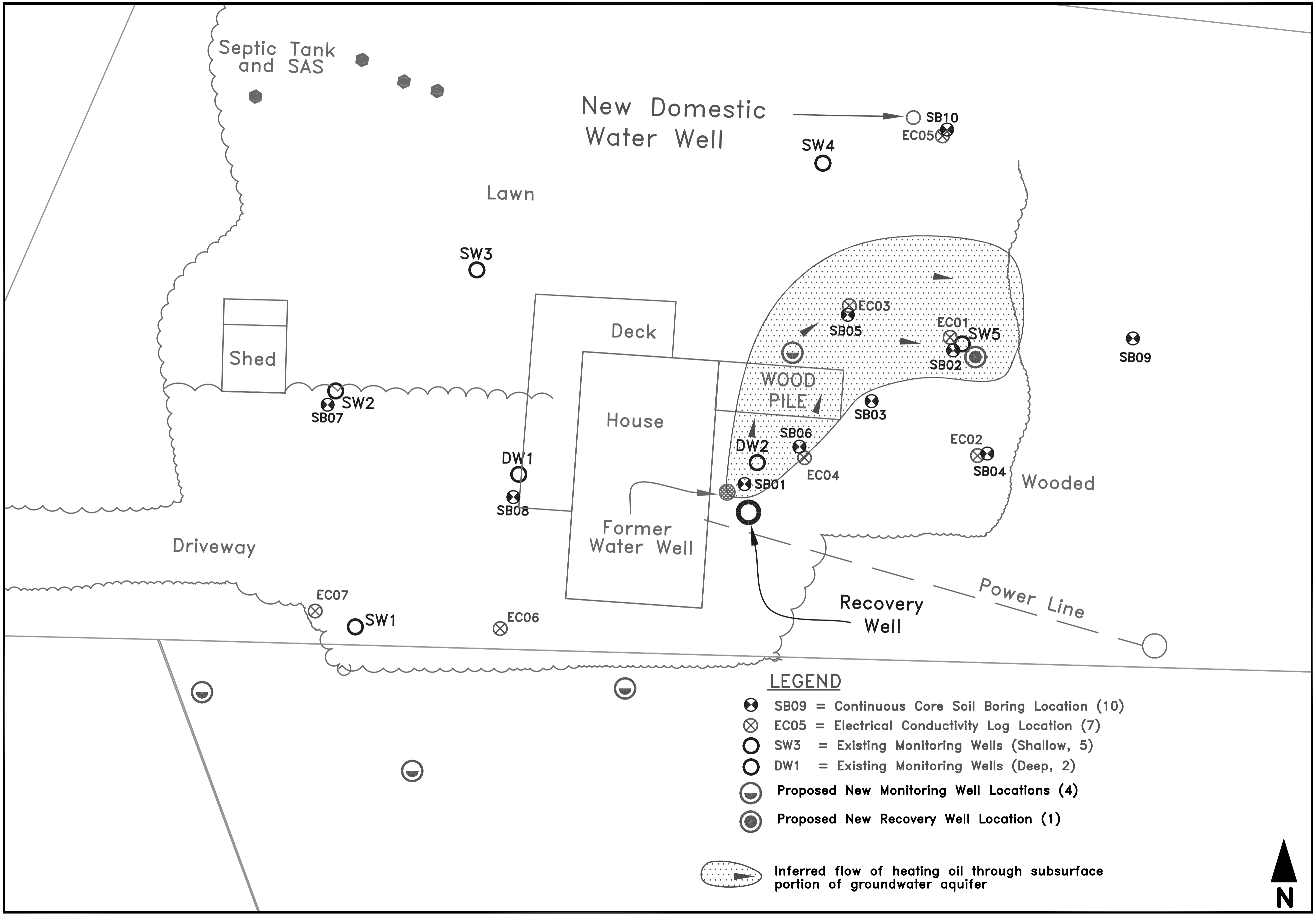
Geophysical Survey
578 Canoro Road
North Pole, Alaska

DATE: 01/30/08	SCALE: 1" = 30'
DESIGN: PLB	PROJECT: 06-1080
DRAWN: PLB	DWG:061080e(08(02))

FIGURE
2



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Proposed Additional Well Locations
578 Canoro Road
North Pole, Alaska

DATE: 03/05/08	SCALE: 1" = 30'
DESIGN: PLB	PROJECT: 06–1080
DRAWN: PLB	DWG:061080e(08(03))

FIGURE 3

Attachment 2

Table 1

Canoro Road Well Search Results

Address	Sub (Block)/Lot	Owner (Last)	Owner (First)	Reply	On-site Well	Log	Well Dia.	Well Depth	Date Tested
580 Orion Dr.	Orion 4th (4)/1	Leonard	Tim	Yes	Yes				11-Jan-08
600 Orion Dr.	Orion 4th (4)/2	Maines	Jeremy	Yes	Yes				11-Jan-08
560 Ursa Major Rd.	Orion 4th (4)/3	Lightly	Robert	Yes	Yes	Yes	6"	40	11-Jan-08
570 Ursa Major Rd.	Orion 4th (4)/4	Spears	Jimmy	No		Yes	6"	60	
580 Ursa Major Rd.	Orion 4th (4)/5	McCallum	Nita	Yes	Yes	Yes	6"	50	
575 Ursa Major Dr.	Orion 2nd (4)/8	Baptist	Dawn	No					
635 Orion Dr.	Orion 4th (4)/11	Badger Investments		No	Yes				
635 Orion Dr.	Orion 4th (4)/12	Badger Investments		No					
615 Orion Dr.	Orion 4th (4)/13	Badger Investments		No					
605 Orion Dr.	Orion 4th (4)/14	Badger Investments		No					
595 Orion Dr.	Orion 4th (4)/15	Shefchik	Michael	Yes	Yes				11-Jan-08
585 Orion Dr.	Orion 4th (4)/16	Dick	Jan	Yes	Yes	Yes	6"	40	11-Jan-08
581 Orion Dr.	Orion 4th (4)/17	Badger Investments		No					
551 Canoro Rd.	TL-1104	Borba	Robert	Yes	Yes				
561 Canoro Rd.	TL-1109	Morrow	Rodger	No					
525 Canoro Rd.	TL-1110	Myers	David	No					
575 Canoro Rd.	TL-1112	Gallagher	Eleanor	Yes	Yes				
	TL-1113	Michael Family Trust	Michel	No					
579 Canoro Rd.	TL-1114	Shefchik	Robert	Yes	Yes		2"	20-30	11-Jan-08
568 Canoro Rd.	TL-1115	Wilson	Robert	No					
575 Canoro Rd.	TL-1133	Gallagher	Ivan	No					
550 Canoro Rd.	TL-1135	Queen	Rick	No					
530 Canoro Rd.	TL-1136	Rhines	Frank	No					
575 Canoro Rd.	TL-1139	Gallagher	Ivan	No					

Table 2
Sample Location Information

Address	Last	Access point	Treatment Type	Raw water	Sample ID
580 Orion Dr.	Leonard	Mop sink		Yes	CRW-04
600 Orion Dr.	Maines	Removed sediment filter		Yes	CRW-02
560 Ursa Major Rd.	Lightly	Kitchen tap		No	CRW-01
595 Orion Dr.	Shefchik	Boiler intake		Yes	CRW-05
585 Orion Dr.	Dick	Mop sink		Yes	CRW-03
579 Canoro Rd.	Shefchik	Bathroom tap		No	CRW-08
578 Canoro Rd.	Ballard	Pressure tank		Yes	CRW-06, CRW-07

Table 3
Analytical Results

Address	Owner Last Name	Sample ID	Benzene	Toluene	Ethyl-benzene	Tot Xylenes	VOCs
		Units	mg/L	mg/L	mg/L	mg/L	mg/L
		ADEC Limit	0.005	1	0.7	10	Various
560 Ursa Major Rd.	Lightly	CRW-01	0.0005U	0.000840	0.0005U	0.001U	NT
600 Orion Dr.	Maines	CRW-02	0.0005U	0.0005U	0.0005U	0.001U	NT
585 Orion Dr.	Dick	CRW-03	0.0005U	0.0005U	0.0005U	0.001U	NT
580 Orion Dr.	Leonard	CRW-04	0.0005U	0.0005U	0.0005U	0.001U	NT
595 Orion Dr.	Shefchik	CRW-05	0.0005U	0.00237	0.0005U	0.001U	NT
578 Canaro Rd.	Ballard	CRW-06	0.0005U	0.0005U	0.0005U	0.001U	ND
578 Canaro Rd.	Ballard	CRW-07(Dup 06)	0.0005U	0.0005U	0.0005U	0.001U	ND
579 Canaro Rd.	Shefchik	CRW-08	0.0005U	0.0005U	0.0005U	0.001U	NT

Notes:

U	Analyte not detected at the listed detection limit
Shade	Analyte detected in concentration below the ADEC Cleanup level
ND	Analyte(s) not detected
NT	Analyte(s) not tested for

Quality Control Summary

Sample ID	CRW-06	CRW-07	Average	Difference	RPD
Analyte	mg/L	mg/L	mg/L	mg/L	%
B	0.0005U	0.0005U	NA	NA	**NA**
T	0.0005U	0.0005U	NA	NA	**NA**
E	0.0005U	0.0005U	NA	NA	**NA**
X	0.0010U	0.0010U	NA	NA	**NA**

NA	The calculation is not applicable.
RPD	Relative percent difference as described in the SSP

Table 4
Groundwater Results - Historical Summary

Well ID	Date	Benzene	Toluene	Ethyl-benzene	Total Xylenes	DRO	Lab Comment
Units		**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**	
ADEC Limit		0.005	1	0.7	10	1.5	
DW1-W1	Feb-07	0.0005U	0.00245	0.002U	0.00813	0.319U	
DW1	Jul-07	0.0005U	0.002U	0.002U	0.002U	0.324U	
DW10(Dup1)	Jul-07	0.0005U	0.002U	0.002U	0.002U	0.319U	
DW2-W2	Feb-07	**0.117**	0.698	0.269	1.639	**15.0**	WMD/WG
DW2-W3(Dup)	Feb-07	**0.113**	0.702	0.277	1.667	**8.64**	WMD/WG
DW2	Jul-07	**0.0452**	0.416	0.209	1.253	**19.3**	WMD
SW1-W4	Feb-07	0.0005U	0.002U	0.002U	0.002U	0.326U	
SW1	Jul-07	**0.00982**	0.002U	0.00864	0.0550	0.333U	
SW2-W5	Feb-07	0.0005U	0.002U	0.002U	0.002U	0.333U	
SW2	Jul-07	0.0005U	0.002U	0.002U	0.002U	0.324U	
SW3-W6	Feb-07	0.0005U	0.002U	0.002U	0.002U	0.313U	
SW3	Jul-07	0.0005U	0.002U	0.002U	0.002U	0.313U	
SW4-W7	Feb-07	0.0005U	0.002U	0.002U	0.00238	0.326U	
SW4	Jul-07	0.0005U	0.002U	0.002U	0.002U	0.316U	
SW5-W8	Feb-07	**0.466**	**1.670**	**0.767**	4.400	**2320**	
SW5	Jul-07	Not sampled due to free product depth greater than 0.03 feet					
DRW (Recovery)	Jul-07	0.0005U	0.002U	0.002U	0.002U	1.10	WMD
DWW (Old Well)	Jul-07	0.00321	0.110	0.120	0.644	**14.4**	WMD

Notes:

U	Analyte not detected at the listed detection limit
Shade	Analyte detected in concentration below the ADEC Cleanup level
Bold	Analyte detected in concentration exceeding the ADEC Cleanup level
WMD	Pattern is consistent with a weathered middle distillate
WG	Pattern is consistent with weathered gasoline

Attachment 3

GeoTek Alaska, Inc.

January 28, 2008
Project 07-032

Peter Beardsley, P.E.
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RE: Letter Report - Geophysical Survey at 578 Canoro Road – North Pole, Alaska

The following is a Letter Report submitted to NORTECH Environmental, Health & Safety (NORTECH) by GeoTek Alaska, Inc. (GTA) concerning the performance of a Geophysical Survey at 578 Canoro Road in North Pole, Alaska. NORTECH requested GTA to perform the geophysical survey and other technical services at selected periods from October 17 to November 2, 2007.

Introduction

In an effort to understand the flow and transport of hydrocarbon contamination in the subsurface, NORTECH requested GTA to perform technical services at a private residence near Fairbanks, Alaska. The residence is located at 578 Canoro Road in North Pole, Alaska. In support of this effort, GTA performed a geophysical survey and acquired soil samples at the project site. GTA provided the technical services at selected time periods between the dates of October 17 to November 2, 2007.

The objective of the geophysical survey is to enhance the understanding of the flow and transport of hydrocarbon contamination in the subsurface at the project site. The hydrocarbon contamination is heating oil, and it was introduced into the subsurface through an existing water well on the residential property. Four hundred seventy gallons (470 gal.) of heating oil were mistakenly pumped down a standpipe of the residential water well instead of into a buried tank. A contamination recovery well installed adjacent (within 5 ft. away) to the water well did not recover any fuel. Monitoring wells installed within the project site area indicated the flow and transport of the hydrocarbons in the subsurface was more complex than anticipated. To accomplish the objectives of the geophysical survey, GTA acquired, processed, and interpreted geophysical data to enhance the understanding of the flow and transport of the contaminant in the subsurface.

GTA acquired approximately sixteen hundred linear feet (1,600 ft.) of Ground Penetrating Radar (GPR) and seven (7) soil conductivity logs using subsurface Electrical Conductivity (EC) probes. The GPR data were acquired during the period of October 17-18, 2007. The locations of soil conductivity data acquisition were chosen by a NORTECH representative in the field and were acquired by GTA on November 2, 2007.

This Letter Report presents the results from the performance of the geophysical survey at the project site.

Scope of Services

GTA mobilized a field team (2 technicians) to acquire the geophysical data at the project site in the Fairbanks area (Figure 1). The project site is located at 578 Canoro Road in North Pole, AK (Figure 2).

The geophysical survey consisted of acquiring GPR profile data in a grid pattern, and soil conductivity data at specific locations, within the project site area. The GPR profile line and soil conductivity locations were delineated within the project site by Mr. Peter Beardsley (NORTECH's field representative) and Mr. Chris Nettels (GTA).

A GPS base station was established by GTA to provide for the acquisition of Real Time Kinematic (RTK) GPS data for the location of the geophysical data in a real world coordinate system. The base station also serves as the control point for the geophysical survey. GPS location data were acquired after the acquisition of the geophysical data.

Preliminary processing of the geophysical data was accomplished in GTA's office. An initial interpretation of the data was performed to assist in determining the location for acquisition of soil conductivity data and soil sample borings. The results from this initial interpretation were presented to NORTECH's representative prior to the performance of soil sampling and soil conductivity data acquisition at the project site.

Final processing of the GPR data was performed at the office of GeoTek Alaska, Inc. in Anchorage, Alaska. A final interpretation of the geophysical data has been accomplished and the results are presented in this Letter Report.

Limitations of Technical Services

GeoTek Alaska, Inc. (GTA) performed our services in a manner consistent with the skill level of currently practicing professionals under similar conditions. GTA's investigations are conducted within the design limitations of the equipment used for the purposes described in this report. Interpretations developed and presented in this report are based on the data collected by GTA in the field and were performed to the best of the interpreter's abilities. Limitations exist as actual site conditions may vary; thus no warranty is expressed or implied. This report is intended for the exclusive use of NORTECH and their authorized parties for purposes described herein.

Project Site and Geophysical Survey Areas

The project site is a residential property as shown in Figure 3. It consists of a cleared area approximately one hundred seventy five feet by one hundred seventy five feet (175 ft. X 175 ft.). A house with a deck is located in the south central portion of this open area. The project site is bounded on the west, south, and east by wooded areas. The northern boundary of the project site is the property boundary. The cleared area (outlined in red on Figure 3) was generally flat and consisted of a grass covered lawn with the exception of the south and southeast sides of the house, a gravel driveway with concrete pad, and a firewood stack located at the northeast corner of the house. A slight topographical rise existed on the eastern edge of the property.

The geophysical data acquired within the area described above are GPR profile lines (in a grid pattern) and soil conductivity logs (Figure 3). The data acquired consisted of;

- Eight (8) north-south oriented GPR profile lines,
- Seven (7) east-west oriented GPR profile lines, and
- Seven (7) Soil Conductivity Logs

Instrumentation and Technical Approach

Instrumentation

Following, is a brief description of GTA's instrument used to acquire the geophysical data at the project site:

Sensors and Software pulseEKKO Pro system - The Sensors and Software pulseEKKO Pro system consists of a GPR antenna system (with attached transmitter and receiver) that is transported manually or by a lightweight cart. The GPR system also includes a Digital Video Logger (DVL), an odometer wheel, and battery. The DVL is where GPR data is recorded and displayed in wiggle trace format. The real-time display of traces allows the operator to see the acquired data on the DVL as the operator moves. This provides for quality control of data during acquisition, and the ability to observe diagnostic responses of buried objects (i.e., pipelines, boulders, void spaces, etc.).

Geoprobe SC500 Conductivity Probe and FC5000 Field Data Acquisition Platform - The SC500 Conductivity Probe is a 4-pole Wenner array soil conductivity probe. Current is applied through the outer two (2) poles of the array and voltage is measured across the two inner poles. This arrangement provides for an accurate measurement, as well as, providing the greatest depth of measurement into the formation. The tapered geometry of the probe assures dependable, uninterrupted contact between the measurement poles and the soil. The probe is very robust in construction, and is designed for percussion driving into the soil.

The FC5000 Field Data Acquisition Platform provides for simple field operation. The FC5000 is an embedded computer equipped with a soil conductivity signal conditioning and measurement system. Log files are saved to a solid-state hard drive, and a floppy drive allows easy transfer of log files.

Technical Approach

Ground Penetrating Radar - Ground Penetrating Radar directs a pulse of radio waves (i.e., frequencies from 12.5 Mhz to 1000 Mhz) downward into the earth. Part of the transmitted energy of the waves is reflected back to the receiver from interfaces or objects with differing electrical properties. GPR reflection data is recorded as a function of the two-way time required for a signal pulse to transmit, reflect, and return to the receiver antenna. Differing soil properties produce reflection events in the GPR profile data. A reflection event is produced at an interface where the electrical properties (e.g., dielectric constant and electrical conductivity) vary with soil lithology, associated grain size and porosity, water saturation, and pore space chemistry.

A GPR profile line consists of data traces recorded at the station spacing determined appropriate for the project objectives. The records of multiple, separate pulses at a single location (i.e., station) are summed to enhance the signal-to-noise ratio and produce a single trace for that station. The summed trace is transmitted in digital form to a data-logging instrument or computer. Digital GPR data are processed using industry standard GPR software to enhance the data quality for interpretation.

Additionally, localized buried targets (both metallic and non-metallic) can also produce a reflection event that enables the location of the object, and determination of its depth in the subsurface. A hyperbolic shaped response or diffraction is diagnostic of localized buried targets. The top of the hyperbola in GPR profile data indicates the location of buried objects. The shape of the tails of the hyperbola provides for the calculation of the velocity of the radio waves in the subsurface. Thus, the depth of a buried object can be determined from the time of the reflection event for the object (top of hyperbola) and the calculated velocity of the radio waves in the subsurface.

The geophysical survey at the project site was accomplished by first establishing the location for the acquisition of GPR profile lines. Location of these lines was established by NORTECH and GTA representatives in the field, and designed as a grid pattern of north-south and east-west oriented lines. The profile lines were established using wooden stakes to mark the line path of each line, and cloth tapes to control station spacing along the length of the GPR profile line. As mentioned above, the station spacing for a GPR profile line is the distance between each recorded data trace. The display of all traces recorded at each station produces a complete GPR profile line.

Prior to the acquisition of GPR data at the project site, a test line was acquired to determine the appropriate antenna frequency to accomplish the project objectives. This test line was acquired, using 100 Mhz antennas, between the residential water well and a monitoring well designated as SW5 (Figure 3). Based on observations of the data in the field, it was determined that this antenna frequency did not provide signal penetration to a depth necessary to accomplish the project objectives. To accomplish the project objectives, GTA acquired the GPR data using 50 Mhz antennas with one foot (1 ft.) station spacing. A location map of the GPR profile lines acquired is shown in Figure 3.

After GPR data acquisition, the data were processed to provide a presentation of the data in interpretable form. Data processing provides for the enhancement of the data quality and produces a presentation of the data in the form of a profile line. The GPR profile lines form the basis of the data interpretation to achieve the objectives of the project. GTA performed preliminary processing and interpretation of the GPR data to identify any stratigraphic or subsurface features that might influence the flow and transport of the contaminant in the subsurface. Additionally, the preliminary interpretation of the GPR data was used to determine locations for the acquisition of soil conductivity data and continuous soil samples. Final processing and interpretation of the GPR and soil conductivity data were accomplished in GTA's office in Anchorage, AK.

Soil Conductivity – The Electrical Conductivity (EC) probe provides for "continuous" logging (a reading approximately every 0.6 inches) of the soil conductivity from ground surface to the total depth of investigation. The EC probe is advanced into the subsurface at approximately one foot per minute (1 ft/min). In general, because of the low conductivity of earth materials, the units for electrical conductivity are milliSiemens/meter (mS/m).

A change in electrical conductivity indicates a change in soil material. Possible variations in soil materials that cause corresponding changes in conductivity measurements are; change in soil particle size, and change in mineralogy of the soil particles. If the soil conductivity log shows a change, then something in the soil or pore water has changed. The electrical conductivity of unconsolidated soils and sediments is mainly a function of their grain size. Fine-grained materials such as clays have a higher conductivity than silty materials, and silty materials have a higher conductivity than sands or gravels. Most soils and sediments are mixtures of the common soil types (i.e., clays, silts, sands, and gravels) and the conductivity of any bulk soil or sediment will be influenced by this fact. Some other influences of conductivity of unconsolidated materials are the chemical composition, moisture content, and salinity of pore fluids. Because of these factors, soil and sediment samples at a particular area must be acquired at every site to verify what the specific conductivity values from the site represent.

For this project, soil conductivity logs were conducted at seven locations where GPR data had been acquired. Figure 3 indicates the locations of the soil conductivity logs identified by a red and white symbol and labeled as EC followed by a number (e.g., EC03). The soil conductivity logs were acquired to determine soil type (i.e., clay, silt, sand, and gravel) as informed by the continuous soil samples from borings, and to correlate the EC data to the GPR data. The intended purpose for the soil conductivity log is to provide "ground truth" to the identification of GPR data reflections that correspond to the soil type variations within the subsurface.

Control Surveying

Prior to the acquisition of geophysical data, GTA personnel determined an appropriate GPS base station to enable the acquisition of RTK GPS location of the geophysical data. The selected base station is the GPS location, identified in the NGS DataBase as SUAF, located at the University of Alaska Fairbanks in Fairbanks, AK. All of the GPS location data for the geophysical survey were corrected based on the established base station location.

GTA used our Leica 1200 System (GPS) to acquire position data of the geophysical survey data. Position data was referenced to the established base station or survey control monument. The coordinates for the base station are shown below in Table 1. Positions displayed in any figures included in this report are based on data acquired and processed by GTA. <u>Note:</u> GTA is not a Registered Land Surveyor (RLS).

Table 1

Project Control Point

Geophysical Survey – Canoro Road, North Pole, AK

Datum, Coordinate System	Project Control Point	Easting (feet)	Northing (feet)	Elevation (feet)
NAD83, AK 3	SUAF	3972688.254	214798.833	711.932

Results

In general, the quality of the geophysical data ranges from good to excellent. The GPR data is of excellent quality with a depth of penetration to approximately fifty feet (50 ft.). The quality of the EC data is good; however, some of the EC data exhibited instrument responses that are believed to be attributable to a faulty electrical connection(s) within the EC probe.

The reduced quality in the soil conductivity logs is due to abnormally high amplitudes in shallower depth ranges, and amplitude spiking that occurred in the EC data. The increased amplitude issues in the EC data may be attributable to electrical connections within the EC probe, or groundwater seeping into the EC probe. The problem of a faulty electrical connection in the EC probe was probably exacerbated by the increased hammering on the direct push rod required to advance the EC probe into the more resistant soil layers at the project site.

Although abnormal amplitudes occurred in some of the EC data, the basic shape of the soil conductivity log curves were preserved and were consistent with the other unaffected soil conductivity logs. In order to use the data in the interpretation, the abnormal amplitude responses were either normalized to a range consistent with the other unaffected soil conductivity logs, or simply removed in the case of single amplitude spikes.

Prior to further discussion of the results from this geophysical survey, it is appropriate to provide a background to the technical issues and a brief discussion of some geologic concepts used in the interpretation of the geophysical data.

Background

The objective of this geophysical survey is to enhance the understanding of the flow and transport of hydrocarbon contamination in the subsurface at the project site. As briefly noted above, heating oil was mistakenly pumped into the subsurface through a standpipe of the residential water well instead of into an buried tank. The top of this screen in the water well is at a depth of thirty six feet (36 ft.) below the ground surface (bgs), and served as the entryway for the fuel into the subsurface. In an attempt to recover the fuel, a recovery well was installed adjacent to and approximately five feet (5 ft.) from the water well location. This well encountered a slight sheen at a depth of eighteen feet (18 ft.) bgs but did not recover any fuel. Due to the lack of fuel recovery, monitoring wells were installed on the property to ascertain the direction of groundwater flow and the distribution of the hydrocarbon contamination in the subsurface. Based on the data from the monitoring wells, it was suspected that complexities in the subsurface were influencing the flow and transport of the hydrocarbon contamination in the subsurface. The suspected subsurface complexities could not be identified without further data acquisition to enhance the understanding of the subsurface and possible influences on the flow and transport of the hydrocarbon contamination.

As previously mentioned, seven (7) monitoring wells were installed in various locations around the property. Based on the monitoring well data, the potentiometric surface of the groundwater in the project area dips slightly (approximately 0.07 ft.) west-southwest (WSW). Three (3) of the seven (7) monitoring wells, indicated as DW2, SW5, and SW1 in Figure 3, encountered hydrocarbon contamination in the subsurface;

- In monitoring well DW2, heating oil was detected at twenty five to thirty five feet (25-35 ft.) bgs. The location of this monitoring well is approximately ten feet (10 ft.) northeast of the residential water well.
- In monitoring well SW5, approximately two feet (2 ft.) of free product (heating oil) was observed on the surface of the groundwater in the well. This monitoring well is approximately sixty five feet (65 ft.) northeast of the residential water well location.
- Monitoring well, SW1, had traces of benzene on the surface of the groundwater. The location of this well is approximately ninety feet (90 ft.) to the southwest of the residential water well.

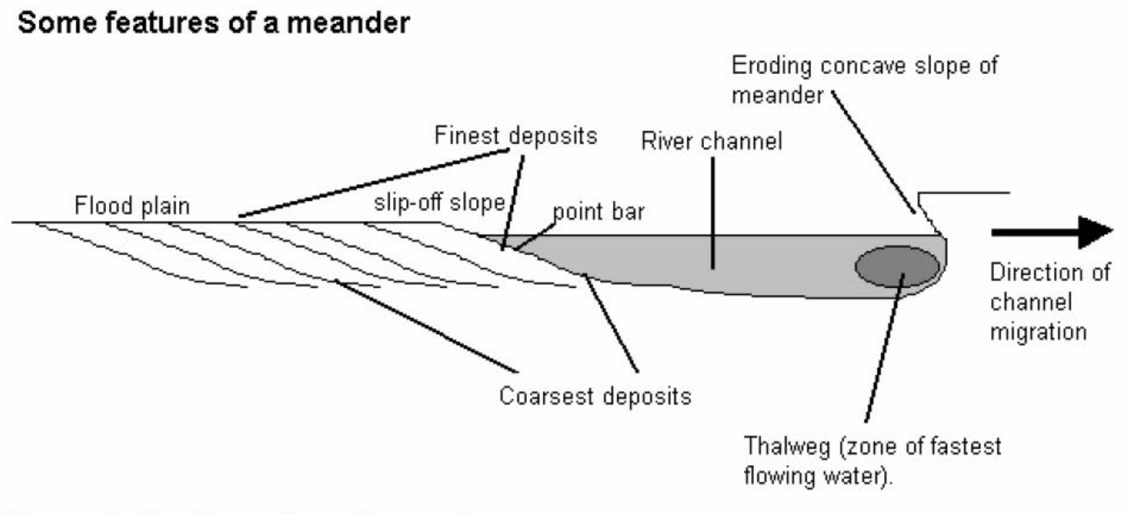
In summation, the data from the monitoring wells installed around the property produced unexpected results in the detection of the hydrocarbon contamination at the project site. First, no fuel was recovered in a recovery well located only five feet away from where fuel had been pumped into the subsurface. Secondly, heating oil was detected at twenty five to thirty five feet (25-35 ft.) bgs at a location ten feet (10 ft.) from where it had been pumped into the subsurface at the residential water well, but up gradient to the direction of the groundwater flow as indicated by the monitoring well data. Most perplexing, however, was the detection of the greatest amount of hydrocarbon contamination at the site, two feet (2 ft.) of free product (fuel) in monitoring well SW5, at a location over sixty feet (60 ft.) away from where it had entered into the subsurface and also up gradient to the direction of groundwater flow. The hydrocarbon contamination in this well was observed on the groundwater surface and at a depth over twenty feet (20 ft.) shallower than the depth where it entered into the subsurface (36 ft. bgs) at the residential water well. The least unexpected result was the detection of benzene on the groundwater surface at a monitoring well down gradient in the direction of the groundwater flow from the residential water well. The unexpected results from the monitoring well data indicated that complexities in the subsurface were influencing the flow and transport of the hydrocarbon contamination and could not be addressed with just monitoring well data alone.

Recognizing that the characterization of the contaminated site was not sufficient with just the monitoring well data, NORTECH requested GTA to perform a geophysical survey and acquire soil samples at the project site.

Regional Geology Summary

In general, the near-surface stratigraphy (or layers of soil) in the project area is influenced by the deposition of sediment in a meandering river environment (Chena River and tributaries) and the associated floodplain of the Chena River valley. The location of the private property is within a bend of a meander of the Chena River. Presently, the Chena River channel is nearest to the project site at approximately seven hundred fifty feet (750 ft.) to the west (Figure 2). Based on the location of the site, the deposits in the project area are expected to have the characteristics of an alluvial depositional environment.

Meandering streams spread out in low-relief valleys in the interiors of continents or in low-relief coastal plains. A characteristic of water flowing in a definite channel is that it tends to meander, not flow in a straight line. As meanders (or bows) in the river form, their presence only influences more meandering. The reason for this is that the main directional force of the river ends up colliding with the outer bank when it reaches a meander. The force of the water cuts into this outer bank (called the "cut bank") that causes erosion and extends the meander outward. At the same time, it generates a circular motion in the water which starts at the cut bank and rotates downward toward the bottom of the channel, then toward the inside bank and then back up to the surface. This causes sediments eroded from the cut bank to be deposited in the relatively slow flowing, low energy water on the inside bank, known as the point bar. The result is that the channel is deeper on the outer cut bank than on the inner point bar. The material deposited on the point bar side forms a slope angling downward (deeper) from the point bar towards the cut bank. This is known as the slip-off slope as shown in the illustration below.



Other types of sediment deposition associated with the meandering river are the alluvium that forms the floodplain of the river. The alluvium has two (2) main origins which occur at the time of a flood.

In times of flooding, the river can breach its banks. It may temporarily cut through the outer levee and spill large quantities of water and sediments. This is known as a crevasse splay, which is typically in a lobe shape with a mixture of fine- and coarse-grained sediments. In a less violent flood, the level of the water may rise gradually and simply overflow its bank (overbank deposits) without actually breaching the levee. This also results in flooding of the flood plain, but the resulting sedimentary deposits will be fine-grained sheets of silt as opposed to the mixture of sediments in the crevasse splay.

The geological processes discussed above are responsible for the deposition of the soils at the project site. These depositional processes and resulting soil types are believed to play an important role in the flow and transport of the hydrocarbon contamination at the project site.

General Concepts of Sequence Stratigraphy

In general, a depositional sequence is defined as a stratigraphic unit composed of a relatively conformable succession of genetically related strata, and bounded at its top and base by unconformities or their correlative conformities. A depositional sequence is determined by a single objective criterion, the physical relations of the strata themselves. A depositional sequence is chronostratigraphically significant because it was deposited during a given interval of geologic time limited by the ages of sequence boundaries where the boundaries are conformities. However, the age range of the strata within the sequence boundaries may differ from place to place where the boundaries are unconformities. The hiatus of deposition along the unconformable part of a sequence boundary generally is variable in duration. The hiatus along a conformable part is not measurable, and the surface is practically synchronous. Stratal surfaces within a sequence are essentially synchronous in terms of geologic time. Depositional sequences may range in thickness from hundreds of feet to a few inches.

The boundaries of sequences are usually defined at unconformities and traced to their correlative conformities. Discordance of strata is the main criterion used in the determination of sequence boundaries, and the type of discordant relation is the best indicator of whether an unconformity results from erosion or nondeposition. The relationship of strata at the boundaries can indicate whether a boundary is a nondepositional hiatus or an erosional hiatus. These relations are based on the parallelism, or lack of it, between the strata and the boundary itself. If the strata both above and below a surface are concordant (parallel), then there is no physical evidence of an unconformity along that part of the surface. Alternatively, if either the strata above or the strata below a surface are discordant (i.e., they terminate against it), then there is physical evidence of an unconformity (or structural disruption).

Sequence Stratigraphy using GPR

The unique properties of GPR reflections allow the direct application of geologic concepts based on physical stratigraphy. Primary GPR reflections are generated by physical surfaces in the sediments, consisting mainly of stratal surfaces and unconformities with GPR signal (electrical properties) contrasts. The primary GPR reflections parallel stratal surfaces and unconformities. Since all sediments above a stratal or uniformity surface are younger than those below it, the resulting GPR profile line or section is a record of the chronostratigraphic (time-startigraphic) depositional and structural patterns and not a record of the time-transgressive soil type (i.e., clay, silt, sand, gravel). A limiting factor of the GPR reflections is that even though many attributes of stratigraphy can be determined from the geometry of reflection correlation patterns, *soil type can not be directly determined*.

Final Interpretation of Geophysical Data

In the project site area, an initial observation of the GPR profile data indicated that the profile section could be subdivided into groups of similar GPR signal reflection patterns or configurations separated by a change in pattern or by the surfaces of discontinuous reflections. These groups, for the purposes of this report, are referred to as “sequences” and are related to sediment deposition and erosion in the GPR data coverage area. The GPR reflection terminations and configurations are interpreted as stratification patterns, and provide for the recognition and correlation of depositional sequences, interpretation of depositional environment, and estimation of soil type.

Interpreted Stratigraphic Sequences

The stratigraphic sequences interpreted in this report are based on the geologic concepts discussed above. In this case, the interpretation identified five (5) separate sequences. A more detailed interpretation may and probably would identify additional sequences (or divide the identified sequences somewhat differently). However, to address the project issues, the sequence interpretation presented in this report is sufficient to accomplish the project objectives. The stratigraphic sequences interpreted in the GPR data are described below:

> ***Note:*** *The color box to the left of the sequence description below corresponds to the color used for each sequence in the interpreted GPR profile lines. The sequences are described from shallowest to deepest below ground surface.*
>
> *Selections of five (5) interpreted GPR profile lines are shown in Figures 4-8. The locations of the selected GPR profile lines are highlighted in green on the Project Site Map (Figure 3)*

Sequence 1

Sequence 1 – A sequence that is approximately five to seven feet (5-7 ft.) thick. It consists of a parallel continuous horizontal reflection associated with the ground surface reflection and with the base of the sequence. The base reflection is relatively horizontal and concordant (or parallel) with the top of the underlying sequence, Sequence 2. The soils in this sequence are interpreted to be mainly associated with the pad construction for the property and house. There may be some soils at the base of this sequence that are associated with alluvium deposited in a low energy environment in the floodplain of the Chena River.

Sequence 2

Sequence 2 – A sequence approximately four to ten feet (4-10 ft.) thick bounded by horizontal reflections at the top and base w/ discontinuous, broad (low relief) hummocky clinoform reflections within the sequence. This clinoform reflection pattern is typically associated with lateral outbuilding or progressive lateral development of gently sloping depositional surfaces. The depositional environment of this sequence is interpreted to be associated with lower energy deposition associated with floodplain deposits such as overbank deposits.

Sequence 3

Sequence 3 – A sequence that varies in thickness from approximately five to twenty feet (5-20 ft.) thick bounded by a concordant or horizontal reflection at the top of the sequence (or the base of

Sequence 2), and by a discordant reflection at the base (boundary with Sequence 4). The sequence thickens to the west and southwest within the project area. This sequence consists of both dipping and hummocky reflections (of higher relief) within its boundaries. Due to the presence of the termination of inclined reflections at the lower boundary (or downlap), this sequence is interpreted to be associated with erosion into the lower sequence (Sequence 4) and then subsequent sediment deposition in a river (or tributary) channel (i.e., point bar deposits). This sequence is very similar to the adjacent lower sequence, Sequence 4, in its reflection patterns and it is interpreted to be associated with an avulsion of the channel (when the channel breaches its levee and takes a new course) and subsequent point bar deposition in the new channel location. This sequence could be due to the migration of a meander in the river channel.

Sequence 4

Sequence 4 – A sequence that varies in thickness from approximately zero to twenty six (0-26 ft.) within the GPR data coverage area. This sequence thins toward the west and southwest. It is approximately twenty five feet (25 ft.) thick on the east side of the project area, and decreases in thickness to zero feet (0 ft.) near the western side of the project area. This sequence is bounded by both discordant reflections at the top and base. The top boundary of Sequence 4 is a reflection surface that dips to the west and southwest (base of Sequence 3). It is interpreted that the upper boundary of Sequence 4 (lower boundary of Sequence 3) is associated with an erosional surface that cuts into Sequence 4 with subsequent deposition of sediments in the overlying Sequence 3. The thickness of Sequence 4 decreases to zero (in the west and southwest portion of the data coverage area) where it is interpreted to be completely eroded. Within Sequence 4, several dipping reflections are observed in the GPR profile lines (highlighted in yellow in Figures 4 and 5). These dipping reflections are interpreted to be associated with the deposition of sediment layers on the slip-off slope of a point bar as shown above in the illustration titled “Some features of a meander”.

The lower boundary of Sequence 4 is a discordant reflection that dips to both the east and north in the project area. Downlap which is exhibited by the termination of inclined reflections (associated with the slip-off slope) at the sequence's lower boundary reflection is observed in the GPR profile lines. This indicates that this boundary was a previous erosional surface or depositional hiatus prior to the deposition of the sediments included in Sequence 4. The GPR profile data indicates that the reflections below the boundary of Sequence 4 are, in general, parallel to this boundary reflection. Sequence 4 is very similar in the appearance of internal reflections as in Sequence 3. Thus, Sequence 4 is also interpreted to be associated with the deposition of sediments on a point bar in the meander of the river channel.

Sequence 5

Sequence 5 – This sequence is simply the base of the interpretation of the sequence stratigraphy in the project area. For the reasons noted above, the top boundary of this sequence is the lower boundary of Sequence 4. The GPR data quality begins to deteriorate at approximately forty two feet (42 ft.) bgs throughout most of the project area, so that details of the reflection events are not completely resolved. However, based on the reflections within the upper ten to fifteen feet (10-15 ft.), the sediment layers appear to be concordant or parallel. The stratigraphic features of this sequence were not as important to the objectives of this geophysical survey since they are below the depth of the residential water well and the introduction of hydrocarbon contamination into the subsurface. No interpretation of the depositional environment for this sequence has been made.

Soil Conductivity Data Interpretation

The soil conductivity data were generally acquired at specific locations along certain GPR profile line locations. These locations were chosen to facilitate the correlation of the soil conductivity data with the GPR profile line data at areas of interest within the project area. The soil conductivity logs (shown in red) have been overlaid on the GPR profile lines shown in Figures 4-8.

The results from the interpretation of the soil conductivity data reinforced the interpretation of the sequence stratigraphy, and in some instances, contributed to the refinement to the interpretation of sequence boundaries. The electrical conductivity of unconsolidated sediments is mainly a function of their grain size. Thus, the soil type (clay, silt, sand, & gravel) can be interpreted from this data. Although, as stated above, the stratigraphic sequences were not based on soil type, the type of soils can be an indication of the depositional environment when taken in context with the stratigraphic features observed in the GPR profile data.

As observed in Figures 4-8, the interpreted sequence boundaries based on GPR reflections are supported by changes in the electrical conductivity at the equivalent depths of the GPR reflection data. Generally, this is to be expected since both data sets respond to changes in the electrical properties of the subsurface. However, in combination with soil boring sample data the soil conductivity data provides a method to correlate “ground truth” from the soil sample data to the GPR data. Based on the soil conductivity data, the interpretation of sequence boundaries was refined by correlating the shape of soil conductivity log curves to one another and then correlating the soil conductivity log curves to the GPR interpretation of the sequence boundaries.

Another benefit of the soil conductivity data is that it is in-situ. Information about the subsurface can be acquired without the disturbance of the soil material. For this project, that capability was very important due to problems that arose with the disturbance to some of the core samples from acquisition by the direct push method. In some of the soil cores, the natural stratification of the soils were disturbed beyond recognition in the soil samples. Since the soil material was disturbed in some of the core samples, soil conductivity data made it possible to determine the stratification of the soil types in the subsurface from where the core sample had been taken. The acquisition of soil conductivity data was recommended by GTA as a method to mitigate the problems of soil disturbance in the cores so that it was possible to observe the stratification of the different soil types in-situ.

Conclusions

In conclusion, GTA accomplished the objectives of the geophysical survey at the project site, 578 Canoro Road, in North Pole, Alaska. Conclusions from the results of the geophysical survey are addressed in the following;

- The objective of the geophysical survey is to acquire geophysical data to enhance the understanding of the flow and transport of hydrocarbon contamination in the subsurface at the project site. To accomplish this objective, GTA acquired Ground Penetrating Radar, soil conductivity, and soil sample data at the project site between the dates of October 17 to November 2, 2007.

- The interpretation of the geophysical data is based on; the regional and local geological setting of the project site, basic geologic concepts including sequence stratigraphy, and a synthesis of the different data sets acquired at the project site.

  The project area is located in the Chena River valley where the shallow subsurface soils have been deposited in an alluvial environment. The near-surface stratigraphy (or layers of soil) in the project area is influenced by the deposition of sediment in a meandering river environment (Chena River and tributaries) and the associated floodplain of the river valley.

  From an interpretation of the GPR profile line data and soil conductivity data, several stratigraphic sequences were identified. To demonstrate these sequences, a selection of interpreted GPR profile lines from the GPR data set are shown in Figures 4-8. In the figures, the soil conductivity logs (e.g., EC03) are shown in red and have been overlain on the GPR profile line data. The different stratigraphic sequences are interpreted to be associated with particular depositional features (e.g., slip-off slope of a point bar, floodplain, etc.) within a meandering river system.

- Based on an interpretation of the geophysical data sets (GPR and soil conductivity) and soil samples, the flow and transport of the hydrocarbon contamination are directly influenced by the stratigraphy of the subsurface soil types within the project area.

The hydrocarbon contamination entered the subsurface through the residential water well screen at a depth of approximately thirty six feet (36 ft.) bgs, and below the groundwater surface by approximately twenty two feet (22 ft.). An interpretation of the GPR profile line data indicates that the location of the water well screen is at a depth near the base of Sequence 4 or possibly within the upper few feet of Sequence 5. As discussed above, Sequence 4 is interpreted to be the deposition of sediments on a point bar within a meandering river depositional environment. In particular, dipping reflections within Sequence 4 were observed on the GPR profile lines. These dipping reflections are interpreted to be associated with the deposition of sediment on a slip-off slope of a point bar in a meandering river channel. An example of these dipping reflections can be observed on GPR Profile Line 29 (Figure 4) where they are highlighted in yellow. Thus, as indicated by the GPR data, the hydrocarbon contamination entered into the subsurface near the base of these dipping strata in Sequence 4.

It is concluded that these dipping strata directly influence the flow and transport of the hydrocarbon contamination in the subsurface for the following reasons. First, the natural buoyancy of hydrocarbon contamination in water is to rise to the surface of the groundwater from where it entered into the subsurface. Second, even though the strata within Sequence 4 consist mainly of sandy gravel, interbedded finer grain sediments (i.e., fine sands, silts) are also present as observed in the both the soil conductivity logs and some of the better preserved soil samples. Finer grain strata are less permeable so they retard the flow of the hydrocarbon contamination through them and induce the flow of the hydrocarbon contamination through the coarser grain or more permeable sediments. Third, these finer grain strata incline (dip) from the east down to the west (or up from west to east) as observed on the east-west GPR profile lines (Figures 4, 6-8). For these reasons, it is concluded that the inclined finer grain strata produce a preferred pathway for the flow of the hydrocarbon contamination. The resulting pathway is within the more permeable and coarser grain sediments that are also inclined upwards toward the east, and away from the entry point of the contamination into the subsurface. Thus, the dipping interbedded fine grain strata directly influence the mobility of the hydrocarbon contamination, as well as, the direction of the flow and transport.

- Integrating the interpretation of the geophysical data with the monitoring well and soil sample data better defines a general pathway for the flow and transport of the hydrocarbon contamination. For the following discussion, the locations of the monitoring wells, soil borings, and GPR profile lines are shown in Figure 3.

  The pathway is more defined by the integration of the data as follows:

  - The recovery well installed to the south of the residential water well (the subsurface entry point for the contamination) did not encounter any hydrocarbon contamination other than an observed slight sheen. Thus, the pathway was not to the south.
  - According to the soil boring data, hydrocarbon contamination was observed in borings SB01, SB02, SB05, and SB06. Starting at the location of the residential water well, it is interpreted that the basic pathway of the hydrocarbon contamination is northeast through the locations of SB01 and SB06.
  - From the location of SB06, the pathway turns more to the north toward the location of SB05. This is concluded for two reasons; 1) SB03 had no observed hydrocarbon contamination, and 2) the GPR data indicates that not only is the inclination of the finer grained stata upward and to the east, but is also upwards to the north. This is indicated by the reflections highlighted in yellow in GPR Profile Line 32 (Figure 5) shown in yellow. The reflections

incline to the north to a location approximately between GPR Profile Lines 27 and 29 at which point they are horizontal and then begin to incline downward to the north at a location between GPR Profile Lines 31 and 33. These highlighted reflections are interpreted to be associated with finer grain sediments as indicated by the increase in conductivity seen in the overlaid soil conductivity logs (EC01 and EC05).

  - From the location of the soil boring SB05, the pathway turns back to the east toward the monitoring well SW5 and soil boring SB02. This indicates that the general inclination of the strata upwards to the east (shown in Figure 4) is, again, influencing the flow of the contamination. It is at this point the hydrocarbon contamination reaches enough permeability in the overlying soils to reach the depth of the groundwater surface as observed in SW5 and SB02. Based on the lack of observed hydrocarbon contamination in the soil boring SB09, it appears that the contamination has not been transported much beyond the location of monitoring well SW5.
  - Note: This interpreted pathway is general. Due to the laterally discontinuous nature of the sediments within Sequence 4, and the variation in the porosity and permeability of all the sediments within this sequence, the pathway may be and probably is more complex and beyond the capability of the current data to determine.

- The geophysical survey performed at the project site was necessary to determine the flow and transport of the hydrocarbon contamination in the subsurface. Only the presence or absence of hydrocarbon contamination at a well or soil boring location could be determined from the existing monitoring well data and acquisition of soil boring samples. To determine the extent of the contamination in the subsurface, the acquisition of considerably more soil boring data would have been required. And, regardless of the number of soil borings sampled, the soil boring data would not have provided the insight necessary to determine the reason for the presence or absence of contamination at any particular location within the project site.

To maximize cost efficiency, the use of geophysical methods was necessary to minimize the number of required soil borings. Using a preliminary interpretation of the GPR data for this project, soil boring locations were minimized and, more importantly, placed in locations critical to the understanding of the flow and transport of the hydrocarbon contamination. In other words, the geophysical data provided a technical method to maximize the information gained from the acquisition of “ground truth” data (soil borings), minimized the acquisition of more expensive soil boring data, and ultimately provided an understanding of the transport and flow of contamination within the subsurface.

- GTA has accomplished the objectives of this geophysical survey, and based on an interpretation of the data sets the results and conclusions from the survey are presented in this Letter Report.

Closure

GeoTek Alaska, Inc. appreciates this opportunity to support NORTECH Environmental, Health & Safety with a geophysical survey at 578 Canoro Road in North Pole, Alaska. GTA remains available to assist NORTECH with future projects. Should you have any questions or require any additional information, please do not hesitate to contact the undersigned at (907) 569-5900 or 250-2944.

Sincerely,

Chris Nettels

Chris Nettels
President/Consulting Geophysicist

GeoTek Alaska, Inc.

Geophysical and Environmental Site Assessment

NORTECH

Canoro Road – Project Site

Location Map

Created By: CBN	Date: 01/18/08
Project No: 07-032	File Path: Geophysical/ Report/Figures/Final/ Canoro Location_figures 1-2

Figure: 1

GeoTek Alaska, Inc.

Geophysical and Environmental Site Assessment

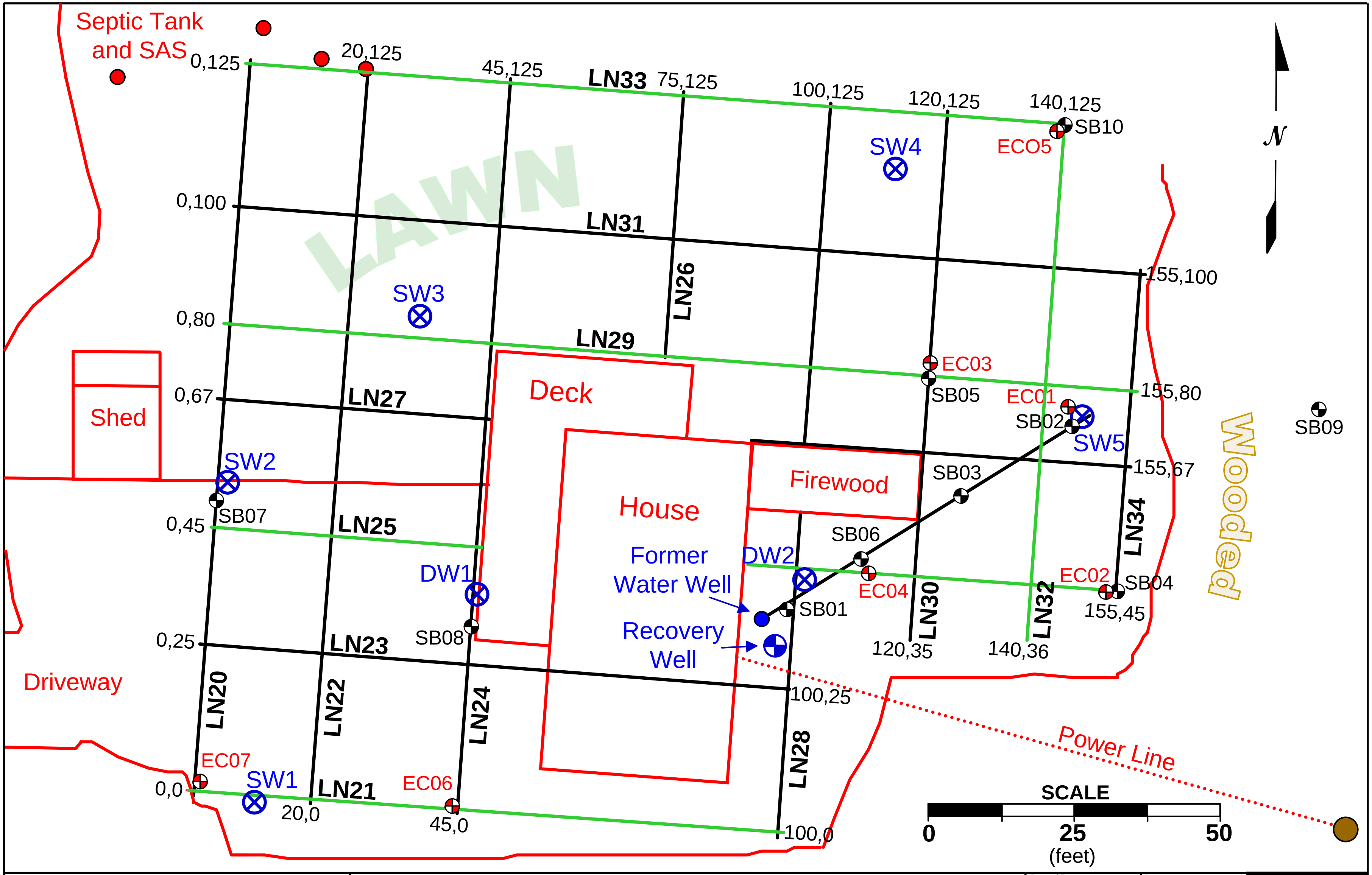
NORTECH

Project Site - 578 Canoro Road

Location Map

Created By: CBN	Date: 01/18/08
Project No: 07-032	File Path: Geophysical/ Report/Figures/Final/ Canoro Location_figures 1-2

Figure: 2



GeoTek Alaska, Inc.

Geophysical and Environmental Site Assessment

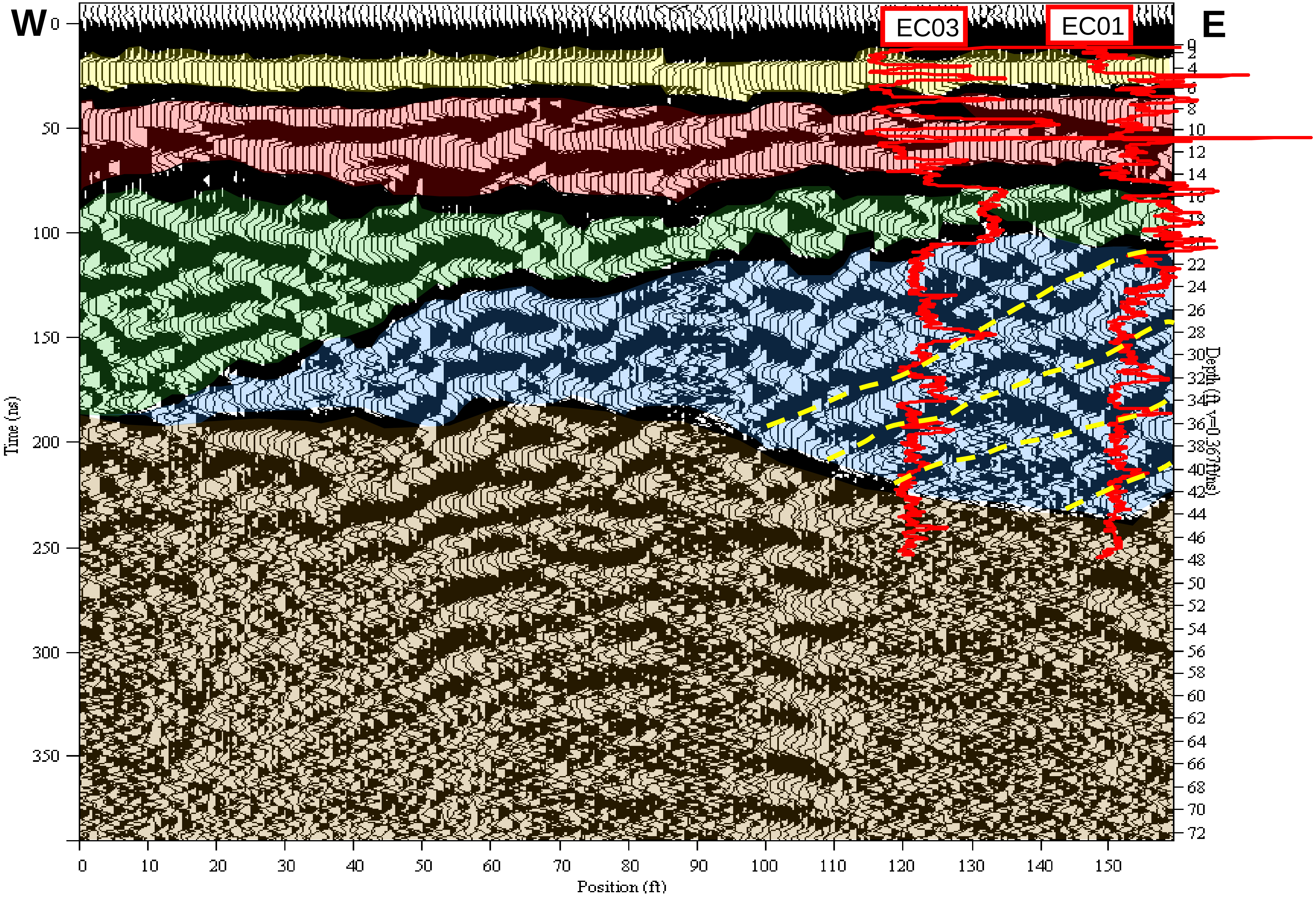
NORTECH

Canoro Road Geophysical Survey

Project Site Map

Created By: CBN	Date: 01/18/08
Project No: 07-032	File Path: 07-032_Geophysical/ Report/Figures/Final/GPR & EC_interp

Figure:
3

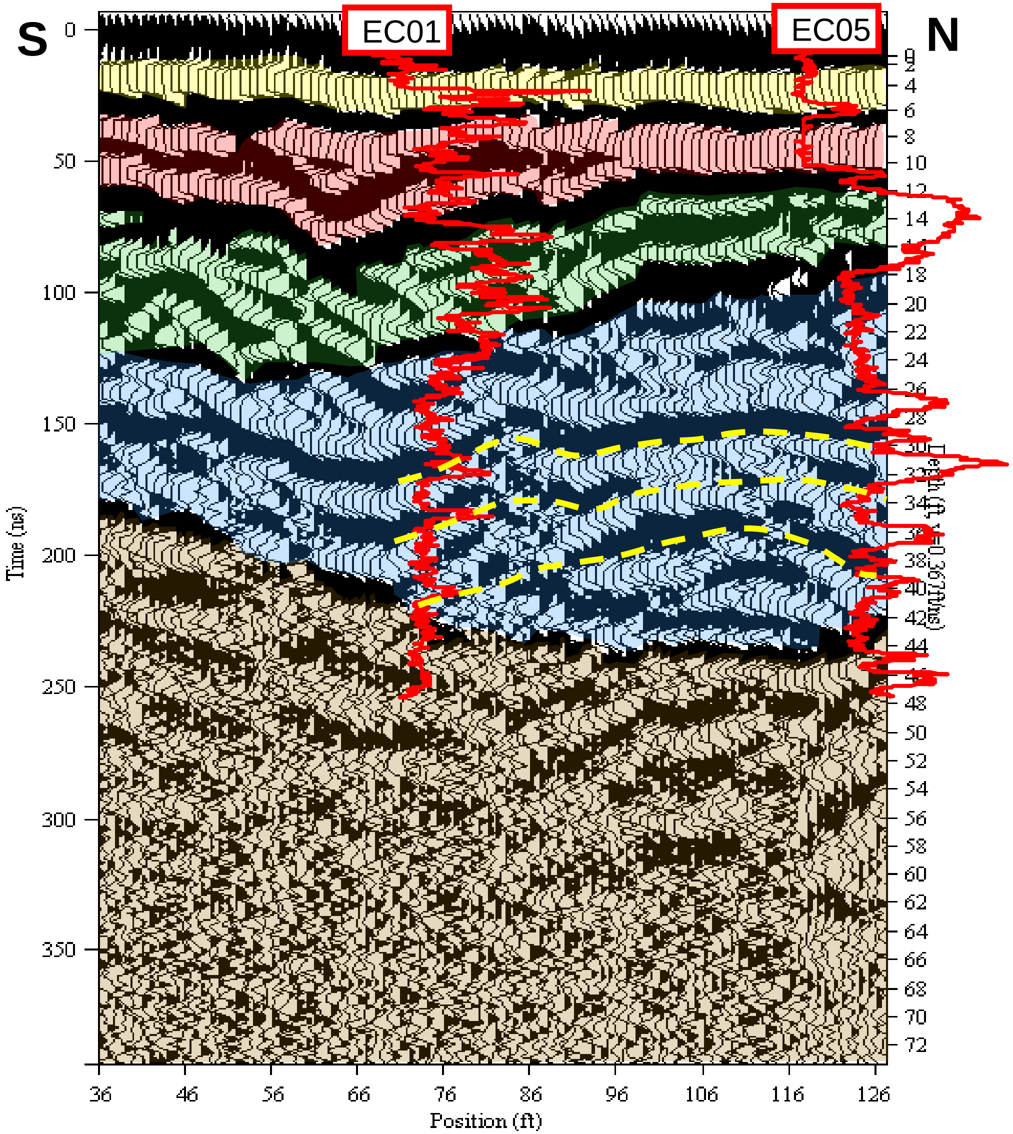


GeoTek Alaska, Inc.
Geophysical and Environmental Site Assessment

NORTECH
Canoro Road Geophysical Survey
GPR Profile Line 29

Created By: CBN	Date: 01/18/08
Project No: 07-032	File Path: 07-032_Geophysical/ Report/Figures/Final/GPR & EC_interp

Figure:
4



GeoTek Alaska, Inc.

Geophysical and Environmental Site Assessment

NORTECH

Canoro Road Geophysical Survey

GPR Profile Line 32

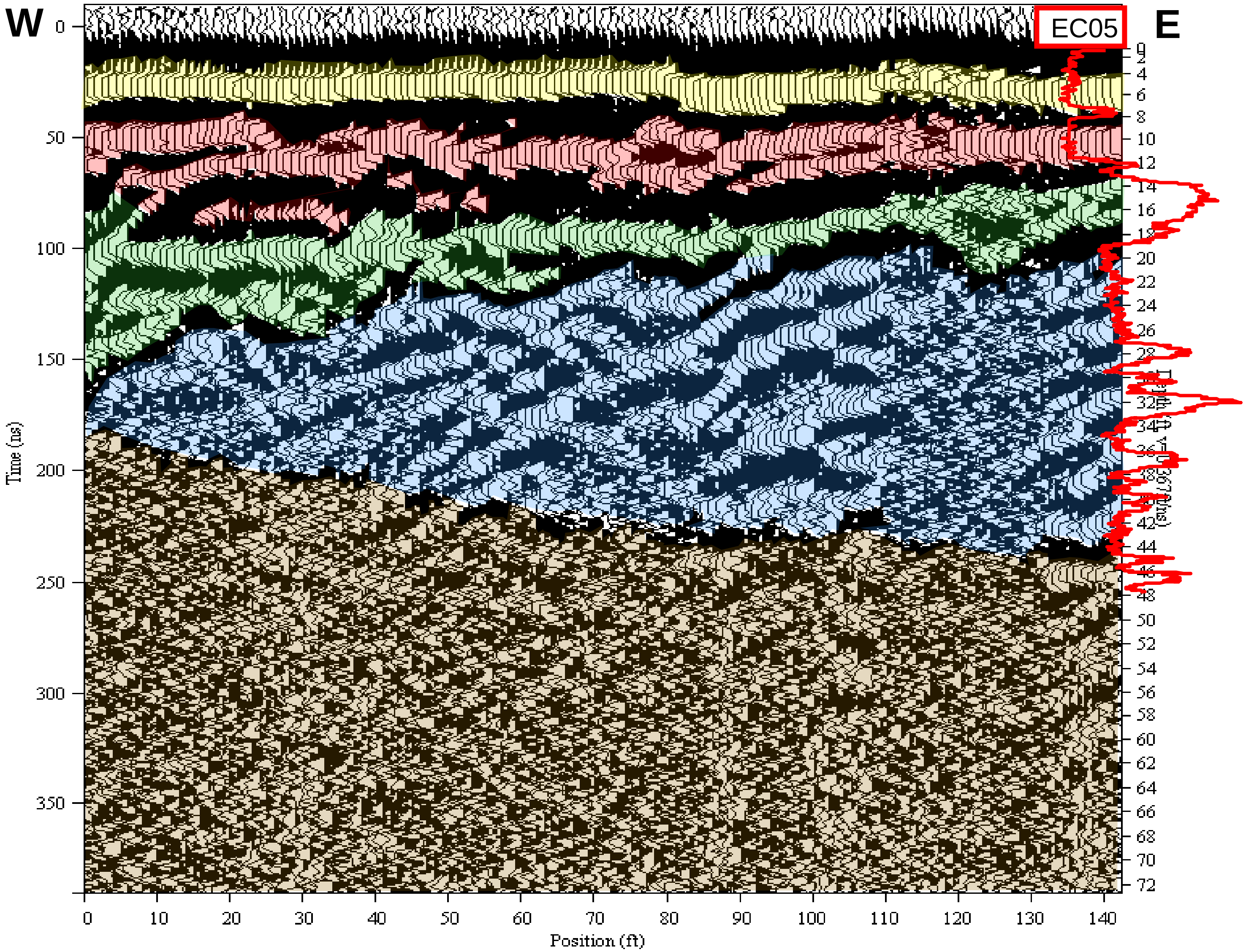
Created By: CBN

Date: 01/18/08

Project No: 07-032

File Path: 07-032_Geophysical/ Report/Figures/Final/GPR & EC_interp

Figure: 5

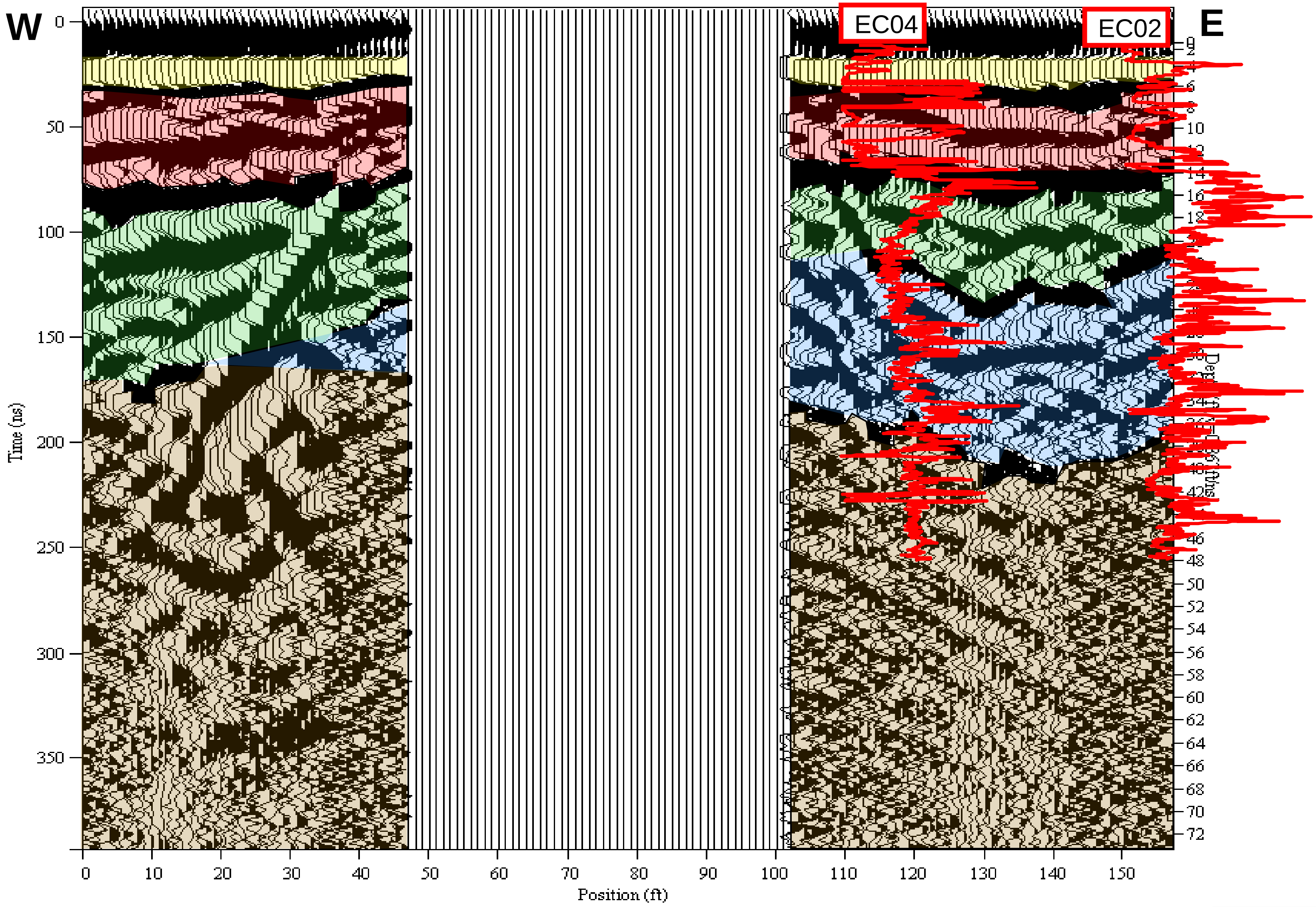


GeoTek Alaska, Inc.
Geophysical and Environmental Site Assessment

NORTECH
Canoro Road Geophysical Survey
GPR Profile Line 33

Created By: CBN	Date: 01/18/08
Project No: 07-032	File Path: 07-032_Geophysical/ Report/Figures/Final/GPR & EC_interp

Figure:
6

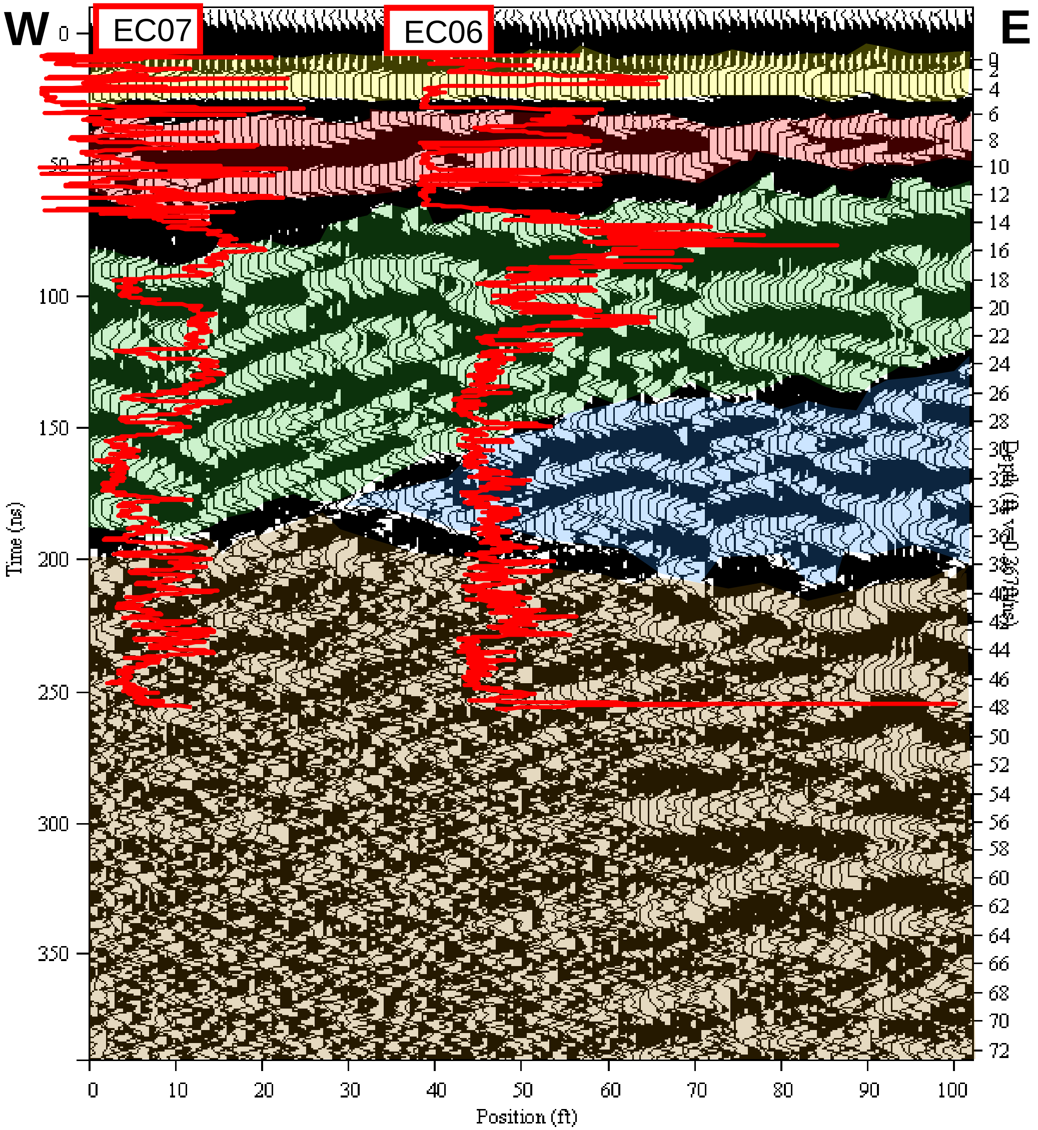


GeoTek Alaska, Inc.
Geophysical and Environmental Site Assessment

NORTECH
Canoro Road Geophysical Survey
GPR Profile Line 25

Created By:	Date:
CBN	01/18/08
Project No:	File Path:
07-032	07-032_Geophysical/ Report/Figures/Final/GPR & EC_interp

Figure:
7



GeoTek Alaska, Inc.
Geophysical and Environmental Site Assessment

NORTECH
Canoro Road Geophysical Survey
GPR Profile Line 21

Created By: CBN	Date: 01/18/08
Project No: 07-032	File Path: 07-032_Geophysical/ Report/Figures/Final/GPR & EC_interp

Figure:
8

Attachment 4

NORTECH Environmental and Engineering Consultants Test Boring Log

PROJECT: **Canoro Road**
LOCATION: **578 Canoro Road, North Pole**

JOB NO.	06-1080
HOLE NO.	**SB01**
SHEET	1
START DATE	26-Oct-07
FINISH DATE	26-Oct-07
DRILLER	Scott V
HELPER	Chris B
INSPECTOR	Peter/Dave/Jeff

	CASING		SAMPLE	CORE
TYPE				
SIZE (ID)				
HAMMER WT				
HAMMER FALL				

GROUNDWATER		DEPTH TO		
DATE	TIME	WATER	BOTTOM	BOTTOM OF HOLE

DEPTH IN FEET	CASING BLOWS PER FOOT	SAMPLE NO	SAMPLE DEPTH (FT)	SAMPLE BLOWS PER 6 INCHES	RECOVERY (IN)	SOIL DESCRIPTION AND OTHER DATA	PID
0.0					3.5 feet		
						Silty topsoil with organics	
2.5						Tan gravel	
						Brown gravel	
5.0						Grey gravel	0.0
					2.5 feet		
7.5						Grey gravel	
						Brown sand	
10.0						Brown gravel	0.7
					2.5 feet		
12.5						Brown gravely sand	14.5
15.0						Wet grey sandy gravel	1.5
					5 feet	Grey coarse sand	
17.5						Uniform fine grey sand	
						Coarser gravel	1.8
20.0						Gravel	3.5

NOTES: Core logs listed from bottom to top. Dashed border indicates groundwater. Kept samples indicated by double-border around PID results.

NORTECH Environmental and Engineering Consultants Test Boring Log

PROJECT: **Canoro Road**
LOCATION: **578 Canoro Road, North Pole**

JOB NO.	06-1080
HOLE NO.	**SB01**
SHEET	2
START DATE	26-Oct-07
FINISH DATE	26-Oct-07
DRILLER	Scott V
HELPER	Chris B
INSPECTOR	Peter/Dave/Jeff

	CASING		SAMPLE	CORE
TYPE				
SIZE (ID)				
HAMMER WT				
HAMMER FALL				

GROUNDWATER		DEPTH TO		
DATE	TIME	WATER	BOTTOM	BOTTOM OF HOLE

DEPTH IN FEET	CASING BLOWS PER FOOT	SAMPLE NO	SAMPLE DEPTH (FT)	SAMPLE BLOWS PER 6 INCHES	RECOVERY (IN)	SOIL DESCRIPTION AND OTHER DATA	PID
20.0							
					4 feet		
						Fine gravel (possible grading in sleeve)	
						Washed gravel	
22.5							
						Grey sandy gravel	
						Oily sheen on sleeve	780+
25.0							
					2.5 feet		
27.5							
							772
							386
						Sandy gravel, graded in sleeve	
							752
30.0							
					3 feet		
32.5							601
						Sandy gravel, graded in sleeve	
							826
35.0							
37.5							
40.0							

NOTES: Core logs completed from bottom to top. Dashed border indicated groundwater. Slanted-dashed border indicated fuel. Kept samples denoted by double-border on PID result.

NORTECH Environmental and Engineering Consultants Test Boring Log

PROJECT: **Canoro Road**
LOCATION: **578 Canoro Road, North Pole**

JOB NO.	06-1080
HOLE NO.	**SB02**
SHEET	1
START DATE	26-Oct-07
FINISH DATE	26-Oct-07
DRILLER	Scott V
HELPER	Chris B
INSPECTOR	Peter/Dave/Jeff

	CASING		SAMPLE	CORE
TYPE				
SIZE (ID)				
HAMMER WT				
HAMMER FALL				

GROUNDWATER		DEPTH TO		
DATE	TIME	WATER	BOTTOM	BOTTOM OF HOLE

DEPTH IN FEET	CASING BLOWS PER FOOT	SAMPLE NO	SAMPLE DEPTH (FT)	SAMPLE BLOWS PER 6 INCHES	RECOVERY (IN)	SOIL DESCRIPTION AND OTHER DATA	PID
0.0					4 feet	Topsoil with frozen silty sand.	
						Gravely sand.	
2.5						Peet layers with sand.	
						Sand with fine brown silty layers.	2.5
5.0					4 feet		
						Finer sand	
7.5						Coarser sand with fines layered in	
						Small layer of organics	2.2
10.0						2" of silt with sand below	
					3.5 feet		
12.5						1" organic layer	12.5
						Fine sand with a few silty layers Gravely sand	412
						Darker brown sand	
15.0							7.8
					3.5 feet	Fine sand	
17.5						Gravely fine sand	
						Fine sand	164
20.0						Gravel	402

NOTES: Core logs listed from bottom to top. Dashed border indicates groundwater.

NORTECH Environmental and Engineering Consultants Test Boring Log

PROJECT: **Canoro Road**
LOCATION: **578 Canoro Road, North Pole**

JOB NO.	06-1080
HOLE NO.	**SB02**
SHEET	2
START DATE	26-Oct-07
FINISH DATE	26-Oct-07
DRILLER	Scott V
HELPER	Chris B
INSPECTOR	Peter/Dave/Jeff

	CASING		SAMPLE	CORE
TYPE				
SIZE (ID)				
HAMMER WT				
HAMMER FALL				

GROUNDWATER		DEPTH TO		
DATE	TIME	WATER	BOTTOM	BOTTOM OF HOLE

DEPTH IN FEET	CASING BLOWS PER FOOT	SAMPLE NO	SAMPLE DEPTH (FT)	SAMPLE BLOWS PER 6 INCHES	RECOVERY (IN)	SOIL DESCRIPTION AND OTHER DATA	PID
20.0							
							164
22.5					3.5 feet	Uniform sandy gravel with tight fine-sand layers	
							590
25.0							
						Coarse gravel	20.1
27.5					3.5 feet	Fine sandy gravel	
						Gravel with a trace of sand	13.7
30.0							49.5
						Sandy gravel	
32.5					4 feet	Fewer fines, more gravel	
							511
						Sandy gravel	
						Gravel with few fines	746
35.0							
37.5							
40.0							

NOTES: Core logs completed from bottom to top. Dashed border indicated groundwater. Slanted-dashed border indicated fuel. Kept samples denoted by double-border on PID result.

NORTECH Environmental and Engineering Consultants Test Boring Log

PROJECT: **Canoro Road**

LOCATION: **578 Canoro Road, North Pole**

JOB NO.	06-1080
HOLE NO.	**SB03**
SHEET	1
START DATE	26-Oct-07
FINISH DATE	26-Oct-07
DRILLER	Scott V
HELPER	Chris B
INSPECTOR	Peter/Dave/Jeff

	CASING	SAMPLE	CORE
TYPE			
SIZE (ID)			
HAMMER WT			
HAMMER FALL			

GROUNDWATER		DEPTH TO		
DATE	TIME	WATER	BOTTOM	BOTTOM OF HOLE

DEPTH IN FEET	CASING BLOWS PER FOOT	SAMPLE NO	SAMPLE DEPTH (FT)	SAMPLE BLOWS PER 6 INCHES	RECOVERY (IN)	SOIL DESCRIPTION AND OTHER DATA	PID
0.0							
						Organics/top soil	
2.5					4.5 feet	Fine sand with 2" silt above	
						Medium sand with 1/2" layer of silt above	4.5
5.0							
						Medium sand	
7.5					3.5 feet	Silty with trace of sand. Oblique silty layer above	
						Medium sand	2.7
10.0							
						Medium sand interbedded with [gravel?]	
12.5					4 feet	Gravel	6.7
						3" rusty sand above 3" rusty gravel	
						Grey sand	5.3
15.0							
17.5					3.5 feet	Grey to dark gray sand, saturated	6.8
						gravel	
						Sand	6.9
20.0						Sandy gravel	

NOTES: Core logs listed from bottom to top. Dashed border indicates groundwater.

NORTECH Environmental and Engineering Consultants Test Boring Log

PROJECT: **Canoro Road**
LOCATION: **578 Canoro Road, North Pole**

JOB NO.	06-1080
HOLE NO.	**SB03**
SHEET	2
START DATE	26-Oct-07
FINISH DATE	26-Oct-07
DRILLER	Scott V
HELPER	Chris B
INSPECTOR	Peter/Dave/Jeff

	CASING		SAMPLE	CORE
TYPE				
SIZE (ID)				
HAMMER WT				
HAMMER FALL				

GROUNDWATER	DEPTH TO			
DATE	TIME	WATER	BOTTOM	BOTTOM OF HOLE

DEPTH IN FEET	CASING BLOWS PER FOOT	SAMPLE NO	SAMPLE DEPTH (FT)	SAMPLE BLOWS PER 6 INCHES	RECOV-ERY (IN)	SOIL DESCRIPTION AND OTHER DATA	PID
20.0							
					4.5 feet	Fine sand/coarse silt	4.5
						Gravel	
22.5							
						Gravel with 2" fine sand above	
							2.8
							1.2
25.0							
					4 feet		1.8
						Gravel, sorted in core	
27.5							
							2.5
30.0							
					4 feet		
						Gravel, sorted in core	
							6.4
32.5							3.7
						Gravel	3.2
							2.7
35.0							
					2.5 feet		
							1.6
37.5							
						Gravel, poor recovery	1.1
40.0							

NOTES: Core logs listed from bottom to top. Dashed border indicates groundwater.

NORTECH Environmental and Engineering Consultants Test Boring Log

PROJECT: **Canoro Road**
LOCATION: **578 Canoro Road, North Pole**

JOB NO.	06-1080
HOLE NO.	**SB04**
SHEET	1
START DATE	27-Oct-07
FINISH DATE	27-Oct-07
DRILLER	Scott V
HELPER	Chris B
INSPECTOR	Peter/Dave/Jeff

	CASING		SAMPLE	CORE
TYPE				
SIZE (ID)				
HAMMER WT				
HAMMER FALL				

GROUNDWATER		DEPTH TO		
DATE	TIME	WATER	BOTTOM	BOTTOM OF HOLE

DEPTH IN FEET	CASING BLOWS PER FOOT	SAMPLE NO	SAMPLE DEPTH (FT)	SAMPLE BLOWS PER 6 INCHES	RECOVERY (IN)	SOIL DESCRIPTION AND OTHER DATA	PID
0.0					4 feet		
						Top soil	
2.5						Silt below 2" of organics	
						Sand	
						organics with a 2" layer of silt	
5.0						Sand	1.1
					4 feet		
						Interbedded sands	
7.5						Sand with occasional organic layers	1.6
						Coarser sand	1.4
10.0					4 feet		
12.5						Sand	
						Rusty brown gravely sand	0.9
						Wet grey sand	1.7
15.0					3.5 feet		
17.5						Sand	
						Gravel, getting progressively coarser	
20.0						Gravel	1.1

NOTES: Core logs listed from bottom to top. Dashed border indicates groundwater.

NORTECH Environmental and Engineering Consultants Test Boring Log

PROJECT: **Canoro Road**
LOCATION: **578 Canoro Road, North Pole**

JOB NO.	06-1080
HOLE NO.	**SB04**
SHEET	2
START DATE	27-Oct-07
FINISH DATE	27-Oct-07
DRILLER	Scott V
HELPER	Chris B
INSPECTOR	Peter/Dave/Jeff

	CASING		SAMPLE	CORE
TYPE				
SIZE (ID)				
HAMMER WT				
HAMMER FALL				

GROUNDWATER		DEPTH TO		
DATE	TIME	WATER	BOTTOM	BOTTOM OF HOLE

DEPTH IN FEET	CASING BLOWS PER FOOT	SAMPLE NO	SAMPLE DEPTH (FT)	SAMPLE BLOWS PER 6 INCHES	RECOVERY (IN)	SOIL DESCRIPTION AND OTHER DATA	PID
20.0							
22.5					3 feet	Gravel	0.8
						3" of fine sand (almost silt) within gravel layer	
						Gravel	1.1
25.0							
						Gravel	
27.5					4 feet		0.5
						2" fine sand within gravel layer	
						Gravel	
							1.1
30.0							
32.5					3 feet		
						Gravel	0.4
35.0						2" sand below gravel	0.7
						Sand	
37.5					4 feet		0.5
						fine gravel	
						4" sand	0.5
40.0						Sandy gravel	

NOTES: Core logs listed from bottom to top. Dashed border indicates groundwater.

NORTECH Environmental and Engineering Consultants Test Boring Log

PROJECT: **Canoro Road**
LOCATION: **578 Canoro Road, North Pole**

JOB NO.	06-1080
HOLE NO.	**SB05**
SHEET	1
START DATE	27-Oct-07
FINISH DATE	27-Oct-07
DRILLER	Scott V
HELPER	Chris B
INSPECTOR	Peter/Dave/Jeff

	CASING		SAMPLE	CORE
TYPE				
SIZE (ID)				
HAMMER WT				
HAMMER FALL				

GROUNDWATER		DEPTH TO		
DATE	TIME	WATER	BOTTOM	BOTTOM OF HOLE

DEPTH IN FEET	CASING BLOWS PER FOOT	SAMPLE NO	SAMPLE DEPTH (FT)	SAMPLE BLOWS PER 6 INCHES	RECOVERY (IN)	SOIL DESCRIPTION AND OTHER DATA	PID
0.0					4.5 feet	Frozen silt	
2.5						Fine sand with traces of silt	
						Sand	
						Silt and organic layers	1.6
5.0						Dark brown sand	1.4
					3.5 feet	Fine sand	
7.5						2" organics and silt layers	
						Medium sand	1.1
						Medium sand with organic layers	1.9 1.8
10.0						Medium sand	
					3.5 feet		
						2" silt	
						Sand	
12.5						Gravel	
						Rusty brown gravel	
15.0						Grey wet sand	1.9 1.6
					4 feet		
17.5						Grey wet sand	5.7
20.0						Fine black gravel, decomp odor	10.3

NOTES: Core logs listed from bottom to top. Dashed border indicates groundwater. Kept samples indicated by double-border around PID results.

NORTECH Environmental and Engineering Consultants Test Boring Log

PROJECT: **Canoro Road**
LOCATION: **578 Canoro Road, North Pole**

JOB NO.	06-1080
HOLE NO.	**SB05**
SHEET	2
START DATE	27-Oct-07
FINISH DATE	27-Oct-07
DRILLER	Scott V
HELPER	Chris B
INSPECTOR	Peter/Dave/Jeff

	CASING		SAMPLE	CORE
TYPE				
SIZE (ID)				
HAMMER WT				
HAMMER FALL				

GROUNDWATER		DEPTH TO		
DATE	TIME	WATER	BOTTOM	BOTTOM OF HOLE

DEPTH IN FEET	CASING BLOWS PER FOOT	SAMPLE NO	SAMPLE DEPTH (FT)	SAMPLE BLOWS PER 6 INCHES	RECOVERY (IN)	SOIL DESCRIPTION AND OTHER DATA	PID
20.0							255
					3.5 feet	Sandy gravel with petroleum odor	
22.5						4" fine sandy silt with trace of gravel	220
						Sandy gravel	134
25.0							
					3 feet		4.6
27.5						Sandy gravel	
30.0							
					3 feet		
32.5						Sandy gravel, bottom 6" harder according to driller	
							5.4
35.0							
37.5							
40.0							

NOTES: Core logs completed from bottom to top. Dashed border indicated groundwater. Slanted-dashed border indicated fuel. Kept samples denoted by double-border on PID result.

NORTECH Environmental and Engineering Consultants Test Boring Log

PROJECT: **Canoro Road**
LOCATION: **578 Canoro Road**

JOB NO.	06-1080
HOLE NO.	**SB06**
SHEET	1
START DATE	27-Oct-07
FINISH DATE	27-Oct-07
DRILLER	Scott V
HELPER	Chris B
INSPECTOR	Peter/Dave/Jeff

	CASING	SAMPLE	CORE
TYPE			
SIZE (ID)			
HAMMER WT			
HAMMER FALL			

GROUNDWATER		DEPTH TO		
DATE	TIME	WATER	BOTTOM	BOTTOM OF HOLE

DEPTH IN FEET	CASING BLOWS PER FOOT	SAMPLE NO	SAMPLE DEPTH (FT)	SAMPLE BLOWS PER 6 INCHES	RECOVERY (IN)	SOIL DESCRIPTION AND OTHER DATA	PID
0.0					4.5 feet	Organics/topsoil	
						Frozen silt, 1.5-2" oblique layer	
						Fine to medium sand	
2.5						2" silt	
						Medium sand	
5.0						2" organic "striping"	0.8
					4 feet	Medium sand grading to silt	
7.5							2.5
						Medium sand	
10.0							2.7
					3.5 feet		
						Sand	
12.5						Sandy gravel	
						2" rusty bands, 4" sand	3.1
						Grey wet sand	3.3
15.0							
					5 feet	Sand	
17.5							4.1
						Gravely sand	4.9
						2" black decaying org matter	
20.0						sand/gravel	3.7

NOTES: Core logs listed from bottom to top. Dashed border indicates groundwater.

NORTECH **Environmental and Engineering Consultants Test Boring Log**

PROJECT: **Canoro Road**
LOCATION: **578 Canoro Road, North Pole**

JOB NO.	06-1080
HOLE NO.	**SB06**
SHEET	2
START DATE	27-Oct-07
FINISH DATE	27-Oct-07
DRILLER	Scott V
HELPER	Chris B
INSPECTOR	Peter/Dave/Jeff

	CASING		SAMPLE	CORE
TYPE				
SIZE (ID)				
HAMMER WT				
HAMMER FALL				

GROUNDWATER		DEPTH TO		
DATE	TIME	WATER	BOTTOM	BOTTOM OF HOLE

DEPTH IN FEET	CASING BLOWS PER FOOT	SAMPLE NO	SAMPLE DEPTH (FT)	SAMPLE BLOWS PER 6 INCHES	RECOV-ERY (IN)	SOIL DESCRIPTION AND OTHER DATA	PID
20.0							
22.5					2 feet	Whole Interval - Sandy gravel, wet and oily	473
						Trace layer fine sand somewhere in this area	
						Coarse gravel in this area	513
25.0							
						Sorted in tube, oily	
27.5					3.5 feet		94.3
						Thin silty layer	
						Thin silty layer	12.1
						Sandy gravel	19.1
30.0							
32.5						Sandy gravel	30.5
							71.1
35.0							
37.5							
40.0							

NOTES: Core logs completed from bottom to top. Dashed border indicated groundwater. Slanted-dashed border indicated fuel.

NORTECH Environmental and Engineering Consultants Test Boring Log

PROJECT: **Canoro Road**
LOCATION: **578 Canoro Road, North Pole**

JOB NO.	06-1080
HOLE NO.	**SB07**
SHEET	1
START DATE	28-Oct-07
FINISH DATE	28-Oct-07
DRILLER	Scott V
HELPER	Chris B
INSPECTOR	Peter/Dave/Jeff

	CASING		SAMPLE	CORE
TYPE				
SIZE (ID)				
HAMMER WT				
HAMMER FALL				

GROUNDWATER	DEPTH TO			
DATE	TIME	WATER	BOTTOM	BOTTOM OF HOLE

DEPTH IN FEET	CASING BLOWS PER FOOT	SAMPLE NO	SAMPLE DEPTH (FT)	SAMPLE BLOWS PER 6 INCHES	RECOVERY (IN)	SOIL DESCRIPTION AND OTHER DATA			
0.0								PID	
					5 feet	Sandy gravel			
						Gravel			
								0.1	
						Silt			
2.5									
						Grey coarse sand			
						2" silt		0.1	
						Grey sand with 2" Dark very fine sand below			
5.0									
					4 feet	Sand			
7.5						Sandy gravel			
						4" sand		0.2	
10.0						Gravel			
					3.5 feet				
						Gravel			
12.5									
								0.2	
						Rusty to grey sand		0.2	
15.0						Grey sand			
					3 feet				
17.5						Sand			
						Medium gravel			
20.0									

NOTES: Core logs listed from bottom to top. Dashed border indicates groundwater.

NORTECH Environmental and Engineering Consultants Test Boring Log

PROJECT: **Canoro Road**
LOCATION: **578 Canoro Road, North Pole**

JOB NO.	06-1080
HOLE NO.	**SB07**
SHEET	2
START DATE	28-Oct-07
FINISH DATE	28-Oct-07
DRILLER	Scott V
HELPER	Chris B
INSPECTOR	Peter/Dave/Jeff

	CASING	SAMPLE	CORE
TYPE			
SIZE (ID)			
HAMMER WT			
HAMMER FALL			

GROUNDWATER		DEPTH TO		
DATE	TIME	WATER	BOTTOM	BOTTOM OF HOLE

DEPTH IN FEET	CASING BLOWS PER FOOT	SAMPLE NO	SAMPLE DEPTH (FT)	SAMPLE BLOWS PER 6 INCHES	RECOVERY (IN)	SOIL DESCRIPTION AND OTHER DATA	PID
20.0					2.5 feet		
22.5							0.1
						Grey medium sandy gravel	
25.0					3 feet		
27.5						Fine sand	0.0
						Coarse silt	
						Medium gravel	0.1
30.0					4.5 feet		
						Coarse grey sand	
32.5						Medium gravel	
						Coarse sand with 2" gravel below	0.1
35.0							
37.5							
40.0							

NOTES: Core logs listed from bottom to top. Dashed border indicates groundwater.

NORTECH Environmental and Engineering Consultants Test Boring Log

PROJECT:	**Canoro Road**
LOCATION:	**578 Canoro Road, North Pole**

JOB NO.	06-1080
HOLE NO.	**SB08**
SHEET	1
START DATE	28-Oct-07
FINISH DATE	28-Oct-07
DRILLER	Scott V
HELPER	Chris B
INSPECTOR	Peter/Dave/Jeff

	CASING		SAMPLE	CORE
TYPE				
SIZE (ID)				
HAMMER WT				
HAMMER FALL				

GROUNDWATER			DEPTH TO	
DATE	TIME	WATER	BOTTOM	BOTTOM OF HOLE

DEPTH IN FEET	CASING BLOWS PER FOOT	SAMPLE NO	SAMPLE DEPTH (FT)	SAMPLE BLOWS PER 6 INCHES	RECOVERY (IN)	SOIL DESCRIPTION AND OTHER DATA	PID
0.0					4 feet		
						Gravel	
2.5							
						8" fine sand/silt with organic bands / 8" sand / 2" silt	
							0.0
5.0						2" silt / 4" fine sand	
					3.5 feet		
						Coarse sand	
7.5							
						2" organics interbedded in the sand	
						Coarse sand	
						Sandy gravel	0.0
10.0						Gravel	
					3.5 feet	Sandy gravel	
12.5						Coarse gravel	
							0.0
						Brown sand with gravel layers	
						Sand	0.0
15.0							
					3 feet		
17.5							
						Brown coarse sand	
						Medium gravel	
						Medium-coarse dark grey sand	0.0
20.0							

NOTES: Core logs listed bottom to top. Dashed border indicates groundwater.

NORTECH Environmental and Engineering Consultants Test Boring Log

PROJECT: **Canoro Road**
LOCATION: **578 Canoro Road, North Pole**

JOB NO.	06-1080
HOLE NO.	**SB08**
SHEET	2
START DATE	28-Oct-07
FINISH DATE	28-Oct-07
DRILLER	Scott V
HELPER	Chris B
INSPECTOR	Peter/Dave/Jeff

	CASING		SAMPLE	CORE
TYPE				
SIZE (ID)				
HAMMER WT				
HAMMER FALL				

GROUNDWATER		DEPTH TO		
DATE	TIME	WATER	BOTTOM	BOTTOM OF HOLE

DEPTH IN FEET	CASING BLOWS PER FOOT	SAMPLE NO	SAMPLE DEPTH (FT)	SAMPLE BLOWS PER 6 INCHES	RECOVERY (IN)	SOIL DESCRIPTION AND OTHER DATA	PID
20.0					1.5 feet		
22.5							0.0
						Sandy gravel	
25.0					3 feet		
						Sandy grey-blue gravel	
27.5						Organics in grey-blue sand	0.0
						Grey gravel	
						Black organics mixed in course gravel	0.0
30.0					3 feet		
32.5						Grey sand/medium gravel	
						Fine gravel with no sand	
						Coarse washed gravel with little to no sand (suspected grading in core)	0.0
35.0							
37.5							
40.0							

NOTES:

NORTECH **Environmental and Engineering Consultants Test Boring Log**

PROJECT: **Canoro Road**
LOCATION: **578 Canoro Road, North Pole**

JOB NO.	06-1080
HOLE NO.	**SB09**
SHEET	1
START DATE	28-Oct-07
FINISH DATE	28-Oct-07
DRILLER	Scott V
HELPER	Chris B
INSPECTOR	Peter/Dave/Jeff

	CASING		SAMPLE	CORE
TYPE				
SIZE (ID)				
HAMMER WT				
HAMMER FALL				

GROUNDWATER	DEPTH TO			
DATE	TIME	WATER	BOTTOM	BOTTOM OF HOLE

DEPTH IN FEET	CASING BLOWS PER FOOT	SAMPLE NO	SAMPLE DEPTH (FT)	SAMPLE BLOWS PER 6 INCHES	RECOVERY (IN)	SOIL DESCRIPTION AND OTHER DATA	PID
0.0							
					4 feet	Organics	
2.5						Silt grading to fine sand	
5.0						2" sand / 4" organics with silt layers	0.0
					4 feet	Coarse grey sand with 2" woody debris/organics at bottom	
7.5						Coarse grey sand	
10.0							
					3.5 feet		
12.5						Sand	0.0
15.0						4" rusty sand / 2" silt w/ organics / 2" gray gravely sand	0.0
					4 feet	Sandy grey gravel	0.0
17.5						8" Coarse grey sand	
20.0						Sandy gravel	0.0

NOTES: Core logs listed from bottom to top. Dashed border indicates groundwater.

NORTECH Environmental and Engineering Consultants Test Boring Log

PROJECT: **Canoro Road**
LOCATION: **578 Canoro Road, North Pole**

JOB NO.	06-1080
HOLE NO.	**SB09**
SHEET	2
START DATE	28-Oct-07
FINISH DATE	28-Oct-07
DRILLER	Scott V
HELPER	Chris B
INSPECTOR	Peter/Dave/Jeff

	CASING		SAMPLE	CORE
TYPE				
SIZE (ID)				
HAMMER WT				
HAMMER FALL				

GROUNDWATER		DEPTH TO		
DATE	TIME	WATER	BOTTOM	BOTTOM OF HOLE

DEPTH IN FEET	CASING BLOWS PER FOOT	SAMPLE NO	SAMPLE DEPTH (FT)	SAMPLE BLOWS PER 6 INCHES	RECOVERY (IN)	SOIL DESCRIPTION AND OTHER DATA	PID
20.0							
22.5					3 feet	Dark grey sand	0.0
						Sandy grey gravel	0.0
25.0							
						4" grey sand	0.0
27.5					3 feet	Fine grey sandy gravel	
						Coarse grey sandy gravel	0.0
30.0							
						Coarse grey gravel	
						Grey sand	
32.5					4.5 feet	Coarse gravel	0.0
						Grey sand	
						Coarse grey sandy gravel	0.0
35.0							
37.5							
40.0							

NOTES: Core logs listed from bottom to top. Dashed border indicates groundwater.

NORTECH Environmental and Engineering Consultants Test Boring Log

PROJECT: **Canoro Road**
LOCATION: **578 Canoro Road, North Pole**

JOB NO.	06-1080
HOLE NO.	**SB10**
SHEET	1
START DATE	28-Oct-07
FINISH DATE	28-Oct-07
DRILLER	Scott V
HELPER	Chris B
INSPECTOR	Peter/Dave/Jeff

	CASING		SAMPLE	CORE
TYPE				
SIZE (ID)				
HAMMER WT				
HAMMER FALL				

GROUNDWATER	DEPTH TO			
DATE	TIME	WATER	BOTTOM	BOTTOM OF HOLE

DEPTH IN FEET	CASING BLOWS PER FOOT	SAMPLE NO	SAMPLE DEPTH (FT)	SAMPLE BLOWS PER 6 INCHES	RECOV-ERY (IN)	SOIL DESCRIPTION AND OTHER DATA			
0.0								PID	
					4 feet				
						Very fine sand		0.6	
						Sand			
2.5									
						Sand with organic layers			
						Grey sand		0.4	
5.0									
					4 feet				
						Sand with silt layers			
								0.5	
7.5						Grey sand			
								0.6	
10.0									
					4 feet				
								0.7	
						Sandy gravel (brown)			
12.5						Sandy gravel (grey)			
						Brown sand			
						Grey sand		0.7	
15.0									
					3 feet				
								0.6	
						Coarse grey sand			
17.5									
						Coarse sandy gravel			
								0.6	
20.0									

NOTES: Core logs listed from bottom to top. Dashed border indicates groundwater.

NORTECH Environmental and Engineering Consultants Test Boring Log

PROJECT: **Canoro Road**
LOCATION: **578 Canoro Road, North Pole**

JOB NO.	06-1080
HOLE NO.	**SB10**
SHEET	2
START DATE	28-Oct-07
FINISH DATE	28-Oct-07
DRILLER	Scott V
HELPER	Chris B
INSPECTOR	Peter/Dave/Jeff

	CASING		SAMPLE	CORE
TYPE				
SIZE (ID)				
HAMMER WT				
HAMMER FALL				

GROUNDWATER		DEPTH TO		
DATE	TIME	WATER	BOTTOM	BOTTOM OF HOLE

DEPTH IN FEET	CASING BLOWS PER FOOT	SAMPLE NO	SAMPLE DEPTH (FT)	SAMPLE BLOWS PER 6 INCHES	RECOVERY (IN)	SOIL DESCRIPTION AND OTHER DATA	PID
20.0					2.5 feet		
22.5							0.8
						Grey coarse sandy gravel	0.8
25.0					2.5 feet		
27.5							0.6
						Coarse grey sandy gravel	
						Dark grey coarse sand	0.7
30.0					4 feet		
						Coarse grey sand	0.7
32.5							
						Coarse sandy gravel	
						Small sandy gravel	0.7
35.0							
37.5							
40.0							

NOTES: Core logs listed from bottom to top. Dashed border indicates groundwater.

Attachment 5

Attn: Ron Pratt

57

AURORA DRILLING

A DIVISION OF AMERICAN ARCTIC COMPANY
P.O. BOX 61619 • FAIRBANKS, ALASKA • 99706 • PHONE (907) 456-6712 • FAX (907) 451-4356

Well Log

OWNER Last Name: Ballard
Owner First Name: Timothy & Jacquelyn
Well Serial Number: 57-2007
Date: 12/4/2007

Mailing: 578 Old Canoro Road
City, State, Zip: North Pole Ak 99705
Street Address and/or Legal Description: 578 Old Canoro Road

DRILLED FOR Last Name: Ballard
DRILLED FOR First Name: Timothy & Jacquelyn
Driller: Jack Follett
Well Seal: yes

Screen:
Depth of Well: 210'
Yield in GPM: 30-Jan
Static Water Level: 12'

Size of Casing	Cased To	Perforated
6"	210'	49'-59'
5"		
4 1/2"		
Above Casing		

Formations Encountered

0	to	2	Frozen Overburden
2	to	35	Sand & Gravel
35	to	45	Sand, Gravel & Water
45	to	65	Gravel & Water
65	to	70	Mud & Sand
70	to	210	Frozen Mud

Pump Installation

Date Installed: 12/6/2007
Type: Goulds
Size: 1/2
Pump Model: 10GS05412

Pump Depth: 21'
Water Line: Soft K Copper 1"
Wire: 10/4pmp wire
Heat Tape: 5 Watt Chromalox

Pipe: Galvanized 1"
Pitless Adaptor: MAASS Weld-on 6x1
Pressure Tank: WM 14 40Gallon

	PH	Hardness (GPG)	Iron	Manganese (PPM)
Water Test Results				

Attachment 6

SGS Environmental Services
Alaska Division
Level II Laboratory Data Report

Project:	06-1080
Client:	Nortech
SGS Work Order:	1080261

Released by: Stephen C. Ede

Alaska Division Technical Director

Stephen C. Ede
2008.01.23
16:37:00 -09'00'

Contents:

Cover Page
Case Narrative
Final Report Pages
Quality Control Summary Forms
Chain of Custody/Sample Receipt Forms

Note:
Unless otherwise noted, all quality assurance/quality control criteria is in compliance with the standards set forth by the proper regulatory authority, the SGS Quality Assurance Program Plan, and the National Environmental Accreditation Conference.

Case Narrative

Client	NORTECH	Nortech	**Printed Date/Time**	1/23/2008	16:21
Workorder	1080261	06-1080			

Sample ID **Client Sample ID**

Refer to the sample receipt form for information on sample condition.

814384 **CCV** **CCV for HBN 196680 [VMS/9628]**

8260B - Initial calibration verification (ICV) result for dichlorodifluoromethane did not meet QC goals (biased high). This analyte was not detected in the associated samples.

814387 **CCV** **CCV for HBN 196680 [VMS/9628]**

8260B - Continuing calibration verification (CCV) result for dichlorodifluoromethane did not meet QC goals (biased high). This analyte was not detected in the associated samples.

Laboratory Analysis Report

200 W. Potter Drive
Anchorage, AK 99518-1605
Tel: (907) 562-2343
Fax: (907) 561-5301
Web: http://www.us.sgs.com

Dave Miller
Nortech
2400 College
Fairbanks, AK 99709

Work Order:	1080261 06-1080
Client:	Nortech
Report Date:	January 23, 2008

Released by:

Stephen C. Ede
Alaska Division Technical Director

Stephen C. Ede
2008.01.23 16:37:34
-09'00'

Enclosed are the analytical results associated with the above workorder.

As required by the state of Alaska and the USEPA, a formal Quality Assurance/Quality Control Program is maintained by SGS. A copy of our Quality Assurance Plan (QAP), which outlines this program, is available at your request.

The laboratory certification numbers are AK971-05 (DW), UST-005 (CS) and AK00971 (Micro) for ADEC and 001828 for NELAP (RCRA methods: 1010/1020, 1311, 6000/7000, 9040/9045, 9056, 9060, 9065, 8015B, 8021B, 8081A/8082, 8260B, 8270C).

Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth by the SGS QAP, the National Environmental Laboratory Accreditation Program and, when applicable, other regulatory authorities.

If you have any questions regarding this report or if we can be of any other assistance, please contact your SGS Project Manager at 907-562-2343.

The following descriptors may be found on your report which will serve to further qualify the data.

PQL	Practical Quantitation Limit (reporting limit).
U	Indicates the analyte was analyzed for but not detected.
F	Indicates value that is greater than or equal to the MDL.
J	The quantitation is an estimation.
ND	Indicates the analyte is not detected.
B	Indicates the analyte is found in a blank associated with the sample.
*	The analyte has exceeded allowable regulatory or control limits.
GT	Greater Than
D	The analyte concentration is the result of a dilution.
LT	Less Than
!	Surrogate out of control limits.
Q	QC parameter out of acceptance range.
M	A matrix effect was present.
JL	The analyte was positively identified, but the quantitation is a low estimation.
E	The analyte result is above the calibrated range.

Note: Soil samples are reported on a dry weight basis unless otherwise specified.

SGS Ref.#	1080261001
Client Name	Nortech
Project Name/#	06-1080
Client Sample ID	CRW-01
Matrix	Water (Surface, Eff., Ground)
PWSID	0

All Dates/Times are Alaska Standard Time

Printed Date/Time	01/23/2008 16:21
Collected Date/Time	01/10/2008 16:00
Received Date/Time	01/12/2008 10:23
Technical Director	**Stephen C. Ede**

Sample Remarks:

Parameter	Results	PQL	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
VOLATILES GC/MS									
Benzene	ND	0.500	ug/L	EPA 524.2	A		01/14/08	01/14/08	DSH
Toluene	0.840	0.500	ug/L	EPA 524.2	A		01/14/08	01/14/08	DSH
Ethylbenzene	ND	0.500	ug/L	EPA 524.2	A		01/14/08	01/14/08	DSH
P & M -Xylene	ND	1.00	ug/L	EPA 524.2	A		01/14/08	01/14/08	DSH
o-Xylene	ND	0.500	ug/L	EPA 524.2	A		01/14/08	01/14/08	DSH
Xylenes (total)	ND	1.00	ug/L	EPA 524.2	A		01/14/08	01/14/08	DSH
Surrogates									
1,2-Dichloroethane-D4 <surr>	98		%	EPA 524.2	A	70-130	01/14/08	01/14/08	DSH
Toluene-d8 <surr>	101		%	EPA 524.2	A	70-130	01/14/08	01/14/08	DSH
4-Bromofluorobenzene <surr>	118		%	EPA 524.2	A	70-130	01/14/08	01/14/08	DSH

SGS Ref.#	1080261002	**All Dates/Times are Alaska Standard Time**	
Client Name	Nortech	**Printed Date/Time**	01/23/2008 16:21
Project Name/#	06-1080	**Collected Date/Time**	01/10/2008 16:30
Client Sample ID	CRW-02	**Received Date/Time**	01/12/2008 10:23
Matrix	Water (Surface, Eff., Ground)	**Technical Director**	**Stephen C. Ede**
PWSID	0		

Sample Remarks:

Parameter	Results	PQL	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
VOLATILES GC/MS									
Benzene	ND	0.500	ug/L	EPA 524.2	A		01/14/08	01/14/08	DSH
Toluene	ND	0.500	ug/L	EPA 524.2	A		01/14/08	01/14/08	DSH
Ethylbenzene	ND	0.500	ug/L	EPA 524.2	A		01/14/08	01/14/08	DSH
P & M -Xylene	ND	1.00	ug/L	EPA 524.2	A		01/14/08	01/14/08	DSH
o-Xylene	ND	0.500	ug/L	EPA 524.2	A		01/14/08	01/14/08	DSH
Xylenes (total)	ND	1.00	ug/L	EPA 524.2	A		01/14/08	01/14/08	DSH
Surrogates									
1,2-Dichloroethane-D4 <surr>	101		%	EPA 524.2	A	70-130	01/14/08	01/14/08	DSH
Toluene-d8 <surr>	101		%	EPA 524.2	A	70-130	01/14/08	01/14/08	DSH
4-Bromofluorobenzene <surr>	116		%	EPA 524.2	A	70-130	01/14/08	01/14/08	DSH

SGS Ref.#	1080261003		**All Dates/Times are Alaska Standard Time**	
Client Name	Nortech		**Printed Date/Time**	01/23/2008 16:21
Project Name/#	06-1080		**Collected Date/Time**	01/10/2008 17:00
Client Sample ID	CRW-03		**Received Date/Time**	01/12/2008 10:23
Matrix	Water (Surface, Eff., Ground)		**Technical Director**	**Stephen C. Ede**

Sample Remarks:

Parameter	Results	PQL	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
VOLATILES GC/MS									
Benzene	ND	0.500	ug/L	EPA 524.2	A		01/14/08	01/14/08	DSH
Toluene	ND	0.500	ug/L	EPA 524.2	A		01/14/08	01/14/08	DSH
Ethylbenzene	ND	0.500	ug/L	EPA 524.2	A		01/14/08	01/14/08	DSH
P & M -Xylene	ND	1.00	ug/L	EPA 524.2	A		01/14/08	01/14/08	DSH
o-Xylene	ND	0.500	ug/L	EPA 524.2	A		01/14/08	01/14/08	DSH
Xylenes (total)	ND	1.00	ug/L	EPA 524.2	A		01/14/08	01/14/08	DSH
Surrogates									
1,2-Dichloroethane-D4 <surr>	101		%	EPA 524.2	A	70-130	01/14/08	01/14/08	DSH
Toluene-d8 <surr>	101		%	EPA 524.2	A	70-130	01/14/08	01/14/08	DSH
4-Bromofluorobenzene <surr>	117		%	EPA 524.2	A	70-130	01/14/08	01/14/08	DSH

SGS Ref.# 1080261004
Client Name Nortech
Project Name/# 06-1080
Client Sample ID CRW-04
Matrix Water (Surface, Eff., Ground)

PWSID 0

All Dates/Times are Alaska Standard Time
Printed Date/Time 01/23/2008 16:21
Collected Date/Time 01/10/2008 17:30
Received Date/Time 01/12/2008 10:23
Technical Director **Stephen C. Ede**

Sample Remarks:

Parameter	Results	PQL	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
VOLATILES GC/MS									
Benzene	ND	0.500	ug/L	EPA 524.2	A		01/14/08	01/14/08	DSH
Toluene	ND	0.500	ug/L	EPA 524.2	A		01/14/08	01/14/08	DSH
Ethylbenzene	ND	0.500	ug/L	EPA 524.2	A		01/14/08	01/14/08	DSH
P & M -Xylene	ND	1.00	ug/L	EPA 524.2	A		01/14/08	01/14/08	DSH
o-Xylene	ND	0.500	ug/L	EPA 524.2	A		01/14/08	01/14/08	DSH
Xylenes (total)	ND	1.00	ug/L	EPA 524.2	A		01/14/08	01/14/08	DSH
Surrogates									
1,2-Dichloroethane-D4 <surr>	99.4		%	EPA 524.2	A	70-130	01/14/08	01/14/08	DSH
Toluene-d8 <surr>	101		%	EPA 524.2	A	70-130	01/14/08	01/14/08	DSH
4-Bromofluorobenzene <surr>	119		%	EPA 524.2	A	70-130	01/14/08	01/14/08	DSH

SGS Ref.#	1080261005	**All Dates/Times are Alaska Standard Time**	
Client Name	Nortech	**Printed Date/Time**	01/23/2008 16:21
Project Name/#	06-1080	**Collected Date/Time**	01/10/2008 18:00
Client Sample ID	CRW-05	**Received Date/Time**	01/12/2008 10:23
Matrix	Water (Surface, Eff., Ground)	**Technical Director**	**Stephen C. Ede**

PWSID 0

Sample Remarks:

Parameter	Results	PQL	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
VOLATILES GC/MS									
Benzene	ND	0.500	ug/L	EPA 524.2	A		01/14/08	01/14/08	DSH
Toluene	2.37	0.500	ug/L	EPA 524.2	A		01/14/08	01/14/08	DSH
Ethylbenzene	ND	0.500	ug/L	EPA 524.2	A		01/14/08	01/14/08	DSH
P & M -Xylene	ND	1.00	ug/L	EPA 524.2	A		01/14/08	01/14/08	DSH
o-Xylene	ND	0.500	ug/L	EPA 524.2	A		01/14/08	01/14/08	DSH
Xylenes (total)	ND	1.00	ug/L	EPA 524.2	A		01/14/08	01/14/08	DSH
Surrogates									
1,2-Dichloroethane-D4 <surr>	100		%	EPA 524.2	A	70-130	01/14/08	01/14/08	DSH
Toluene-d8 <surr>	98.8		%	EPA 524.2	A	70-130	01/14/08	01/14/08	DSH
4-Bromofluorobenzene <surr>	118		%	EPA 524.2	A	70-130	01/14/08	01/14/08	DSH

SGS Ref.# 1080261006
Client Name Nortech
Project Name/# 06-1080
Client Sample ID CRW-06
Matrix Water (Surface, Eff., Ground)

All Dates/Times are Alaska Standard Time
Printed Date/Time 01/23/2008 16:21
Collected Date/Time 01/10/2008 18:30
Received Date/Time 01/12/2008 10:23
Technical Director **Stephen C. Ede**

PWSID 0

Sample Remarks:

Parameter	Results	PQL	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
Volatile Gas Chromatography/Mass Spectroscopy									
1,1,1,2-Tetrachloroethane	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
1,1,1-Trichloroethane	ND	0.500	ug/L	EPA 524.2	A	(<200)	01/22/08	01/22/08	DSH
1,1,2,2-Tetrachloroethane	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
1,1,2-Trichloroethane	ND	0.500	ug/L	EPA 524.2	A	(<5)	01/22/08	01/22/08	DSH
1,1-Dichloroethane	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
1,1-Dichloroethene	ND	0.500	ug/L	EPA 524.2	A	(<7)	01/22/08	01/22/08	DSH
1,1-Dichloropropene	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
1,2,3-Trichlorobenzene	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
1,2,3-Trichloropropane	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
1,2,4-Trichlorobenzene	ND	0.500	ug/L	EPA 524.2	A	(<70)	01/22/08	01/22/08	DSH
1,2,4-Trimethylbenzene	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
1,2-Dibromo-3-chloropropane	ND	2.00	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
1,2-Dibromoethane	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
1,2-Dichlorobenzene	ND	0.500	ug/L	EPA 524.2	A	(<600)	01/22/08	01/22/08	DSH
1,2-Dichloroethane	ND	0.500	ug/L	EPA 524.2	A	(<5)	01/22/08	01/22/08	DSH
1,2-Dichloropropane	ND	0.500	ug/L	EPA 524.2	A	(<5)	01/22/08	01/22/08	DSH
1,3,5-Trimethylbenzene	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
1,3-Dichlorobenzene	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
1,3-Dichloropropane	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
1,4-Dichlorobenzene	ND	0.500	ug/L	EPA 524.2	A	(<75)	01/22/08	01/22/08	DSH
2,2-Dichloropropane	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
2-Chlorotoluene	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
4-Chlorotoluene	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
4-Isopropyltoluene	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Benzene	ND	0.500	ug/L	EPA 524.2	A	(<5)	01/22/08	01/22/08	DSH
Bromobenzene	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Bromochloromethane	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Bromodichloromethane	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH

SGS Ref.#	1080261006		**All Dates/Times are Alaska Standard Time**	
Client Name	Nortech		**Printed Date/Time**	01/23/2008 16:21
Project Name/#	06-1080		**Collected Date/Time**	01/10/2008 18:30
Client Sample ID	CRW-06		**Received Date/Time**	01/12/2008 10:23
Matrix	Water (Surface, Eff., Ground)		**Technical Director**	**Stephen C. Ede**

PWSID 0

Parameter	Results	PQL	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
Volatile Gas Chromatography/Mass Spectroscopy									
Bromoform	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Bromomethane	ND	1.00	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Carbon tetrachloride	ND	0.500	ug/L	EPA 524.2	A	(<5)	01/22/08	01/22/08	DSH
Chlorobenzene	ND	0.500	ug/L	EPA 524.2	A	(<100)	01/22/08	01/22/08	DSH
Chloroethane	ND	1.00	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Chloroform	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Chloromethane	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
cis-1,2-Dichloroethene	ND	0.500	ug/L	EPA 524.2	A	(<70)	01/22/08	01/22/08	DSH
cis-1,3-Dichloropropene	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Dibromochloromethane	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Dibromomethane	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Dichlorodifluoromethane	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Ethylbenzene	ND	0.500	ug/L	EPA 524.2	A	(<700)	01/22/08	01/22/08	DSH
Hexachlorobutadiene	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Isopropylbenzene (Cumene)	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Methyl-t-butyl ether	ND	1.00	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Methylene chloride	ND	0.500	ug/L	EPA 524.2	A	(<5)	01/22/08	01/22/08	DSH
n-Butylbenzene	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
n-Propylbenzene	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Naphthalene	ND	0.500	ug/L	EPA 524.2	B		01/21/08	01/21/08	DSH
o-Xylene	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
P & M -Xylene	ND	1.00	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
sec-Butylbenzene	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Styrene	ND	0.500	ug/L	EPA 524.2	A	(<100)	01/22/08	01/22/08	DSH
tert-Butylbenzene	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Tetrachloroethene	ND	0.500	ug/L	EPA 524.2	A	(<5)	01/22/08	01/22/08	DSH
Toluene	ND	0.500	ug/L	EPA 524.2	A	(<1000)	01/22/08	01/22/08	DSH
Total Trihalomethanes	ND	2.00	ug/L	EPA 524.2	A	(<80)	01/22/08	01/22/08	DSH
trans-1,2-Dichloroethene	ND	0.500	ug/L	EPA 524.2	A	(<100)	01/22/08	01/22/08	DSH
trans-1,3-Dichloropropene	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH

SGS Ref.#	1080261006	**All Dates/Times are Alaska Standard Time**	
Client Name	Nortech	**Printed Date/Time**	01/23/2008 16:21
Project Name/#	06-1080	**Collected Date/Time**	01/10/2008 18:30
Client Sample ID	CRW-06	**Received Date/Time**	01/12/2008 10:23
Matrix	Water (Surface, Eff., Ground)	**Technical Director**	**Stephen C. Ede**
PWSID	0		

Parameter	Results	PQL	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
Volatile Gas Chromatography/Mass Spectroscopy									
Trichloroethene	ND	0.500	ug/L	EPA 524.2	A	(<5)	01/22/08	01/22/08	DSH
Trichlorofluoromethane	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Vinyl chloride	ND	0.400	ug/L	EPA 524.2	A	(<2)	01/22/08	01/22/08	DSH
Xylenes (total)	ND	1.00	ug/L	EPA 524.2	A	(<10000)	01/22/08	01/22/08	DSH
Surrogates									
1,2-Dichloroethane-D4 <surr>	104		%	EPA 524.2	A	70-130	01/22/08	01/22/08	DSH
4-Bromofluorobenzene <surr>	118		%	EPA 524.2	A	70-130	01/22/08	01/22/08	DSH
Toluene-d8 <surr>	101		%	EPA 524.2	A	70-130	01/22/08	01/22/08	DSH

SGS Ref.#	1080261007		**All Dates/Times are Alaska Standard Time**	
Client Name	Nortech		**Printed Date/Time**	01/23/2008 16:21
Project Name/#	06-1080		**Collected Date/Time**	01/10/2008 19:00
Client Sample ID	CRW-07		**Received Date/Time**	01/12/2008 10:23
Matrix	Water (Surface, Eff., Ground)		**Technical Director**	**Stephen C. Ede**

Sample Remarks:

Parameter	Results	PQL	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
Volatile Gas Chromatography/Mass Spectroscopy									
1,1,1,2-Tetrachloroethane	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
1,1,1-Trichloroethane	ND	0.500	ug/L	EPA 524.2	A	(<200)	01/22/08	01/22/08	DSH
1,1,2,2-Tetrachloroethane	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
1,1,2-Trichloroethane	ND	0.500	ug/L	EPA 524.2	A	(<5)	01/22/08	01/22/08	DSH
1,1-Dichloroethane	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
1,1-Dichloroethene	ND	0.500	ug/L	EPA 524.2	A	(<7)	01/22/08	01/22/08	DSH
1,1-Dichloropropene	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
1,2,3-Trichlorobenzene	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
1,2,3-Trichloropropane	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
1,2,4-Trichlorobenzene	ND	0.500	ug/L	EPA 524.2	A	(<70)	01/22/08	01/22/08	DSH
1,2,4-Trimethylbenzene	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
1,2-Dibromo-3-chloropropane	ND	2.00	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
1,2-Dibromoethane	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
1,2-Dichlorobenzene	ND	0.500	ug/L	EPA 524.2	A	(<600)	01/22/08	01/22/08	DSH
1,2-Dichloroethane	ND	0.500	ug/L	EPA 524.2	A	(<5)	01/22/08	01/22/08	DSH
1,2-Dichloropropane	ND	0.500	ug/L	EPA 524.2	A	(<5)	01/22/08	01/22/08	DSH
1,3,5-Trimethylbenzene	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
1,3-Dichlorobenzene	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
1,3-Dichloropropane	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
1,4-Dichlorobenzene	ND	0.500	ug/L	EPA 524.2	A	(<75)	01/22/08	01/22/08	DSH
2,2-Dichloropropane	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
2-Chlorotoluene	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
4-Chlorotoluene	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
4-Isopropyltoluene	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Benzene	ND	0.500	ug/L	EPA 524.2	A	(<5)	01/22/08	01/22/08	DSH
Bromobenzene	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Bromochloromethane	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Bromodichloromethane	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH

SGS Ref.#	1080261007	**All Dates/Times are Alaska Standard Time**	
Client Name	Nortech	**Printed Date/Time**	01/23/2008 16:21
Project Name/#	06-1080	**Collected Date/Time**	01/10/2008 19:00
Client Sample ID	CRW-07	**Received Date/Time**	01/12/2008 10:23
Matrix	Water (Surface, Eff., Ground)	**Technical Director**	**Stephen C. Ede**

Volatile Gas Chromatography/Mass Spectroscopy

Parameter	Results	PQL	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
Bromoform	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Bromomethane	ND	1.00	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Carbon tetrachloride	ND	0.500	ug/L	EPA 524.2	A	(<5)	01/22/08	01/22/08	DSH
Chlorobenzene	ND	0.500	ug/L	EPA 524.2	A	(<100)	01/22/08	01/22/08	DSH
Chloroethane	ND	1.00	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Chloroform	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Chloromethane	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
cis-1,2-Dichloroethene	ND	0.500	ug/L	EPA 524.2	A	(<70)	01/22/08	01/22/08	DSH
cis-1,3-Dichloropropene	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Dibromochloromethane	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Dibromomethane	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Dichlorodifluoromethane	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Ethylbenzene	ND	0.500	ug/L	EPA 524.2	A	(<700)	01/22/08	01/22/08	DSH
Hexachlorobutadiene	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Isopropylbenzene (Cumene)	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Methyl-t-butyl ether	ND	1.00	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Methylene chloride	ND	0.500	ug/L	EPA 524.2	A	(<5)	01/22/08	01/22/08	DSH
n-Butylbenzene	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
n-Propylbenzene	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Naphthalene	ND	0.500	ug/L	EPA 524.2	B		01/21/08	01/21/08	DSH
o-Xylene	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
P & M -Xylene	ND	1.00	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
sec-Butylbenzene	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Styrene	ND	0.500	ug/L	EPA 524.2	A	(<100)	01/22/08	01/22/08	DSH
tert-Butylbenzene	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Tetrachloroethene	ND	0.500	ug/L	EPA 524.2	A	(<5)	01/22/08	01/22/08	DSH
Toluene	ND	0.500	ug/L	EPA 524.2	A	(<1000)	01/22/08	01/22/08	DSH
Total Trihalomethanes	ND	2.00	ug/L	EPA 524.2	A	(<80)	01/22/08	01/22/08	DSH
trans-1,2-Dichloroethene	ND	0.500	ug/L	EPA 524.2	A	(<100)	01/22/08	01/22/08	DSH
trans-1,3-Dichloropropene	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH

SGS Ref.#	1080261007	**All Dates/Times are Alaska Standard Time**	
Client Name	Nortech	**Printed Date/Time**	01/23/2008 16:21
Project Name/#	06-1080	**Collected Date/Time**	01/10/2008 19:00
Client Sample ID	CRW-07	**Received Date/Time**	01/12/2008 10:23
Matrix	Water (Surface, Eff., Ground)	**Technical Director**	**Stephen C. Ede**

Parameter	Results	PQL	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
Volatile Gas Chromatography/Mass Spectroscopy									
Trichloroethene	ND	0.500	ug/L	EPA 524.2	A	(<5)	01/22/08	01/22/08	DSH
Trichlorofluoromethane	ND	0.500	ug/L	EPA 524.2	A		01/22/08	01/22/08	DSH
Vinyl chloride	ND	0.400	ug/L	EPA 524.2	A	(<2)	01/22/08	01/22/08	DSH
Xylenes (total)	ND	1.00	ug/L	EPA 524.2	A	(<10000)	01/22/08	01/22/08	DSH
Surrogates									
1,2-Dichloroethane-D4 <surr>	104		%	EPA 524.2	A	70-130	01/22/08	01/22/08	DSH
4-Bromofluorobenzene <surr>	116		%	EPA 524.2	A	70-130	01/22/08	01/22/08	DSH
Toluene-d8 <surr>	99.9		%	EPA 524.2	A	70-130	01/22/08	01/22/08	DSH

SGS Ref.#	1080261008	**All Dates/Times are Alaska Standard Time**	
Client Name	Nortech	**Printed Date/Time**	01/23/2008 16:21
Project Name/#	06-1080	**Collected Date/Time**	01/10/2008 19:30
Client Sample ID	CRW-08	**Received Date/Time**	01/12/2008 10:23
Matrix	Water (Surface, Eff., Ground)	**Technical Director**	**Stephen C. Ede**

PWSID 0

Sample Remarks:

Parameter	Results	PQL	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
VOLATILES GC/MS									
Benzene	ND	0.500	ug/L	EPA 524.2	A		01/14/08	01/15/08	DSH
Toluene	ND	0.500	ug/L	EPA 524.2	A		01/14/08	01/15/08	DSH
Ethylbenzene	ND	0.500	ug/L	EPA 524.2	A		01/14/08	01/15/08	DSH
P & M -Xylene	ND	1.00	ug/L	EPA 524.2	A		01/14/08	01/15/08	DSH
o-Xylene	ND	0.500	ug/L	EPA 524.2	A		01/14/08	01/15/08	DSH
Xylenes (total)	ND	1.00	ug/L	EPA 524.2	A		01/14/08	01/15/08	DSH
Surrogates									
1,2-Dichloroethane-D4 <surr>	99.3		%	EPA 524.2	A	70-130	01/14/08	01/15/08	DSH
Toluene-d8 <surr>	103		%	EPA 524.2	A	70-130	01/14/08	01/15/08	DSH
4-Bromofluorobenzene <surr>	120		%	EPA 524.2	A	70-130	01/14/08	01/15/08	DSH

SGS Ref.#	1080261009	**All Dates/Times are Alaska Standard Time**	
Client Name	Nortech	**Printed Date/Time**	01/23/2008 16:21
Project Name/#	06-1080	**Collected Date/Time**	01/10/2008 16:00
Client Sample ID	TB	**Received Date/Time**	01/12/2008 10:23
Matrix	Water (Surface, Eff., Ground)	**Technical Director**	**Stephen C. Ede**

PWSID 0

Sample Remarks:

Parameter	Results	PQL	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init

Volatile Gas Chromatography/Mass Spectroscopy

Parameter	Results	PQL	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
1,1,1,2-Tetrachloroethane	ND	0.500	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
1,1,1-Trichloroethane	ND	0.500	ug/L	EPA 524.2	A	(<200)	01/21/08	01/21/08	DSH
1,1,2,2-Tetrachloroethane	ND	0.500	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
1,1,2-Trichloroethane	ND	0.500	ug/L	EPA 524.2	A	(<5)	01/21/08	01/21/08	DSH
1,1-Dichloroethane	ND	0.500	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
1,1-Dichloroethene	ND	0.500	ug/L	EPA 524.2	A	(<7)	01/21/08	01/21/08	DSH
1,1-Dichloropropene	ND	0.500	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
1,2,3-Trichlorobenzene	ND	0.500	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
1,2,3-Trichloropropane	ND	0.500	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
1,2,4-Trichlorobenzene	ND	0.500	ug/L	EPA 524.2	A	(<70)	01/21/08	01/21/08	DSH
1,2,4-Trimethylbenzene	ND	0.500	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
1,2-Dibromo-3-chloropropane	ND	2.00	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
1,2-Dibromoethane	ND	0.500	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
1,2-Dichlorobenzene	ND	0.500	ug/L	EPA 524.2	A	(<600)	01/21/08	01/21/08	DSH
1,2-Dichloroethane	ND	0.500	ug/L	EPA 524.2	A	(<5)	01/21/08	01/21/08	DSH
1,2-Dichloropropane	ND	0.500	ug/L	EPA 524.2	A	(<5)	01/21/08	01/21/08	DSH
1,3,5-Trimethylbenzene	ND	0.500	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
1,3-Dichlorobenzene	ND	0.500	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
1,3-Dichloropropane	ND	0.500	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
1,4-Dichlorobenzene	ND	0.500	ug/L	EPA 524.2	A	(<75)	01/21/08	01/21/08	DSH
2,2-Dichloropropane	ND	0.500	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
2-Chlorotoluene	ND	0.500	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
4-Chlorotoluene	ND	0.500	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
4-Isopropyltoluene	ND	0.500	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
Benzene	ND	0.500	ug/L	EPA 524.2	A	(<5)	01/21/08	01/21/08	DSH
Bromobenzene	ND	0.500	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
Bromochloromethane	ND	0.500	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
Bromodichloromethane	ND	0.500	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH

SGS Ref.# 1080261009
Client Name Nortech
Project Name/# 06-1080
Client Sample ID TB
Matrix Water (Surface, Eff., Ground)

PWSID 0

All Dates/Times are Alaska Standard Time
Printed Date/Time 01/23/2008 16:21
Collected Date/Time 01/10/2008 16:00
Received Date/Time 01/12/2008 10:23
Technical Director **Stephen C. Ede**

Volatile Gas Chromatography/Mass Spectroscopy

Parameter	Results	PQL	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
Bromoform	ND	0.500	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
Bromomethane	ND	1.00	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
Carbon tetrachloride	ND	0.500	ug/L	EPA 524.2	A	(<5)	01/21/08	01/21/08	DSH
Chlorobenzene	ND	0.500	ug/L	EPA 524.2	A	(<100)	01/21/08	01/21/08	DSH
Chloroethane	ND	1.00	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
Chloroform	ND	0.500	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
Chloromethane	ND	0.500	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
cis-1,2-Dichloroethene	ND	0.500	ug/L	EPA 524.2	A	(<70)	01/21/08	01/21/08	DSH
cis-1,3-Dichloropropene	ND	0.500	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
Dibromochloromethane	ND	0.500	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
Dibromomethane	ND	0.500	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
Dichlorodifluoromethane	ND	0.500	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
Ethylbenzene	ND	0.500	ug/L	EPA 524.2	A	(<700)	01/21/08	01/21/08	DSH
Hexachlorobutadiene	ND	0.500	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
Isopropylbenzene (Cumene)	ND	0.500	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
Methyl-t-butyl ether	ND	1.00	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
Methylene chloride	ND	0.500	ug/L	EPA 524.2	A	(<5)	01/21/08	01/21/08	DSH
n-Butylbenzene	ND	0.500	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
n-Propylbenzene	ND	0.500	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
Naphthalene	ND	0.500	ug/L	EPA 524.2	B		01/21/08	01/21/08	DSH
o-Xylene	ND	0.500	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
P & M -Xylene	ND	1.00	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
sec-Butylbenzene	ND	0.500	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
Styrene	ND	0.500	ug/L	EPA 524.2	A	(<100)	01/21/08	01/21/08	DSH
tert-Butylbenzene	ND	0.500	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
Tetrachloroethene	ND	0.500	ug/L	EPA 524.2	A	(<5)	01/21/08	01/21/08	DSH
Toluene	ND	0.500	ug/L	EPA 524.2	A	(<1000)	01/21/08	01/21/08	DSH
Total Trihalomethanes	ND	2.00	ug/L	EPA 524.2	A	(<80)	01/21/08	01/21/08	DSH
trans-1,2-Dichloroethene	ND	0.500	ug/L	EPA 524.2	A	(<100)	01/21/08	01/21/08	DSH
trans-1,3-Dichloropropene	ND	0.500	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH

SGS Ref.#	1080261009
Client Name	Nortech
Project Name/#	06-1080
Client Sample ID	TB
Matrix	Water (Surface, Eff., Ground)
PWSID	0

All Dates/Times are Alaska Standard Time

Printed Date/Time	01/23/2008 16:21
Collected Date/Time	01/10/2008 16:00
Received Date/Time	01/12/2008 10:23
Technical Director	**Stephen C. Ede**

Parameter	Results	PQL	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
Volatile Gas Chromatography/Mass Spectroscopy									
Trichloroethene	ND	0.500	ug/L	EPA 524.2	A	(<5)	01/21/08	01/21/08	DSH
Trichlorofluoromethane	ND	0.500	ug/L	EPA 524.2	A		01/21/08	01/21/08	DSH
Vinyl chloride	ND	0.400	ug/L	EPA 524.2	A	(<2)	01/21/08	01/21/08	DSH
Xylenes (total)	ND	1.00	ug/L	EPA 524.2	A	(<10000)	01/21/08	01/21/08	DSH
Surrogates									
1,2-Dichloroethane-D4 <surr>	103		%	EPA 524.2	A	70-130	01/21/08	01/21/08	DSH
4-Bromofluorobenzene <surr>	118		%	EPA 524.2	A	70-130	01/21/08	01/21/08	DSH
Toluene-d8 <surr>	101		%	EPA 524.2	A	70-130	01/21/08	01/21/08	DSH

SGS Ref.#	813631	Method Blank	**Printed Date/Time**		01/23/2008 16:21
Client Name	Nortech		**Prep**	**Batch**	VXX17850
Project Name/#	06-1080			**Method**	SW5030B
Matrix	Drinking Water			**Date**	01/14/2008

QC results affect the following production samples:

1080261001, 1080261002, 1080261003, 1080261004, 1080261005, 1080261008

Parameter	Results	Reporting/Control Limit	MDL	Units	Analysis Date
Volatile Gas Chromatography/Mass Spectroscopy					
Benzene	ND	0.500	0.150	ug/L	01/14/08
Ethylbenzene	ND	0.500	0.150	ug/L	01/14/08
o-Xylene	ND	0.500	0.150	ug/L	01/14/08
P & M -Xylene	ND	1.00	0.310	ug/L	01/14/08
Toluene	ND	0.500	0.150	ug/L	01/14/08
Xylenes (total)	ND	1.00	0.450	ug/L	01/14/08
Surrogates					
1,2-Dichloroethane-D4 <surr>	101	70-130		%	01/14/08
4-Bromofluorobenzene <surr>	116	70-130		%	01/14/08
Toluene-d8 <surr>	98.5	70-130		%	01/14/08

Batch	VMS9621
Method	EPA 524.2
Instrument	HP 5890 Series II MS1 VJA

SGS Ref.#	814380 Method Blank	**Printed Date/Time**	01/23/2008 16:21
Client Name	Nortech	**Prep Batch**	VXX17864
Project Name/#	06-1080	**Method**	SW5030B
Matrix	Drinking Water	**Date**	01/21/2008

QC results affect the following production samples:

1080261006, 1080261007, 1080261009

Parameter	Results	Reporting/Control Limit	MDL	Units	Analysis Date

Volatile Gas Chromatography/Mass Spectroscopy

SGS Ref.#	814380	Method Blank	**Printed Date/Time**		01/23/2008 16:21
Client Name	Nortech		**Prep**	**Batch**	VXX17864
Project Name/#	06-1080			**Method**	SW5030B
Matrix	Drinking Water			**Date**	01/21/2008

Parameter	Results	Reporting/Control Limit	MDL	Units	Analysis Date
Volatile Gas Chromatography/Mass Spectroscopy					
1,1,1,2-Tetrachloroethane	ND	0.500	0.150	ug/L	01/21/08
1,1,1-Trichloroethane	ND	0.500	0.150	ug/L	01/21/08
1,1,2,2-Tetrachloroethane	ND	0.500	0.150	ug/L	01/21/08
1,1,2-Trichloroethane	ND	0.500	0.150	ug/L	01/21/08
1,1-Dichloroethane	ND	0.500	0.150	ug/L	01/21/08
1,1-Dichloroethene	ND	0.500	0.150	ug/L	01/21/08
1,1-Dichloropropene	ND	0.500	0.150	ug/L	01/21/08
1,2,3-Trichlorobenzene	ND	0.500	0.150	ug/L	01/21/08
1,2,3-Trichloropropane	ND	0.500	0.150	ug/L	01/21/08
1,2,4-Trichlorobenzene	ND	0.500	0.150	ug/L	01/21/08
1,2,4-Trimethylbenzene	ND	0.500	0.150	ug/L	01/21/08
1,2-Dibromo-3-chloropropane	ND	2.00	0.620	ug/L	01/21/08
1,2-Dibromoethane	ND	0.500	0.150	ug/L	01/21/08
1,2-Dichlorobenzene	ND	0.500	0.150	ug/L	01/21/08
1,2-Dichloroethane	ND	0.500	0.150	ug/L	01/21/08
1,2-Dichloropropane	ND	0.500	0.150	ug/L	01/21/08
1,3,5-Trimethylbenzene	ND	0.500	0.150	ug/L	01/21/08
1,3-Dichlorobenzene	ND	0.500	0.150	ug/L	01/21/08
1,3-Dichloropropane	ND	0.500	0.150	ug/L	01/21/08
1,4-Dichlorobenzene	ND	0.500	0.150	ug/L	01/21/08
2,2-Dichloropropane	ND	0.500	0.150	ug/L	01/21/08
2-Chlorotoluene	ND	0.500	0.150	ug/L	01/21/08
4-Chlorotoluene	ND	0.500	0.150	ug/L	01/21/08
4-Isopropyltoluene	ND	0.500	0.150	ug/L	01/21/08
Benzene	ND	0.500	0.150	ug/L	01/21/08
Bromobenzene	ND	0.500	0.150	ug/L	01/21/08
Bromochloromethane	ND	0.500	0.150	ug/L	01/21/08
Bromodichloromethane	ND	0.500	0.150	ug/L	01/21/08
Bromoform	ND	0.500	0.150	ug/L	01/21/08
Bromomethane	ND	1.00	0.310	ug/L	01/21/08
Carbon tetrachloride	ND	0.500	0.150	ug/L	01/21/08
Chlorobenzene	ND	0.500	0.150	ug/L	01/21/08
Chloroethane	ND	1.00	0.310	ug/L	01/21/08
Chloroform	ND	0.500	0.150	ug/L	01/21/08
Chloromethane	ND	0.500	0.150	ug/L	01/21/08
cis-1,2-Dichloroethene	ND	0.500	0.150	ug/L	01/21/08
cis-1,3-Dichloropropene	ND	0.500	0.150	ug/L	01/21/08
Dibromochloromethane	ND	0.500	0.150	ug/L	01/21/08
Dibromomethane	ND	0.500	0.150	ug/L	01/21/08

SGS

SGS Ref.#	814380	Method Blank	**Printed Date/Time**	01/23/2008 16:21
Client Name	Nortech		**Prep** **Batch**	VXX17864
Project Name/#	06-1080		**Method**	SW5030B
Matrix	Drinking Water		**Date**	01/21/2008

Volatile Gas Chromatography/Mass Spectroscopy

Parameter	Results	Reporting/Control Limit	MDL	Units	Analysis Date
Dichlorodifluoromethane	ND	0.500	0.150	ug/L	01/21/08
Ethylbenzene	ND	0.500	0.150	ug/L	01/21/08
Hexachlorobutadiene	ND	0.500	0.150	ug/L	01/21/08
Isopropylbenzene (Cumene)	ND	0.500	0.150	ug/L	01/21/08
Methyl-t-butyl ether	ND	1.00	0.500	ug/L	01/21/08
Methylene chloride	ND	0.500	0.150	ug/L	01/21/08
n-Butylbenzene	ND	0.500	0.150	ug/L	01/21/08
n-Propylbenzene	ND	0.500	0.150	ug/L	01/21/08
o-Xylene	ND	0.500	0.150	ug/L	01/21/08
P & M -Xylene	ND	1.00	0.310	ug/L	01/21/08
sec-Butylbenzene	ND	0.500	0.150	ug/L	01/21/08
Styrene	ND	0.500	0.150	ug/L	01/21/08
tert-Butylbenzene	ND	0.500	0.150	ug/L	01/21/08
Tetrachloroethene	ND	0.500	0.150	ug/L	01/21/08
Toluene	ND	0.500	0.150	ug/L	01/21/08
Total Trihalomethanes	ND	2.00	0.600	ug/L	01/21/08
trans-1,2-Dichloroethene	ND	0.500	0.150	ug/L	01/21/08
trans-1,3-Dichloropropene	ND	0.500	0.150	ug/L	01/21/08
Trichloroethene	ND	0.500	0.150	ug/L	01/21/08
Trichlorofluoromethane	ND	0.500	0.150	ug/L	01/21/08
Vinyl chloride	ND	0.400	0.120	ug/L	01/21/08
Xylenes (total)	ND	1.00	0.450	ug/L	01/21/08
Surrogates					
1,2-Dichloroethane-D4 <surr>	103	70-130		%	01/21/08
4-Bromofluorobenzene <surr>	118	70-130		%	01/21/08
Toluene-d8 <surr>	102	70-130		%	01/21/08

Batch VMS9628
Method EPA 524.2
Instrument HP 5890 Series II MS1 VJA

SGS Ref.#	814401	Method Blank	**Printed Date/Time**		01/23/2008 16:21
Client Name	Nortech		**Prep**	**Batch**	VXX17865
Project Name/#	06-1080			**Method**	SW5030B
Matrix	Drinking Water			**Date**	01/21/2008

QC results affect the following production samples:

1080261006, 1080261007, 1080261009

Parameter	Results	Reporting/Control Limit	MDL	Units	Analysis Date
Volatile Gas Chromatography/Mass Spectroscopy					
Naphthalene	ND	0.500	0.150	ug/L	01/21/08
Surrogates					
1,2-Dichloroethane-D4 <surr>	100	70-130		%	01/21/08
4-Bromofluorobenzene <surr>	103	70-130		%	01/21/08
Toluene-d8 <surr>	99.2	70-130		%	01/21/08

Batch	VMS9629
Method	EPA 524.2
Instrument	HP 5890 Series II MS3 VNA

SGS Ref.#	813632 Lab Control Sample	**Printed Date/Time**		01/23/2008 16:21
	813633 Lab Control Sample Duplicate	**Prep**	**Batch**	VXX17850
Client Name	Nortech		**Method**	SW5030B
Project Name/#	06-1080		**Date**	01/14/2008
Matrix	Drinking Water			

QC results affect the following production samples:

1080261001, 1080261002, 1080261003, 1080261004, 1080261005, 1080261008

Volatile Gas Chromatography/Mass Spectroscopy

Parameter		QC Results	Pct Recov	LCS/LCSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date
Benzene	LCS	9.06	91	(70-130)			10 ug/L	01/14/2008
	LCSD	8.81	88		3	(< 30)	10 ug/L	01/14/2008
Ethylbenzene	LCS	10.2	102	(70-130)			10 ug/L	01/14/2008
	LCSD	9.41	94		8	(< 30)	10 ug/L	01/14/2008
o-Xylene	LCS	9.66	97	(70-130)			10 ug/L	01/14/2008
	LCSD	9.03	90		7	(< 30)	10 ug/L	01/14/2008
P & M -Xylene	LCS	20.0	100	(70-130)			20 ug/L	01/14/2008
	LCSD	18.6	93		7	(< 30)	20 ug/L	01/14/2008
Toluene	LCS	9.30	93	(70-130)			10 ug/L	01/14/2008
	LCSD	8.83	88		5	(< 30)	10 ug/L	01/14/2008
Xylenes (total)	LCS	29.7	99	(70-130)			30 ug/L	01/14/2008
	LCSD	27.6	92		7	(< 30)	30 ug/L	01/14/2008
Surrogates								
1,2-Dichloroethane-D4 <surr>	LCS		98	(70-130)				01/14/2008
	LCSD		97		1			01/14/2008
4-Bromofluorobenzene <surr>	LCS		95	(70-130)				01/14/2008
	LCSD		94		1			01/14/2008
Toluene-d8 <surr>	LCS		100	(70-130)				01/14/2008
	LCSD		97		3			01/14/2008

Batch	VMS9621
Method	EPA 524.2
Instrument	HP 5890 Series II MS1 VJA

SGS Ref.# 814381 Lab Control Sample
814382 Lab Control Sample Duplicate
Client Name Nortech
Project Name/# 06-1080
Matrix Drinking Water

Printed Date/Time 01/23/2008 16:21
Prep **Batch** VXX17864
Method SW5030B
Date 01/21/2008

QC results affect the following production samples:

1080261006, 1080261007, 1080261009

Parameter	QC Results	Pct Recov	LCS/LCSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date

Volatile Gas Chromatography/Mass Spectroscopy

SGS Ref.#	814381	Lab Control Sample	**Printed Date/Time**		01/23/2008 16:21
	814382	Lab Control Sample Duplicate	**Prep**	**Batch**	VXX17864
Client Name	Nortech			**Method**	SW5030B
Project Name/#	06-1080			**Date**	01/21/2008
Matrix	Drinking Water				

Volatile Gas Chromatography/Mass Spectroscopy

Parameter		QC Results	Pct Recov	LCS/LCSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date
1,1,1,2-Tetrachloroethane	LCS	10.0	100	(70-130)			10 ug/L	01/21/2008
	LCSD	10.4	104		3	(< 30)	10 ug/L	01/21/2008
1,1,1-Trichloroethane	LCS	10.5	105	(70-130)			10 ug/L	01/21/2008
	LCSD	10.8	108		3	(< 30)	10 ug/L	01/21/2008
1,1,2,2-Tetrachloroethane	LCS	9.62	96	(70-130)			10 ug/L	01/21/2008
	LCSD	10.4	104		8	(< 30)	10 ug/L	01/21/2008
1,1,2-Trichloroethane	LCS	8.64	86	(70-130)			10 ug/L	01/21/2008
	LCSD	9.25	93		7	(< 30)	10 ug/L	01/21/2008
1,1-Dichloroethane	LCS	8.83	88	(70-130)			10 ug/L	01/21/2008
	LCSD	9.08	91		3	(< 30)	10 ug/L	01/21/2008
1,1-Dichloroethene	LCS	9.60	96	(70-130)			10 ug/L	01/21/2008
	LCSD	10.2	102		6	(< 30)	10 ug/L	01/21/2008
1,1-Dichloropropene	LCS	10.4	104	(70-130)			10 ug/L	01/21/2008
	LCSD	10.6	106		3	(< 30)	10 ug/L	01/21/2008
1,2,3-Trichlorobenzene	LCS	9.19	92	(70-130)			10 ug/L	01/21/2008
	LCSD	10.1	101		10	(< 30)	10 ug/L	01/21/2008
1,2,3-Trichloropropane	LCS	7.97	80	(70-130)			10 ug/L	01/21/2008
	LCSD	8.95	90		12	(< 30)	10 ug/L	01/21/2008
1,2,4-Trichlorobenzene	LCS	8.79	88	(70-130)			10 ug/L	01/21/2008
	LCSD	10.2	102		15	(< 30)	10 ug/L	01/21/2008
1,2,4-Trimethylbenzene	LCS	9.24	92	(70-130)			10 ug/L	01/21/2008
	LCSD	9.90	99		7	(< 30)	10 ug/L	01/21/2008
1,2-Dibromo-3-chloropropane	LCS	9.47	95	(70-130)			10 ug/L	01/21/2008
	LCSD	11.2	112		17	(< 30)	10 ug/L	01/21/2008
1,2-Dibromoethane	LCS	9.55	96	(70-130)			10 ug/L	01/21/2008
	LCSD	10.4	104		9	(< 30)	10 ug/L	01/21/2008
1,2-Dichlorobenzene	LCS	9.95	100	(70-130)			10 ug/L	01/21/2008
	LCSD	10.6	106		6	(< 30)	10 ug/L	01/21/2008

SGS Ref.# 814381 Lab Control Sample
814382 Lab Control Sample Duplicate
Client Name Nortech
Project Name/# 06-1080
Matrix Drinking Water

Printed Date/Time 01/23/2008 16:21
Prep **Batch** VXX17864
Method SW5030B
Date 01/21/2008

Parameter		QC Results	Pct Recov	LCS/LCSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date
Volatile Gas Chromatography/Mass Spectroscopy								
1,2-Dichloroethane	LCS	9.07	91	(70-130)			10 ug/L	01/21/2008
	LCSD	9.12	91		1	(< 30)	10 ug/L	01/21/2008
1,2-Dichloropropane	LCS	9.49	95	(70-130)			10 ug/L	01/21/2008
	LCSD	10.0	100		5	(< 30)	10 ug/L	01/21/2008
1,3,5-Trimethylbenzene	LCS	8.44	84	(70-130)			10 ug/L	01/21/2008
	LCSD	8.77	88		4	(< 30)	10 ug/L	01/21/2008
1,3-Dichlorobenzene	LCS	8.28	83	(70-130)			10 ug/L	01/21/2008
	LCSD	8.71	87		5	(< 30)	10 ug/L	01/21/2008
1,3-Dichloropropane	LCS	9.86	99	(70-130)			10 ug/L	01/21/2008
	LCSD	10.1	101		3	(< 30)	10 ug/L	01/21/2008
1,4-Dichlorobenzene	LCS	9.06	91	(70-130)			10 ug/L	01/21/2008
	LCSD	9.61	96		6	(< 30)	10 ug/L	01/21/2008
2,2-Dichloropropane	LCS	8.68	87	(70-130)			10 ug/L	01/21/2008
	LCSD	8.82	88		2	(< 30)	10 ug/L	01/21/2008
2-Chlorotoluene	LCS	8.32	83	(70-130)			10 ug/L	01/21/2008
	LCSD	8.64	86		4	(< 30)	10 ug/L	01/21/2008
4-Chlorotoluene	LCS	8.33	83	(70-130)			10 ug/L	01/21/2008
	LCSD	8.68	87		4	(< 30)	10 ug/L	01/21/2008
4-Isopropyltoluene	LCS	10.3	103	(70-130)			10 ug/L	01/21/2008
	LCSD	10.9	109		6	(< 30)	10 ug/L	01/21/2008
Benzene	LCS	9.90	99	(70-130)			10 ug/L	01/21/2008
	LCSD	10.1	101		2	(< 30)	10 ug/L	01/21/2008
Bromobenzene	LCS	8.45	85	(70-130)			10 ug/L	01/21/2008
	LCSD	8.99	90		6	(< 30)	10 ug/L	01/21/2008
Bromochloromethane	LCS	9.61	96	(70-130)			10 ug/L	01/21/2008
	LCSD	9.73	97		1	(< 30)	10 ug/L	01/21/2008
Bromodichloromethane	LCS	10.5	105	(70-130)			10 ug/L	01/21/2008

SGS Ref.#	814381	Lab Control Sample	**Printed Date/Time**		01/23/2008 16:21
	814382	Lab Control Sample Duplicate	**Prep**	**Batch**	VXX17864
Client Name	Nortech			**Method**	SW5030B
Project Name/#	06-1080			**Date**	01/21/2008
Matrix	Drinking Water				

Volatile Gas Chromatography/Mass Spectroscopy

Parameter		QC Results	Pct Recov	LCS/LCSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date
	LCSD	10.7	107		1	(< 30)	10 ug/L	01/21/2008
Bromoform	LCS	9.73	97	(70-130)			10 ug/L	01/21/2008
	LCSD	10.2	102		5	(< 30)	10 ug/L	01/21/2008
Bromomethane	LCS	10.2	102	(70-130)			10 ug/L	01/21/2008
	LCSD	9.73	97		5	(< 30)	10 ug/L	01/21/2008
Carbon tetrachloride	LCS	10.6	106	(70-130)			10 ug/L	01/21/2008
	LCSD	10.7	107		1	(< 30)	10 ug/L	01/21/2008
Chlorobenzene	LCS	9.46	95	(70-130)			10 ug/L	01/21/2008
	LCSD	9.93	99		5	(< 30)	10 ug/L	01/21/2008
Chloroethane	LCS	9.95	100	(70-130)			10 ug/L	01/21/2008
	LCSD	10.6	106		6	(< 30)	10 ug/L	01/21/2008
Chloroform	LCS	10.1	101	(70-130)			10 ug/L	01/21/2008
	LCSD	10.4	104		3	(< 30)	10 ug/L	01/21/2008
Chloromethane	LCS	9.70	97	(70-130)			10 ug/L	01/21/2008
	LCSD	9.87	99		2	(< 30)	10 ug/L	01/21/2008
cis-1,2-Dichloroethene	LCS	10.0	100	(70-130)			10 ug/L	01/21/2008
	LCSD	10.2	102		2	(< 30)	10 ug/L	01/21/2008
cis-1,3-Dichloropropene	LCS	10.8	108	(70-130)			10 ug/L	01/21/2008
	LCSD	11.4	114		5	(< 30)	10 ug/L	01/21/2008
Dibromochloromethane	LCS	9.38	94	(70-130)			10 ug/L	01/21/2008
	LCSD	9.75	98		4	(< 30)	10 ug/L	01/21/2008
Dibromomethane	LCS	9.48	95	(70-130)			10 ug/L	01/21/2008
	LCSD	9.64	96		2	(< 30)	10 ug/L	01/21/2008
Dichlorodifluoromethane	LCS	10.3	103	(70-130)			10 ug/L	01/21/2008
	LCSD	10.9	109		6	(< 30)	10 ug/L	01/21/2008
Ethylbenzene	LCS	8.08	81	(70-130)			10 ug/L	01/21/2008
	LCSD	8.31	83		3	(< 30)	10 ug/L	01/21/2008

SGS Ref.# 814381 Lab Control Sample
814382 Lab Control Sample Duplicate
Client Name Nortech
Project Name/# 06-1080
Matrix Drinking Water

Printed Date/Time 01/23/2008 16:21
Prep **Batch** VXX17864
Method SW5030B
Date 01/21/2008

Parameter		QC Results	Pct Recov	LCS/LCSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date
Volatile Gas Chromatography/Mass Spectroscopy								
Hexachlorobutadiene	LCS	8.86	89	(70-130)			10 ug/L	01/21/2008
	LCSD	10.1	101		13	(< 30)	10 ug/L	01/21/2008
Isopropylbenzene (Cumene)	LCS	9.69	97	(70-130)			10 ug/L	01/21/2008
	LCSD	10.0	100		3	(< 30)	10 ug/L	01/21/2008
Methyl-t-butyl ether	LCS	16.5	110	(70-130)			15 ug/L	01/21/2008
	LCSD	17.7	118		7	(< 30)	15 ug/L	01/21/2008
Methylene chloride	LCS	10.3	103	(70-130)			10 ug/L	01/21/2008
	LCSD	10.7	107		4	(< 30)	10 ug/L	01/21/2008
n-Butylbenzene	LCS	8.77	88	(70-130)			10 ug/L	01/21/2008
	LCSD	9.58	96		9	(< 30)	10 ug/L	01/21/2008
n-Propylbenzene	LCS	7.99	80	(70-130)			10 ug/L	01/21/2008
	LCSD	8.28	83		4	(< 30)	10 ug/L	01/21/2008
o-Xylene	LCS	10.1	101	(70-130)			10 ug/L	01/21/2008
	LCSD	10.4	104		3	(< 30)	10 ug/L	01/21/2008
P & M -Xylene	LCS	16.5	83	(70-130)			20 ug/L	01/21/2008
	LCSD	16.9	85		2	(< 30)	20 ug/L	01/21/2008
sec-Butylbenzene	LCS	9.75	98	(70-130)			10 ug/L	01/21/2008
	LCSD	10.3	103		6	(< 30)	10 ug/L	01/21/2008
Styrene	LCS	10.1	101	(70-130)			10 ug/L	01/21/2008
	LCSD	10.5	105		3	(< 30)	10 ug/L	01/21/2008
tert-Butylbenzene	LCS	9.98	100	(70-130)			10 ug/L	01/21/2008
	LCSD	10.4	104		5	(< 30)	10 ug/L	01/21/2008
Tetrachloroethene	LCS	8.59	86	(70-130)			10 ug/L	01/21/2008
	LCSD	8.94	89		4	(< 30)	10 ug/L	01/21/2008
Toluene	LCS	9.35	94	(70-130)			10 ug/L	01/21/2008
	LCSD	9.87	99		5	(< 30)	10 ug/L	01/21/2008
Total Trihalomethanes	LCS	39.7	*					01/21/2008
	LCSD							

SGS

SGS Ref.#	814381	Lab Control Sample	**Printed Date/Time**		01/23/2008 16:21
	814382	Lab Control Sample Duplicate	**Prep**	**Batch**	VXX17864
Client Name	Nortech			**Method**	SW5030B
Project Name/#	06-1080			**Date**	01/21/2008
Matrix	Drinking Water				

Volatile Gas Chromatography/Mass Spectroscopy

Parameter		QC Results	Pct Recov	LCS/LCSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date
trans-1,2-Dichloroethene	LCS	9.08	91	(70-130)			10 ug/L	01/21/2008
	LCSD	9.27	93		2	(< 30)	10 ug/L	01/21/2008
trans-1,3-Dichloropropene	LCS	9.94	99	(70-130)			10 ug/L	01/21/2008
	LCSD	10.7	107		7	(< 30)	10 ug/L	01/21/2008
Trichloroethene	LCS	9.26	93	(70-130)			10 ug/L	01/21/2008
	LCSD	9.51	95		3	(< 30)	10 ug/L	01/21/2008
Trichlorofluoromethane	LCS	10.1	101	(70-130)			10 ug/L	01/21/2008
	LCSD	10.3	103		2	(< 30)	10 ug/L	01/21/2008
Vinyl chloride	LCS	9.81	98	(70-130)			10 ug/L	01/21/2008
	LCSD	10.4	104		6	(< 30)	10 ug/L	01/21/2008
Xylenes (total)	LCS	26.6	89	(70-130)			30 ug/L	01/21/2008
	LCSD	27.3	91		3	(< 30)	30 ug/L	01/21/2008
Surrogates								
1,2-Dichloroethane-D4 <surr>	LCS		101	(70-130)				01/21/2008
	LCSD		100		1			01/21/2008
4-Bromofluorobenzene <surr>	LCS		93	(70-130)				01/21/2008
	LCSD		95		3			01/21/2008
Toluene-d8 <surr>	LCS		98	(70-130)				01/21/2008
	LCSD		99		0			01/21/2008

Batch VMS9628
Method EPA 524.2
Instrument HP 5890 Series II MS1 VJA

SGS Ref.#	814402 Lab Control Sample	**Printed Date/Time**		01/23/2008 16:21
	814403 Lab Control Sample Duplicate	**Prep**	**Batch**	VXX17865
Client Name	Nortech		**Method**	SW5030B
Project Name/#	06-1080		**Date**	01/21/2008
Matrix	Drinking Water			

QC results affect the following production samples:

1080261006, 1080261007, 1080261009

Parameter		QC Results	Pct Recov	LCS/LCSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date
Volatile Gas Chromatography/Mass Spectroscopy								
Naphthalene	LCS	11.3	113	(70-130)			10 ug/L	01/21/2008
	LCSD	12.0	120		6	(< 30)	10 ug/L	01/21/2008
Surrogates								
1,2-Dichloroethane-D4 <surr>	LCS		98	(70-130)				01/21/2008
	LCSD		98		0			01/21/2008
4-Bromofluorobenzene <surr>	LCS		99	(70-130)				01/21/2008
	LCSD		98		2			01/21/2008
Toluene-d8 <surr>	LCS		101	(70-130)				01/21/2008
	LCSD		98		2			01/21/2008

Batch	VMS9629
Method	EPA 524.2
Instrument	HP 5890 Series II MS3 VNA

1080261

Taylor, Forest (Anchorage)

From: David L. Miller [dmiller@nortechengr.com]
Sent: Monday, January 14, 2008 9:08 AM
To: Taylor, Forest (Anchorage)
Subject: Amended COC:

Forest,

To confirm, for COC #1080261, the DRO analysis needs to be canceled. Additionally, samples CRW-06 and CRW-07 need to be changed from BTEX (524) to VOC (524).

Thanks!

David Miller
Environmental Scientist
NORTECH Environmental Engineering, Health & Safety
2400 College Road, Fairbanks, AK 99709
907-452-5688 Ext 242   907-452-5694 - fax
dmiller@nortechengr.com
http://www.nortechengr.com

SGS 1080261

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072895

① CLIENT: Nortech

CONTACT: ~~06-1080~~ Dave Miller PHONE NO: (907) 452-5688

PROJECT: 06-1080 SITE/PWSID#:

REPORTS TO: dmiller@nortechengr.com E-MAIL:

FAX NO.:( )

INVOICE TO: 2400 College Rd Fairbanks, AK 99709 QUOTE #

P.O. NUMBER 06-1080

SGS Reference:

PAGE ____ OF ____

							Preservatives Used	HCl	HCl							
② LAB NO.	SAMPLE IDENTIFICATION	DATE	TIME	MATRIX	No CONTAINERS	SAMPLE TYPE C= COMP G= GRAB	Analysis Required ③ ~~[illegible]~~ (524) BTEX	DRO (AK102)								REMARKS Re-run at no cost
① A-C	CRW-01	06-10-08	1600	Water	3		X									as per
② A-C	CRW-02	│	1630	│	│		│									
③ A-C	CRW-03	│	1700	│	│		│									Chuck.
④ A-C	CRW-04	│	1730	│	│		│									
⑤ A-C	CRW-05	│	1800	│	│		│									
⑥ A-E	CRW-06	│	1830	│	5		│	X								
⑦ A-C	CRW-07	│	1900	│	3		│									
⑧ A-C	CRW-08	│	1930	│	│		│									
⑨ A-C	TB	│		│	│		│									

⑤

	Date	Time		Date	Time
Collected/Relinquished By: (1) David J Miller	1-11-08	1115	Received By: Carmen Beene	1/11/08	1120
Relinquished By: (2) Carmen Beene	1/11/08	1430	Received By:		
Relinquished By: (3)			Received By:		
Relinquished By: (4)			Received By:	1/12/08	1023

④

Shipping Carrier:

Shipping Ticket No:

Special Deliverable Requirements:

Special Instructions:

Requested Turnaround Time:

☐ RUSH ________ Date Needed ☐ STD

Samples Received Cold? (Circle) YES NO

Temperature °C: TB=2.1 C=4.1

Chain of Custody Seal: (Circle)

INTACT BROKEN [✓ ABSENT]

☐ 200 W. Potter Drive Anchorage, AK 99518 Tel: (907) 562-2343 Fax: (907) 561-5301

☐ 1270 Greenbrier Street Charleston, WV 25311 Tel: (304) 346-0725 Fax: (304) 346-0761

White - Retained by Lab
Yellow - Returned with Report

1080261

SGS

SAMPLE RECEIPT FORM

SGS WO#:

Yes	No	NA	
	✓		Are samples **RUSH**, priority, or *w/n 72 hrs.* of **hold time**?
		✓	If yes have you done *e-mail notification*?
	✓		Are samples *within 24 hrs.* of **hold time** or **due date**?
		✓	If yes, have you *spoken with* Supervisor?
	✓		Archiving bottles – if req., are they properly marked?
✓			Are there any **problems**? PM Notified?
✓			Were samples preserved correctly and [✓ pH verified?]
	✓		If this is for PWS, provide **PWSID.**
		✓	Will courier charges apply?
		✓	Method of payment?
	✓		Data package required? (Level: 1 / 2 / 3 / 4)
			Notes:
	✓		Is this a DoD project? (USACE, Navy, AFCEE)

Due Date: 1/25/08
Received Date: 01/11/08
Received Time: 1120
Is **date/time conversion** necessary? NO
\# of hours to AK Local Time: NA
Thermometer ID: FBX 71D

Cooler ID	Temp Blank	Cooler Temp
1	2.1 °C	4.1 °C
	°C	°C
	°C	°C
	°C	°C
	°C	°C

*Temperature readings include thermometer correction factors

Delivery method (circle all that apply) [✓ Client] /
Alert Courier / UPS / FedEx / USPS /
AA Goldstreak / NAC / ERA / PenAir / Carlile
Lynden / SGS / Other:

Airbill #

Additional Sample Remarks: (√ *if applicable)*

	Extra Sample Volume?
✓	Limited Sample Volume?
	Field preserved for volatiles?
	Field-filtered for dissolved?
	Lab-filtered for dissolved?
	Ref Lab required?
	Foreign Soil?

This section must be filled out for DoD projects (USACE, Navy, AFCEE)

Yes	No	
		Is received temperature 4 ± 2°C?
		Exceptions: Samples/Analyses Affected:
		Rad Screen performed? Result:
		Was there an airbill? *(Note # above in the right hand column)*
		Was cooler sealed with custody seals?
		# / where:
		Were seal(s) intact upon arrival?
		Was there a COC with cooler?
		Was COC sealed in plastic bag & taped inside lid of cooler?
		Was the COC filled out properly?
		Did the COC indicate COE / AFCEE / Navy project?
		Did the COC and samples correspond?
		Were all sample packed to prevent breakage?
		Packing material:
		Were all samples unbroken and clearly labeled?
		Were all samples sealed in separate plastic bags?
		Were all VOCs free of headspace and/or MeOH preserved?
		Were correct container / sample sizes submitted?
		Is sample condition good?
		Was copy of CoC, SRF, and custody seals given to PM to fax?

This section must be filled if problems are found.

Yes	No	
✓		Was client notified of problems?

Individual contacted: DAVID
Via: [✓ Phone] / Fax / Email (*circle one*)
Date/Time: 1/14/08 0905
Reason for contact: CLIENT CALLED TO DIRECT CANCELATION OF DRO (#6) AND CHANGE #6 & #7 TO VOC 524-2 INSTEAD OF BTEX 524-2.
Change Order Required? YES
SGS Contact: FAT

Notes: CANCEL DRO FOR #6 Samples ②C, ①A, ⑤A, ⑧A,B arrived frozen to lab.
CHANGE BTEX TO VOC FOR #6 & #7 FAT 1/14/08
sample ⑤A has a Bubble 6 mm. samples ⑤ B,C have bubbles 7mm.
samples ⑧ A,B were broken in transit from freezing.

Completed by (sign):
(print): Carmon Boone

Login proof (check one): waived ____ required ✓ performed by:

DOCUMENT\FORMS\approved\SRF_F004r15.doc

Form # F004r15 6/6/5

SGS

1080261

SGS WO#:

SAMPLE RECEIPT FORM FOR TRANSFERS
From
FAIRBANKS, ALASKA OR HONOLULU, HAWAII
To

ANCHORAGE, AK

TO BE COMPLETED IN ANCHORAGE UPON ARRIVAL FROM FAIRBANKS OR HAWAII. NOTES RECORDED BELOW ARE ACTIONS NEEDED UPON ARRIVAL IN ANCHORAGE.

Notes: Cooler arrived very cold. 5 voa bottles were frozen 2 voa bottles broke in Transit as a result of the freezing, samples ⑧ A, B

Receipt Date / Time: 1/12/08 1023

Is Sample Date/Time Conversion Necessary? Yes ______ No ✓

Number of Hours From Alaska Local Time: —

Foreign Soil? Yes ______ No ✓

Delivery method to Anchorage (*circle all that apply*):

Alert Courier / UPS / FedEx / USPS / AA Goldstreak / NAC / ERA / PenAir / Carlile / [✓ Lynden] / SGS

Other: ______

Airbill # ______

COOLER AND TEMP BLANK READINGS*

Cooler ID	Temp Blank (°C)	Cooler (°C)	Cooler ID	Temp Blank (°C)	Cooler (°C)
1	-0.1	-3.1			

CUSTODY SEALS INTACT: [✓ YES] / NO

 # / WHERE: 2, 1 on front + 1 on back

COMPLETED BY: Joe Rud.

**Temperature readings include thermometer correction factors.*

SGS

SAMPLE RECEIPT FORM (page 2)

SGS WO#: 11080261

#	Container ID	Matrix	Test	QC	TB	1 L	500 mL	250 mL	125 mL	60 mL	40 mL	8oz (250 mL)	4oz (125 mL)	Other	AG	CG	HDPE	Nalgene	Cubie	Coli	Septa	Other	None	HCl	HNO_3	H_2SO_4	MeOH	$Na_2S_2O_3$	NaOH	Other
1-5	A-C	1	BTex								15				✓						✓			✓						
6	A-C		VOC 524								3				✓						✓			✓						
	De		extra volume			2									✓									✓						
7	A-C		Voc 524								3				✓						✓			✓						
8	C		BTex								1				✓						✓			✓						
9	A-C		Voc		✓						3				✓						✓			✓						

Bottle Totals	1 L	500 mL	250 mL	125 mL	60 mL	40 mL	8oz (250 mL)	4oz (125 mL)	Other
Bottle Totals	2					25			

Completed by: Date: 1/14/08

SGS Environmental **CUSTODY SEAL** WO# 1080261

Signature: Carmen Beene **Date/Time:** 1/11/08 1640

SGS Environmental **CUSTODY SEAL** WO# 1080261

Signature: Carmen Beene 1/11/08 **Date/Time:** 1/11/08 1640

Laboratory Data Review Checklist

1. Laboratory

a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

● Yes ○ No Comments:

b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses ADEC CS approved?

○ Yes ○ No Comments:

Not Applicable.

2. Chain of Custody (COC)

a. COC information completed, signed, and dated (including released/received by)?

● Yes ○ No Comments:

b. Correct analyses requested?

● Yes ○ No Comments:

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt (4° ± 2° C)?

● Yes ○ No Comments:

Samples were within range when dropped of at SGS at Fairbanks.

b. Sample preservation acceptable - acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

● Yes ○ No Comments:

c. Sample condition documented - broken, leaking (Methanol), zero headspace (VOC vials)?

● Yes ○ No Comments:

Two Sample 8 VOAs arrived at Anchorage broken due to freezing, Sample 5 VOAs had bubbles

d. If there were any discrepancies, were they documented? - For example, incorrect sample containers/ preservation, sample temperature ouside of acceptance range, insufficient or missing samples, etc.?

● Yes ○ No Comments:

sample temperature was low

e. Data quality or usability affected? Explain.

Comments:

No, unfrozen VOAs and/or VOAs with acceptable bubbles were identified and analyzed for each sample

4. <u>Case Narrative</u>

a. Present and understandable?

● Yes ○ No Comments:

b. Discrepancies, errors or QC failures identified by the lab?

● Yes ○ No Comments:

c. Were all corrective actions documented?

● Yes ○ No Comments:

d. What is the effect on data quality/usability according to the case narrative?

Comments:

CCV issues were related to compounds not detected in these samples

5. <u>Samples Results</u>

a. Correct analyses performed/reported as requested on COC?

● Yes ○ No Comments:

b. All applicable holding times met?

● Yes ○ No Comments:

c. All soils reported on a dry weight basis?

○ Yes ○ No Comments:

Not Applicable.

d. Are the reported PQLs less than the Cleanup Level or the minimum required detection level for the project?

● Yes ○ No Comments:

e. Data quality or usability affected? Explain.

Comments:

NA

6. QC Samples

a. Method Blank

i. One method blank reported per matrix, analysis and 20 samples?

● Yes ○ No Comments:

ii. All method blank results less than PQL?

● Yes ○ No Comments:

iii. If above PQL, what samples are affected?

Comments:

NA

iv. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

○ Yes ○ No Comments:

NA

v. Data quality or usability affected? Explain.

Comments:

NA

b. Laboratory Control Sample/Duplicate (LCS/LCSD)

i. Organics - One LCS/LCSD reported per matrix, analysis and 20 samples?

● Yes ○ No Comments:

ii. Metals/Inorganics - One LCS and one sample duplicate reported per matrix, analysis and 20 samples?

○ Yes ○ No Comments:

NA

iii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

● Yes ○ No Comments:

iv. Precision - All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

● Yes ○ No Comments:

v. If %R or RPD is outside of acceptable limits, what samples are affected?

Comments:

NA

vi. Do the affected samples(s) have data flags? If so, are the data flags clearly defined?

○ Yes ○ No Comments:

NA

vii. Data quality or usability affected? Explain.

Comments:

NA

c. Surrogates - Organics Only

i. Are surrogate recoveries reported for organic analyses - field, QC and laboratory samples?

● Yes ○ No Comments:

ii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

● Yes ○ No Comments:

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

○ Yes ○ No Comments:

NA

iv. Data quality or usability affected? Explain.
Comments:

NA

d. Trip Blank - Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

i. One trip blank reported per matrix, analysis and cooler?
● Yes ○ No Comments:

ii. All results less than PQL?
● Yes ○ No Comments:

iii. If above PQL, what samples are affected?
Comments:

NA

iv. Data quality or usability affected? Explain.
Comments:

NA

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?
● Yes ○ No Comments:

ii. Submitted blind to lab?
● Yes ○ No Comments:

iii. Precision - All relative percent differences (RPD) less than specified DQOs? (Recommended: 30% water, 50% soil) RPD (%) = Absolute Value of: $\frac{(R_1 - R_2)}{((R_1 + R_2)/2)} \times 100$

Where R_1 = Sample Concentration
R_2 = Field Duplicate Concentration

● Yes ○ No Comments:

iv. Data quality or usability affected?
○ Yes ○ No Comments:

NA

f. Decontamination or Equipment Blank (if applicable)

○ Yes ○ No ● Not Applicable

i. All results less than PQL?

○ Yes ○ No

Comments:

NA

ii. If above PQL, what samples are affected?

Comments:

NA

iii. Data quality or usability affected? Explain.

Comments:

NA

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab Specific, etc.)

a. Defined and appropriate?

● Yes ○ No

Comments:

Completed by: Peter Beardsley

Title: Environmental Engineer

Date: Jan 31, 2008

CS Report Name:

Report Date:

Consultant Firm: Nortech

Laboratory Name: SGS

Laboratory Report Number: 1080261

ADEC File Number: 100.38.217

ADEC RecKey Number: 2006310133101

Print Form

Version 2.1

Reset Form

Attachment 7

610 University Avenue
Fairbanks, AK 99709-3643
PHONE: (907) 451-2104
FAX: (907) 451-5105
www.dec.state.ak.us

DIVISION OF SPILL PREVENTION AND RESPONSE
CONTAMINATED SITES PROGRAM

File: 100.38.217

October 15, 2007

Ron Jaeger
Badger Fuel 1995 Badger Road
North Pole, Alaska 99705

Re: Environmental Assessment Activities at 578 Canoro Road, North Pole, Alaska

Dear Mr. Jaeger:

On October 10, 2007, the Alaska Department of Environmental Conservation (ADEC) received a letter report written by Nortech Environmental Engineering, Health, and Safety (Nortech) entitled "Summer 2007 Groundwater Sampling and Monitoring Update, 578 Canoro Road, North Pole, Alaska," dated September 10, 2007. On the same date, ADEC received a March 28, 2007 correspondence, also from Nortech, entitled "Work Plan for Additional Aquifer Characterization based on Interim Characterization Recommendations 578 Canoro Road, North Pole, Alaska." Together these documents describe activities completed since November 2006 to investigate and respond to a fuel release, which was caused by Badger Fuel inadvertently delivering arctic diesel to a drinking water well at the subject property. The Nortech documents also propose further site work in order to more thoroughly address the contamination remaining onsite and find a location for a new drinking water well. ADEC understands this additional work is scheduled to begin on October 16, 2007.

ADEC has the following comments on the proposed activities:

1. In the future, please submit the work plan at least 2 weeks prior to beginning the work. ADEC currently has limited staff and expedited reviews are not always possible. If we do not have the time to properly review or approve the work plan, you run the risk of higher investigation and cleanup costs through the need to repeat work that does not meet ADEC's requirements or complete additional work in order to meet site closure requirements. We do our best to work with responsible parties and consultants and their timelines; however this is becoming more difficult with our staffing challenges. We appreciate your consideration of this issue.

2. Please complete a well search within the vicinity of 578 Canoro Road to determine if there are any other drinking water wells that may be impacted by this release.

3. The elevation (stage) of the water in the Chena River should be included in the evaluation of the hydrology at this site. The U.S. Geological Survey (USGS) has a method for calculating the river stage at any point. Please contact them for this information and include it in your

evaluation of groundwater flow. Gathering information from the USGS on the stage of the Tanana may also assist your evaluation.

4. ADEC concurs with discontinuing sampling at the kitchen tap as long as the residence remains connected to a holding tank. Once a new drinking water well is installed, the tap should be sampled monthly for the first three months then quarterly for an additional nine months. This equates to six sampling events within the first year after installation of the new well.

5. Please clarify the timeframes included in the March 28, 2007 work plan. For example, the work plan indicates that product recovery will end in July 2007. Is the current plan to extend product recovery until July 2008, completing monthly visits prior to break up in 2008 and weekly during break up?

6. When the new monitoring well is installed at the southwest corner of the property, please collect soil information. Geotek's rig should be able to collect soil corings as the well is being driven with minimal extra expense.

Thank you for your ongoing efforts to address the contamination at this site. I have copied your consultant on this correspondence through electronic mail. If you have any questions or concerns regarding this letter, please contact me at (907) 451-2104 or via email at ann.farris@alaska.gov.

Sincerely,

Ann Farris
Environmental Engineer Associate

Cc: Peter Beardsley, Nortech, via electronic mail

Peter Beardsley

From: Peter Beardsley
Sent: Wednesday, October 17, 2007 8:04 AM
To: 'Farris, Ann M (DEC)'
Subject: RE: 578 Canoro Road

Ann-

I appreciate the turnaround on this. I looked through the comments and have the following clarifications:

Item 1 – Thanks again for the prompt turnaround.

Item 2 – We will complete a well search on adjacent properties. A new residence has been built to the southwest and a well is visible near the property line. We plan to contact this owner and obtain a well log. We will contact other adjacent property owners as well.

Item 3 – I talked to Dave Meyer with USGS and he didn't know of a particular method to do this. I will give you a call to discuss this.

Item 4 – The drinking water sampling program described will be performed.

Item 5 – The timeframe for product recovery will begin when a 4" recovery well is installed in a location which has adequate product for recovery, which will probably not be for at least a month or two. The work plan identifies 14 visits. At an average of 2 per month this would probably take us through June or July 2008. The frequency of visits will be determined based on the effectiveness of product recovery and this will be discussed in the report documenting these activities, which should be available about two months after the recovery well installation.

Item 6 – The new well locations will be determined based on the soil data collected by GeoTek and we have an extra location that we may use out in the location of SW1 towards the southwest corner. At this time, the new well installation is expected to be a second event with Homestead Drilling. We expect to put the wells in locations that we are already confident about the soil through GPR and direct push soil sampling. We will collect soil data in this area one way or another.

Let me know if you have any additional comments.

Thanks
Peter

From: Farris, Ann M (DEC) [mailto:ann.farris@alaska.gov]
Sent: Monday, October 15, 2007 9:08 AM
To: Peter Beardsley
Subject: RE: 578 Canoro Road

Here are my comments on the work plan Peter. If you have any questions, give me a holler.

Just a note on comment 1, I'm sending that out to everyone now. Things here are too tight for us to be as flexible as we have been in the past. At least until we get some more people hired, we aren't going to be able to, in general, turn things around like we have in the past.

Tthanks,
Ann

From: Peter Beardsley [mailto:peter@nortechengr.com]

Sent: Saturday, October 13, 2007 6:49 AM
To: Farris, Ann M (DEC)
Subject: RE: 578 Canoro Road

Ann-

The house currently has a 2500-gallon holding tank and I can't remember which company delivers water. Nothing was detected in late July, which was the last time we tested the water. Very low levels of a couple of random VOCs were detected in the sampling event right after we cleaned the system and they were present in most or all samples, indicating that they were probably present in the delivered water. Methyl chloride was detected in one sample in March and one sample in May. No VOCs were detected in July. Regular testing of the hauled water has not made a lot of sense to me while the house has hauled water, but I think the periodic drinking water testing for VOCs should be on a schedule program once we get the new well in.

Let me know if you have any other questions.

Thanks
Peter

From: Farris, Ann M (DEC) [mailto:ann.farris@alaska.gov]
Sent: Thursday, October 11, 2007 11:59 AM
To: Peter Beardsley
Subject: RE: 578 Canoro Road

What have the results been from the kitchen tap? Any detects?

From: Peter Beardsley [mailto:peter@nortechengr.com]
Sent: Wednesday, October 10, 2007 4:04 PM
To: Farris, Ann M (DEC)
Subject: RE: 578 Canoro Road

Ann-

I talked to GeoTek a little while ago. The plan is to do the GPR on Tuesday or Wednesday next week and the direct push the following week. The product recovery well will be some time after that.

I will give you a call on Friday if I haven't heard from you.

Thanks
Peter

From: Farris, Ann M (DEC) [mailto:ann.farris@alaska.gov]
Sent: Wednesday, October 10, 2007 9:53 AM
To: Peter Beardsley
Subject: FW: 578 Canoro Road

Hi Peter-

Are you planning to start this on Monday? If so, and you haven't heard from me beforehand, contact me on Friday to discuss. I think I will have a chance to review it tomorrow.

Ann

From: Frechione, James (DEC)
Sent: Wednesday, October 10, 2007 8:21 AM

To: Farris, Ann M (DEC)
Subject: FW: 578 Canoro Road

Ann - do you want to continue with this one ??

if not - I could take it or assisgn it to Neal

let me know

From: Peter Beardsley [mailto:peter@nortechengr.com]
Sent: Wednesday, October 10, 2007 7:56 AM
To: Frechione, James (DEC)
Subject: 578 Canoro Road

Jim-

The most recent groundwater report and our original proposal for the aquifer characterization program are attached. The recommendations from the groundwater report slightly modify the aquifer characterization program.

The water system sampling at the kitchen sink has been periodic (about quarterly) instead of monthly since it is hauled water. We would like to continue the quarterly sampling on the new well that is expected to be installed next month for 1 year and then discontinue it. The frequency of groundwater elevation and free product monitoring/recovery will be determined based on field conditions.

We are planning on doing the work next week while GeoTek is in town on another job and we still have time to try and get the new well in this year. I hadn't intended for this to be such short notice, but that is how the schedule is working out.

Please give me a call if you have any questions.

Thanks

Peter

Peter Beardsley, PE
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<<070830-ltr-rpt-v2-w-attach.pdf>> <<070315-work-plan-adec.pdf>>

Peter Beardsley

From: Farris, Ann M (DEC) [ann.farris@alaska.gov]
Sent: Monday, December 17, 2007 7:44 AM
To: Peter Beardsley
Subject: RE: Another landowner for 578 Canoro Rd

I would like to see the full analyte list at the new drinking water well onsite. Sampling for BTEX at the other wells should be fine for now.

I also think it would be valuable to sample for AK102 at any shallow drinking water wells that are immediately down gradient of the site. The lots I'm thinking of are TL-1114, Lot 1, and 3. Of those, probably only TL-1114 will have a shallow well.

Thanks,
Ann

From: Peter Beardsley [mailto:peter@nortechengr.com]
Sent: Monday, December 17, 2007 7:14 AM
To: Farris, Ann M (DEC)
Subject: RE: Another landowner for 578 Canoro Rd

Ann-

Ok, hopefully we will be able to get a pretty good list of wells/locations and set up sampling of some of them for later this week. I will talk to the driller and hopefully we can test the new well also. I was planning on running the samples by 524.2 with reporting for BTEX only due to the known source of contamination. Let me know if you think we should to the full 524.2.

Thanks
Peter

From: Farris, Ann M (DEC) [mailto:ann.farris@alaska.gov]
Sent: Monday, December 17, 2007 7:10 AM
To: Peter Beardsley
Subject: Another landowner for 578 Canoro Rd

Morning Peter-

I received a call from another landowner in the Orion Subdivision. Lot 2, Jennifer Maines. Her cell number is 388-9074. She received Dave Miller business card and has been trying to reach him too. I'll call her back this morning, but it sounded like, from her message, they do have a well and are willing to allow sampling.

Ann Farris

Alaska Dept. of Environmental Conservation
(907) 451-2104