

EXECUTIVE SUMMARY

FOREWORD

San-Dex Enterprises Ltd. retained EBA Engineering Consultants Ltd. (EBA) to conduct a Stage 1 and 2 Preliminary Site Investigation (PSI) of a property located at 8741 Hwy 3 and 95, in Yahk, British Columbia (herein referred to as the "Property"). EBA understands that this Stage 1 and 2 PSI is being conducted as part of environmental due diligence to facilitate the purchase of the Property.

The subject Property is located along Hwy 3 and 95 within the townsite of the unincorporated area of Yahk. The site fronts along Highway 3 and 95 and backs onto Moyie River. The Property is rectangular in shape and covers an area of 3.41 acres. Access to the Property is available through Highway 3 and 95. Currently the Property consists of a store building, a residence (mobile home), storage sheds, workshop, shower and washroom building for campers, open kitchen, and pump house. The operations on the Property include retail of souvenirs, groceries, liquor, propane, fuel (gasoline and diesel) dispensing, camping ground, and bus depot (Greyhound service). The Property is commonly known as "Grouse Mountain Variety Store". A large portion of the Property is used as a camp site. Approximately 30% of the Property is occupied by the buildings or paved/graded with sand and gravel while the remaining 70% is grassed/vegetated camp site. The site is served with a groundwater well used as a potable water source. The Property utilizes a septic system and the septic disposal field is located to the south of the store building in the camping ground. In general, the Property is used for residential and commercial purposes.

FINDINGS AND CONCLUSIONS

Anecdotal information indicated that the Property had been used as a general store and gas station since the early 1930s. Two former USTs were located to the east side of the store which were removed in the late 1980s. Currently two gasoline and diesel USTs installed in 1989 and pump island are located to the north of the store.

Based on interviews conducted, information reviewed during this investigation, visual observations made during the site visit, and current activities and management practices at the Property, there are two on-site sources (former UST location and current gas retail operation with two USTs and pump island) that might have potential to cause significant environmental impairment to the Property. Therefore, current and historical Property uses are suspected to be APECs. The table below summarizes the APECs and their associated potential contaminants of concern (PCOCs).

ON-SITE APECs AND PCOCs			
No.	On-site APEC	Information Source	EBA Evaluation
APEC #1	Former use of USTs for fuel retail (gasoline and diesel)	Review of previous environmental report	Potential to impact soil and groundwater quality at the Property due the release of hydrocarbon products as a result of former fuel storage and dispensing of fuel. The PCOCs include: BTEXS, VPHs, MTBE, EPH, LEPH, HEPH, PAHs, and metals.

ISSUED FOR USE

ON-SITE APECS AND PCOCS			
No.	On-site APEC	Information Source	EBA Evaluation
APEC #2	Current use of two USTs for storage of gasoline and diesel and fuel pumps (fuel retailing operation)	Interview and site reconnaissance	Potential to impact soil and groundwater quality at the Property due to the current storage and dispensing of fuel. The PCOCs include: BTEXS, VPHs, MTBE, EPH, LEPH, HEPH, PAHs, and metals.

UST – underground storage tank

EPH – extractable petroleum hydrocarbons

LEPH – light extractable petroleum hydrocarbons

HEPH – heavy extractable petroleum hydrocarbons

PAH – polycyclic aromatic hydrocarbons

MTBE – methyl tertiary butyl ether

BTEXS – benzene, toluene, ethylbenzene, xylenes, and styrene

VPH – volatile petroleum hydrocarbons

Prior to 1970s the surrounding area was either forested or undeveloped. Generally the surrounding area appeared to be sparsely developed starting from early 1970s and largely remain unchanged. No commercial or industrial sites with the potential to impact the subsurface of the Property were found in the immediate vicinity of the Property. Current and historical surrounding land uses are not suspected to be areas of potential environmental concern to the Property.

Based on the Stage 1 PSI findings, EBA recommended a Stage 2 PSI be conducted to confirm or refute the presence of potential subsurface contamination due to current and historical land uses at the Property.

The Stage 2 PSI assessed these APECs by advancing four boreholes, installing groundwater monitoring wells at the borehole locations, and conducting soil and groundwater sampling programs. Soil and groundwater samples were collected from each borehole locations and analyzed for PCOCs discussed above.

Based on field observations and analytical test results of selected soil and groundwater samples including a tap water sample collected from inside the store, the Stage 2 PSI concluded the following:

- Using a split spoon sampler device, undisturbed soil samples were successfully collected only at a depth of 0.76 m below ground surface from each borehole and from a depth of 7 m in borehole 09BH04 (sample 04-F). Based on the analytical test results, the undisturbed soil samples did not identify concentrations of PCOCs in excess of the Contaminated Sites Regulation (CSR) Residential (RL) and Commercial (CL) standards for LEPH, HEPH, PAH, BTEXS, and VPH. Due to the presence of gravel and cobbles in the subsurface, undisturbed soil samples were unable to be collected using a split spoon sampler device at depths greater than 0.76 m except for the soil sample 04-F. Due to the air rotary drilling methodology, soil samples were disturbed by air and therefore were not submitted to laboratory for analysis. As a groundwater exceedance was identified in monitoring well 09BH02 and detectable concentrations of PCOCs in groundwater were identified in monitoring well 09BH03 and in the onsite tap water sample, as

discussed below, PCOC concentrations in soil in excess of the applicable standards could be present near the water table.

- Groundwater samples collected from the four monitoring wells and analyzed for EPHw, LEPHw, PAH, BTEXS, MTBE, and VPHw, met the CSR Aquatic Life (AW) and Drinking Water (DW) standards except for ethylbenzene. In monitoring well 09BH02, the concentration of ethylbenzene was recorded at level of 13 µg/L which exceeded the CSR DW standard of 2.4 µg/L.
- Detectable concentrations of VHW₆₋₁₀, VPHw, toluene and xylene were obtained from groundwater sample collected from 09BH02. Concentrations of xylene in groundwater were detected in monitoring well 09BH03, and ethylbenzene and xylene were detected in the onsite tap water sample.
- Groundwater samples collected from 09BH01 and 09BH04 were analyzed for dissolved metals. In most instances, the dissolved metals parameters met the CSR AW and DW standards. The exceptions are for dissolved iron from 09BH04 and dissolved manganese from 09BH01 and 09BH04 which had concentrations of 0.37 µg/L and 0.63 µg/L, respectively and exceeded the CSR DW standard of 0.3 µg/L. The CSR DW standards for dissolved iron and manganese are to protect against taste and odour concerns only.

Based on the Stage 2 PSI field observation and analytical results and the conclusions given above, the following recommendations are made.

- EBA recommends that all existing monitoring wells be monitored on a semi-annual basis to assess the short term and long term trends in dissolved hydrocarbon concentrations.
- EBA recommends that re-sampling and testing the onsite tap water to confirm the findings of the detectable concentrations of ethylbenzene and xylene.
- As a temporary and precautionary measure EBA recommends that the USTs and supply lines be pressure tested for potential fuel leak and fuel inventory be implemented.

Based on the findings noted above, further soil and groundwater assessment is warranted at this time.

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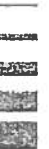


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1.0 INTRODUCTION

1.1 GENERAL

San-Dex Enterprises Ltd. retained EBA Engineering Consultants Ltd. (EBA) to conduct a Stage 1 and 2 Preliminary Site Investigation (PSI) of a property located at 8741 Hwy 3 and 95, in Yahk, British Columbia (herein referred to as the "Property"). EBA understands that this Stage 1 and 2 PSI is being conducted as part of environmental due diligence to facilitate the purchase of the Property.

The Stage 1 PSI has been prepared in general accordance with the requirements of the Canadian Standards Association (CSA) Standard Z768-01 for Environmental Site Assessments. The environmental assessment has not been prepared for the purpose of obtaining an instrument (Determination, Certificate, or Approval) from the Ministry of Environment (MoE) and does not include all supporting documents required for such purpose.

1.2 OBJECTIVE

The primary objective of the Stage 1 PSI is to assess the potential presence of contaminants, hazardous materials, or waste materials of a deleterious nature on the subject Property. The present and past activities at the Property and at the surrounding sites were reviewed to establish the potential for significant adverse impacts (if any) on the environmental status of the Property.

The objective of the Stage 2 PSI is to assess the areas of potential environmental concern (APECs) and associated potential contaminants of concern (PCOCs) on the Property, which are suspected to be present in either soil or groundwater, based on the findings of the Stage 1 PSI.

1.3 AUTHORIZATION

Authorization to proceed with the Stage 1 and 2 PSI was given to EBA by Mr. Dexter Crawford, owner of the Property, on July 27, 2009.

1.4 QUALIFICATIONS OF ASSESSORS

Mr. Haile Habtegiorgis, M.Sc., CEPIT, EIT conducted the historical research, records review, site reconnaissance, monitored boreholes drilling and monitoring wells installation, completed soil and groundwater sampling, interpreted the analytical test results of this project and is the primary author of this report. Mr. Habtegiorgis has 3 years of experience in conducting Stage 1 and 2 Preliminary Site Investigations throughout BC.

Mr. Chris Chu, P. Eng., conducted the final review of this report. Mr. Chu has over 15 years of experience in conducting and managing Stage 1 and 2 Preliminary Site Investigations, Detailed Site Investigations and site remediation projects.

1.5 SCOPE OF WORK

EBA's scope of work for the Stage 1 PSI included the following:

- Conducted a visual observation of the Property and the surrounding areas to identify sources of possible contamination or environmental impairment, and to determine the presence and specific locations of any critical environmental features;
- Reviewed aerial photographs, land title, and previous environmental report about the Property to determine previous site occupancy and activities;
- Investigated and collected relevant information pertaining to environmental concerns about the Property from the Regional District of Central Kootenay (RDCK) and British Columbia Ministry of Environment (MoE);
- Reviewed available published geological and hydrogeological information;
- Interviewed the individual who is familiar with the Property to obtain background information on past operating practices.

The scope of work for this Stage 2 PSI included the following:

- Clearance of underground services prior to the field investigation program by contacting BC One Call and retaining an independent utility locator (One Call Locators Canada Ltd);
- Completed drilling investigations by advancing four boreholes, logging soil stratigraphy and collecting soil samples;
- Submitted selected soil samples to an accredited laboratory for chemical analyses of appropriate Contaminated Sites Regulation (CSR) regulated substances – extractable petroleum hydrocarbons (EPH); light and heavy extractable petroleum hydrocarbons (LEPH and HEPH), polycyclic aromatic hydrocarbons (PAH), benzene, toluene, ethylbenzene, xylenes, and styrene (BTEXS), and volatile petroleum hydrocarbons (VPH);
- Completed the four boreholes as monitoring wells. Developed, purged and sampled all monitoring wells and collected groundwater samples for analyses of selected parameters. Submitted groundwater samples to a laboratory for testing of CSR regulated substances – extractable petroleum hydrocarbons in water (EPHw); light and heavy extractable petroleum hydrocarbons in water (LEPHw and HEPHw), PAH, BTEXS, volatile petroleum hydrocarbons in water (VPHw), volatile hydrocarbons in water (VHw), methyl tertiary butyl ether (MTBE), and dissolved metals.
- Collected a tap water sample for analysis of EPHw, VPHw, BTEXS, MTBE, and PAH.
- Assessed the analytical test results of soil and groundwater with respect to standards published by BC MoE and presented in the CSR.

This comprehensive report was prepared which outlines the findings of the Stage 1 and 2 PSI, and presents our conclusions and recommendations.

2.0 SITE DESCRIPTION

2.1 LOCATION, LEGAL DESCRIPTION, SIZE AND OWNERSHIP

The civic address, legal description, parcel identification number (PID), size, and ownership of the Property are summarized in Table A.

Municipal Address	Legal Description	PID	SIZE	Owner(s)
8741 and 8745 Hwy 3 and 95, Yahk, BC	Plan 110831-I, DL 15452, Parcel B, KD	009-676-082	3.41 acres (13,800 m ²)	San-Dex Enterprises Ltd.

Note: 8745 Hwy 3 and 95 is the civic address for the residence

The BC Water Resources Atlas (WRBC) website under the MoE contains global position for properties within the province of British Columbia. The approximate global position of the Property obtained from WRBC is:

Latitude: 49° 04' 49.10" North

Longitude: 116° 05' 59.45" West

A General Property Location Plan is provided as Figure 1. A Property and Surrounding Land Use Plan is provided as Figure 2.

2.2 SURFICIAL GEOLOGY

The publication "Geological Survey, Cranbrook, Kootenay District, British Columbia" by S.J. Schofield (1915) indicates that soils in the area of the Property consists of Aldridge formation which are characterized by a thick sequence of fine-grained siliciclastic rocks deposited largely by turbidity currents. Based on the review of the previous environmental investigation report, soils on the Property are mainly sand and gravel with cobbles.

2.3 TOPOGRAPHY

Surface topography can influence the direction of migration of contaminants at the soil surface. The local topography is the topography at the subject Property, whereas regional topography is the overall expression of the surface in a given region. The local topography of the subject Property is generally flat with surface drainage to the south towards Moyie River. The regional topography slopes downward to the south.

2.4 REGIONAL HYDROGEOLOGY AND HYDROLOGY

Groundwater is significant as a potential means of contaminant transport. Regional groundwater flow is the overall direction of groundwater flow in a given region. The nearest aquatic receptor is the Moyie River which flows in a westerly direction and located at the edge of the southern Property boundary. Local shallow groundwater flow is inferred to be in a southwesterly direction towards Moyie River.

In coarse-grained soils such as sand and gravel, contaminants will, in general, travel faster in comparison with fine-grained soils such as silt and clay. The inferred regional groundwater flow to the southwest indicates that any sub surface contamination in the Property area may be expected to migrate in a southwesterly direction. Primary concern should, therefore, be given to potential sources of contamination northeast of the Property, while sources in other areas should be of lesser concern.

2.5 CLIMATE

According to data gathered by Environment Canada at the Creston area, normal annual precipitation for the area is approximately 631 mm. Approximately 486 mm of this total is rainfall, with the remainder as snowfall.

3.0 STAGE 1 PRELIMINARY SITE INVESTIGATION

3.1 HISTORICAL REVIEW

EBA conducted a historical review of the Property using available aerial photographs, land titles, RDCK files, and information on file at selected provincial regulatory agencies. This section documents the findings of the review and provides a summary of potential historical areas of environmental concern for both the Property and the surrounding area.

3.1.1 Aerial Photographs

EBA reviewed aerial photographs dated 1945, 1969, 1972, 1974, 1980, and 2000 of the Property area to identify previous site uses and the sequence of development of the area. The following Table B summarises visible features in the reviewed aerial photographs.

Year	Subject Property	Off Site to the North	Off Site to the South	Off Site to the West	Off Site to the East
1945	A small building and access road from Hwy 3 and 95 and largely forested.	Hwy 3 and 95 and beyond Railway Avenue and Canadian Pacific Railway (CPR) track observed.	Moyie River and beyond forested.	Appeared to be forested.	Rows of stored materials observed at the northern portion of the site while the southern portion was forested.

TABLE B: HISTORICAL AIRPHOTO SUMMARY					
Year	Subject Property	Off Site to the North	Off Site to the South	Off Site to the West	Off Site to the East
1969	Four sheds observed in addition to the building observed in 1945 and the rest of the Property appeared forested.	No significant changes from 1945.	Moyie River and beyond forested.	No significant changes from 1945.	No significant changes except for part of the northern portion of the site appeared vacant.
1972	No significant changes except for the addition of two more shed like structures.	No significant change from 1969.	Moyie River and beyond forested.	No significant change from 1969.	Appeared occupied by a building, two sheds, and two trailers and largely forested.
1974	No significant changes from 1972.	No significant changes from 1972.	Moyie River and beyond forested.	No significant changes from 1972.	No significant changes from 1972.
1980	No significant changes from 1974.	No significant changes from 1974.	Moyie River and beyond forested.	No significant changes from 1974.	No significant changes from 1974.
2000	A residence observed east of the building observed in 1945 and several shed like structures observed scattered around the Property. (Due to poor visibility of the aerial photograph, physical features of the gas station were not clear).	No significant change from 1980.	Moyie River and beyond forested.	Occupied by a residence and largely forested.	No significant change from 1980.

The aerial photograph review indicated that a building had occupied the Property from at least the mid 1940s. A residence was constructed between 1980s and 2000 to the east of the store building. No indication of the gas station was identified clearly from the aerial photographs due to blurred images. The adjacent sites to the east and west were developed in the 1970s and 1990s or 2000, respectively. No major commercial or industrial sites were identified in the immediate vicinity of the Property.

3.1.2 City Directories

No city directories were available for the Yahk area.

3.1.3 Fire Insurance Plans

Based on a search of the UBC Special Collections catalogue, no fire insurance maps are available for Yahk, BC and the area of the Property.

3.1.4 Previous Environmental Report

EBA conducted a "Phase 2 Geo-Environmental Hydrocarbon Investigation of the Grouse Mountain Variety Store, Yahk BC" dated August 11, 1994, completed for Federal Business Development Bank (FBDB), (EBA File No. 0808-88795). The investigation and findings summary is presented below.

The objective was to investigate the areas of the two USTs (current USTs) that were installed in 1989 for petroleum hydrocarbon contamination. Four boreholes were advanced at the USTs location, soil samples were collected, and selected soil samples were tested for benzene, toluene, ethylbenzene, and xylene (BTEX) and light hydrocarbons. Based on the chemical analysis of the soil samples, the results were below the method detection limits and therefore below the CSR standards at that time. The report concluded that soil quality met the CSR standards in the area of the USTs location.

The 1994 report indicated that Morrow Recovery Systems Inc. completed an assessment of the former USTs location and the Morrow Recovery Systems Inc. investigation concluded that the site was not contaminated. However, the Morrow Recovery Systems Inc. report was not found on file or provided to EBA by the client during this investigation.

3.1.5 Regulatory Information

Regional District of Central Kootenay (RDCK) — EBA visited the RDCK office in Nelson, BC to obtain and review historical and current permit documents pertaining to the Property. According to the information obtained from the RDCK the only permit document they have on file is a building permit issued on March 16, 1995 to construct a gazebo. Also, no historical drawings for the Property were found documented.

According to the RDCK the Property has two civic addresses, one for the Store (8741 Hwy 3 and 95) and another for the manufactured home used as a residence (8745 Hwy 3 and 95). According to the RDCK the Property and surrounding areas do not have zoning designation as they are in unincorporated rural area.

However, based on the current use of the Property as a general store, fuel retail service, camping ground, liquor retail, and residence, the Property use is considered to be commercial as well as residential.

Provincial – Groundwater Well Database — a search of the provincial groundwater well database administered by the BC Water Resources Atlas (WRBC) website under the MoE

revealed that over 25 groundwater wells are registered within a 1.5 km radius of the Property. Most of these wells are located either up-gradient or cross-gradient with respect to the inferred groundwater flow direction and the Property. No groundwater well was found on the Property based on the WRBC database search. However, one groundwater well used for domestic purpose was found on the Property during the site reconnaissance. The provincial groundwater well search results and selected detail well records are included in Appendix A.

Provincial - BC Online Site Registry — The MoE maintains a database called the Site Registry that contains environmental information pertaining to contaminated or potentially contaminated sites. The Site Registry documents milestones in the cleanup process of a site. The Site Registry contains information on sites that have been investigated and cleaned up in BC since 1988 (when MoE began recording this activity). All of the information is accessible to the public.

The Site Registry is not a registry solely of contaminated sites. Some sites in the registry are contaminated, but most are simply being investigated and require little, if any, cleanup or they have already been cleaned up to government standards. The lack of information on a particular site does not indicate an absence of contamination, but only an absence of MoE documentation.

The Site Registry database can be searched on the basis of geographic location or PID. EBA conducted an area search for registered sites in a 0.5 km radius of the Property. A search conducted using this online database for a region within a 0.5 km radius of the Property resulted in no records.

A copy of the Site Registry search result is included in Appendix B.

3.1.6 Interviews

An onsite interview was conducted with Mr. Crawford, the owner of the Property, during the site reconnaissance. According to Mr. Crawford, he purchased the Property in 1996 and continued the business practice as the previous owner. The Property is known as "Grouse Mountain Variety Store" and the operations include fuel dispensing facility, groceries retail, souvenir retail, liquor outlet, Greyhound service, and camping ground. According to Mr. Crawford, he did not renovate, alter, or demolish any buildings after he purchased the Property. He also indicated that he is not aware of the presence of heating oil USTs or any other kinds on the Property except for the gasoline and diesel USTs that exist in front of the store. According to him, electricity and natural gas have been the source of heating for the buildings on the Property. During the site reconnaissance EBA observed natural gas meter and baseboard heaters on the Property.

Mr. Crawford indicated that the USTs have never been pressure tested for leak since he purchased the Property in 1996. He also indicated that two years ago flood entered into the

diesel UST and it was pumped out by a company in Cranbrook. He did not recall the amount of diesel and water pumped out at that time.

In addition, Mr. Crawford indicated that he is not aware of chemical or petroleum hydrocarbon products spill or leak on the Property in the past.

3.2 SITE RECONNAISSANCE

Mr. Haile Habtegiorgis of EBA performed a site reconnaissance of on July 23, 2009 accompanied by Mr. Dexter Crawford. Access to all areas of the Property was granted to EBA.

The site reconnaissance involved a visual observation of the surface of the Property, including any stains or suspect materials on-site, a visual review of accessible areas inside the on-site buildings (residence, store, storage sheds, and workshop), outside areas, and an assessment of the current conditions of vegetated areas on the Property. A walkover was conducted on neighbouring sites via publicly accessible areas to assess if there were any environmental concerns with the potential to adversely impact the soil and groundwater quality beneath the Property. Photos taken during the site reconnaissance of the Property and immediate surroundings are included in Appendix C.

3.2.1 General

The subject Property is located along Hwy 3 and 95 within the townsite of the unincorporated area of Yahk. The site fronts along Highway 3 and 95 and backs onto Moyie River. The Property is rectangular in shape and covers an area of 3.41 acres. Access to the Property is available through Highway 3 and 95. Currently the Property consists of a store building, a residence (mobile home), storage sheds, workshop, shower and washroom building for campers, open kitchen, and pump house. The operations on the Property include retail of souvenirs, groceries, liquor, propane, fuel (gasoline and diesel) dispensing, camping ground, and bus depot (Greyhound service). The Property is commonly known as "Grouse Mountain Variety Store". A large portion of the Property is used as a camp site. Approximately 30% of the Property is occupied by the buildings or paved/graded with sand and gravel while the remaining 70% is grassed/vegetated camp site. The site is served with a groundwater well used as a potable water source. The Property utilizes a septic system and the septic disposal field is located to the south of the store building in the camping ground. In general, the Property is used for residential and commercial purposes.

3.2.2 Aboveground Storage Tanks (ASTs) and Underground Storage Tanks (USTs)

Four propane ASTs (two used for heating the coin operated shower which are used by campers, one standby for the generator and another for retail of propane) were observed on the Property during the site visit. According to Mr. Crawford, no other ASTs are present on the Property.



Two USTs (gasoline and diesel) are located to the north of the store and the pump island. The gasoline UST is approximately 23,000 litres in capacity while the diesel UST is 13,000 litres. Both USTs are made of fibreglass. Reportedly the USTs were installed in 1989 by Rudy's Petroleum Services Ltd. based in Kelowna, BC.

The August 11, 1994 report identified two former USTs on the east side of the store. No information about the investigation or the proper decommissioning of these USTs was available to EBA during this investigation. Mr. Crawford is not aware of the use of such USTs on the Property.

3.2.3 Hazardous Materials, Wastes and Waste Disposal

Small quantities of automotive fluids in small containers were observed on a shelf inside the store and storage area for retail during the site visit. No evidence of leaks or surficial staining was observed in the area of the automotive fluids. According to Mr. Crawford, general refuse is collected by his staff and taken to Yahk Community Centre for disposal in Cranbrook. Waste bins and recycling bins were observed on the Property during the site visit.

Scattered various materials such as wooden logs, antifreeze in a small container, gasoline in a small container, pieces of metals, old tires, empty barrels, and old vehicles were observed and stored around the Property. Even though no obvious evidence of negligent acts or illegal dumping was observed during the site visit, the housekeeping of the Property needs to be improved.

3.2.4 Surficial Staining

During the site reconnaissance, no obvious surficial staining was observed on the Property, either within the buildings accessed or around the outside of the buildings.

3.2.5 Waste Discharges

No storm water catch basins and floor drains inside the store building were observed on the Property during the site visit. The Property utilizes a septic system and the septic disposal field is located to the south of the store in the camping ground. A sani dump used by campers was observed to the south of the building beside the septic disposal field. According to Mr. Crawford the sani dump is also used by others for a fee.

3.2.6 Fill Areas

Based on the review of available historical information and the site reconnaissance, there was no visual evidence of a significant amount of fill other than structural fill beneath the buildings and asphalt paved areas on the Property. According to Mr. Crawford, he is not aware of the presence of fill material on the Property. Small piles of sand and gravel were observed during the site reconnaissance and according to Mr. Crawford the sand and gravel is used for during winter time for the gravel surfaced road on the Property.



3.2.7 Asbestos Containing Materials (ACMs), Lead-Based Paints and Polychlorinated Biphenyls

The following is a brief summary of potentially hazardous building materials that may exist within the store building. Intrusive investigation and sampling of potentially hazardous building materials is not within the scope of this Stage 1 PSI. Based on the date of construction of the store building on-site the following notes/remarks are made:

- Construction materials used prior to the late 1970s were known to possibly contain asbestos. Asbestos is considered a health hazard if it is friable, airborne, and exposed to humans. No sampling was undertaken, at the time of the site visit, to confirm or refute, the existence of ACMs on the Property. Based on the age of the building onsite (constructed prior to 1940s), it is possible that building materials (i.e., floor, walls, ceiling and piping) contain asbestos. Sampling and analysis of any suspect materials is recommended prior to any future building renovation or demolition.
- Lead can be associated with paints, plumbing solder, pipes and other products such as wall shielding in x ray rooms. Lead based paint was withdrawn from the market in the late 1970s. If present, lead based paint is likely concealed beneath multiple layers of paint applied over the years during renovations. Lead based paint and plumbing equipment are not a direct health risk when concealed (sealed behind layers of non lead paint) and/or in good condition. It should, however, be considered when planning future renovations, when particles from lead based paint could be released and/or ingested in the course of the work. Based on the age of the building onsite, it is possible that lead is present in the paint and plumbing pipes and solders in the original building materials at the Property.
- The Federal Environmental Contaminants Act (1976) has restricted the use and controlled the phase out of polychlorinated biphenyls (PCBs) in Canada. Additionally, the storage and disposal of PCBs is regulated. The Act prohibited the use of PCBs in electrical equipment installed after July 1, 1980. PCBs are commonly found in light ballasts, electrical transformers (pole or ground mounted) and various other types of electrical equipment (i.e., rectifiers) dating back to the early 1980s or earlier. Fluorescent bulbs were observed inside the store and the residence during the site visit. Based on the age of the building onsite, PCBs could be present in building electrical equipment. PCB containing light ballasts or electrical equipment should be disposed of appropriately at the end of their useful life.

3.2.8 Surrounding Land Use (Offsite Observation)

EBA viewed publicly accessible and visible portions of adjacent land as part of the site visit to identify surrounding land use and activities of potential environmental concern. The following Table C summarizes the surrounding land use.

TABLE C: SURROUNDING LAND USE				
Observation	North of Property	South of Property	West of Property	East of Property
Land Use	Hwy 3 and 95 followed by CPR rail track	Moyie River and beyond forested	Residence	Motel
Zoning	-	-	Unzoned - unincorporated rural area	Unzoned - unincorporated rural area
Business Name(s)	-	-	Private	Yahk Motel
Address(es)	-	-	8715 Hwy 3 and 95	8769 Hwy 3 and 95

During the site reconnaissance, no major commercial or industrial sites with the potential to impact the subsurface of the Property were found in the immediate vicinity of the Property.

3.3 SUMMARY OF THE STAGE 1 PRELIMINARY SITE INVESTIGATION (PSI)

3.3.1 General

In general terms, there are two distinct types of potential environmental risk to any property. The first type of risk is from potential contamination from on-site land use. This would include potential accidental spills or site practices that may contaminate the Property directly. The second type of risk is from contamination caused by adjacent site owners, which might then be transported through the subsurface soils by groundwater, or in overland runoff onto the Property.

3.3.2 Potential for Impairment from On-Site Sources

Anecdotal information indicated that the Property had been used as a general store and gas station since the early 1930s. Two former USTs were located to the east side of the store which were removed in the late 1980s. Currently two gasoline and diesel USTs installed in 1989 and pump island are located to the north of the store.

Based on interviews conducted, information reviewed during this investigation, visual observations made during the site visit, and current activities and management practices at the Property, there are two on-site sources (former UST location and current gas retail operation with two USTs and pump island) that might have potential to cause significant environmental impairment to the Property. Therefore, current and historical Property uses are suspected to be APECs.

Table D below summarizes the APECs and their associated potential contaminants of concern (PCOCs).

TABLE D: ON-SITE APECS AND PCOCS			
No.	On-site APEC	Information Source	EBA Evaluation
APEC #1	Former use of USTs for fuel retail (gasoline and diesel)	Review of previous environmental report	Potential to impact soil and groundwater quality at the Property due to the release of hydrocarbon products as a result of former fuel storage and dispensing of fuel. The PCOCs include: BTEXS, VPHs, MTBE, EPH, LEPH, HEPH, PAHs, and metals.
APEC #2	Current use of two USTs for storage of gasoline and diesel and fuel pumps (fuel retailing operation)	Interview and site reconnaissance	Potential to impact soil and groundwater quality at the Property due to the current storage and dispensing of fuel. The PCOCs include: BTEXS, VPHs, MTBE, EPH, LEPH, HEPH, PAHs, and metals.

3.3.3 Potential for Impairment from Off-Site Sources

Prior to 1970s the surrounding area was either forested or undeveloped. Generally the surrounding area appeared to be sparsely developed starting from early 1970s and largely remain unchanged. No commercial or industrial sites with the potential to impact the subsurface of the Property were found in the immediate vicinity of the Property. Current and historical surrounding land uses are not suspected to be areas of potential environmental concern to the Property.

Based on the age of the building on-site, hazardous building materials may present within the building materials. Therefore, if renovation or demolition of the store building is considered, it should proceed in accordance with the BC Occupational Health and Safety Regulation, BC Hazardous Waste Regulation and Federal Transportation of Dangerous Goods (TDG) Act.

Based on the Stage 1 PSI findings, EBA recommends a Stage 2 PSI be conducted to confirm or refute the presence of potential subsurface contamination due to current and historical land uses at the Property.

Subsequent sections of this report describe the Stage 2 PSI, which investigated the on-site APECS.

4.0 STAGE 2 PRELIMINARY SITE INVESTIGATION (PSI)

The Stage 2 PSI consisted of drilling investigation, installation of four groundwater monitoring wells, and soil and groundwater sampling programs to assess the soil and groundwater conditions. Mr. Haile Habtegiorgis of EBA monitored the drilling investigations and monitoring well installation, logged the soils encountered and collected soil and groundwater samples for laboratory analysis.



The methodologies completed as part of this assessment generally followed the MoE Guidance Document 1 "Technical Guidance on Contaminated Sites – Site Characterization and Confirmation Testing".

The following sections summarize the investigation of the on-site APECs described under Section 3.3.2.

4.1 INVESTIGATION METHODOLOGY

The following sections discuss about the sampling analysis program, boreholes drilling, monitoring wells installation, soil samples collection, well development and sampling methods. In addition, tap water sample was collected from inside the store to assess the impact of gas retail operation on the domestic groundwater well on-site.

4.1.1 Sampling Analysis Program

The complete soil and groundwater sampling and analysis program undertaken during the Stage 2 PSI to address the identified APECs and PCOCs are summarized as follows in Table F. In addition, tap water sample was collected from inside the store to assess the impact of fuel dispensing operation on the domestic groundwater well on-site.

APEC and Location	Description	Stage 2 Field Investigation	Analyses	
		Investigation Locations	Soil	Groundwater
APEC #1 - Onsite	Former USTs location to the east of the store building	09BH01	EPH, LEPH/HEPH, BTEXS, and VPH	EPHw, LEPHw/HEPHw, BTEXS, MTBE, VPHw, and dissolved metals
APEC #2 - Onsite	Current USTs and pump island location	09BH02, 09BH03, and 09BH04	EPH, LEPH/HEPH, PAH, BTEXS, and VPH	EPHw, LEPHw/HEPHw, PAH, BTEXS, MTBE, VPHw, dissolved metals

The locations of the boreholes and monitoring wells are shown on Figure 3.

4.1.2 Borehole Drilling and Collection of Soil Samples

Mr. Haile Habtegiorgis, M.Sc, CEPIT, EIT monitored the boreholes drilling and the well installation program, logged the soils encountered, and collected soil samples for laboratory analysis. Borehole drilling and monitoring well installations were completed on August 11 and August 12, 2009.

Due to the presence of gravel and cobble material, the boreholes were advanced using a Foremost DR24 Air Rotary drill rig supplied by JR Drilling Ltd. of Cranbrook, BC.

Boreholes were advanced to a maximum depth of 10.30 m below the ground surface. Soil samples were collected from the split spoon sampling device at a depth of 0.76 m and drill cuttings from the discharge hose and cyclone approximately at every 1.5 m intervals.

Soil samples were collected into clean, labelled jars, equipped with Teflon lids. All sampling locations were recorded. Soil samples were selected for analysis based on the sampling methodology, sample collection depth with respect to the water table, headspace vapour concentrations, and field evidence of contaminants. As the 50 mm diameter split spoon sampler was unable to retrieve coarse gravel sample, disturbed soil samples were collected from the drill cuttings from the discharge hose and cyclone. However, the disturbed soil samples collected at depths greater than 0.76 m (except for soil sample 04-F collected from split spoon sampler) were not selected for laboratory analysis. The selected soil samples were submitted, under chain of custody, in coolers, on ice, to CanTest Ltd. laboratory in Burnaby for analysis of selected PCOCs, using analytical methods approved by the MoE. CanTest is accredited by the Canadian Association for Environmental and Analytical Laboratories (CAEAL).

Headspace vapour concentrations were measured in the soil samples obtained, concurrent with collecting the samples to be submitted for analysis. The headspace samples were stored in a sealed plastic bag, and the measurements were obtained using a GasTech vapour analyzer. Headspace vapour emission (HVE) measurements are indicated on the borehole logs in Appendix D.

To minimize the potential for cross contamination EBA's field representative wore fresh sampling gloves for each new soil sample collected.

All of the boreholes were completed as monitoring wells. Monitoring well installation methods are described in the following section. Environmental conditions observed at each borehole location are described in Section 4.2.

4.1.3 Monitoring Well Installation

The installation of groundwater monitoring wells was completed by JR Drilling Ltd. at borehole locations as instructed by EBA. Monitoring wells were installed following drilling. The monitoring well locations are shown on Figure 3.

The monitoring wells were constructed using 50 mm diameter, screw-jointed Schedule 40 polyvinyl chloride (PVC), which was factory washed and bagged to prevent contamination. Each well was constructed using a length of machine-slotted screen (0.010 inch openings) below unslotted riser pipe. The screen was surrounded by a silica sand filter pack where native soils had not sloughed in around the screen. The silica sand filter pack extended to approximately 0.3 m above the top of the screen. Bentonite pellets were placed above the sand. All boreholes were sealed at the surface with bentonite and completed with flush mounted monuments. Well completion details are shown on the borehole logs in Appendix D.



4.1.4 Well Development and Sampling Methods

Prior to purging and sampling, each monitoring well was developed to remove water and sediment introduced during the well installation process. EBA developed the monitoring wells using Twister Pump (submersible pump) on August 13, 2009. Well development continued until the produced water cleared and a volume of water equivalent to a minimum of six well volumes or more was removed from each well.

Prior to groundwater sampling on August 13, 2009, groundwater was purged from each well using submersible pump until measurement of groundwater temperature, conductivity, and pH varied by less than 10% and at least three well volumes had been removed. All groundwater samples were collected with a bailer immediately following purging.

Groundwater samples were placed in clean labelled bottles supplied by the laboratory. The sample bottles were subsequently placed in a cooler with ice and transported under chain of custody procedures to CanTest for analysis.

Standard EBA procedures were followed during the groundwater sampling process to minimize the potential for cross-contamination between wells. Water samples for EPHw, LEPHw, HEPHw, and PAH analyses were not filtered, nor were preservatives added to these samples by EBA. Water samples for volatile organic compounds analyses including BTEXS, VPHw, and MTBE parameters were preserved using laboratory supplied and measured aliquots of sodium bisulfate. Water samples for dissolved metal analyses were field filtered using a 0.45 micron filter and preserved using laboratory supplied and measured aliquots of nitric acid.

4.2 SOIL AND GROUNDWATER CONDITIONS

4.2.1 Soil Conditions

A detailed description of the soil stratigraphy encountered at each borehole locations is presented in borehole logs in Appendix D. In general, soil conditions encountered on the Property consisted of sand, gravel and cobbles. Increased gravel and cobbles content were encountered with increase in depth. Similar soil types were encountered at all borehole locations. No hydrocarbon staining or odour was noted during drilling except for 09BH02 and 09BH04 (no staining but hydrocarbon odour only) locations.

4.2.2 Groundwater Conditions

No hydrocarbon odour or sheen was observed during well development and purging except for monitoring well 09BH04. Hydrocarbon sheen was observed during well development (the first 10 litre removed) and as the amount of water removed increased, no sheen was observed. Also, at 09BH04 hydrocarbon sheen was noted in the split spoon sampler during drilling and soil sampling at the water table.

EBA measured the depth to groundwater levels on August 13, 2009. The monitoring wells were surveyed relative to a temporary benchmark identified as the top of southeast corner

of wood frame for the sign post to the north of the current USTs location, given an elevation arbitrarily set at 100.000 m to aid in the interpretation of the groundwater flow direction.

Groundwater levels in all monitoring wells on the Property were measured using an electronic water level meter. Depths to groundwater ranged from 6.42 m to 6.59 m below ground surface. The borehole and groundwater elevation data are presented in Table 1.

Based on the groundwater depth measurements and monitoring well casing survey, the groundwater flow direction was measured to be in a southwest direction. As noted in Section 2.3, the inferred regional groundwater flow direction is to the southwest, towards Moyie River.

4.3 SOIL AND GROUNDWATER QUALITY ASSESSMENT STANDARDS

Standards used in the assessment of contaminated sites are contained in the Contaminated Sites Regulation (CSR, BC Reg. 375/96 including amendments up to BC Reg. 343/2008, January 1, 2009).

Schedule 4 of the CSR provides generic numerical standards for the assessment and remediation of soil. Generic standards depend solely on land use. Schedule 5 of the CSR provides matrix numerical standards for soil. Schedule 6 of the CSR provides generic numerical standards for the assessment and remediation of groundwater, which are based on water use.

4.3.1 Soil Quality Assessment Standards

As the Property use is residential and commercial, the analytical test results were compared to the CSR Residential (RL) and Commercial (CL) Land Use Standards (Generic Numerical and Matrix Numerical Standards).

Standards specified by the CSR for LEPH and HEPH for soil and groundwater stipulate that both be corrected for selected PAH, as defined in Schedules 4 and 6 of the CSR. EPH concentrations in soil are not directly regulated by the CSR. However, the related parameters of LEPH and HEPH are regulated by the CSR. EPH is related to LEPH and HEPH by the following equations:

LEPH = Light EPH ($C_{10} - C_{19}$)-select polycyclic aromatic hydrocarbons

HEPH = Heavy EPH ($C_{19} - C_{32}$)-select polycyclic aromatic hydrocarbons

For soil analyses, light EPH and heavy EPH have been used interchangeably with LEPH and HEPH respectively based on the interpretation that the concentrations of the select polycyclic aromatic hydrocarbons (PAHs) are negligible. The use of light and heavy EPH provides a conservative comparison to the CSR soil standards for LEPH and HEPH. This methodology is consistent with MoE's interim equivalency of EPH and LEPH/HEPH.



The site specific factors of toxicity to soil invertebrates and plants, human intake of contaminated soil, groundwater used for drinking water, and groundwater used by aquatic life were used in determining the CSR Matrix Numerical soil standards.

4.3.2 Groundwater Quality Assessment Standards

An on-site groundwater well is used for domestic purposes on the Property. Therefore, the CSR Drinking Water (DW) Standards are considered applicable to the Property. Also, the nearest surface water body to the Property is the Moyie River, which is located to the south of the Property boundary. Therefore, following technical guidance provided by MoE, groundwater standards for the protection of aquatic life (AW) are considered applicable to the Property.

4.4 DISCUSSION OF ANALYTICAL RESULTS

The analytical results and the relevant CSR standards for the soil and groundwater assessment are summarized in Tables 2 to 4.

Copies of the analytical laboratory reports from CanTest have been included in Appendix E for reference.

The following sections summarize the findings of this investigation for each APEC, based on the sampling and analysis results.

4.4.1 APEC #1 – Former USTs Location (09BH01)

Results of Petroleum Hydrocarbons in Soil

One soil sample (sample ID 01-A) collected at a depth of 0.76 m was analyzed for petroleum hydrocarbon related parameters (EPH, BTEXS, VPH, LEPH, and HEPH). Based on the results of analyses, concentrations of petroleum hydrocarbon related parameters were all less than the laboratory detection limit and the CSR RL and CL standards except for EPH₁₉₋₃₂. EPH₁₉₋₃₂ concentration of 820 µg/g was detected which is less than the CSR RL and CL standards of 1000 µg/g and 2000 µg/g, respectively.

Results of Petroleum Hydrocarbons in Groundwater

A groundwater sample collected from monitoring well 09BH01 was analyzed for petroleum hydrocarbon parameters (EPH_w, LEPH_w, HEPH_w, VPH_w, BTEXS, and MTBE). Based on the results of analysis, concentrations of petroleum hydrocarbons were less than the laboratory detection limits and therefore less than the CSR AW and DW standards.

Results of Dissolved Metals in Groundwater

A groundwater sample collected from monitoring well 09BH01 was analyzed for dissolved metals and most results were below the detection limit used by the laboratory and the CSR AW and DW standards. The exception is that dissolved manganese concentration of 0.37 mg/L was detected which exceeded the CSR DW standard of 0.05 mg/L. However, the DW standard is to protect against the taste and odour concerns only.

4.4.2 APEC #2 – Current USTs and Pump Island Operation (09BH02, 09BH03 and 09BH04)

Results of Petroleum Hydrocarbons in Soil

Five soil samples (sample ID 01-A, 02-A, 03-A, and 04-A collected at 0.76 m, and 04-F at 7.01 m depths) were analyzed for petroleum hydrocarbon related parameters (EPH, BTEXS, VPH, LEPH, and HEPH). Sample ID 04-A was also analyzed for PAHs. Based on the results of the analyses, concentrations of petroleum hydrocarbon related parameters were all less than the laboratory detection limits and therefore below the CSR RL and CL standards. Detectable concentrations of hydrocarbon parameters are as follows:

- 820 µg/g of EPH_{19,32} for 01-A;
- 670 µg/g of EPH_{19,32} for 02-A;
- 280 µg/g of EPH_{10,19} and LEPH for 04-A; and
- 370 EPH_{19,32} and HEPH for 04-A.

All results were less than the CSR RL standards of 1000 µg/g and CSR CL standards of 2000 µg/g for EPH_{10,19} and LEPH, and 5000 µg/g standards of EPH_{19,32} and HEPH, respectively.

PAHs concentrations were less than the laboratory detection limits and therefore below the CSR RL and CL standards for sample ID 04-A.

Results of Petroleum Hydrocarbons in Groundwater

Groundwater samples collected from monitoring well 09BH02, 09BH03, and 09BH04 were analyzed for petroleum hydrocarbon parameters (EPH_w, VPH_w, BTEXS, and MTBE). Also, groundwater from 09BH04 was analyzed for LEPH_w, HEPH_w, and PAHs. Below are details of the analysis:

- EPH_{w10,19}, EPH_{w19,32} concentrations of groundwater analyzed from all wells were below the method detection limits used by the laboratory and therefore below the CSR AW and DW standards. There are no CSR AW and DW standards for EPH_{w19,32}.
- Groundwater from 09BH04 was analyzed for LEPH_w, HEPH_w, and PAHs and the results were below the method detection limits used by the laboratory and therefore below the CSR AW and DW standards.
- VH_{6,10} and VPH_w concentrations of 420 µg/L and 210 µg/L, respectively were detected for groundwater analyzed from 09BH02. Groundwater from 09BH02 had a 13 µg/L concentration of ethylbenzene which exceeded the CSR DW standard of 2.4 µg/L.
- Toluene concentrations of 4.3 µg/L and xylene concentration of 190 µg/L were detected in groundwater sample from 09BH02 which meet the CSR DW standards of 24 µg/L and 300 µg/L, respectively. No CSR AW standard for xylene.

- Concentration of 0.3 µg/L of xylene was detected in groundwater analyzed from 09BH03 and meets the CSR DW standard of 300 µg/L.
- MTBE concentrations were less than the laboratory detection limits in groundwater analyzed from the four monitoring wells and therefore below the CSR AW and DW standards.

Results of Dissolved Metals in Groundwater

A groundwater sample collected from monitoring well 09BH04 was analyzed for dissolved metals and the results were below the CSR AW and DW standards. The exception are that dissolved iron concentration of 1.14 mg/L and dissolved manganese concentration of 0.63 mg/L were obtained which exceeded the CSR DW standards of 0.3 mg/L and 0.05 mg/L, respectively. However, the DW standard is to protect against the taste and odour concerns only. There are no CSR AW standards for dissolved iron and manganese.

4.4.3 Tap Water from the Onsite Groundwater Well

Tap water sample was collected from inside the store and analyzed for EPHw, VPHw, BTEXS, and MTBE for impacts on the onsite groundwater well due to fuel dispensing facility. Analytical results indicated that EPHw₁₀₋₁₉ and EPHw₁₉₋₃₂ were less than the laboratory detection limits and therefore below the CSR AW and DW standards of 500 µg/L and 5000 µg/L, respectively for EPHw₁₀₋₁₉. There are no CSR AW and DW standards for EPHw₁₉₋₃₂.

Also, analytical results indicated that VHw₆₋₁₀ and VPHw were less than the laboratory method detection limits and therefore below the CSR AW standards of 15000 µg/L for VHw₆₋₁₀ and 1500 µg/L for VPHw. There is no CSR DW standard for VPHw.

Analytical results of benzene, toluene, styrene, and MTBE indicated that the concentrations of these parameters were less than the laboratory detection limits and therefore below the CSR AW and DW standards. There is no CSR DW standard for styrene. Ethylbenzene concentration of 0.2 µg/L was detected but less than the CSR AW and DW standards of 2000 µg/L and 2.4 µg/L, respectively. Xylene concentration of 2.4 µg/L was detected but below the CSR DW standard of 300 µg/L. There is no CSR AW standard for xylene.

4.5 DISCUSSION OF QUALITY ASSURANCE / QUALITY CONTROL (QA/QC)

EBA's field procedures are designed to minimize the potential for sampling bias in the field.

EBA's QA/QC protocols for Stage 2 PSI included, but were not limited to:

- adhering to standard EBA quality management system (QMS) field and record keeping procedures;
- using new disposable contaminant-specific gloves when collecting each sample;
- placing samples in appropriate new and labelled laboratory-supplied containers;

- properly preserving samples and transporting the samples to the analytical laboratory in an ice filled cooler;
- keeping detailed field notes and accurately recording sample locations;
- completing chain-of-custody forms for all samples submitted for laboratory analyses;
- analyzing the samples within the recommended holding time following their collection, at a laboratory accredited by the Canadian Association for Environmental and Analytical Laboratories (CAEAL);
- requiring that one person who did not compile the tables appearing in this report review the tables and compare the tabulated analytical results with the original information appearing on the laboratory certificates and information on the chain-of-custody forms to verify the accuracy of the information in the tables; and,
- requiring that a senior EBA professional review this report to verify that it meets EBA investigation and reporting standards.

CanTest, as part of its internal QA/QC procedures, tests for the potential of systematic bias in its analyses. EBA understands that no such bias associated with the analysis for this project has been identified by CanTest.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The Stage 1 PSI identified two onsite APECs for the Property:

- APEC #1 - Former USTs location, and
- APEC #2 - Current USTs and pump island location.

The Stage 2 PSI assessed these APECs by advancing four boreholes, installing groundwater monitoring wells at the borehole locations, and conducting soil and groundwater sampling programs. Soil and groundwater samples were collected from each borehole locations and analyzed for PCOCs as discussed in Section 4.1.1.

Based on field observations and analytical test results of selected soil and groundwater samples including a tap water sample collected from inside the store, the Stage 2 PSI concluded the following:

- Using a split spoon sampler device, undisturbed soil samples were successfully collected only at a depth of 0.76 m below ground surface from each borehole and from a depth of 7 m in borehole 09BH04 (sample 04-F). Based on the analytical test results, the undisturbed soil samples did not identify concentrations of PCOCs in excess of the Contaminated Sites Regulation (CSR) Residential (RL) and Commercial (CL) standards for LEPH, HEPH, PAH, BTEXS, and VPH. Due to the presence of gravel and cobbles in the subsurface, undisturbed soil samples were unable to be collected using a split spoon sampler device at depths greater than 0.76 m except for the soil sample 04-

F. Due to the air rotary drilling methodology, soil samples were disturbed by air and therefore were not submitted to laboratory for analysis. As a groundwater exceedance was identified in monitoring well 09BH02 and detectable concentrations of PCOCs in groundwater were identified in monitoring well 09BH03 and in the onsite tap water sample, as discussed below, PCOC concentrations in soil in excess of the applicable standards could be present near the water table.

- Groundwater samples collected from the four monitoring wells and analyzed for EPHw, LEPHw, PAH, BTEXS, MTBE, and VPHw, met the CSR AW and DW standards except for ethylbenzene. In monitoring well 09BH02, the concentration of **ethylbenzene** was recorded at level of **13 µg/L** which exceeded the CSR DW standard of 2.4 µg/L.
- Detectable concentrations of VHW₆₋₁₀, VPHw, toluene and xylene were obtained from groundwater sample collected from 09BH02. Concentrations of xylene in groundwater were detected in monitoring well 09BH03, and ethylebenzene and xylene were detected in the onsite tap water sample.
- Groundwater samples collected from 09BH01 and 09BH04 were analyzed for dissolved metals. In most instances, the dissolved metals parameters met the CSR AW and DW standards. The exceptions are for dissolved iron from 09BH04 and dissolved manganese from 09BH01 and 09BH04 which had concentrations of 0.37 µg/L and 0.63 µg/L, respectively and exceeded the CSR DW standard of 0.3 µg/L. The CSR DW standards for dissolved iron and manganese are to protect against taste and odour concerns only.

Based on the Stage 2 PSI field observation and analytical results and the conclusions given above, the following recommendations are made.

- EBA recommends that all existing monitoring wells be monitored on a semi-annual basis to assess the short term and long term trends in dissolved hydrocarbon concentrations.
- EBA recommends that re-sampling and testing the onsite tap water to confirm the findings of the detectable concentrations of ethylebenzene and xylene.
- As a temporary and precautionary measure EBA recommends that the USTs and supply lines be pressure tested for potential fuel leak and fuel inventory be implemented.

Based on the findings noted above, further soil and groundwater assessment is warranted at this time.

6.0 CLOSURE

This report and its contents are intended for the sole use of San-Dex Enterprises Ltd. EBA does not accept any responsibility for the accuracy of any of the data, the analysis or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than San-Dex Enterprises Ltd. Any such unauthorized use of this report is at the sole risk of the user. Use of this report is subject to the terms and conditions stated in EBA's Services Agreement and in the Geo-Environmental - General Conditions provided in Appendix F of this report.

EBA trusts this report meets your present requirements. Please contact our office at your earliest convenience if you have any questions or comments.

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TABLE 1: SUMMARY OF GROUNDWATER LEVEL MEASUREMENTS - 8741 Hwy 3 & 95, Yahk, BC

Monitoring Well	Elevation of Ground (m) ¹	Elevation of Top of PVC Casing (m) ¹	Water Level (Aug 13, 2009)	
			Depth (m-btoc) ²⁾	Elevation (m) ¹⁾
09BH01	99.770	99.730	6.475	93.255
09BH02	99.815	99.770	6.560	93.210
09BH03	99.870	99.845	6.590	93.255
09BH04	99.740	99.680	6.415	93.265

Notes :

¹⁾ Elevation are relative to top of southeast corner of the wood frame for the sign post to the north of the USTs location, arbitrarily assigned an elevation of 100.000 m.

²⁾ m-btoc indicates metres below top of casing.



TABLE 2: HYDROCARBONS IN SOIL - 8741 Hwy 3 & 95, Yahk, BC							
Sample Location	09BH01	09BH02	09BH03	09BH04	09BH04	CSR Residential Standards ⁽¹⁾	CSR Commercial Standards ⁽¹⁾
Sample ID	01-A	02-A	03-A	04-A	04-F		
Depth (m)	0.76	0.76	0.76	0.76	7.01		
Hydrocarbon Vapour	50	45	40	55	40		
Date Sampled	8/12/2009	8/11/2009	8/11/2009	8/12/2009	3/10/2009		
Extractable Petroleum Hydrocarbons (µg/g)							
EPH10-19	< 250	< 250	< 250	280	< 250	1000 ⁽²⁾	2000 ⁽²⁾
EPH19-32	820	670	< 250	370	< 250	1000 ⁽²⁾	5000 ⁽²⁾
LEPH	-	-	-	280	-	1000	2000
HEPH	-	-	-	370	-	1000	5000
Volatile Petroleum Hydrocarbons (µg/g)							
VHs6-10	< 100	< 100	< 100	< 100	< 100	-	-
VPHs	< 100	< 100	< 100	< 100	< 100	200	200
Monocyclic Aromatic Hydrocarbons (µg/g)							
Benzene	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	10	10
Ethylbenzene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1	20
Toluene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.5	25
Total Xylenes	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	5	50
Styrene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	5	50
Polycyclic Aromatic Hydrocarbons (µg/g)							
Acenaphthene	-	-	-	< 0.05	-	-	-
Acenaphthylene	-	-	-	< 0.05	-	-	-
Anthracene	-	-	-	< 0.05	-	-	-
Benz(a)anthracene	-	-	-	< 0.05	-	1	10
Benzo(a)pyrene	-	-	-	< 0.05	-	1	10
Benzo(b)fluoranthene	-	-	-	< 0.05	-	1	10
Benzo(g,h,i)perylene	-	-	-	< 0.05	-	-	-
Benzo(k)fluoranthene	-	-	-	< 0.05	-	1	10
Chrysene	-	-	-	< 0.05	-	-	-
Dibenz(a,h)anthracene	-	-	-	< 0.05	-	1	10
Fluoranthene	-	-	-	< 0.05	-	-	-
Fluorene	-	-	-	< 0.05	-	-	-
Indeno(1,2,3-cd)pyrene	-	-	-	< 0.05	-	1	10
Naphthalene	-	-	-	< 0.05	-	5	50
Phenanthrene	-	-	-	< 0.05	-	5	50
Pyrene	-	-	-	< 0.05	-	10	100

Notes:

All concentrations in µg/g

"<" less than the laboratory detection limit indicated.

"-" means no standard or guideline applies.

¹⁾ BC Contaminated Sites Regulation (CSR BC Reg. 375/96 includes amendments up to BC Reg. 343/2008, January 1, 2009) Generic Numerical Soil Standards (Schedules 4 and 10) and Matrix Numerical Soil Standards (Schedule 5), considering the site specific factors of intake of contaminated soil, groundwater used for drinking water, groundwater flow to surface water used by aquatic life, and toxicity to soil invertebrates and plants.

²⁾ The standards referenced are for light extractable petroleum hydrocarbons (LEPH) and heavy extractable petroleum hydrocarbons (HEPH), which are corrected for polyaromatic hydrocarbons (PAHs). EPH (c 10 - c 19) and EPH (c19 - c32) are uncorrected for PAHs.

TABLE 3: HYDROCARBONS IN GROUNDWATER - 8741 Hwy 3 & 95, Yahk, BC							
Location	09BH01	09BH02	09BH03	09BH04	Tap Water	CSR Aquatic Life Standards ⁽¹⁾	CSR Drinking Water Standards ⁽¹⁾
Date Sampled	13-Aug-09	13-Aug-09	13-Aug-09	13-Aug-09	13-Aug-09		
Extractable Petroleum Hydrocarbons (µg/L)							
EPHw ₁₀₋₁₉	< 250	< 250	< 250	< 250	< 250	500 ⁽²⁾ , 5000 ⁽³⁾	5000 ⁽²⁾
EPHw ₁₉₋₃₂	< 250	< 250	< 250	< 250	< 250	-	-
LEPHw	-	-	-	< 250	-	500	-
HEPHw	-	-	-	< 250	-	-	-
Volatile Petroleum Hydrocarbons (µg/L)							
VHw ₆₋₁₀	< 100	420	< 100	< 100	< 100	15 000	15 000
VPHw	< 100	210	< 100	< 100	< 100	1500	-
Monocyclic Aromatic Hydrocarbons (µg/L)							
Benzene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	4000	5
Ethylbenzene	< 0.1	13	< 0.1	< 0.1	0.2	2000	2.4
Toluene	< 0.1	4.3	< 0.1	< 0.1	< 0.1	390	24
Xylenes	< 0.1	190	0.3	< 0.1	2.4	-	300
Styrene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	720	-
MTBE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	34 000	15
Polycyclic Aromatic Hydrocarbons (µg/L)							
Acenaphthene	-	-	-	< 0.1	-	60	-
Acridine	-	-	-	< 0.05	-	0.5	-
Acenaphthylene	-	-	-	< 0.1	-	-	-
Anthracene	-	-	-	< 0.01	-	1	-
Benzo(a)anthracene	-	-	-	< 0.01	-	1	-
Benz(a)pyrene	-	-	-	< 0.01	-	0.1	-
Benzo(b)fluoranthene	-	-	-	< 0.01	-	-	0.01
Benzo(g,h,i)perylene	-	-	-	< 0.01	-	-	-
Benzo(k)fluoranthene	-	-	-	< 0.01	-	-	-
Chrysene	-	-	-	< 0.01	-	1	-
Dibenz(a,h)anthracene	-	-	-	< 0.01	-	-	-
Fluoranthene	-	-	-	< 0.04	-	2	-
Fluorene	-	-	-	< 0.05	-	120	-
Indeno(1,2,3-cd)pyrene	-	-	-	< 0.01	-	-	-
Naphthalene	-	-	-	< 0.3	-	10	-
Phenanthrene	-	-	-	< 0.05	-	3	-
Pyrene	-	-	-	< 0.02	-	0.2	-
Quinoline	-	-	-	< 0.5	-	34	-

Notes:

All concentrations expressed in µg/L

"-" means not analyzed or no standards apply.

"<" less than the laboratory detection limit indicated

BOLD Indicates that the concentration exceeds the currently applicable standard

¹⁾ BC Contaminated Sites Regulation (CSR BC Reg. 375/96 includes amendments up to BC Reg. 343/2008, January 1, 2009) groundwater standards (Schedule 6) for Aquatic Water (AW) and Drinking Water (DW) uses.

²⁾ Standard is for LEPHw. LEPHw concentration (corrected for polyaromatic hydrocarbons) is assumed to be equivalent to EPHw10-19 concentration (uncorrected).

³⁾ Standard applies to all sites irrespective of water use.

TABLE 4: DISSOLVED METALS IN GROUNDWATER - 8741 Hwy 3 & 95, Yahk, BC					
Location		09BH01	09BH04	CSR Aquatic Life Standards ⁽¹⁾	CSR Drinking Water Standards ⁽¹⁾
Date Sampled		13-Aug-09	13-Aug-09		
Hardness	CaCO ₃	29	41		
Dissolved Metals (mg/L)					
Aluminum		0.01	0.013	-	0.2
Antimony		< 0.001	< 0.001	0.2	-
Arsenic		< 0.001	< 0.001	0.05	0.01
Barium		0.025	0.036	10	1
Beryllium		< 0.001	< 0.001	0.053	-
Bismuth		< 0.001	< 0.001	-	-
Boron		0.08	0.22	50	5
Cadmium		< 0.0002	< 0.0002	0.0011	0.005
Calcium		8.29	11.1	-	-
Chromium		< 0.001	< 0.001	0.01	0.05
Cobalt		< 0.001	0.001	0.04	-
Copper		< 0.001	< 0.001	0.09	1
Iron		0.09	1.14	-	0.3
Lead		< 0.001	< 0.001	0.16	0.01
Lithium		0.005	0.011	-	-
Magnesium		2.12	3.11	-	100
Manganese		0.37	0.63	-	0.05
Mercury		< 0.02	< 0.02	0.001	0.001
Molybdenum		< 0.0005	< 0.0005	10	0.25
Nickel		< 0.001	0.001	1.5	-
Phosphorous		< 0.15	< 0.15	-	-
Potassium		1.7	2.4	-	-
Selenium		< 0.001	< 0.001	0.01	0.01
Silver		< 0.00025	< 0.00025	0.015	-
Sodium		15.3	29.9	-	200
Strontium		0.036	0.047	-	-
Tellurium		< 0.001	< 0.001	-	-
Thallium		< 0.0001	< 0.0001	0.003	-
Thorium		< 0.0005	< 0.0005	-	-
Tin		< 0.001	< 0.001	-	-
Titanium		< 0.001	< 0.001	1	-
Uranium		< 0.0005	< 0.0005	3	0.02
Vanadium		< 0.001	< 0.001	-	-
Zinc		< 0.005	< 0.005	2.4	5
Zirconium		< 0.01	< 0.01	-	-

Notes:

All concentrations expressed in milligrams per litre, mg/L

"-" means no standards apply.

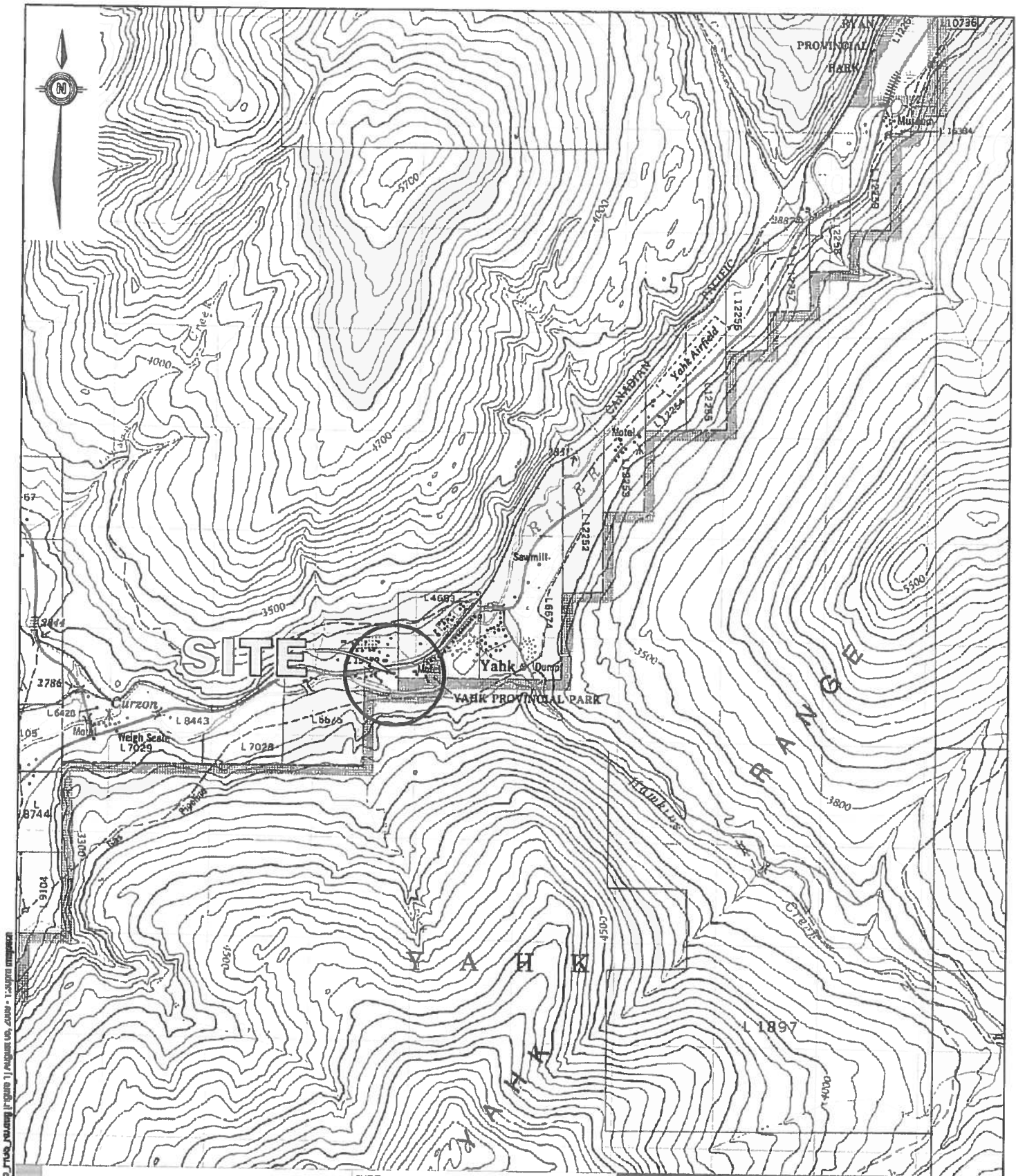
"<" less than the laboratory detection limit indicated.

¹⁾ BC Contaminated Sites Regulation (CSR BC Reg. 375/96 includes amendments up to BC Reg. 343/2008, January 1, 2009) groundwater standards (Schedule 6) for Aquatic Life (AW) and Drinking Water (DW) uses.

BOLD

Indicates that the concentration exceeds the currently applicable standard

Effective January 1, 2009, the DW standard for arsenic was reduced from 0.025 mg/L to 0.01 mg/L



C:\Users\m... \AppData\Local\Temp\... \Figure 1.dwg, 1:50,000, 1:50,000, 1:50,000

CLIENT
 San-Dex Enterprises Ltd.
STAGE 1 and 2 PRELIMINARY SITE INVESTIGATION
 8741 HIGHWAYS 3 and 95, YAHK, BC

SITE LOCATION MAP



EBA Engineering Consultants Ltd.

PROJECT NO. K23101475	DWN LM	CKD HH	REV 0
OFFICE EBA-KELOWNA	DATE August 6, 2009		

Figure 1



RAILWAY AVENUE

Canadian Pacific Railway track

95

HIGHWAYS 3 and 95

access road to Yahk Motel

USTs and pump island

store

shed and pumphouse

residence

workshop

open cooking area

residence

Forested Area

Forested Area

camping ground

MOYIE RIVER

LEGEND

- Approximate Property Boundary
- UST Underground Storage Tank

NOTES: All locations are approximate
Image from Google Earth Pro

SCALE 1:1500



CLIENT

San-Dex Enterprises Ltd.

STAGE 1 and 2 PRELIMINARY SITE INVESTIGATION
8741 HIGHWAYS 3 and 95, YAHK, BC

PROPERTY AND SURROUNDING LAND USE PLAN



PROJECT NO.
K23101475

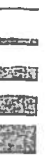
OFFICE
EBA-KELOWNA

DWN	CKD	REV
LM	HH	0

DATE
August 31, 2009

Figure 2

C:\Kulwani\Drawings\23101475\23101475_FIG2_R0.dwg [Figure 2] August 31, 2009 - 10:33am [maljpdch]



APPENDIX

APPENDIX A GROUNDWATER WELLS SEARCH RESULTS



Groundwater Wells Search Results

Legend

Water - River, Canal, etc. - Colour Themed (1:20,000)



Canal

River or Stream - Definite

Water - River, Canal, etc. - Outlined (1:20,000)



Canal

River or Stream - Definite

Water - Lake, Reservoir, etc. - Colour Themed (1:20,000)



Min. - Talking Pond

Lake - Definite

Reservoir - Definite

Water - Lake, Reservoir, etc. - Outlined (1:20,000)



Min. - Talking Pond

Lake - Definite

Reservoir - Definite

Water - Wetlands - Colour Themed (1:20,000)



Flooded Land - Inundated

Marsh

Swamp

Water - Wetlands - Outlined (1:20,000)



0 325 650 m.

Scale: 1:20,000

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Data: Projector: WGS84, Alberta Equal Area Conic

Key Map of British Columbia





Report 1 - Detailed Well Record

Well Tag Number: 66410	Construction Date: 1994-05-18 00:00:00.0
Owner: KAE'S HOTEL	Driller: J. R. Drilling
Address: 8769 HIGHWAY 3	Well Identification Plate Number:
Area: YANK	Plate Attached By:
WELL LOCATION:	Where Plate Attached:
Land District	PRODUCTION DATA AT TIME OF DRILLING:
District Lot: 4683 Plan: 1446 Lot:	Well Yield: 20 (Driller's Estimate) U.S. Gallons per Minute
Township: Section: Range:	Development Method:
Indian Reserve: Meridian: Block:	Pump Test Info Flag: N
Quarter:	Artesian Flow:
Island:	Artesian Pressure (ft):
BCGS Number (NAD 27): 082F010431 Well: 17	Static Level: 30 feet
Class of Well:	WATER QUALITY:
Subclass of Well:	Character:
Orientation of Well:	Colour:
Status of Well: New	Odour:
Well Use: Domestic	Well Disinfected: N
Observation Well Number:	EMS ID:
Observation Well Status:	Water Chemistry Info Flag: N
Construction Method: Drilled	Field Chemistry Info Flag:
Diameter: 6.0 inches	Site Info (SEAM):
Casing drive shoe:	Water Utility:
Well Depth: 60 feet	Water Supply System Name:
Elevation: 0 feet (ASL)	Water Supply System Well Name:
Final Casing Stick Up: inches	SURFACE SEAL:
Well Cap Type:	Flag: N
Bedrock Depth: feet	Material:
Lithology Info Flag: N	Method:
File Info Flag: N	Depth (ft):
Sieve Info Flag: N	Thickness (in):
Screen Info Flag: N	WELL CLOSURE INFORMATION:
Site Info Details:	Reason For Closure:
Other Info Flag:	Method of Closure:
Other Info Details:	Closure Sealant Material:
	Closure Backfill Material:
	Details of Closure:
Screen from to feet	Type Slot Size
Casing from to feet	Diameter Material Drive Shoe
GENERAL REMARKS:	
ST,0.0 TO 60.0, .188 THICK,13 LBS,	
LITHOLOGY INFORMATION:	
From 0 to 60 Ft. TILL & BOULDERS	

- [Return to Main](#)
- [Return to Search Options](#)
- [Return to Search Criteria](#)

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Report 1 - Detailed Well Record

Well Tag Number: 5015	Construction Date: 1950-01-01 00:00:00.0		
Owner: MARCO #1	Driller: Budhenning Co.		
Address:	Well Identification Plate Number:		
Area: YAHK	Plate Attached By:		
WBLL LOCATION:	Where Plate Attached:		
KOOTENAY Land District	PRODUCTION DATA AT TIME OF DRILLING:		
District Lot: Plan: Lot:	Well Yield: 200 (Driller's Estimate) Gallons per Minute (U.S./Imperial)		
Township: Section: Range:	Development Method:		
Indian Reserve: Meridian: Block:	Pump Test Info Flag:		
Quarter:	Artesian Flow:		
Island:	Artesian Pressure (ft):		
BCGS Number (NAD 27): 082F010431 Well: 2	Static Level: 20 feet		
Class of Well:	WATER QUALITY:		
Subclass of Well:	Character:		
Orientation of Well:	Colour:		
Status of Well: New	Odour:		
Well Use: Unknown Well Use	Well Disinfected: N		
Observation Well Number:	EMS ID:		
Observation Well Status:	Water Chemistry Info Flag:		
Construction Method: Drilled	Field Chemistry Info Flag:		
Diameter: 7.0 inches	Site Info (SEAM):		
Casing drive shoe:	Water Utility:		
Well Depth: 54 feet	Water Supply System Name:		
Elevation: 0 feet (ASL)	Water Supply System Well Name:		
Final Casing Stick Up: inches	SURFACE SEAL:		
Well Cap Type:	Flag:		
Bedrock Depth: feet	Material:		
Lithology Info Flag:	Method:		
File Info Flag:	Depth (ft):		
Sieve Info Flag:	Thickness (in):		
Screen Info Flag:	WELL CLOSURE INFORMATION:		
Site Info Details:	Reason For Closure:		
Other Info Flag:	Method of Closure:		
Other Info Details:	Closure Sealant Material:		
	Closure Backfill Material:		
	Details of Closure:		
Screen from	to feet	Type	Slot Size
Casing from	to feet	Diameter	Material
			Drive Shoe
GENERAL REMARKS:			
LITHOLOGY INFORMATION:			
From	0 to	9 Ft.	hard dug
From	9 to	20 Ft.	boulders and gravel
From	20 to	36 Ft.	sand - gravel - clay
From	36 to	42 Ft.	hardpan
From	42 to	54.3 Ft.	sand and gravel w.b.

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Report 1 - Detailed Well Record

<p>Well Tag Number: 57766</p> <p>Owner: BRAD ALLRED</p> <p>Address: NEXT TO TEXACO STATION</p> <p>Area: YAHK</p> <p>WELL LOCATION: KOOTENAY Land District District Lot: 15452 Plan: 114855 Lot: A Township: Section: Range: Indian Reserve: Meridian: Block: Quarter: Island: BCGS Number (NAD 27): 082P010342 Well: 5</p> <p>Class of Well: Subclass of Well: Orientation of Well: Status of Well: New Well Use: Domestic Observation Well Number: Observation Well Status: Construction Method: Drilled Diameter: 6.0 inches Casing drive shoe: Well Depth: 40 feet Elevation: 0 feet (ASL) Final Casing Stick Up: inches Well Cap Type: Bedrock Depth: feet Lithology Info Flag: File Info Flag: Sieve Info Flag: Screen Info Flag:</p> <p>Site Info Details: Other Info Flag: Other Info Details:</p>	<p>Construction Date: 1987-12-01 00:00:00.0</p> <p>Driller: R. J. Drilling Well Identification Plate Number: Plate Attached By: Where Plate Attached:</p> <p>PRODUCTION DATA AT TIME OF DRILLING: Well Yield: 12 (Driller's Estimate) U.S. Gallons per Minute Development Method: Pump Test Info Flag: Artesian Flow: Artesian Pressure (ft): Static Level: 22 feet</p> <p>WATER QUALITY: Character: Colour: Odour: Well Disinfected: N EMS ID: Water Chemistry Info Flag: Field Chemistry Info Flag: Site Info (SEAM):</p> <p>Water Utility: Water Supply System Name: Water Supply System Well Name:</p> <p>SURFACE SEAL: Flag: Material: Method: Depth (ft): Thickness (in):</p> <p>WELL CLOSURE INFORMATION: Reason For Closure: Method of Closure: Closure Sealant Material: Closure Backfill Material: Details of Closure:</p>			
Screen from	to feet	Type	Slot Size	
Casing from	to feet	Diameter	Material	Drive Shoe
GENERAL REMARKS:				
WATER CLOUDY ON FINISHING DRILLING DRILLER RECOMMENDED PUMPING @10 GPM UNTIL CLEAR. REF. PLAN # 1148551.				
LITHOLOGY INFORMATION:				
From	0 to	25 Ft.	boulders and gravel	
From	25 to	40 Ft.	gravel	
From	0 to	0 Ft.		
From	0 to	0 Ft.	Should be pumped at 10 GPM until water	
From	0 to	0 Ft.	is clear.	

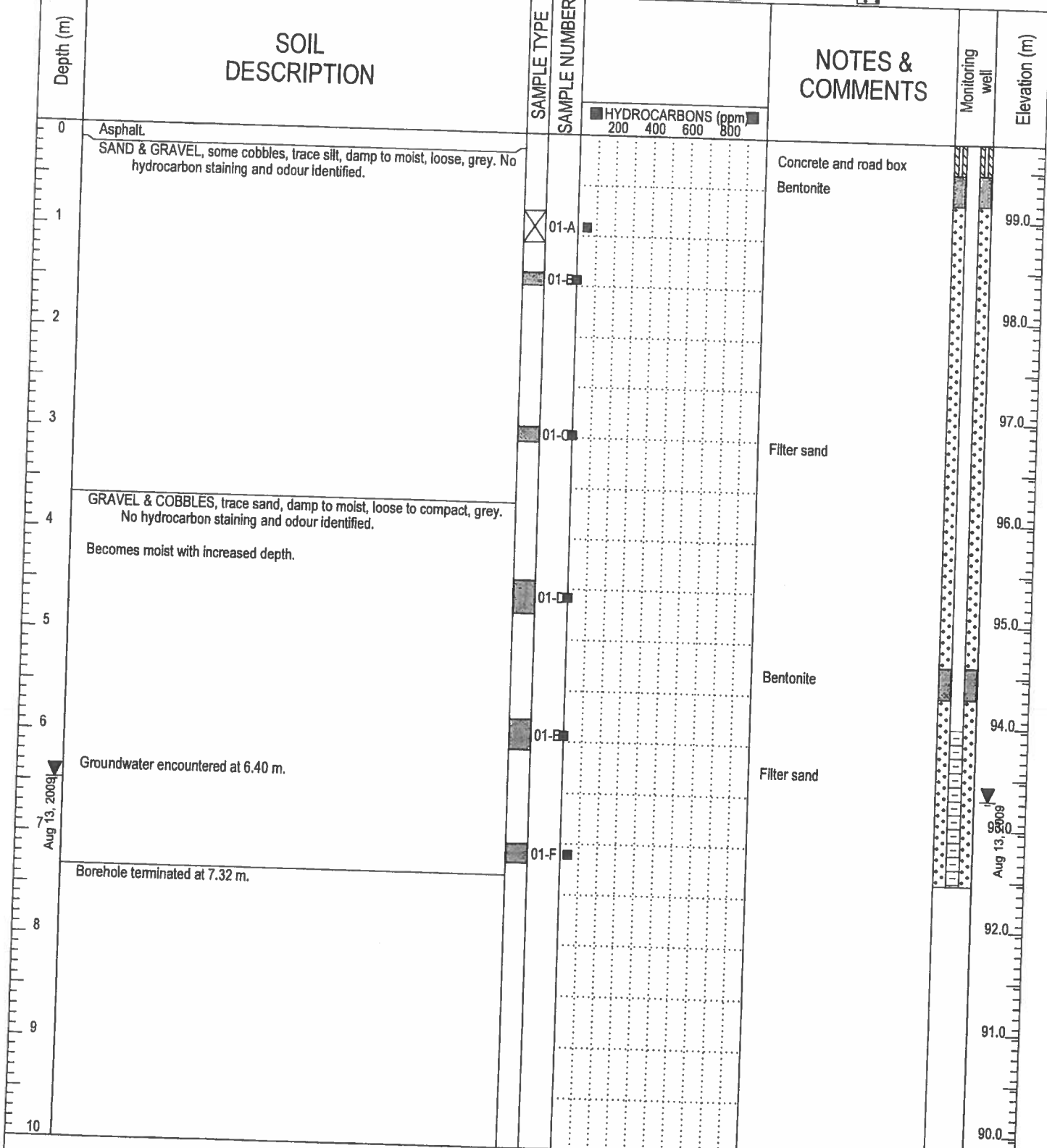
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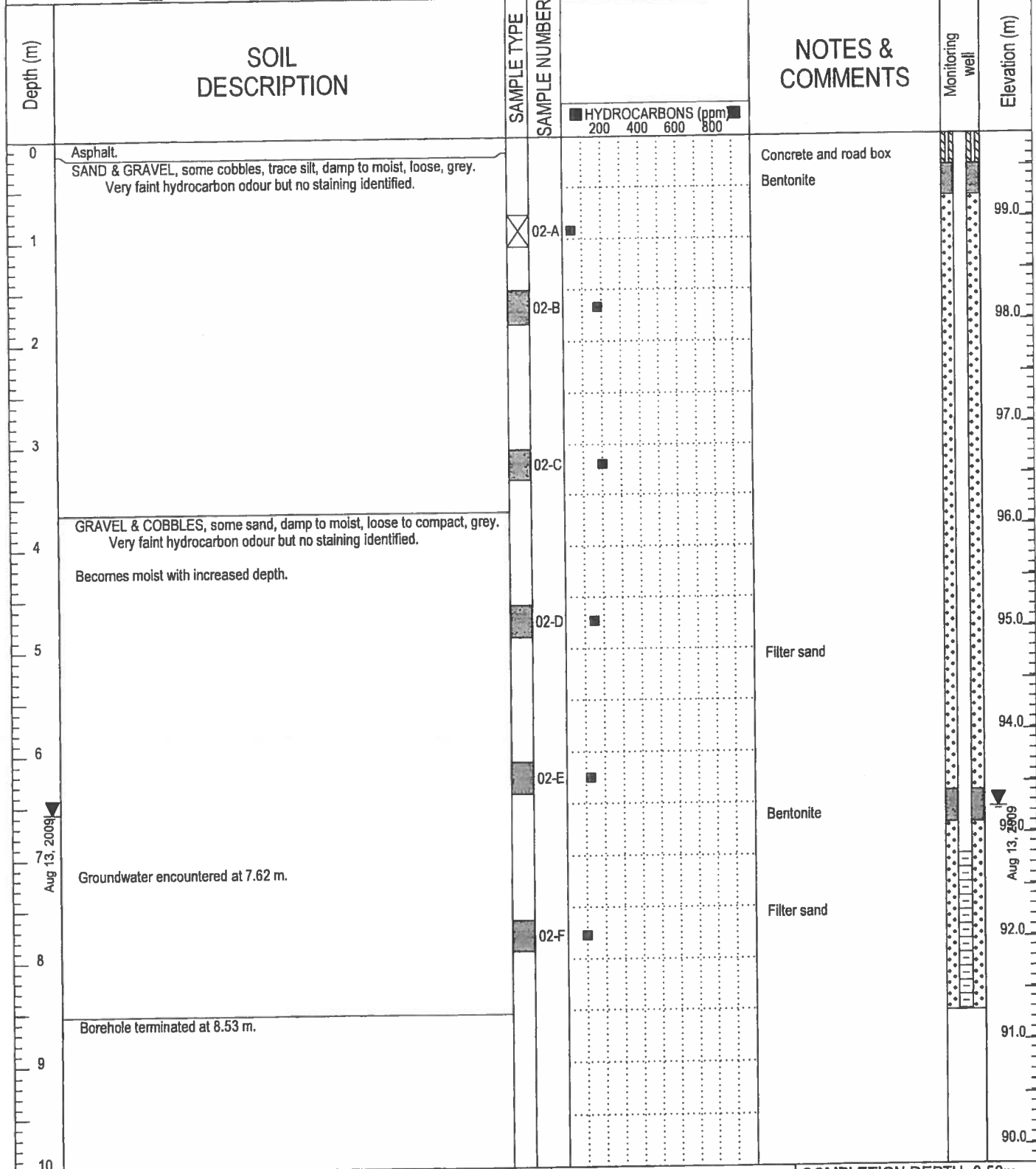
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 Address: 8741 Hwy 3 & 95, Yahk, BC Driller: JR Drilling Ltd. K23101475-09BH01
 Drill Type: Air Rotary (Foremost DR 24) ELEVATION: 99.77m

SAMPLE TYPE DISTURBED NO RECOVERY SPT A-CASING SHELBY TUBE CORE
 BACKFILL TYPE BENTONITE PEA GRAVEL SLOUGH GROUT DRILL CUTTINGS SAND



EBA Engineering Consultants Ltd. LOGGED BY: HH COMPLETION DEPTH: 7.32m
 REVIEWED BY: DW COMPLETE: 8/12/2009
 DRAWING NO: Page 1 of 1

Project Name: Stage 2 Preliminary Site Investigation	Client: San-Dex Enterprises Ltd.	PROJECT NO. - BOREHOLE NO.
Address: 8741 Hwy 3 & 95, Yahk, BC	Driller: JR Drilling Ltd.	K23101475-09BH02
	Drill Type: Air Rotary (Foremost DR 24)	ELEVATION: 99.815m
SAMPLE TYPE	<input type="checkbox"/> DISTURBED <input type="checkbox"/> NO RECOVERY <input checked="" type="checkbox"/> SPT <input type="checkbox"/> A-CASING <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> CORE	
BACKFILL TYPE	<input type="checkbox"/> BENTONITE <input type="checkbox"/> PEA GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> DRILL CUTTINGS <input type="checkbox"/> SAND	

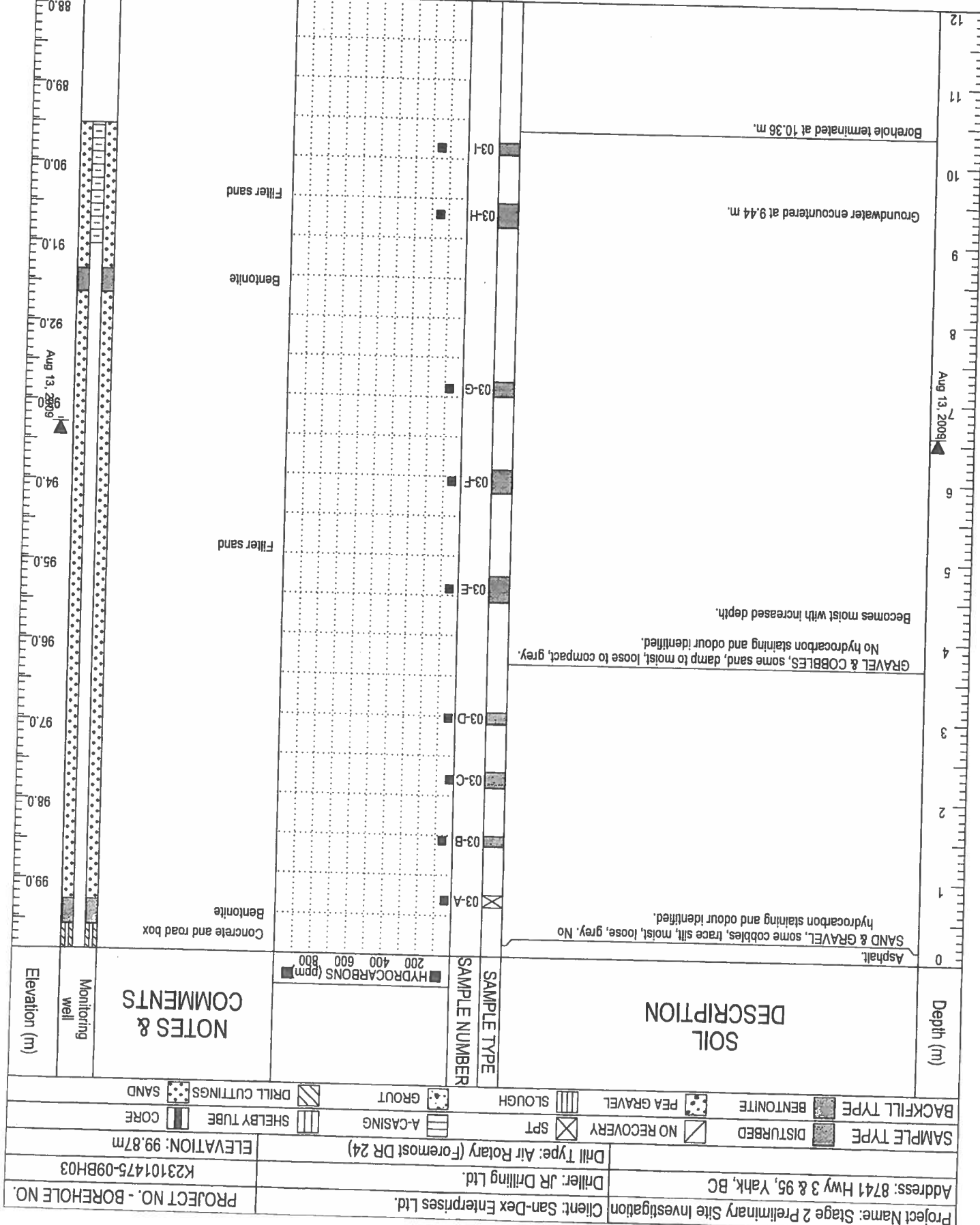


Aug 13, 2009

Aug 13, 2009

LOGGED BY: HH	COMPLETION DEPTH: 8.53m
REVIEWED BY: DW	COMPLETE: 8/11/2009
DRAWING NO:	Page 1 of 1





Project Name: Stage 2 Preliminary Site Investigation	Client: San-Dex Enterprises Ltd.	Address: 8741 Hwy 3 & 95, Yahk, BC
Drill Type: Air Rotary (Foremost DR 24)	Driller: JR Drilling Ltd.	ELEVATION: 99.87m
PROJECT NO. - BOREHOLE NO.	K23101475-09BH03	

BACKFILL TYPE	<input type="checkbox"/> BENTONITE	<input type="checkbox"/> PEA GRAVEL	<input type="checkbox"/> SLOUGH	<input type="checkbox"/> GROUT	<input type="checkbox"/> DRILL CUTTINGS	<input type="checkbox"/> SAND
SAMPLE TYPE	<input type="checkbox"/> DISTURBED	<input type="checkbox"/> NO RECOVERY	<input type="checkbox"/> SPT	<input type="checkbox"/> A-CASING	<input type="checkbox"/> SHELBY TUBE	<input type="checkbox"/> CORE

NOTES & COMMENTS

Monitoring well

Elevation (m)

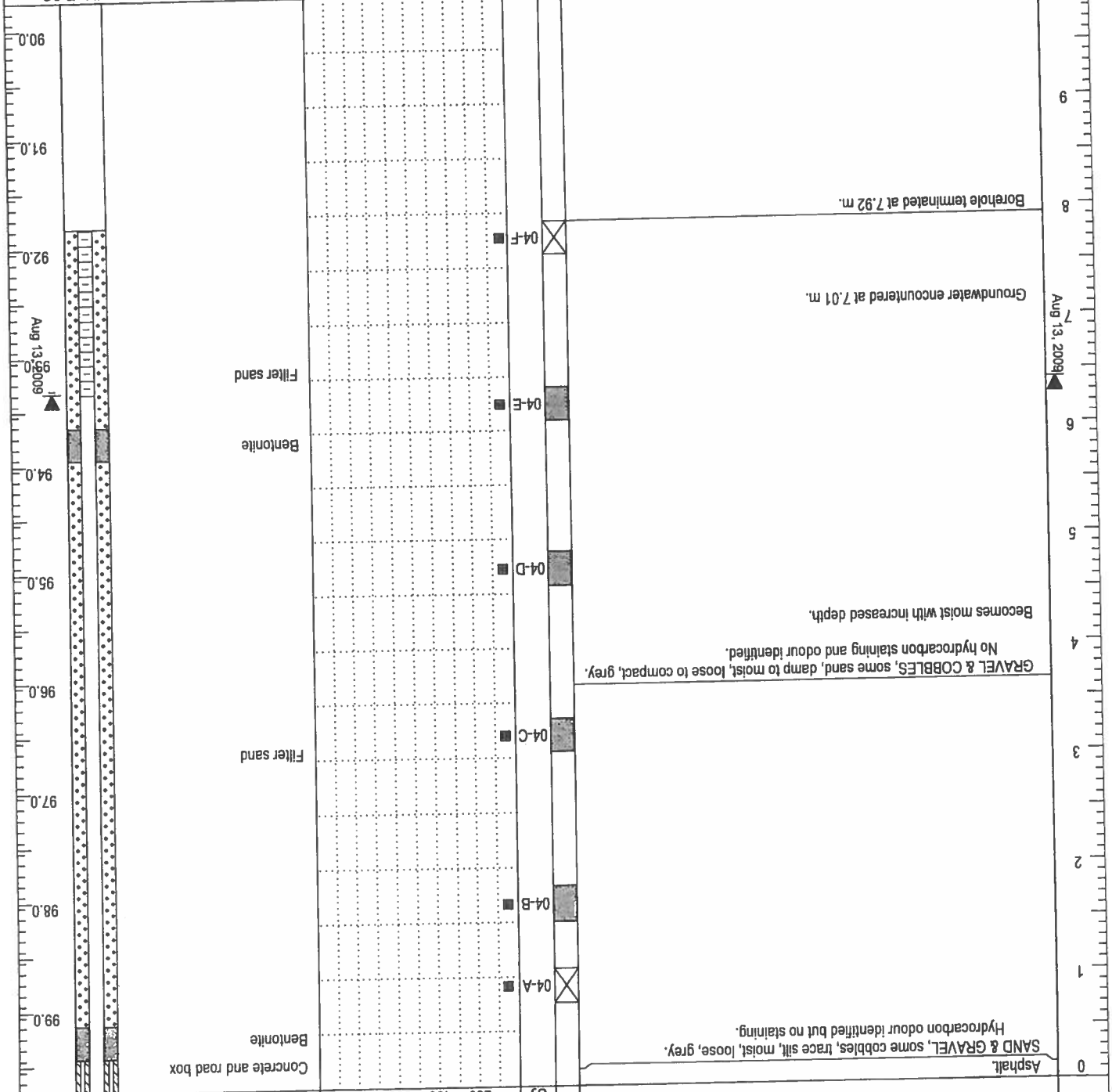


EBA Engineering Consultants Ltd.

LOGGED BY: HH
 REVIEWED BY: DW
 DRAWING NO:

COMPLETE: 8/12/2009
 Page 1 of 1

COMPLETION DEPTH: 7.92m



Depth (m)

SOIL DESCRIPTION

NOTES & COMMENTS

Elevation (m)

Monitoring well

SAMPLE TYPE
 SAMPLE NUMBER
 ■ HYDROCARBONS (ppm)
 200 400 600 800

PROJECT NO. - BOREHOLE NO.	K23101475-09BH04
Client: San-Dex Enterprises Ltd.	Driller: JR Drilling Ltd.
Address: 8741 Hwy 3 & 95, Yahk, BC	
Project Name: Stage 2 Preliminary Site Investigation	
Drill Type: Air Rotary (Foremost DR 24)	ELEVATION: 99.74m
SAMPLE TYPE ■ DISTURBED ▨ NO RECOVERY ▩ SPT ▨ A-CASING ▨ SHELBY TUBE ▨ CORE	BACKFILL TYPE ■ BENTONITE ▨ PEA GRAVEL ▨ SLOUGH ▨ GROUT ▨ DRILL CUTTINGS ▨ SAND

Analysis Report

REPORT ON: Analysis of Soil, Water Samples

REPORTED TO: EBA Engineering

150-1715 Dickson Ave
Kelowna, BC
V1Y 9G6

Att'n: Haile Habtegiorgis

CHAIN OF CUSTODY:

2091111, 2091114, 2091113, 2091112
Yahk
K23101475

PROJECT NAME:
PROJECT NUMBER:

NUMBER OF SAMPLES: 10

REPORT DATE: August 25, 2009

DATE SUBMITTED: August 15, 2009

GROUP NUMBER: 100817017

SAMPLE TYPE: Soil, Water

NOTE: Results contained in this report refer only to the testing of samples as submitted. Other information is available on request.

TEST METHODS:

Volatile Organic Compounds in Water and Soil - analysis was performed using Purge and Trap apparatus and analysis using GC/MS. Methods 624/8240/8260, involving sparging with a Purge and Trap apparatus and analysis using GC/MS.

Volatile Hydrocarbons (VH) and Volatile Petroleum Hydrocarbons (VPH) in Water - analysis was performed using B.C. MOELP CSR-Analytical Method 2 "Volatile Hydrocarbons in Water by GC/FID" and CSR-Analytical Method 5 "Calculation of Volatile Petroleum Hydrocarbons in Solids or Water (VPH)" approved August 12, 1999. The method involves sparging/collection using a Purge & Trap apparatus with GC/MS analysis; VH components ranging from C6 to C10 are quantified against m-xylene and 1,2,4-trimethylbenzene. VPH is calculated by subtraction of specified MAH compounds from VH concentrations.

Volatile Hydrocarbons (VH) in Soil - analysis was performed using B.C. MOELP CSR-Analytical Method 1 "Volatile Hydrocarbons in Solids by GC/FID" approved August 12, 1999. The method involves methanol extraction and direct injection GC/FID analysis; components ranging from C6 to C10 are quantified against m-xylene and 1,2,4-trimethylbenzene.

Volatile Petroleum Hydrocarbons (VPH) in Soil - results were obtained using B.C. MOELP CSR-Analytical Method 5 "Calculation of Volatile Petroleum Hydrocarbons in Solids or Water (VPH)" approved August 12, 1999. VPH is calculated by subtraction of specified MAH compounds from VH concentrations.

Volatile Organic Compounds in Soil - analysis was performed using procedures based on U.S. EPA Methods 624/8240/8260, involving methanol extraction, and direct injection/GCMS analysis.

(Continued)

CANTEST LTD.



Zhenyong Gao, M.Sc.
Coordinator, Trace Organics

4606 Canada Way, Burnaby, BC V5G 1K5
Tel: 604 734 7276 Fax: 604 731 2386

Moisture in Soil - analysis was performed gravimetrically by heating a separate sample portion at 105 C and measuring the weight loss.

Hardness in Water - was calculated based on Method 2340 B in Standard Methods for the Examination of Water and Wastewater (21st Edition).

Extractable Petroleum Hydrocarbons and Light and Heavy Extractable Petroleum Hydrocarbons - analysis was performed using B.C. MOELP CSR-Analytical Method 3 "Extractable Petroleum Hydrocarbons in Solids by GC/FID" and CSR-Analytical Method 6 "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water (LEPH & HEPH)". The method involves acetone/hexane extraction and GC/FID analysis. EPH components ranging from C10 to C19 and C19 to C32 are quantified against eicosane (n-C20). LEPH & HEPH are calculated by subtraction of specified PAH's.

Extractable Petroleum Hydrocarbons and Light and Heavy Extractable Petroleum Hydrocarbons in Water - analysis was performed using B.C. MOELP CSR-Analytical Method 4 "Extractable Petroleum Hydrocarbons in Water by GC/FID" and CSR-Analytical Method 6 "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water (LEPH & HEPH)". The method involves DCM extraction and GC/FID analysis. EPH components ranging from C10 to C19 and C19 to C32 are quantified against eicosane (n-C20). LEPH & HEPH are calculated by subtraction of specified PAH's.

Mercury in Water - analysis was performed using procedures based on U. S. EPA Method 245.7, oxidative digestion using bromination, and analysis using Cold Vapour Atomic Fluorescence Spectroscopy.

Field Filtered Metals in Water - Samples were filtered in the field (e.g. at the time of sampling) and quantitatively determined using Inductively Coupled Plasma Optical Emission Spectroscopy (ICP) and/or Inductively Coupled Plasma-Mass Spectroscopy (ICP/MS).

Polynuclear Aromatic Hydrocarbons - analysis was performed using procedures based on U.S. EPA Methods 625/8270, involving extraction, clean-up steps, and analysis using GC/MS.

TEST RESULTS:

(See following pages)

REPORTED TO: EBA Engineering

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Conventional Parameters in Water

CLIENT SAMPLE IDENTIFICATION:		SAMPLE DATE	CANTEST ID	Hardness CaCO3
09BH01	Aug 13/09	908170047		29
09BH04	Aug 13/09	908170050		41
REPORTING LIMIT			UNITS	1 mg/L

mg/L = milligrams per liter



Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:	09BH01	09BH04
SAMPLE PREPARATION:	DISSOLVED	DISSOLVED
DATE SAMPLED:	Aug 13/09	Aug 13/09
CANTEST ID:	908170047	908170050

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Aluminum	Al	0.01	0.013	0.005	mg/L
Antimony	Sb	<	<	0.001	mg/L
Arsenic	As	<	<	0.001	mg/L
Barium	Ba	0.025	0.036	0.001	mg/L
Beryllium	Be	<	<	0.001	mg/L
Bismuth	Bi	<	<	0.001	mg/L
Boron	B	0.08	0.22	0.05	mg/L
Cadmium	Cd	<	<	0.0002	mg/L
Calcium	Ca	8.29	11.1	0.05	mg/L
Chromium	Cr	<	<	0.001	mg/L
Cobalt	Co	<	0.001	0.001	mg/L
Copper	Cu	<	<	0.001	mg/L
Iron	Fe	0.09	1.14	0.01	mg/L
Lead	Pb	<	<	0.001	mg/L
Lithium	Li	0.005	0.011	0.001	mg/L
Magnesium	Mg	2.12	3.11	0.05	mg/L
Manganese	Mn	0.37	0.63	0.001	mg/L
Mercury	Hg	<	<	0.02	µg/L
Molybdenum	Mo	<	<	0.0005	mg/L
Nickel	Ni	<	0.001	0.001	mg/L
Phosphorus	P	<	<	0.15	mg/L
Selenium	Se	<	<	0.001	mg/L
Silicon	Si	7.5	8.9	0.25	mg/L
Silver	Ag	<	<	0.00025	mg/L
Sodium	Na	15.3	29.9	0.05	mg/L
Strontium	Sr	0.036	0.047	0.001	mg/L
Tellurium	Te	<	<	0.001	mg/L
Thallium	Tl	<	<	0.0001	mg/L
Thorium	Th	<	<	0.0005	mg/L
Tin	Sn	<	<	0.001	mg/L
Titanium	Ti	<	<	0.001	mg/L

(Continued on next page)

mg/L = milligrams per liter
> = Less than reporting limit

µg/L = micrograms per liter

CLIENT SAMPLE IDENTIFICATION:	SAMPLE PREPARATION:	DATE SAMPLED:	CANTEST ID:	REPORTING LIMIT	UNITS
09BH01	DISSOLVED	Aug 13/09	908170047	0.0005	mg/L
09BH04	DISSOLVED	Aug 13/09	908170050	0.01	mg/L
				0.001	mg/L
				0.005	mg/L
					µg/L

Metals Analysis in Water

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Polycyclic Aromatic Hydrocarbons in Water

CLIENT SAMPLE IDENTIFICATION:		09BH04
DATE SAMPLED:		Aug 13/09
CANTEST ID:		908170050
ANALYSIS DATE:		Aug 20/09
REPORTING LIMIT		
Naphthalene	<	0.3
Acenaphthylene	<	0.1
Quinoline	<	0.5
Acenaphthene	<	0.1
Fluorene	<	0.05
Phenanthrene	<	0.05
Anthracene	<	0.01
Acridine	<	0.05
Total LMW-PAH's	<	0.04
Fluoranthene	<	0.02
Pyrene	<	0.01
Benzo(a)anthracene	<	0.01
Chrysene	<	0.01
Benzo(b)fluoranthene	<	0.01
Benzo(k)fluoranthene	<	0.01
Benzo(a)pyrene	<	0.01
Indeno(1,2,3-cd)pyrene	<	0.01
Dibenz(a,h)anthracene	<	0.01
Benzo(g,h,i)perylene	<	0.01
Total HMW-PAH's	<	0.01
Total PAH's	<	0.01

Results expressed as micrograms per liter (µg/L)
> = Less than reporting limit

REPORTED TO: EBA Engineering
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Monocyclic Aromatic Hydrocarbons in Water

CLIENT SAMPLE IDENTIFICATION:	DATE SAMPLED:	CANTEST ID:	ANALYSIS DATE:	Benzene	Ethylbenzene	Toluene	Xylenes	Volatile Hydrocarbons VHw6-10	VPW	Surrogate Recovery	Surrogate Recoveries expressed as percent (%)	Results expressed as micrograms per liter (µg/L)
09BH01	Aug 13/09	908170047	Aug 19/09	<	<	<	<	<	<	101	94	101
09BH02	Aug 13/09	908170048	Aug 19/09	<	13	4.3	190	420	210	102	106	102
09BH03	Aug 13/09	908170049	Aug 19/09	<	<	<	0.3	<	<	107	92	107
09BH04	Aug 13/09	908170050	Aug 19/09	<	<	<	<	<	<	106	92	106
				0.1	0.1	0.1	0.1	1.00	1.00		-	-

Results expressed as micrograms per liter (µg/L)
 Surrogate recoveries expressed as percent (%)
 < = Less than reporting limit

REPORTED TO: EBA Engineering
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Monocyclic Aromatic Hydrocarbons in Water

CLIENT SAMPLE IDENTIFICATION:		Tap Water
DATE SAMPLED:	Aug 13/09	
CANTEST ID:	908170051	
ANALYSIS DATE:	Aug 19/09	
Surrogate Recovery		
Benzene	<	0.1
Ethylbenzene	0.2	0.1
Toluene	<	0.1
Xylenes	2.4	0.1
Volatile Hydrocarbons VHw6-10	<	100
VPHW	<	100
Toluene-d8	101	-
Bromofluorobenzene	102	-

Results expressed as micrograms per liter (µg/L)
 Surrogate recoveries expressed as percent (%)
 < = Less than reporting limit

REPORTED TO: EBA Engineering

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Volatile Organic Compounds in Water

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	Methyl tert-Butyl Ether	Styrene
09BH01	Aug 13/09	908170047	<	<
09BH02	Aug 13/09	908170048	<	<
09BH03	Aug 13/09	908170049	<	<
09BH04	Aug 13/09	908170050	<	<
Tap Water	Aug 13/09	908170051	<	<
REPORTING LIMIT UNITS			0.5 µg/L	0.1 µg/L

µg/L = micrograms per liter
< = Less than reporting limit

REPORTED TO: EBA Engineering

REPORT DATE: August 25, 2009

GROUP NUMBER: 100817017



Extractable Petroleum Hydrocarbons (EPH) in Water

CLIENT SAMPLE IDENTIFICATION:	09BH01	09BH02	09BH03	09BH04	
DATE SAMPLED:	Aug 13/09	Aug 13/09	Aug 13/09	Aug 13/09	REPORTING LIMIT
CANTEST ID:	908170047	908170048	908170049	908170050	
EPHw10-19	<	<	<	<	250
EPHw19-32	<	<	<	<	250

Results expressed as micrograms per liter ($\mu\text{g/L}$)
< = Less than reporting limit

REPORTED TO: EBA Engineering

REPORT DATE: August 25, 2009

GROUP NUMBER: 100817017



Extractable Petroleum Hydrocarbons (EPH) in Water

CLIENT SAMPLE IDENTIFICATION:	Tap Water	
DATE SAMPLED:	Aug 13/09	REPORTING LIMIT
CANTEST ID:	908170051	
EPHw10-19	<	250
EPHw19-32	<	250

Results expressed as micrograms per liter ($\mu\text{g/L}$)

< = Less than reporting limit

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Extractable Petroleum Hydrocarbons - PAH Corrected in Water

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	LEPHw (corrected for PAH's)	HEPHw (corrected for PAH's)
09BH04	Aug 13/09	908170050	<	<
REPORTING LIMIT UNITS			250 µg/L	250 µg/L

µg/L = micrograms per liter
< = Less than reporting limit

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Conventional Parameters in Soil

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	Moisture
09BH01-A	Aug 12/09	908170040	6.6
09BH02-A	Aug 11/09	908170043	9.4
09BH03-A	Aug 11/09	908170044	21.8
09BH04-A	Aug 11/09	908170045	9.3
09BH04-F	Aug 11/09	908170046	13.0
REPORTING LIMIT			0.1
UNITS			%

% = percent

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Monocyclic Volatile Hydrocarbons-Direct Injection- in Soil

CLIENT SAMPLE IDENTIFICATION:	09BH01-A	09BH02-A	09BH03-A	09BH04-A	
DATE SAMPLED:	Aug 12/09	Aug 11/09	Aug 11/09	Aug 11/09	REPORTING LIMIT
CANTEST ID:	908170040	908170043	908170044	908170045	
Benzene	<	<	<	<	0.04
Ethylbenzene	<	<	<	<	0.5
Toluene	<	<	<	<	0.5
Xylenes	<	<	<	<	0.1
Styrene	<	<	<	<	0.1

Results expressed as micrograms per gram, on a dry weight basis. ($\mu\text{g/g}$)

< = Less than reporting limit

REPORTED TO: EBA Engineering

REPORT DATE: August 25, 2009

GROUP NUMBER: 100817017



Monocyclic Volatile Hydrocarbons-Direct Injection- in Soil

CLIENT SAMPLE IDENTIFICATION:	09BH04-F	
DATE SAMPLED:	Aug 11/09	
CANTEST ID:	908170046	REPORTING LIMIT
Benzene	<	0.04
Ethylbenzene	<	0.5
Toluene	<	0.5
Xylenes	<	0.1
Styrene	<	0.1

Results expressed as micrograms per gram, on a dry weight basis. ($\mu\text{g/g}$)

< = Less than reporting limit

REPORTED TO: EBA Engineering

REPORT DATE: August 25, 2009

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Polycyclic Aromatic Hydrocarbons in Soil

CLIENT SAMPLE IDENTIFICATION:	09BH04-A	
DATE SAMPLED:	Aug 11/09	
CANTEST ID:	908170045	
ANALYSIS DATE:	Aug 18/09	REPORTING LIMIT
Naphthalene	<	0.05
2-Methylnaphthalene	<	0.05
Acenaphthylene	<	0.05
Acenaphthene	<	0.05
Fluorene	<	0.05
Phenanthrene	<	0.05
Anthracene	<	0.05
Total LMW-PAH's		
Fluoranthene	<	0.05
Pyrene	<	0.05
Benzo(a)anthracene	<	0.05
Chrysene	<	0.05
Benzo(b)fluoranthene	<	0.05
Benzo(k)fluoranthene	<	0.05
Benzo(a)pyrene	<	0.05
Indeno(1,2,3-cd)pyrene	<	0.05
Dibenz(a,h)anthracene	<	0.05
Benzo(g,h,i)perylene	<	0.05
Total HMW-PAH's		
Total PAH's		

Results expressed as micrograms per gram, on a dry weight basis. (µg/g)

< = Less than reporting limit

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Extractable Petroleum Hydrocarbons (EPH) in Soil

CLIENT SAMPLE IDENTIFICATION:	09BH01-A	09BH02-A	09BH03-A	09BH04-A	
DATE SAMPLED:	Aug 12/09	Aug 11/09	Aug 11/09	Aug 11/09	
CANTEST ID:	908170040	908170043	908170044	908170045	REPORTING LIMIT
EPHs10-19	<	<	<	280	250
EPHs19-32	820	670	<	370	250
LEPHs (corrected for PAH's)	-	-	-	280	250
HEPHs (corrected for PAH's)	-	-	-	370	250

Results expressed as micrograms per gram, on a dry weight basis. ($\mu\text{g/g}$)

< = Less than reporting limit

REPORTED TO: EBA Engineering

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Extractable Petroleum Hydrocarbons (EPH) in Soil

CLIENT SAMPLE IDENTIFICATION:	09BH04-F	
DATE SAMPLED:	Aug 11/09	
CANTEST ID:	908170046	REPORTING LIMIT
EPHs10-19	<	250
EPHs19-32	<	250

Results expressed as micrograms per gram, on a dry weight basis. ($\mu\text{g/g}$)
< = Less than reporting limit

REPORTED TO: EBA Engineering

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Monocyclic Aromatic Hydrocarbons-Methanol Extraction- in Soil

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	Volatile Hydrocarbons VHS6-10	VPHs
09BH01-A	Aug 12/09	908170040	<	<
09BH02-A	Aug 11/09	908170043	<	<
09BH03-A	Aug 11/09	908170044	<	<
09BH04-A	Aug 11/09	908170045	<	<
09BH04-F	Aug 11/09	908170046	<	<
REPORTING LIMIT UNITS			100 µg/g	100 µg/g

µg/g = micrograms per gram, on a dry weight basis.

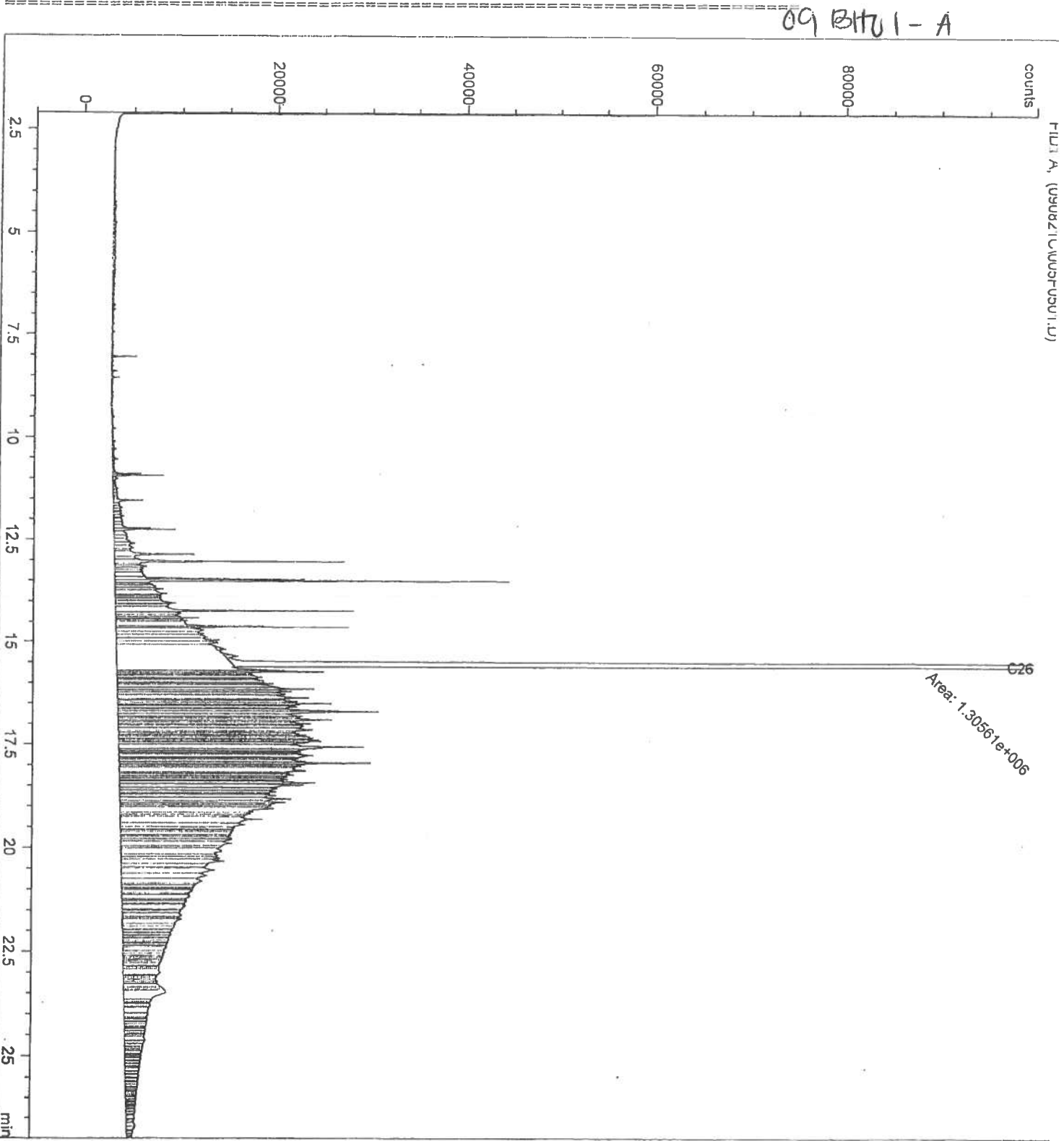
< = Less than reporting limit

Injection Date : 8/21/09 6:05:35 PM Seq. Line : 5
Sample Name : 908170040 Vial : 5
Acq. Operator : pcn Inj : 1
 Inj Volume : 2 µl

Acq. Method : C:\HPCHEM\1\METHODS\!EPH.M
Last changed : 8/21/09 4:46:00 PM by pcn
Analysis Method : C:\HPCHEM\1\METHODS\!EPH_BP.M
Last changed : 8/23/09 9:16:06 AM by pcn
(modified after loading)

10817017
EBA 106

Total Extractable Hydrocarbons. Soils and Waters are extracted using methylene chloride and then analyzed using an HPGC-FID. Calculations are based on an internal standard and reported in ug/L for waters and ug/g for soils.



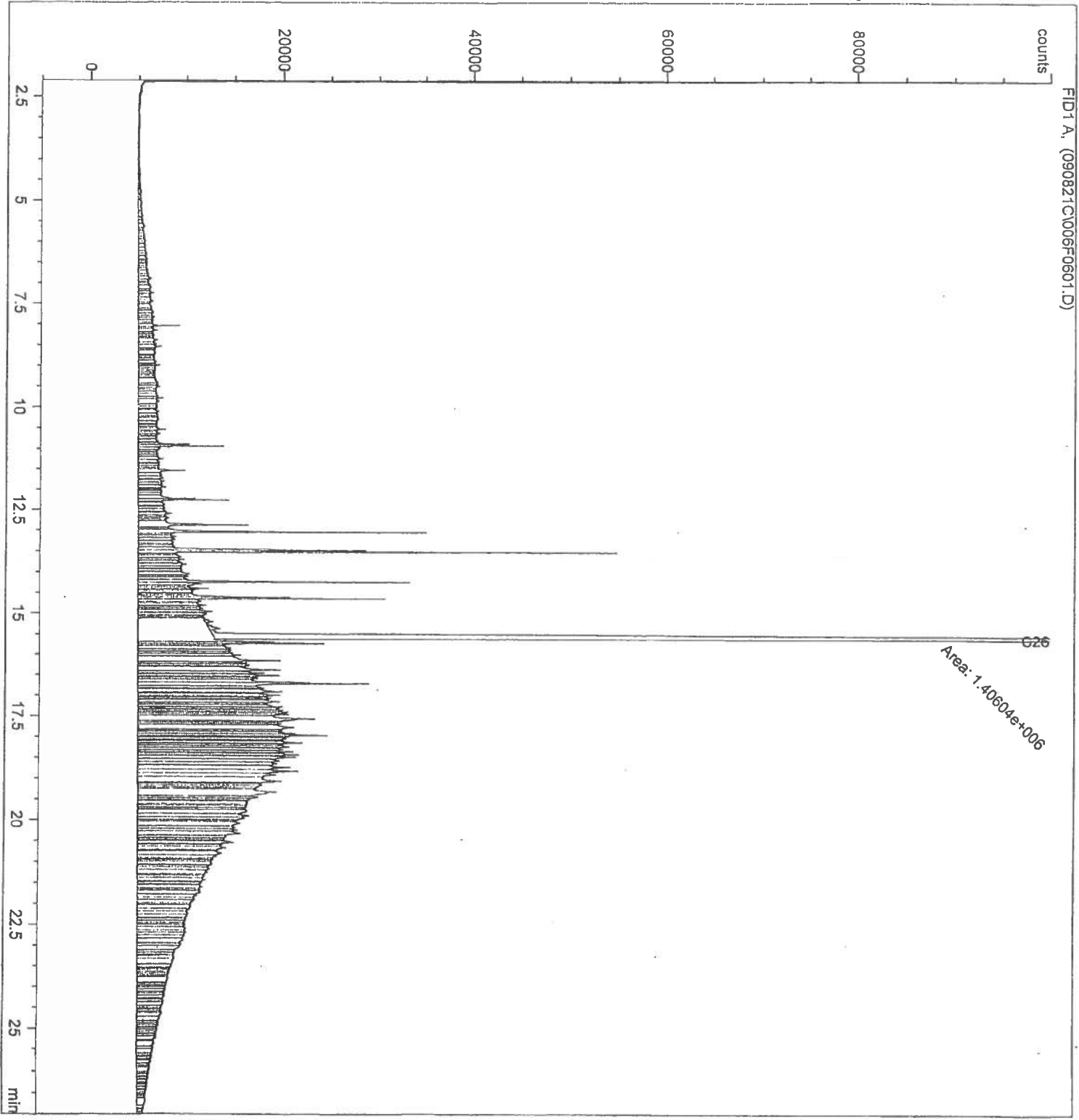
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 Inj Volume : 2 µl

Acq. Method : C:\HPCHEM\1\METHODS\!EPH.M
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Analysis Method : C:\HPCHEM\1\METHODS\!EPH_BP.M
Last changed : 8/23/09 9:16:06 AM by pcn
(modified after loading)

EBA 106

Total Extractable Hydrocarbons. Soils and Waters are extracted using methylene chloride and then analyzed using an HPGC-FID. Calculations are based on an internal standard and reported in ug/L for waters and ug/g for soils.

09 BHT 2-A



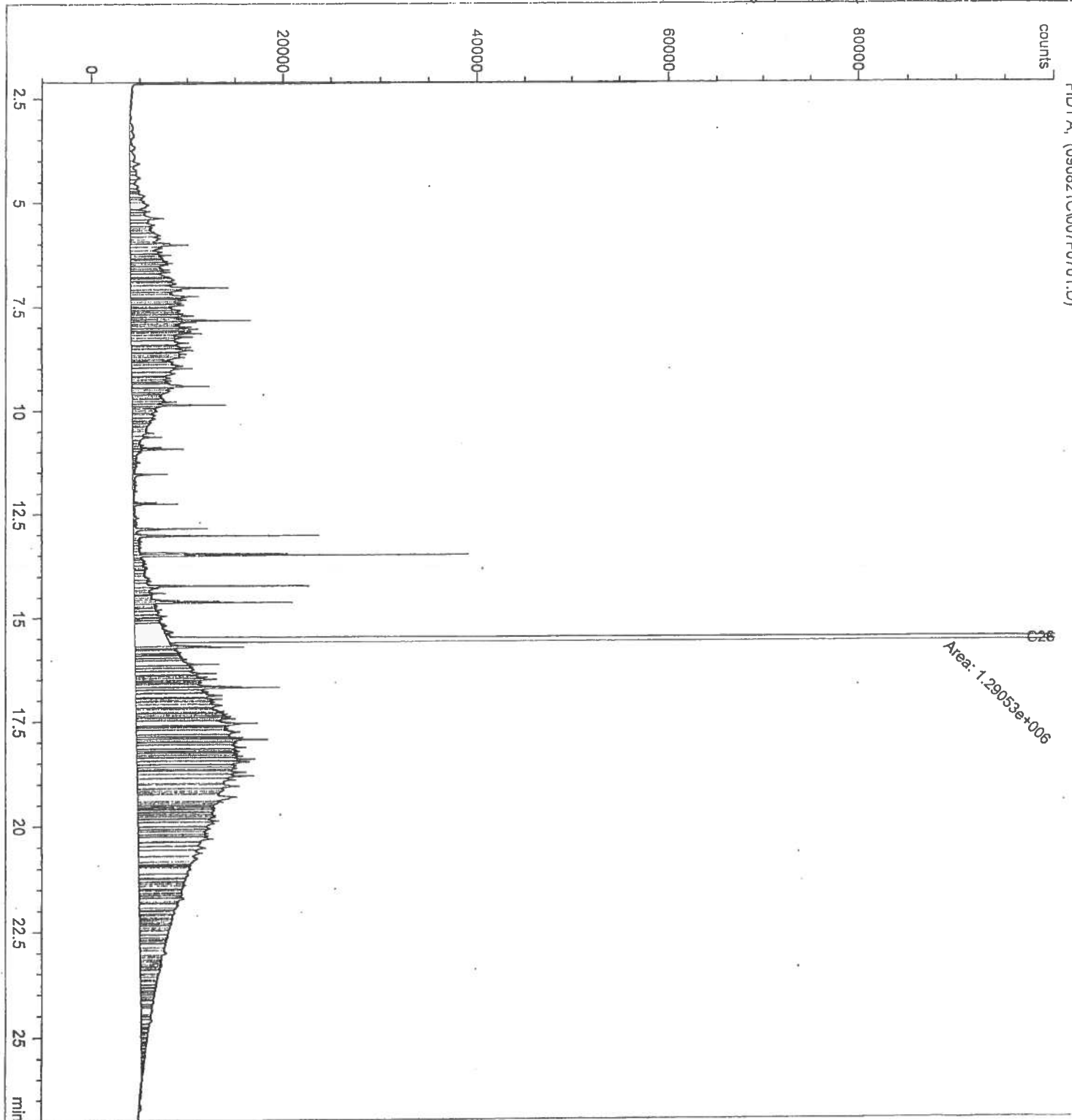
Injection Date : 8/21/09 7:18:49 PM Seq. Line : 7
Sample Name : 908170045 Vial : 7
Acq. Operator : pcn Inj : 1
 Inj Volume : 2 µl

Acq. Method : C:\HPCHEM\1\METHODS\!EPH.M
Last changed : 8/21/09 4:46:00 PM by pcn
Analysis Method : C:\HPCHEM\1\METHODS\!EPH_BP.M
Last changed : 8/23/09 9:16:06 AM by pcn
(modified after loading)

EBA106

Total Extractable Hydrocarbons. Soils and Waters are extracted using methylene chloride and then analyzed using an HPGC-FID. Calculations are based on an internal standard and reported in ug/L for waters and ug/g for soils.

09 BHT 4-A



GEO-ENVIRONMENTAL REPORT – GENERAL CONDITIONS

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