APPENDIX G – FY 2009/2010 MONITORING AND REMEDIATION CLOSURE REPORT, CBSA PORT OF PLEASANT CAMP, PLEASANT CAMP, BC

SNC·LAVALIN
Environment

Division of
SNC-LAVALIN INC.
8648 Commerce Court
Burnaby, British Columbia
Canada V5A 4N6

Tel.: 604-515-5151
Fax: 604-515-5150

FY 2009/2010
MONITORING AND REMEDIATION CLOSURE REPORT

Port of Pleasant Camp
Canada Border Services Agency
Pleasant Camp, BC

VOLUME I OF II

Prepared for:
Real Property Services, Public Works and Government Services Canada, Pacific Region

Prepared By:

D. W. BRIDGER
#29452

P.A. CARMICHAEL

Dave Bridger, M.Sc. P.Geo.
Project Manager/ Hydrogeologist

Patricia Carmichael, M.Sc. P.Geo.
Senior Project Specialist - Hydrogeology

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EXECUTIVE SUMMARY

At the request of Real Property Services, Public Works and Government Services Canada (PWGSC), SNC-Lavalin Environment, Division of SNC-Lavalin Inc. (SLE)[1] has prepared the following report to document remedial system closure and monitoring completed in fiscal year 2009/2010 for a portion of the Canada Border Services Agency (CBSA) Port of Pleasant Camp (the “site”) located in Pleasant Camp, BC.

The objectives of the environmental work completed in FY 2009/2010 at the site included: 1) to provide closure on the remedial air sparge/soil vapour extraction (AS/SVE) system; 2) to improve delineation of residual hydrocarbon-impacted soil and groundwater to support the implementation of a strategy of risk management to mitigate risks to human health and the environment, both long-term, and during future port re-development; and 3) to obtain additional soil quality data to determine the feasibility of partial excavation of shallow contaminated soils prior to or during future port re-development, where opportunity arises.

As outlined in SLE’s work plan and liability estimate dated July 21, 2009[2], the scope of work for the environmental work carried out in FY 2009/2010 included the following tasks:

- *Shutdown of the SVE System and Air Quality Monitoring Program Implementation.* The air sparge (AS) system was shut down earlier January 23, 2009 and the SVE system was kept operating until a monitoring program could be implemented to ensure air quality remained safe for CBSA staff occupying House #5. Four air quality monitoring events were carried out following shutdown of the SVE system on July 15/16, 2009; August 26, 2009; September 24/25, 2009; and January 27/28, 2010. The air quality monitoring included installation of three (3) new sub-slab vapour wells (SVW09-1 through SVW09-3) beneath House #5 and sampling of basement and main floor indoor air and sub-slab soil vapour.

- *Additional Delineation Drilling and Shallow Soil Quality Assessment.* A drilling program was carried out in August 2009 to 1) delineate shallow hydrocarbon-impacted soils in the vicinity of the Generator Building and 2) improve dissolved phase plume delineation in order to support risk assessment and remedial excavation planning. This task included: installation of two monitoring wells (MWs 09-16 and 09-20) to improve plume delineation to the west and northwest; installation of one monitoring well (MW09-5) near the centre of source area

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[1] Formerly Morrow Environmental Consultants Inc. (Morrow).

[2] *FY 2009/2010 Work Plan and Liability Estimate (Revised) CBSA Port of Pleasant Camp Border Crossing Remediation Project Pleasant Camp, BC* dated July 21, 2009.

to evaluate current conditions; and drilling of 8 shallow boreholes to between 4 m and 6.1 m depth (BH09-1 to BH09-8) in the vicinity of the Generator Building, former underground storage tank (UST) excavation, and fuel fill pipe.

- *Post-Remedial Confirmatory Drilling and Soil Quality Assessment.* A second component of the drilling program carried out in August 2009 was to assess post-remedial soil quality at previously identified soil-impacted areas. The drilling program included advancement of 11 deep boreholes to between 5.8 m and 18.3 m depth at the same locations of boreholes advanced prior to remediation and collection of soil samples at depths similar to existing soil data.

- *Biannual Monitoring and Sampling Events.* Monitoring and sampling events were completed on July 9, 2009 and September 28, 2009 and included 1) monitoring of all accessible monitoring wells and collection of groundwater samples from up to 32 selected wells, 2) sampling of surface water in Granite Creek; and 3) sampling of indoor air in House #5 (included as part of the SVE shutdown monitoring program).

- *Reporting.* Reporting tasks included: preliminary risk evaluation of results immediately following vapour sampling events; closure reporting for the remedial system which documents changes in pre-and post-operation soil and groundwater quality at the site; reporting of additional drilling and groundwater and surface water monitoring activities; and development of a Risk Management Plan (RMP) for the site which addresses remaining data gaps for human health and ecological risk components at the site, and presents a strategy to mitigate both long-term and short-term potential risks through monitoring and limited source removal where possible.

The findings of the work completed in FY 2009/2010 were as follows:

Additional Drilling Investigation

- Boreholes advanced in the vicinity of the Generator Building and House #5 to improve delineation of hydrocarbon-impacted soils indicate an area of hydrocarbon-impacted soils at depths above 4 m (depth accessible by most excavation equipment) was identified extending from below the Generator Building (inferred) and north towards the ditch that traverses the base of the slope. The total volume of hydrocarbon impacted-soils in this area (containing F2 greater than CWSPHC CL and RL) was estimated to be on the order of 400 m^3. Hydrocarbon impacted-soils were observed ranging between 1.2 m to 5.5 m depth in this area.

- Further downgradient from the Generator Building, hydrocarbon-impacted soils appear only at depths below 4 m within the saturated zone above the bedrock surface which slopes to the south and to the southeast of House #5. The bedrock surface also slopes steeply to the southeast of House #5; however, the soil contamination is observed above a silt and sand till layer which extends across this area at depths between 5.6 m to 8.3 m.

- The total volume of residual hydrocarbon-impacted soils on the site is estimated to be on the order of 2,250 m^3. Approximately 500 m^3 of this volume is located off-site on MoTI Land, and 400 m^3 is accessible in the vicinity of the Generator Building as noted above. The hydrocarbon contaminated soil continues to be a source of dissolved phase hydrocarbons in groundwater.

<u>Biannual Monitoring and Sampling</u>

- The leading edge of the dissolved phase and light non-aqueous phase liquid (LNAPL) plume in groundwater remains delineated off-site on Haines Highway and has not moved closer to Granite Creek. The cross-gradient extent of the plume along its western limit is now bounded by monitoring wells installed in 2009. Both the dissolved hydrocarbon plume and LNAPL plumes appear to have separated into at least three smaller areas; 1) the source area; 2) in the vicinity of MW 01-17D and 3) near the fuel line at MW 08-2.

- Overall, there is a general trend towards decreasing dissolved phase hydrocarbon concentrations ($EPHw_{10-19}$) in groundwater at the downgradient leading edge of the hydrocarbon impacted area. Hydrocarbons in excess of the CSR AW standard were not measured in several downgradient wells in 2008 and 2009 compared to previous events.

- Natural attenuation of hydrocarbons in groundwater is occurring; however, the current data are limited for determining the effect of shutting the down the remediation system in January 2010 since only two sampling events have been carried within 9 months of shut down.

- There is potential for re-mobilization of dissolved phase and LNAPL plumes in groundwater as well as a rebound effect in hydrocarbon concentrations in both groundwater and soil vapour in the vadose zone following shut down of the remedial system. Ongoing groundwater monitoring and sampling events will be important in order to evaluate potential increasing trends in groundwater.

- The distribution of hydrocarbons in groundwater appears controlled by the irregular bedrock topography across the site, particularly on the south side of Haines Highway where bedrock highs occur and the dissolved phase plume follows bedrock lows or “channels”. Vertical migration of hydrocarbons in bedrock is not expected due to the properties of diesel fuel; however, the upper weathered portion of the bedrock zone may act as a pathway for hydrocarbon plume migration in some areas, particularly during seasonal low water levels. Investigation of groundwater flow and migration of hydrocarbons in bedrock has not been carried out with exception of a deep monitoring well (MW08-4) drilled at the location of the former water well to the west of Generator Building in 2008; no hydrocarbon impacts were observed in bedrock in this location.

Granite Creek Monitoring

- The results of surface water sampling indicated there is no chemical evidence of ecologically significant contamination of Granite Creek related to potential migration of petroleum hydrocarbons from the site.

SVE System Shutdown and Air Quality Monitoring

- Authorization to shut the AS system down was obtained in late 2008 and the system was shut down in January 23, 2009 by the local operator. The SVE system was subsequently shut down on July 9, 2009.

- The results of indoor air quality monitoring and soil vapour sampling in House #5 indicated air quality within House#5 remained acceptable following shutdown of the remedial system in 2009.

AS/SVE System Closure

- The combined AS/SVE system operated for a period of approximately 3 years with few mechanical issues and minimal downtime (system was operation 94% of the time) and was successful in achieving remedial objectives despite the limitations and challenges presented by heterogeneous soil and drilling conditions (i.e., silt and clay lenses and boulders) at the site.

- Performance of the AS/SVE system was evaluated based on 1) maintaining AS air pressures and flow rates into the subsurface, 2) estimates of the mass of hydrocarbons extracted by the SVE system from weekly hydrocarbon vapour measurements, 3) groundwater quality based on biannual groundwater monitoring and sampling events using a network of up to 31 monitoring wells, and 4) soil quality based on confirmatory soil sampling following shut down of the system.

- The AS system achieved an average flow rate of 94 cfm over the period of operation and was expected to result in physical stripping of hydrocarbons in the saturated zone and enhanced biodegradation. The effectiveness of the AS system was limited by the siltation of the sparging wells which likely resulted in a smaller radius of influence, particularly during the final year of operation in 2008 when AS air pressured where noted to decline. The presence of heterogeneous soil conditions (boulders and intermittent silt layers) likely reduced the effectiveness of the sparging system in some areas; the lower permeability silt layers prevented any air flow from being induced in the eastern portion of the remediation area at AS 03-4 and 03-5 (and subsequently 07-1 and 07-2).

- The SVE system was successful in removing approximately 3,275 kg of hydrocarbons in the vapour phase from the subsurface. No impacts from hydrocarbon vapours released by the air sparging system were detected in House #5 based on the results of indoor air sampling.

- In groundwater, the overall area of the dissolved and LNAPL plumes appears reduced from the inferred extent of the plumes observed prior to operation of the remediation system in mid 2006. The separation into the three smaller areas of groundwater impacts most likely resulted from the operation of the remediation system. The dissolved phase plume at the site has reduced to 950 m^2 from approximately 2,700 m^2 while the LNAPL plume has reduced to 400 m^2 from 1,650 m^2 (reduced by up to 65% and 75%, respectively) based on 2009 groundwater monitoring results. In addition, the distribution patterns of geochemical parameters suggests that operation of the air sparging system resulted in enhanced aerobic biodegradation of hydrocarbons.

- Soil results from the confirmatory drilling program completed in 2009 indicate that hydrocarbons in excess of the CCME CL guidelines are still present within the areas where the AS/SVE system was in operation. The overall extent of impacted soils remains the unchanged. The hydrocarbon concentrations were generally lower where F2 or EPH exceedances were historically measured and the improvement in soil quality from pre- to post-remediation may be the result of remedial system operation.

Recommendations

Based on the results of work completed in FY 2009/2010, and assuming the border crossing facility is to remain in it current state (i.e., no re-development) the following tasks are recommended for FY 2010/2011:

- Biannual groundwater monitoring and sampling should be continued to confirm plume stability and biodegradation and ensure protection of human and ecological receptors. The groundwater monitoring should include as a minimum sampling of key “sentry” wells located along the top of the embankment upgradient from Granite Creek. This data will be used to support an ongoing long term monitoring as part of a risk management approach for the site. Once sufficient data has been collected (post AS -shutdown) to determine that the plume is stable or continuing to show a decreasing trend, the monitoring frequency can likely be reduced.

- Installation of dataloggers in selected wells to determine seasonal variations in groundwater levels (no monitoring data from November to April) and determine potential for hydrocarbons to seasonally migrate through the upper weathered portion of the bedrock surface in some areas.

- Confirm if the underground fuel lines to Houses #1 to 4 are leaking and if a secondary source of hydrocarbon contamination exists. Leak testing of the fuel line is required prior to June 2010 and soil quality can be assessed during replacement of the fuel line which has been proposed as part of ongoing fuel system upgrades for the site.

- Investigate soil quality in the ditch located north of the facility to evaluate whether fuel escaped into the ditch during the spill event in 1980.

- Removal of all accessible shallow hydrocarbon impacted soils in the vicinity of the Generator Building as part of future re-development of the port facility. The contaminated soils continue to be a source of dissolved phase hydrocarbons in groundwater and their removal would likely enhance the timeframe for biodegradation of hydrocarbons in groundwater and improve groundwater quality at the site.

- It is recommended to leave the AS and SVE system equipment on site until it is confirmed that groundwater concentrations do not rebound. When it is determined that the system is no longer required at the site a plan for decommissioning should be determined.

1. INTRODUCTION

At the request of Real Property Services, Public Works and Government Services Canada (PWGSC), SNC-Lavalin Environment, Division of SNC-Lavalin Inc. (SLE)[1] has prepared the following report to document remedial system closure and monitoring completed in fiscal year 2009/2010 for a portion of the Canada Border Services Agency (CBSA) Port of Pleasant Camp (the “site”) located in Pleasant Camp, BC.

1.1. Objectives

As outlined in SLE’s work plan and liability estimate dated July 21, 2009[2], the objectives of the environmental work completed in FY 2009/2010 at the site included the following:

- To provide closure on the remedial air sparge/soil vapour extraction (AS/SVE) system;
- To improve delineation of residual hydrocarbon-impacted soil and groundwater to support the implementation a strategy of risk management to mitigate risks to human health and the environment, both long-term, and during future port re-development
- To obtain additional soil quality data to determine the feasibility of partial excavation of shallow contaminated soils prior to or during future port re-development, where opportunity arises.

1.2. Scope of Work

In order to meet these objectives, the following tasks were carried out in FY 2009/2010.

- *Task 1: Project Coordination.* Obtain Yukon Government Authorization and Permits, and Preparation of Health and Safety Plan (HASP).
- *Task 2: SVE System Shutdown and Air Quality Monitoring Program.* The AS system was shut down on January 23, 2009 by the local operator. However, as House #5 is currently occupied by CBSA staff, the SVE system was kept in operation until an air quality monitoring program could be implemented in House #5 during and following the shutdown to ensure that air quality in House #5 remained at safe levels. As such, shutdown of the SVE

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[2] *FY 2009/2010 Work Plan and Liability Estimate (Revised) CBSA Port of Pleasant Camp Border Crossing Remediation Project Pleasant Camp, BC* dated July 21, 2009.

system operating around House #5 was carried out on July 9, 2009 and air quality monitoring after the shutdown to ensure conditions remained safe for CBSA staff occupying House #5. Post-shutdown air quality monitoring events were carried out on July 15/16, 2009; August 26, 2009; September 24/25, 2009; and January 27/28, 2010 (4 events). and included installation of three (3) new sub-slab vapour wells (SVW09-1 through SVW09-3) beneath House #5 and sampling of basement and main floor indoor air and sub-slab soil vapour.

- *Task 3A: Additional Delineation Drilling and Shallow Soil Quality Assessment.* A drilling program was carried out in August 2009 to 1) delineate shallow hydrocarbon-impacted soils in the vicinity of the Generator Building and 2) improve dissolved phase plume delineation to the west in order to support risk assessment and remedial excavation planning. This task included: installation of two monitoring wells (MWs 09-16 and 09-20) to improve plume delineation to the west; installation of one monitoring well (MW09-5) near the centre of source area to evaluate current conditions; and drilling of 8 shallow boreholes to between 4 m and 6.1 m depth (BH09-1 to BH09-8) in the vicinity of the Generator Building, former underground storage tank (UST) excavation, and fuel fill pipe.

- *Task 3B: Post-Remedial Confirmatory Drilling and Soil Quality Assessment.* A second component of the drilling program carried out in August 2009 was to assess post-remedial soil quality at previously identified soil-impacted areas. The drilling program included advancement of 11 deep boreholes (BH09-9 to BH09-15, BH09-17 to BH09-19, and BH09-21) to between 5.8 m and 18.3 m depth at the same locations of boreholes advanced prior to remediation and collection of soil samples at depths similar to existing soil data. .

- *Task 4: Biannual Monitoring and Sampling Events.* Monitoring and sampling events were completed on July 9, 2009 and September 28, 2009 and included:

  - monitoring of all accessible monitoring wells and collection of groundwater samples from up to 32 selected wells;

  - sampling of surface water in Granite Creek (4 samples from existing sample stations); and

  - sampling of indoor air in House #5 (included as part of the SVE shutdown monitoring program).

- *Task 5: Reporting.* The following reporting tasks were carried out:
  - Preliminary risk interpretation of results immediately following vapour sampling events;
  - Closure reporting for the remedial system which documents changes in pre-and post-operation soil and groundwater quality at the site;
  - Reporting of additional drilling and groundwater and surface water monitoring activities; and
  - Development of a Risk Management Plan (RMP), in following with PWGSC Contaminated Sites Risk Management Best Practice[3] guidance, which addresses remaining data gaps for human health and ecological risk components at the site, and presents a strategy to mitigate both long-term and short-term potential risks through monitoring and limited source removal where possible.

The following report documents the closure of the remedial system including post-SVE shutdown air quality monitoring and post-remedial soil assessment, and reports on the additional delineation drilling and biannual groundwater and surface water quality monitoring completed in FY2009/2010. The RMP document will be provided under separate cover.

All work was conducted in accordance with the PWGSC Remediation Standing Offer Agreement (SOA) E0276-040048/C.

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[3] *Contaminated Sites Risk Management Best Practice*, prepared by Franz Environmental Ltd. for PWGSC dated September 18, 2003.

2. REGULATORY FRAMEWORK

The Port of Pleasant Camp is located on federal land; accordingly, the analytical results for soil and groundwater samples have been evaluated based on the guidelines, criteria and standards in the following documents:

- *Canada Wide Standards for Petroleum Hydrocarbons (PHC) in Soil (CWSPHC*), Canadian Council of Ministers of the Environment (CCME), Winnipeg, MB, January 1, 2008.
- *Canadian Environmental Quality Guidelines (CEQG)*, Canadian Council of Ministers of the Environment (CCME), Winnipeg MB, 2007.

For off-site areas where impacts on properties under provincial jurisdiction have been identified (i.e., under Haines Highway), the analytical results of soil, groundwater, and surface water samples collected are evaluated based on the standards and guidelines contained in the following provincial regulations:

- Contaminated Sites Regulation (CSR), B.C. Reg. 375/96, including amendments up to B.C. Reg. 112/2010.
- *Hazardous Waste Regulation* (HWR)*,* B.C. Reg. 63/88, including amendments up to B.C. Reg. 63/2009.
- Water, Air and Climate Change Branch, MoE, British Columbia Approved Water Quality Guidelines (Criteria), 2006 Edition, (BCAWQG), including updates to January 2009.
- Water, Air and Climate Change Branch, MoE, *A Compendium of Working Water Quality Guidelines for British Columbia,* 1998 Edition, updated August 2006 (Compendium).

2.1. Soil

For soil, the standards/guidelines listed in the federal CCME Canadian Soil Quality Guidelines (SQG) and CWSPHC, and provincial CSR provide numerical concentrations for the evaluation of soil quality and the identification of remediation requirements. The historical, current and anticipated future land use of the site is for operation of a border crossing facility. As such, the land use is zoned commercial and analytical results for soil were compared to federal and provincial soil standards and guidelines for commercial land use (CL). It is noted, however, that since employees currently live in the buildings (i.e., House #5), residential (RL) receptor criteria are shown for comparison purposes only.

Federal Guidelines/Standards

The federal SQG for benzene, ethylbenzene, toluene, and xylenes (BETX) are intended to be protective of both environmental (SQG_E) and human health (SQG_{HH}) and SQG are derived for different soil textures (coarse and fine) and depths (surface and subsoil). As referenced on the analytical tables, the site-specific exposure pathways considered in the application of these guidelines included the most stringent of: soil ingestion, soil dermal contact, inhalation of indoor air, ecological soil contact, and groundwater check values for aquatic life.

For polycyclic aromatic hydrocarbons (PAHs) in soil, analytical data were compared to federal SQG updated in October 2008, superseding the previous CCME 1999 and interim 1991 guidelines. The site-specific exposure pathways considered for PAHs included the most stringent of direct contact for human health protection, and protection of aquatic life, and soil contact for environmental health. Guideline values for different soil textures and depths are not specified for the PAH SQG.

Exposure pathways used in the selection of applicable CWSPHC standards for hydrocarbon fractions F1, F2, F3, and F4 include the most stringent of: direct soil contact, soil ingestion, vapour inhalation (indoor), protection of groundwater for aquatic life, eco soil contact (for surface soils only), and management limits (for subsoils). The CWSPHC standards are derived for both coarse and fine soil textures.

Provincial Standards

The BC CSR provides both generic numerical (Schedule 4) and matrix (Schedule 5) soil standards. Generic numerical soil standards (i.e., not site specific) exist for volatile petroleum hydrocarbons (VPH), light extractable petroleum hydrocarbon/heavy extractable petroleum hydrocarbon (LEPH/HEPH) concentrations in soil as well as for metals. Extractable petroleum hydrocarbons ($EPH_{C10\text{-}C19}$ and $EPH_{C19\text{-}C32}$) include PAHs compounds while the regulated LEPH and HEPH require a subtraction of PAHs concentrations. Where PAHs concentrations were not measured, EPH concentrations are considered conservative when compared to LEPH and HEPH standards.

The matrix numerical soil standards exist for BTEX as well as some volatile organic compounds (VOC) and some metals (arsenic, cadmium, chromium, copper, lead, and zinc). The standards used depend on site-specific conditions (e.g., soil pH; intake of contaminated soil and use of groundwater for drinking water for human health protection; and groundwater flow to surface water used by freshwater aquatic life, toxicity to soil invertebrates and plants, and major microbial functional impairment for environmental protection). The site-specific factors considered to be applicable at the site included the most stringent of: intake of contaminated soil, toxicity to soil invertebrates and plants, and groundwater flow to surface water used by freshwater aquatic life.

Site-specific factors for the protection of drinking water or potable water were not considered in the selection of federal and provincial soil standards as drinking water for the on-site CBSA staff is obtained from an intake on Granite Creek located approximately 100 m west (i.e., cross-gradient) of the border crossing facility (the location of the soil and groundwater plume).

2.2. Groundwater

Groundwater analytical data have been compared to the federal CEQG Canadian Water Quality Guidelines and provincial CSR standards for the protection of freshwater aquatic life (AW) based on the short distance (i.e., less than 1 km) and expected groundwater travel times from the inferred leading edge of the dissolved phase hydrocarbon plume to Granite Creek located approximately 30 m south (downgradient) of the site.

As noted above, drinking water guidelines/standards have not been applied as groundwater is not used for drinking water on site and the drinking water source to the west of the site (Granite Creek) is not likely to be impacted by site conditions.

The provincial CSR non-aqueous phase liquid (NAPL) indicator standards apply irrespective of water use at all sites. No other potential groundwater uses (i.e., irrigation, livestock watering, etc.) were identified.

For groundwater, it should be noted that the federal CEQG guidelines are intended for evaluating ambient water quality of a receiving body of water and may not be suitable for direct application to groundwater. Dilution-attenuation of constituent concentrations between the groundwater zone and the receiving surface water body (Granite Creek) are expected to occur at the site and it is considered reasonable to apply a correction factor to the guidelines to account for this effect. This is consistent with the BC CSR aquatic life standards which assume a minimum dilution factor of 10:1 (see CSR Schedule 6, Note 2(a), and acceptance by Environment Canada that a dilution factor may be applied to CEQG aquatic life guidelines when evaluating groundwater. We note, however, that actual dilution factors at the site have not been confirmed and that this would require further investigation. For the purposes of this report, a dilution factor has not been applied to the CEQG AW standards shown in the tables for comparison to groundwater analytical data.

In addition, it should be noted that there are no federal guidelines for gross hydrocarbon parameters (VPHw and LEPHw/EPHw) used in the provincial regulatory framework.

2.3. Surface Water

Surface water analytical data from Granite Creek have been compared to the federal CEQG Canadian Water Quality Guidelines and provincial approved and working guidelines for the protection of freshwater aquatic life contained in the BCAWQG and Compendium reports referenced above (collectively referenced as BC WQG).

2.4. Contaminants of Concern and Related Analytical Parameters

Diesel fuel is the contaminant of concern as identified by previous investigations. The following regulated analytical parameters are used to assess potential impacts to soil, groundwater and surface water and measure remedial progress:

Primary Contaminant of Concern (COC)

- light extractable petroleum hydrocarbons (LEPH/$EPH_{C10\text{-}C19}$; provincially regulated only); and
- CWS-PHC fraction F_2 (soil parameter only; federally regulated only).

Secondary Potential Contaminants of Concern (PCOC)

- benzene, ethylbenzene, toluene and xylenes (BETX; regulated both federally and provincially);
- CWS-PHC fractions F_1 (soil parameter only; regulated federally only);
- PAH (regulated provincially and federally); and
- metals (regulated provincially and federally at lower detection limits).

It is noted that the primary contaminant in both soil and water is petroleum hydrocarbons in the carbon ranges associated with F_2 (C_{10}-C_{16}) and LEPH (C_{10}-C_{19}).

3. BACKGROUND

The following provides an overview of soil and groundwater conditions at the site and results of the AS/SVE remedial system operation and monitoring to the end of 2008. Additional details are contained in SLE's previous investigation reports, RAP, and annual progress reports which are referenced below.

3.1. Physical Setting and Site Description

The CBSA Port of Pleasant Camp border crossing facility is located on Haines Highway (commonly referred to as Haines Road) in the northwestern corner of British Columbia, approximately 170 km south of Haines Junction, YT as shown on Drawings 131416-901 (Location Plan) and 131416-902 (Key Plan). The nearest settlement is Haines, Alaska located approximately 70 km to the south.

The Pleasant Camp border crossing facility covers an approximate area of 2 ha (20,000 m^2) area and is comprised of two (2) legal lots as indicated below:

- Cassiar District Lot 6350; and
- Cassiar District Lot 1047.

The site is located on a bench along the northeast side of Haines Highway at the base of a steep slope. The ground surface slopes gently from northwest to southeast and is either paved, gravel or grass covered. The surrounding area is heavily forested, with steep mountainous terrain descending to the Klehini River Valley. Granite Creek, a tributary of the Klehini River, is located 50 m southwest of the site, across Haines Highway, at the base of a steep bank as shown on the appended Wide Area Site Plan (Drawing 131416-903). Granite Creek, and the areas beyond the west side of the Haines Highway right-of-way (ROW), are located within the Tatshenshini-Alsek Provincial Park.

The Canadian section of Haines Highway (between Haines Junction, YT and the Alaskan border) is BC Provincial Crown Land under the jurisdiction to the BC Ministry of Transportation and Infrastructure (MoTI). Although in BC, the highway is currently maintained by the Yukon Government Department of Highways and Public Works.

The CBSA border crossing facility infrastructure consists of 13 structures including one (1) well house, one (1) maintenance building, three (3) garages, a customs office, a generator building and shed, and five (5) residences. The general layout of the border crossing facility and surrounding area is shown on the Wide Area Site Plan (Drawing 131416-903). A detailed site plan showing all underground utilities is presented on the Site Plan (Drawing 131416-904). Several photographs of the site are included in Appendix I.

3.1.1. Climate

Figure 1 attached presents graphs showing 1) average rainfall and precipitation data from the 1971 to 2000 climate normals from the on-site weather station, and 2) actual precipitation and temperature over the period 2001 to 2010. The border crossing facility receives on average a total of 1,416 mm of precipitation per year with approximately half of this amount occurring as snowfall between October and April. The highest rainfall typically occurs in September and October and the driest month is typically June.

3.1.2. Stratigraphy and Hydrogeology

Prior investigations revealed that soils are generally comprised of four (4) distinct stratigraphic units as follows:

- **FILL:** comprised of silty sand and gravel, with cobbles and boulders (Unit 1); overlying.
- **SAND and GRAVEL:** with varying amounts of silt and cobbles and boulders (Unit 2). overlying.
- **SAND or SILT and SAND:** dense, till-like (Unit 3).
- **BEDROCK:** (Unit 4).

Discontinuous lenses of silty sand to sand with some silt were encountered within the native sand and gravel unit. In addition, a clay lens was noted at four drilling locations indicating that clay lenses are not extensive throughout the site.

The groundwater table is encountered between approximately 3 m and 8 m depth, typically within or just below the finer grained silty sand layers within the sand and gravel and just above the bedrock. As such, many of the monitoring wells are completed at the bedrock contact. The water table has been observed to fluctuate up to 1.9 m annually, although the average range is 0.9 m (approximately).

The potentiometric elevations from prior monitoring events indicate that groundwater flow is estimated to be southeast under a steep hydraulic gradient of 0.08 m/m becoming steeper (up to 0.13 m/m) to the south, closer to Granite Creek. The slope of the bank down to Granite Creek is in the range of 0.3 m/m to 0.4 m/m. However, no seeps have been observed along this slope suggesting that the groundwater hydraulic gradient steepens on the south side of Haines Highway (i.e., most likely follows the bedrock surface).

The calculated average hydraulic conductivity within the sand and gravel (Unit 2) is estimated to range between 8 x 10^{-4} m/s (MW01-18) to 7 x 10^{-5} m/s (MWP3), corresponding to estimated groundwater velocities of at least 2 m/day to 18 m/day from the site to the other side of Haines Highway.

3.2. Contamination History

Hydrocarbon impacted soil and groundwater identified at the site during previous investigations (referenced below) was inferred to be associated with a fuel spill that occurred in 1980 when diesel fuel was lost through a floor drain in the Generator Building as a result of fuel overflowing from the day tank. The quantity of fuel lost was estimated to be up to approximately 18,170 L (4,800 gal) based on time required to fill the 300 gal day tank (30 minutes) in the Generator Building and estimated time the fill pump was reportedly left running (8 hours). The Generator Building floor drain apparently discharged to a drain tile field located below a 22,700 L (5,000 gal) underground storage tank containing diesel fuel for power generators located between House #5 and the Generator Building. This UST was removed by SEACOR in 1999 (Seacor, 2000a). Impacted soils were encountered beneath the tank; however, as the tank was reportedly in good condition upon removal, the source of hydrocarbons was inferred to be from the 1980 fuel spill versus a leak in the UST.

Information obtained from CBSA staff in 2008 has also indicated that circa 1975, approximately 11,360 L (3,000 gal) of diesel fuel was accidentally pumped into the former water well (the water well standpipe was mistaken for the UST fill pipe) located immediately northwest of the Generator Building. The water well was reportedly backfilled with concrete and abandoned and it is unknown if there were efforts made to recover the fuel. The completion details and depth of the water well are currently unknown although anecdotal information from CBSA staff indicates the well was 36.5 m to 43 m (120 ft to 140 ft) deep; bedrock in the vicinity of the wells is at 4.7 m depth below grade based on a borehole (BH08-4) advanced at this location in 2008.

A 1983 diesel spill of approximately 180 gallons was also documented by Gartner Lee (1997) during a Phase I investigation at the site. No further information is available on this spill.

3.3. Previous Environmental Work (1997 to 2008)

The following reports summarize the environmental work performed at the site that formed the basis for implementation of the RAP and subsequent reports since implementation of the RAP:

- *Remediation Progress Report FY2008/2009, Port of Pleasant Camp, Canada Border Services Agency Pleasant Camp, BC*, by Morrow, Draft dated March 31, 2009 (SLE, 2009).
- *Remediation Progress Report FY2007/2008, Port of Pleasant Camp, Canada Border Services Agency Pleasant Camp, BC*, by Morrow, Draft dated July 21, 2008 (Morrow, 2008).
- *Remediation Progress Report FY2006/2007, Port of Pleasant Camp, Canada Border Services Agency Pleasant Camp, BC*, by Morrow, Draft dated June 15, 2007 (Morrow, 2007).
- *Human Health Preliminary Quantitative Risk Assessment, Port of Pleasant Camp, Canada Border Services Agency, Pleasant Camp, BC.* by Morrow, dated November 3, 2006 (Morrow, 2006c).
- *Preliminary Quantitative Ecological Risk Assessment – Problem Formulation, Port of Pleasant Camp, Canada Border Services Agency, Pleasant Camp, BC*. by Azimuth Consulting Group Inc., dated November 3 2006 (Azimuth, 2006).
- *Remediation Progress Report FY2005/2006, Port of Pleasant Camp, Canada Border Services Agency Pleasant Camp, BC*, by Morrow, dated October 2006 (Morrow, 2006b).
- *Port of Pleasant Camp Crossing Facility, Pleasant Camp, BC, Pre-remediation Groundwater Sampling Event – July 2005*, by Morrow, dated February 2006 (Morrow, 2006a).
- *CEAA Screening Report, Installation of In Situ Remediation System – Combined Air Sparging and Soil Vapour Extraction, Port of Pleasant Camp, Canada Border Services Agency, Pleasant Camp, BC*, by Morrow, dated August 2005 (Morrow, 2005c).
- *Remedial Action Plan, Port of Pleasant Camp, Canada Border Services Agency, Pleasant Camp, BC*, by Morrow, dated August 2005 (RAP; Morrow, 2005b).

- *Supplementary Off Site Delineation Drilling and Installation of Remediation Wells, Port of Pleasant Camp, Canada Border Services Agency, Pleasant Camp, BC*, by Morrow, dated July 8, 2005 (Morrow, 2005a).

- *Human Health Screening Level Risk Assessment, Port of Pleasant Camp, Canada Border Services Agency, Pleasant Camp, BC*, by Morrow dated December 9, 2004 (Morrow,2004b).

- *Supplemental to Detailed Site Investigation, Port of Pleasant Camp, Canada Customs and Revenue Agency Border Crossing Facility, Pleasant Camp, BC,* by Morrow, dated April 8, 2004 (Morrow, 2004a).

- *Detailed Site Investigation, Port of Pleasant Camp, Canada Customs and Revenue Agency Border Crossing Facility, Pleasant Camp, BC*', by Morrow, dated February 2002 (Morrow, 2002).

- *Port of Pleasant Camp, British Columbia, Border Crossing Condition Report and Feasibility*, PWGSC Project # 848691, by Boldwing Continuum/IKOY Architects, dated January 2001.

- *Soil and Groundwater Investigation, Pleasant Camp Border Crossing, Pleasant Camp, BC,* by SEACOR Environmental Engineering Inc. (Seacor), dated December 2000 (Seacor, 2000b).

- *Final Report, Tank Upgrade/Decommissioning Report, Yukon/Northern BC Border Crossings, Pleasant Camp, BC and Beaver Creek, YT,* by SEACOR Environmental Engineering Inc., dated March 22, 2000 (Seacor, 2000a).

- *Phase I Assessment, Pleasant Camp, BC, Draft Report*, by Gartner Lee Limited, dated November 1997.

A detailed summary of each report referenced above dated prior to August 2005 is provided in the Morrow RAP.

Subsurface investigations carried out by Morrow and others between 2000 and 2008 have included a total of 66 boreholes, 53 of which were completed as monitoring wells. The locations of all boreholes and monitoring wells are shown on Drawing 131416-904 (Site Plan) and historic soil and groundwater analytical results are shown on Drawings 131415-908 (Detailed Soil Analytical Results - Hydrocarbons) and 131416-911 (Detailed Groundwater Analytical Results -

Hydrocarbons), respectively. Soil, groundwater, surface water and air data from previous investigations are compared to current standards and criteria in the Tables, attached.

Most recently in 2008 (SLE, 2009), an additional drilling investigation was carried out to 1) improve delineation of the leading edge of the dissolved phase plume in groundwater on the slope between Haines Road and Granite Creek, 2) to improve delineation in the northeast portion of the hydrocarbon plume area and investigate potential for an underground fuel line to be a source of contamination in this area, and 3) to investigate potential hydrocarbon contamination in bedrock at the former water well location.

3.4. Pre-Remediation Soil Quality

Based on investigation work completed prior to 2006, the area of impacted soils was estimated to encompass an approximate 1,500 m^2 area in the vicinity of House #5 and extend locally off site below Haines Highway immediately south and southeast of House #5 (Morrow, 2005). The hydrocarbon impacted soil contains concentrations of federally regulated F2 carbon ranges up to 6,000 µg/g, greater than the CWSPHC CL standards and the BC CSR CL standards. The average thickness of the contaminated soil was estimated to be approximately 1 m (typically the smear zone at the water table) and the depth to contaminants ranged from 2.5 m to 7.2 m over this area and below the roadway.

In accordance with Section 60.1 of the BC CSR, CBSA has previously (August 2005) notified the neighbouring landowners (BC MoTI) in writing regarding off-site migration of contaminants.

Additional drilling carried out in 2008 identified hydrocarbon exceedances at 6 m depth in soil in BH08-2, located in the northeast section of the site (upgradient of 01-17D); and at 8 m depth in BH08-8, located off-site at the western extent of the plume along Haines Highway (downgradient from former spill area). The extent of soil impacts in these two areas remained undelineated as well as the extent of shallow impacted soils in the vicinity of the source area between the Generator Building and House #5. These data gaps were addressed by the additional drilling investigation completed in 2009.

3.5. Pre-Remediation Groundwater Quality

3.5.1. LNAPL

Based on July 2005 data (the monitoring event prior to commissioning of the remediation system; Morrow, 2006a), the aerial extent of measured light non-aqueous phase liquid (LNAPL) was estimated to be 250 m^2 and the total estimated volume of LNAPL was 750 L based on a historical apparent thickness of 3 mm. The LNAPL was delineated on-site (no off-site impacts) and was identified in six monitoring wells located in the vicinity of House #5 (MWs MWP4, 01-14, 01-22, 01-24, 03-10 and 03-11).

It is noted that between 2001 and 2003 there were several wells not included in this aerial extent that contained groundwater with hydrocarbon concentrations indicative of the potential presence of LNAPL suggesting that the LNAPL plume may have been larger but mostly existing as residual (i.e., immobile). In addition, historical EPH concentrations indicated that LNAPL was most likely present in a separate area located on the east side of the site in 2001 at MW01-17D. Subsequent sampling of this well during operation of the system in 2007 and 2008 contained elevated EPHw$_{10-19}$ concentrations and presence of a sheen observed indicating that LNAPL continued to be present at MW01-17D. With the inclusion of these wells with elevated EPH concentrations, the size of the pre-remediation LNAPL plume area increases to approximately 1,650 m2 as shown on Drawing 131416-911.

3.5.2. Dissolved Phase Hydrocarbons

Based on the results of pre-remediation groundwater sampling in July 2005, a dissolved phase plume containing concentrations of EPHw$_{10-19}$ (in excess of the CSR standard of 500 μg/L for LEPHw) ranging from 500 μg/L up to 4,100 μg/L existed in the vicinity of the residual soil impacts and extended south off-site under Haines Road. The dissolved phase plume was originally estimated to extend over an area of approximately 2,000 m^2; however, the plume was not completely delineated on the south side of Haines Road at MW 04-3 and MW 04-5 due to steep topography, and to the west of the Generator Building.

Subsequent drilling completed in 2008 and 2009 achieved delineation of the dissolved plume in these areas and indicated the pre-remediation dissolved plume area was larger, covering approximately 2,700 m^2 as shown on Drawing 131416-911. The dissolved phase plume was identified only within unconsolidated deposits above the bedrock surface and inferred to preferentially migrate within localized “channels” downgradient from the source area towards Granite Creek. Investigation of granitic bedrock has not been carried out with exception of a deep monitoring well (MW08-4) drilled at the location of the former water well to the west of Generator Building in 2008; no hydrocarbon impacts were observed in bedrock in this location.

3.6. Remedial Objectives and Remedial Action Plan Implementation (2005 to 2009)

In following with the 2005 RAP, PWGSC’s remedial objectives at the site were to:

- control and/or eliminate the off-site migration of petroleum hydrocarbons in groundwater (both dissolved phase and LNAPL;
- remove residual LNAPL in groundwater;
- reduce groundwater concentrations to within applicable CSR Schedule 6 standards for protection of freshwater AW, or if not possible, to establish a long-term risk management strategy to address dissolved phase hydrocarbon impacts;
- monitor the stability of the LNAPL and dissolved phase hydrocarbon plumes in groundwater; and
- ensure that soil and groundwater contamination does not pose a risk to human health or the environment.

Based on these objectives, the remedial strategy at the site included implementation of the following:

In Situ Remediation by Combined Air Sparge (AS) / Soil Vapour Extraction (SVE): Based on an evaluation of remedial options by Morrow in 2005, in situ remediation with a combined AS/SVE system was selected as the most suitable option for the remediation of impacted on-site and off-site soil and groundwater. The AS/SVE system was expected to reduce hydrocarbon concentrations in soil and groundwater by volatilization of contaminants and enhanced biodegradation (by AS) and to use SVE to reduce impacts to House #5 from potentially mobilized vapours in soil and ambient air.

The AS/SVE system was commissioned in mid-June 2006 and was successfully operated until January 2009 (AS) and July 2009 (SVE) when it was shutdown following a review by SLE in which it was determined that there minimal remedial benefit in continuing to run the system.

A detailed evaluation of the performance of the system and rationale for shutdown is provided in Section 9.0.

Plume Stability Monitoring: Biannual groundwater monitoring and sampling events were carried out and included monitoring of sentry wells located along the south side of Haines Highway to ensure that further LNAPL and dissolved phase hydrocarbon plume migration was not occurring. The occurrence of natural attenuation of the dissolved phase plume was also assessed.

The results of biannual monitoring events conducted during the period of system operation between June 2006 and July 2009 indicated the size of the inferred LNAPL plume appeared to decrease compared to historical results. None of the wells contained measurable product during the two monitoring events completed in June and September 2008 and although sheen was noted at MWs AS-4 (September), AS-13 (September), AS-22 (June), P4, 03-3, 03-8, 03-10, 03-11 (June), 06-2, 06-5 (June), 08-2 (September), 08-7 (September), and 08-8 (September), the analytical data from 2008 does not support the presence of LNAPL at these locations. Elevated $EPHw_{10\text{-}19}$ concentrations indicating the potential presence of LNAPL were measured in MWs 03-3, 03-8, 03-10D and 06-5 in the past. In addition, elevated $EPHw_{10\text{-}19}$ concentrations measured in groundwater and presence of a sheen were observed during sampling in 2007 and 2008 indicating that LNAPL was also likely present at MW01-17D located on the east side of the site.

The dissolved phase hydrocarbon plume was bounded along its leading edge (southern and eastern extents) by monitoring wells installed in 2008 along the embankment above Granite Creek but remained undelineated to the west and northwest (at new 2008 monitoring well MW08-3 and AS-11). Concentrations of $EPHw_{10\text{-}19}$ within the plume appeared to decrease in MWs 03-3, 03-9, 04-5, and 06-5, and remained stable at 03-8, 03-10, 03-11, 06-2, and 06-4. A general trend towards decreasing $EPHw_{10\text{-}19}$ concentrations in groundwater was observed at the downgradient leading edge of the dissolved phase hydrocarbon plume. The leading edge of the dissolved plume appeared to have moved closer to the site (i.e., hydrocarbons in excess of the CSR AW standard were not measured in downgradient wells, MWs 03-9, 04-2, and 04-5, in 2008 compared to previous events) indicating that the dissolved plume was most likely decreasing in size

Ecological Monitoring in Granite Creek: As the leading edge of dissolved phase plume located south of Haines Highway had not been delineated (as of 2005) due to steep topography (i.e., limited access for drilling equipment at that time), potential impacts to Granite Creek were evaluated through a Preliminary Quantitative Ecological Risk Assessment (PQRA) Problem Formulation[4] completed in September 2005 (prior to operation of the remedial system), and subsequent ecological monitoring in 2007 and 2008 which included sampling of assessment of surface water, sediment, soil, and benthic invertebrates in the creek.

The purpose of the PQRA work was to establish a baseline for ecological conditions, to assess risks from dissolved phase hydrocarbons at the leading edge of the plume that may not be within the influence of the proposed remediation system, and to assess the need for ecological control measures at the site during the remediation time frame.

The PQRA findings concluded that there was no chemical evidence of ecologically significant contamination in Granite Creek and that the creek environment was a typical aquatic system, apparently physically stable and ecologically healthy. Based on the ecological problem formulation for the site, it was recommended that monitoring of ecologically important parameters (i.e., water quality, sediment and soil invertebrates) be conducted as opposed to formal risk assessment on Granite Creek.

The subsequent monitoring work in 2007 and 2008 did not identify any significant ecological risks.

Human Health Risk Assessment: A human health screening level risk assessment (HHSLRA)[5] was completed in 2006 in order to evaluate whether or not conditions identified at the site would pose unacceptable risks to persons spending time at the border crossing facility, in particular at House #5 located above the impacted soil and groundwater. No unacceptable risks to persons spending time in House #5 as a result of vapour inhalation due to petroleum hydrocarbons or polycyclic aromatic hydrocarbons (PAHs) were identified; however, it was recommended that additional indoor air monitoring in House #5 be completed to ensure that conditions remain acceptable. To date, biannual indoor air sampling at House #5 has indicated that indoor air quality in House #5 is acceptable from a human health perspective.

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[4] *Preliminary Quantitative Ecological Risk Assessment – Problem Formulation, Port of Pleasant Camp, Canada Border Services Agency, Pleasant Camp, BC*, Azimuth Consulting Group Inc., dated November 2006

[5] Human Health Preliminary Quantitative Risk Assessment, Port of Pleasant Camp, Canada Border Services Agency, Pleasant Camp, BC, by Morrow, dated November 2006.

Subsequent indoor air sampling at House #5 in 2007 and 2008 during operation of the remedial AS/SVE system was consistent with previous sampling events and showed that indoor air concentrations of petroleum hydrocarbons and PAHs were acceptable from a human health perspective.

4. FIELD METHODOLOGY

The following section documents field methodologies followed in FY2009/2010 during:

- additional drilling investigation completed in August 2009;
- two monitoring and sampling events completed in July and September 2009, and
- House #5 soil vapour well (SVW) installation and air quality sampling completed in July, August, September, and January 2010.

All work was conducted in accordance with SLE Preferred Operating Procedures (POPs) and standard industry practice unless otherwise stated.

4.1. Drilling Investigation

The additional drilling was completed at the Site in August 2009 to 1) delineate shallow soil impacts around the vicinity of the Generator Building and install an additional delineation well to support risk assessment and remedial excavation planning, and 2) to assess soil quality at previously identified soil-impacted areas to confirm post-remedial conditions and evaluate remedial system closure at the site.

Drilling of twenty-one (21) boreholes (BH09-1 through BH09-21) of which two (2) were completed as monitoring wells (BH09-5 and BH09-16) was conducted at the Site between August 21 and 31, 2009. All borehole and monitoring well locations are shown on the Site Plan (Drawing 131416-904). Several photographs taken during the 2009 drilling program are contained in Appendix I.

The rationale/objectives for the completion of the boreholes and associated monitoring wells are presented below in Table A.

TABLE A: Borehole/Monitoring Well Rationale

Drilling Location	Rationale/Objective
BHs 09-1, 2, and 4	Delineate and confirm current shallow soil quality north of Generator Building
BH09-3	Confirm soil quality at BH01-16, previous soil impacts measured in north of Generator Building
MW09-5	Confirm soil and groundwater quality in source area, update previous soil impacts identified
BH09-6, 7, 8 and BH09-12	Confirm current soil quality in source area, update previous soil impacts identified
09-9 and 09-18	Delineate soil quality at west side of hydrocarbon plume/source area; investigate potential impacts in shallow soil at existing fuel transfer area
BH09-10, 13, 14, 15, 17, 19 and BH09-21	Confirm current soil quality at previously identified areas of soil impacts
BH09-11	Investigate/delineate soil quality in vicinity of fuel line, east of source area near BH08-2
MW09-16	Delineate soil and groundwater quality on west side of hydrocarbon plume
MW09-20	Delineate soil and groundwater quality to southwest of hydrocarbon plume, south of Haines Highway

4.1.1. Utility Locate and Borehole Clearance

On August 16, 2009, prior to drilling at on-site locations, the location of underground utilities were confirmed by a utility locate contractor (Interproject Systems Inc. [IPS]) of Vancouver, BC.

A vacuum truck operated by Badger Daylighting of Fort Nelson, BC (Badger) was used to daylight (by hydroexcavation method) twelve (12) of the twenty-one (21) borehole locations on the PWGSC property due to the potential for underground utilities. The hydroexcavation method resulted in an approximately 0.4 m diameter borehole and was typically completed to depths slightly greater than known or suspected utilities in the vicinity, generally between 1.8 m and 2.4 m.

Prior to commencing off-site work, SLE obtained a Yukon Highways and Public Works permit (Performance of Work within a Highway Right-of-Way) from the Yukon Highways and Public Works Transportation Branch for the work along Haines Highway. As noted previously, the highway is BC MoTI land but is managed by the Yukon government. A copy of the permit is included in Appendix II.

4.1.2. Drilling and Soil Sampling

Soil sampling during hydroexcavation was conducted by collecting soil samples directly from the walls of the hydroexcavated hole using a sampling shovel. The shovel was decontaminated using detergent and rinsed with water prior to collecting each sample to prevent cross-contamination.

Boreholes were advanced using an air rotary (ODEX) drill rig operated by Geotech Drilling Ltd. of Prince George, BC (Geotech). Prior to drilling each borehole, the drill rods and casing used during drilling and any associated sampling equipment were cleaned using a pressure washer to minimize the potential for cross-contamination between borehole locations.

Soil sampling during drilling was completed by advancing split spoons at regular intervals during ODEX drilling or, where conditions prevented split spoon sampling, soil samples were collected directly from the ODEX air return.

During completion of hydroexcavation and drilling of the boreholes, soil conditions were logged in detail with respect to soil type, colour, density, moisture content and indications of apparent hydrocarbon contamination.

Soil samples were placed directly into laboratory supplied duplicate sample jars with Teflon® lined lids following collection. When adequate sample recovery allowed, a portion of each sample collected was placed in a sealable polyethylene bag and allowed to equilibrate with the headspace in the bag. The vapour contained in the headspace was measured for hydrocarbon vapour concentration using a GasTech® 1238ME calibrated to a hexane standard and operated in methane-elimination mode. The field screening results are shown on the borehole logs and were used, along with visual observations, to identify samples for potential laboratory analysis. The jarred soil samples were submitted to Cantest Ltd. in Burnaby, BC (Cantest) under SLE chain-of-custody procedures for selective analysis of one or more of the PCOC identified previously.

4.1.3. Borehole Soil Management and Backfilling

Clean soil cuttings generated during hydroexcavation activities were placed in a stockpile behind the on-site houses in the eastern corner of the Site, as designated by CBSA. Soil cuttings suspected of containing hydrocarbon contamination during hydroexcavation activities were not encountered and management was not required. All drill cuttings generated during drilling on the Site were spread out on the ground surface adjacent to the borehole unless hydrocarbon contamination was suspected, in which case the drill cuttings were stored in 45 gallon steel drums for future disposal.

Boreholes not completed as monitoring wells were backfilled with a combination of slough/clean borehole cuttings, bentonite, silica sand and/or imported sand and gravel and covered with existing ground surface conditions.

Approximately seven (7) cubic metres of sand and gravel was imported to the site from Turner Construction Co. located in Haines, Alaska. A soil sample (Fill-1) and a duplicate soil sample (Fill-1a) was collected from the imported sand and gravel and analyzed for EPH and total metals.

4.1.4. Monitoring Well Installation

Boreholes 09-5, 09-16 and 09-20 were completed as monitoring wells consisting of 3 m or 2.1 m (MW09-16) of 50 mm diameter, Schedule 40 PVC slotted screen. Screens were set to a depth of 6.1 m below ground surface (bgs) in MW09-5; 5.9 m bgs in MW09-16; and 7.2 m bgs in MW09-20. Groundwater monitoring wells were completed with the screened interval straddling the inferred water table.

The monitoring wells were completed to surface with blank (solid walled) threaded PVC riser pipe of equal diameter as the screen. The annulus surrounding each slotted section was backfilled with silica sand to approximately 0.3 m above the top of the slotted section. Bentonite seals were placed immediately above the silica sand to within 0.3 m of the surface to isolate the well screen. Monitoring wells were completed with a flush-mount steel road box set in concrete with a bolt-down lid. Construction details for the monitoring wells are shown on the Borehole Logs contained in Appendix III.

Following drilling, SLE personnel surveyed the ground surface at each of the borehole locations and the top of casing elevations at each of the newly installed monitoring well locations and tied the survey into existing data referenced to a temporary benchmark (flagpole base located at west front corner of House #5) using a geodetic elevation of 275.801 m. This benchmark was surveyed by Underhill Geomatics Ltd. in June 2008 and referenced to geodetic datum using Geodetic Control Monument 48C508F. All previously surveyed borehole and monitoring well elevations were shifted by a correction factor of 24.199 m to geodetic datum. All borehole and well survey elevations are contained in Table III-1 in Appendix III.

4.1.5. Well Development

Following installation, each monitoring well was developed using dedicated Waterra® tubing and a surge block. The surge block was moved up and down the screened portion of the well to remove water and fine-grained sediment from around the well screen. Well development comprised the removal of an objective of three bore volumes of water (one bore volume is defined as the volume of water within the well pipe and within the sand pack surrounding the well screen). Groundwater parameters (pH, temperature and conductivity) and qualitative visual assessment of water quality (i.e., colour, turbidity, and sheen) were monitored periodically during development.

Water removed from the groundwater monitoring wells during well development that was not suspected of containing contamination (based on visual and olfactory evidence and previous analytical data in nearby groundwater monitoring wells) was dumped directly onto the ground surface. If contamination was suspected (i.e., odour or sheen was identified during development or previous analytical data in nearby wells identified contamination) then the purged groundwater was placed in 45 gallon steel drums and stored on-site for future disposal.

4.1.6. Soil and Purge Water Disposal

Drums containing approximately 0.25 m^3 of suspect-contaminated soil cuttings from the August 2009 drilling program and 0.4 m^3 (400 L) of contaminated purge water from groundwater sampling were removed off-site on October 23, 2009. A copy of the Yukon Environment Relocation Permit and related correspondence is provided in Appendix II.

4.2. Biannual Monitoring and Sampling

Monitoring and sampling events were completed on July 9, 2009 and September 28, 2009 and included:

- monitoring of all accessible monitoring wells and collection of groundwater samples from up to 32 selected wells;
- sampling of surface water in Granite Creek (4 samples from existing sample stations); and
- sampling of indoor air in House #5 (included as part of the SVE shutdown monitoring program).

4.2.1. Groundwater

Prior to groundwater sampling, each well was monitored for hydrocarbon vapour concentrations (HVC), depth to water and LNAPL accumulations. During the monitoring of water level measurements, hydrocarbon sensitive paste was applied to the end of the probe to detect the presence of liquid phase petroleum hydrocarbons. The results of the site-monitoring events are presented on the monitoring reports in Appendix IV.

Prior to sampling, new wells were developed and existing wells were purged using dedicated Waterra® tubing and foot valves to remove fine-grained material from the well and obtain a fresh formation sample. Field measurements of pH, temperature and conductivity were recorded during purging and sampling. During the September 2009 monitoring and sampling event, dissolved oxygen (DO) and redox potential (Eh) were also recorded during purging and sampling.

Groundwater samples were collected using dedicated Waterra® tubing and foot valves and a disposable bailer. Samples collected for LEPHw[6] and PAHs were obtained using dedicated high-density polyethylene bailers and were collected on the day following well purging. This procedure for the collection of EPH and PAHs was used to minimize the amount of fine-grained sediment in the groundwater sample. As the laboratories are required to analyze both dissolved and total EPH/PAH, which may have been adsorbed onto sediment particles within the sample, the use of this sampling procedure reduces the potential for obtaining "falsely elevated" concentrations of these parameters in groundwater. All water samples were stored in an ice-filled cooler to be delivered with the appropriate chain-of-custody documentation to Cantest in Burnaby, BC for analysis.

Water removed from the groundwater monitoring wells during sampling that was not suspected of containing contamination (based on visual and olfactory evidence and previous analytical data in nearby groundwater monitoring wells) was dumped directly onto the ground surface. If contamination was suspected (i.e., odour or sheen was identified during development or previous analytical data in nearby wells identified contamination) then the purged groundwater was placed in 45 gallon steel drums and stored on site for future disposal.

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[6] Note that $EPHw_{10-19}$ is considered equal to LEPHw for this report. Direct comparison to LEPHw requires that certain PAHs be subtracted from EPH concentrations and since PAHs are not primary contaminants of concern they were not typically analyzed. Using the uncorrected $EPHw_{10-19}$ concentrations as LEPHw is considered a conservative comparison if PAHs are a concern.

4.2.1.1. July 2009 Monitoring and Sampling Plan

On July 10, 2009, a full site monitoring event was conducted, which included all accessible groundwater monitoring wells, to determine LNAPL accumulations and to verify the groundwater flow direction.

On July 11 to 15, 2009, a total of 26 groundwater samples and four (4) blind field duplicate samples were collected from select groundwater monitoring wells for selective analysis of EPH, PAH, dissolved metals and anions. Details of the sampling program and rationale are provided in below in Table B.

TABLE B: Summary of Groundwater Sampling Program – July 2009

Sample ID	EPH & PAH	Metals & Anions	Rationale
MWs 01-17D (+Dup),	X		Investigate dissolved phase hydrocarbon concentrations at leading edge of hydrocarbon plume and geochemistry in downgradient wells.
01-21,	X		
03-9,	X	X	
04-2,	X	X	
04-3,	X	X	
04-4,	X		
04-6,	X		
08-5,	X	X	
08-6,	X	X	
08-7 (+Dup), and	X	X	
08-8	X	X	
MWs AS-13	X		Investigate dissolved phase hydrocarbon concentrations and geochemistry within hydrocarbon plume.
03-3,	X	X	
03-8,	X		
03-10, and	X		
06-2	X		
MWs 01-19 (+Dup),	X	X	Investigate dissolved phase hydrocarbon concentrations and geochemistry beyond eastern extent of plume.
03-1,	X	X	
03-7,	X	X	
08-1, and	X		
08-2	X	X	
MWs AS-22 and	X		Investigate dissolved phase hydrocarbon concentrations and geochemistry within plume surrounding and downgradient of source area at western extent.
08-3	X	X	
MWs AS-23 (+Dup),	X		Investigate dissolved phase hydrocarbon concentrations and geochemistry upgradient of the hydrocarbon plume.
06-5, and	X	X	
06-6	X		
MWs AS-4, AS-11, AS-15, 04-5, and 03-2	-	-	Could not sample – either dry or insufficient water for sampling.

Additional samples were collected on August 26 and 27, 2009, during the August 2009 drilling event from monitoring wells 08-6, 08-7, 08-8, and 03-10 for analysis of EPH, dissolved metals and anions.

4.2.1.2. September 2009 Monitoring and Sampling Plan

On September 23, 2009, a full site monitoring event was conducted, which included all accessible groundwater monitoring wells, to assess DO and Eh parameters, determine LNAPL accumulations and to verify the groundwater flow direction.

On September 24 to 27, 2009, a total of 32 groundwater samples and four (4) blind field duplicate samples were collected from select groundwater monitoring wells for selective analysis of EPH, PAH, dissolved metals and anions. Details of the sampling program and rationale are provided below in Table C.

TABLE C: Summary of Groundwater Sampling Program – September 2009

Sample ID	EPH & PAH	Metals & Anions	Rationale
MWs 01-17D (+Dup),	X		Investigate dissolved phase hydrocarbon concentrations at leading edge of hydrocarbon plume and geochemistry in downgradient wells.
01-20,	X	X	
01-21,	X		
03-9,	X	X	
04-1,	X	X	
04-2,	X	X	
04-4,	X		
04-5	X	X	
04-6,	X		
08-6 (+Dup),	X	X	
08-7, and	X	X	
08-8	X	X	
MWs P4	X		Investigate dissolved phase hydrocarbon concentrations and geochemistry within hydrocarbon plume.
AS-13	X		
03-3,	X	X	
03-8,	X		
03-10,	X		
06-2, and	X		
09-5 (+Dup)	X	X	
MWs AS-15,	X		Investigate dissolved phase hydrocarbon concentrations and geochemistry beyond eastern extent of plume.
01-19 (+Dup),	X	X	
03-7,	X	X	
06-4,		X	
08-2	X		

TABLE C (Cont'd): Summary of Groundwater Sampling Program – September 2009

Sample ID	EPH & PAH	Metals & Anions	Rationale
MWs AS-4, AS-11, AS-22, 03-11, 08-3, and 08-4	X X X X X X	X	Investigate dissolved phase hydrocarbon concentrations and geochemistry within plume surrounding and downgradient of source area at western extent.
MW 09-16	X	X	Investigate dissolved phase hydrocarbon concentrations and geochemistry surrounding plume at western extent. Used to delineate the plume to the west.
MW 06-1	X		Investigate dissolved phase hydrocarbon concentrations upgradient of the hydrocarbon plume.
MWs P13 and 09-20	-	-	Could not sample – either dry or insufficient water for sampling.

4.2.2. Granite Creek Surface Water Sampling

SLE conducted biannual follow-up surface water sampling events of the Creek, as per the recommendations from Azimuth following the 2008 sampling events[7]. The sampling events were conducted on July 11 and September 26, 2009 from four locations in the creek (SW04-1 upstream; SW04-2 and SW04-3 midstream; and SW04-4 downstream). Sample station locations along Granite Creek are presented on the Wide Area Site Plan (Drawing 131416-903).

Surface water samples were collected from Granite Creek for analysis of BETX/VPH/EPH, metals and anions on both sampling events and PAH during the September 2009 event.

4.3. House #5 Air Quality Monitoring

4.3.1. Soil Vapour Well Installation

On July 9, 2009, three (3) soil vapour wells (SVW09-1 through SVW09-3) were installed beneath the floor slab in the basement of House #5 by Rocky Mountain Soil Sampling Inc. (RMSSI) of Vancouver, BC. Locations of the soil vapour wells are indicated on the Site Plan (Drawing 131416-904). The concrete floor slab was cored using a coring machine provided and operated by RMSSI. Upon completion of coring, each soil vapour well location was hand excavated using a digging bar to a maximum depth of 0.6 m below the top of the concrete slab.

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[7] *Port of Pleasant Camp, BC: Review of 2008 Monitoring Data, Related to Potential for Ecological Risks to Granite Creek*, Azimuth Consulting Group Inc., dated April 23, 2009.

Soil samples were not collected during the hand excavation of each soil vapour well location due to the shallow depth of each well; however, soil conditions were logged in detail with respect to soil type, colour, density, moisture content and indications of apparent hydrocarbon contamination.

The three soil vapour wells were completed using 0.1 m of 25 mm diameter, Schedule 40 PVC slotted screen set at the maximum depth of hand excavation (0.6 m below the top of the concrete slab). The soil vapour wells were completed to surface with blank (solid walled) threaded PVC riser pipe of equal diameter as the screen.

Due to ground conditions, two (2) of the soil vapour wells (SVW09-2 and SVW09-3) were installed on slight angles, whereas SVW09-1 was installed vertically.

The annulus surrounding each slotted section was backfilled with silica sand to approximately 0.2 m above the top of the slotted section of pipe. Bentonite seals were placed immediately above the silica sand to 0.18 m below the top of the concrete slab to isolate the well screen. A thin layer of sand (0.03 m) was placed above the bentonite seal and each well was completed with a flush-mount steel road box set in concrete with a bolt-down lid. Construction details for the soil vapour wells are shown on the Borehole Logs in Appendix III.

4.3.2. Soil Vapour Sampling

Soil vapour in House #5 was completed on July 15, 2009, August 26, 2009, September 24, 2009 and January 28, 2010 (four events).

Prior to sampling the newly installed soil vapour wells, subsurface conditions were allowed to stabilize for five days. Following the stabilization period, the headspace vapour concentrations in each well were measured using a GasTech® combustible gas indicator, calibrated to a hexane standard, and operated in the methane elimination mode.

Soil vapour samples were collected from each of the three (3) soil vapour wells during the four (4) sampling events. During the 2009 sampling events (July, August and September), each vapour well was purged for one hour using a GasTech with a flow rate of approximately 2.0 L/min. Following purging, vapour samples were obtained using laboratory supplied sample pumps calibrated to approximately 0.2 L/min. Samples were collected in laboratory supplied sample tubes containing activated charcoal for BTEX, VPH, hexane, naphthalene and aliphatics and aromatics and laboratory supplied XAD-2 tubes with PTFE filters (placed between the soil vapour well and the sample tube) for PAHs.

During the January 28, 2010, soil vapour sampling event, flow, vacuum and leak tests were conducted on the three (3) soil vapour wells prior to sampling. It is recommended that flow, vacuum and leak tests be completed at a frequency of one per ten soil vapour wells for any given installation type (i.e., hand driven versus drilled and stick-up versus flush mount, etc.); however, due to the uncertainty of the integrity of the seals around each well (especially for the two soil vapour wells installed on slight angles), flow, vacuum and leak tests were conducted on all three (3) wells.

Prior to purging each soil vapour well during the January 28, 2010 soil vapour sampling event, a polyethylene sheet was placed over the soil vapour well and a 20 L bucket was placed upside down over the polyethylene sheet. The soil vapour well cap was connected to a barbed fitting on the underside of the 20 L bucket using Teflon tubing. A rotameter (flow meter) was connected to the barbed fitting on the top of the 20 L bucket and a “T” connector was connected after the rotameter. A magnehelic vacuum gauge was connected to one end of the “T” connector and the sampling pump was connected to the other end of the “T” connector. All connections were sealed with Teflon tape in order to eliminate leaks.

Each soil vapour well was purged using the sampling pump for a predetermined period of time (based on the flow rate of the pump and the diameter and depth of each well). The magnehelic vacuum gauge was monitored such that the vacuum within each well during purging did not exceed 5” H_2O (inches of water).

Following purging, a helium leak test was completed on each of the soil vapour wells. Helium was pumped into the area within the 20 L bucket surrounding the well until the helium concentration within the 20 L bucket was measured between 80% and 100% using a portable helium detector. A vacuum chamber containing an empty tedlar bag was connected to the 20 L bucket connection that was connected to the soil vapour well. The sample pump was connected to the vacuum chamber to draw air from the well and fill the tedlar bag. The helium detector was used to measure the helium concentration within the tedlar bag and if the concentration was less than 1% of the helium concentration in the 20 L bucket, then there would be no significant leaks; however, if the helium concentration was greater than 1% of the helium concentration in the 20 L bucket, then the soil vapour well would need to be sealed more effectively, or re-installed, as helium would be detected within the soil vapour well indicating a significant leak.

For each soil vapour well sampling event, vapour sampling parameters were collected simultaneously using a dual “Y” splitter set-up. A 6 mm diameter well-specific, surgical grade rubber hose was connected to a barbed fitting located on each well cap or to a barbed fitting on a 20 L bucket connected to each well cap (if flow, vacuum and leak tests were conducted). A “Y” splitter was inserted into the hose and the PTFE filter and XAD-2 sample tube was placed on one end of the “Y” splitter and a charcoal tube was placed on the other end of the “Y” splitter. A second “Y” splitter was used to connect both sample tubes to the sampling pump. Each sample was collected over a time period of 120 minutes (two hours) for all analyses.

A duplicate soil vapour sample was collected (SVW09-A) from SVW09-2 during the August 2009 sampling event for BTEX, VPH, hexane, naphthalene, aliphatics and aromatics and PAHs. The duplicate sample was collected immediately following the collection of the original samples from SVW09-2 using the same dual “Y” splitter set-up and sampling pump.

After sample collection, the sample tubes and filters were capped (sealed) and shipped in protective coolers, along with the appropriate chain-of-custody and pump calibration information, to Cantest in Burnaby, BC for analysis.

4.3.3. Indoor Air Sampling

Indoor air sampling within House #5 was completed in conjunction with soil vapour sampling on July 16, 2009; August 26, 2009; September 25, 2009; and January 27, 2010 (four events). Indoor air samples were collected from within the basement and on the main floor of House #5.

Air samples were obtained using laboratory supplied and calibrated sample pumps, calibrated to a flow rate of approximately 0.2 L/min. Similar to soil vapour sampling, samples were collected in laboratory supplied sample tubes containing activated charcoal for BTEX, VPH, hexane, naphthalene and aliphatics and aromatics and laboratory supplied XAD-2 tubes with PTFE filters (placed between the soil vapour well and the sample tube) for PAHs.

Vapour sampling parameters were collected simultaneously for each sampling location using a single “Y” splitter set-up. Sample tubes and filters were connected to a “Y” splitter, which was connected to the sampling pump. Sample tubes were placed approximately 1 m above the floor and allowed to run for 240 minutes (4 hours) for PAHs (XAD-2 tubes with PTFE filters) and 480 minutes (8 hours) for the charcoal tubes.

A duplicate sample (H5-A) was collected from the basement of House #5 during each of the four sampling events for BTEX, VPH, hexane, naphthalene, aliphatics and aromatics and PAHs.

Duplicate samples were collected simultaneously next to the original samples using a second air sampling pump with a single “Y” splitter set-up.

Following sample collection, the sample tubes and filters were sealed and shipped with the soil vapour samples to Cantest in Burnaby, BC for analysis.

4.4. Quality Assurance/Quality Control Program

Quality Assurance/Quality Control (QA/QC) measures were undertaken to ensure unbiased and representative sample collection and assess the repeatability and accuracy of laboratory analyses. The QA/QC measures included:

- use of trained and experienced personnel;
- cleaning of all drilling and soil sampling equipment between boreholes;
- washing of split spoon samplers in dilute soapy water and rinsing with clean water prior to each use;
- use of dedicated water sampling equipment in each monitoring well;
- developing and purging of monitoring wells prior to sampling;
- consistently following standard SLE written sampling procedures with variations from the procedures noted; and
- use of laboratory prepared sample containers and chain-of-custody documentation when collecting and transporting samples.

To assess the repeatability and accuracy of laboratory analyses and reporting, the following measures were undertaken:

- collection of blind duplicate samples at a target frequency of approximately 10% for all analytes and independently labelled and analyzed to eliminate possible laboratory bias;
- internal duplicate samples were also analyzed as part of the laboratory’s (Cantest) internal QA/QC program; and

- electronic copies of the analytical results were downloaded directly from the laboratory (Cantest) into SLE's database. These results were then automatically tabulated with the corresponding CCME and CSR standards. Manual verification of the tabulated results was undertaken at a minimum 50% frequency.

Blind field duplicate samples collected and submitted during the field programs as part of the QA/QC program included: one (1) duplicate sample for every ten (10) soil samples, one (1) duplicate sample for every seven (7) groundwater samples, one (1) duplicate sample for every eight (8) surface water samples, one (1) duplicate sample for every two (2) indoor air samples and one (1) duplicate sample for every twelve (12) soil vapour samples.

A common measurement used for comparison of duplicate laboratory results is the RPD DUP, which is defined as the absolute value of the difference between a sample set, divided by the average. Because analytical error increases near the MDL, RPD DUP is typically only calculated where the concentrations are above the practical quantitation limit (PQL) (defined as five [5] times the detection limit). A RPD DUP value is not calculated for parameters with concentrations less than five times the detection limit. Table D summarizes the trigger points that will be applied for assessing the data.

TABLE D: RPD Trigger Criteria

Parameter Group	Soil RPD DUP Trigger Criteria	Water RPD DUP Trigger Criteria
Organics	100%	100%
Inorganics	50%	50%

Analysis of split sample duplicates were conducted to ensure variability is less than the RPD triggers. If data variability is greater than the RPD triggers, the reason for the variability was investigated and documented.

5. SOIL RESULTS AND DISCUSSION

5.1. Drilling Observations and Stratigraphy

Geological cross-sections updated with drilling results from 2008 and 2009 are presented on Drawings 131416-905 and 131416-906. The main stratigraphic units encountered were as follows:

- **FILL:** comprised of silty sand and gravel, with cobbles and boulders (Unit 1); overlying;
- **SAND and GRAVEL:** with varying amounts of silt and cobbles and boulders (Unit 2); overlying;
- **SAND or SILT and SAND:** dense and till-like (Unit 3); and
- **BEDROCK:** (Unit 4).

Fill (Unit 1) appears to be composed of mixed native sand and gravel or near Haines Highway, composed of material imported for road construction and varies in thickness from less than 0.1 m to 5.0 m.

The sand and gravel (Unit 2) is highly variable and appears to contain the finer grained lenses of silty sand; sand with some silt; or clay. Void spaces within the sand and gravel were encountered during drilling indicating the presence of very large boulders. Discontinuous lenses of silty sand to sand with some silt were encountered within Unit 2. In addition, a clay lens was noted at four drilling locations and does not appear to be extensive. Thicknesses of Unit 2 range from 1 m thick in the northern portion of the site to 5 m or more south/southeast of the site.

A dense till-like unit comprised of sand or silt and sand (Unit 3) was commonly encountered on top of the bedrock surface beneath Unit 2 and sometimes within Unit 2. The dense till-like Unit 3 ranged in thickness of a few centimetres above the bedrock in the northern portion of the site to more than 2 m or 3 m within Unit 2, south of the site.

The geographical setting and the coarse nature of the unconsolidated sand and gravel material encountered beneath the site overlying dense glacial till indicates the materials were deposited in a high energy glaciofluvial environment (i.e., glacial outwash stream) and/or possibly by debris flows from the adjacent mountain side. The thin discontinuous fine grained lenses observed within the sand and gravel deposits suggest low energy episodes or deposition at channel margins.

Bedrock (Unit 4) was encountered at depths ranging from 2.0 m below ground surface (northern limit of the site) to greater than 18.3 m (in BH09-13) at the southeastern end of the site where bedrock was not encountered in any of the holes drilled in this area. Bedrock was typically encountered between 6 m to 9 m in the boreholes drilled south of Haines Highway. The topography of the bedrock surface was contoured and is presented on Drawing 131416-907. The bedrock was observed to be granitic during drilling at BH08-2.

The contours show that bedrock slopes to the south/southeast and drops off at the bank leading down to Granite Creek and also at the southeastern side of the site where bedrock was not encountered. The contours also show a few bedrock highs on the south side of Haines Highway which appear to control groundwater flow as discussed in the following section.

5.2. Soil Analytical Results

Soil analytical results are tabulated on Tables 1, 2 and 3, along with the applicable CL comparison guidelines and standards. Results were also compared to RL standards for comparison purposes only since the site is zone commercial but does accommodate residences. In addition, CCME guidelines were not applied at drilling locations located off-site and on provincial lands. The laboratory certificates of analysis are provided in Appendix IX. A summary of the soil analytical results is provided in the table below, and shown on the appended Drawing 131416-908.

In 2009, twenty-one drilling locations were targeted and where possible, soil samples were collected and analyzed. Sixteen boreholes were located on site (federal property) and five boreholes were located on provincial land (BH09-10, BH09-15, BH09-17, BH09-19 and MW09-20)

- Of the 16 on-site locations:
    - 11 locations had soil impacts that exceeded the applicable CCME CL (and RL) guidelines for F_2 and/or phenanthrene only (BH09-3, BH09-5 through 9, BH09-11 though 14 and BH09-21). Naphthalene exceeded the CCME CL guideline at BH09-8 also.
    - 2 locations had soil impacts that exceeded only the CCME RL guidelines for F_2 and/or phenanthrene (BH09-1 and BH09-18); and
    - 3 locations did not have any soil impacts in excess of the CCME guidelines (BH09-2, BH09-4 and BH09-16).

- Of the five off-site locations:
  - 2 locations had soil impacts that exceeded the CSR CL standard for LEPH (BH09-17 and BH09-19); and
  - 3 locations did not have any soil impacts in excess of the CSR CL standards for any of the COCs analyzed (BH09-10, BH09-15 and MW09-20).

In summary:

- 34 soil samples were submitted for CCME petroleum hydrocarbon fraction analysis from on-site locations and 13 of these samples exceeded the CCME CL and RL guidelines for F_2; the remaining 18 samples exceeded only the CCME RL guideline for F_2; and 3 samples did not exceed either the CCME CL or RL guidelines.

- 25 soil samples were analyzed for EPH from both on and off-site locations and 4 samples exceeded the CSR CL (and RL) standards (BH09-11, BH09-13, BH09-17 and BH09-19 at depths between 5.8 m and 8.2 m below ground surface); 3 other samples only exceeded the CSR RL standard.

- 23 samples were analyzed for PAH and 9 on-site soil samples exceeded the CCME CL guidelines (mainly for phenanthren)e and 8 samples did not. None of the 6 off-site samples exceeded the CSR CL standards for PAH.

- No exceedances of the remaining contaminants of concern were measured.

- The CCME CL exceedances were measured in soil collected between approximately 1.5 m and 5.5 m in the northern portion of the site (BH09-3, BH09-5, BH09-6, BH09-7 and BH09-8) and between 5.6 m to 7.8 m south and southeast of the site (BH09-9, BH09-11, BH09-12, BH09-13, BH09-14 and BH09-21).

- The one (1) imported backfill sample (Fill-1) and it’s duplicate soil sample (Fill-1a) did not exceed the CSR CL or RL standards for EPH; however, Fill-1 and it’s duplicate (Fill-1a) were outside the acceptable CCME CL (and RL) guideline for pH and Fill-1a slightly exceeded the CCME RL guideline for total copper. The concentration of total copper in the original soil sample (Fill-1) was significantly lower than it’s duplicate and did not exceed the CCME RL guideline for total copper.

5.2.1. Quality Assurance/Quality Control (QA/QC) Results

Results from the four (4) duplicate soil samples submitted for BETX, VPH, EPH and petroleum hydrocarbon fractions met SLE's acceptable limits of analytical variability (i.e., less than 100% RPD_{DUP}). RPD calculations were less than 38% and as such, the analytical soil results are considered acceptable and reliable.

5.3. Discussion – Soil Quality

5.3.1. Delineation of Soil Impacts

Shallow Soil Impacts – A total of nine (9) boreholes were advanced in the vicinity of the Generator Building and House #5 to improve delineation of hydrocarbon-impacted soils in this area. Based on the soil results from both the 2009 and existing boreholes, an area of hydrocarbon-impacted soils at depths above 4 m (depth accessible by most excavation equipment) was identified extending from below the Generator Building (inferred) and north towards the ditch that traverses the base of the slope. The extent of the area of shallow soil impacts is shown on Drawing 131416-908. A large concrete pad was observed at approximately 0.6 m depth immediately north of the Generator Building.

Hydrocarbon impacted-soils in this area (based on F_2 greater than CWSPHC CL and RL) were observed between 1.2 m (BH01-16) to 1.8 m depth (BH09-1 and BHP12) below ground surface extending in most locations to the bedrock surface which ranged between 3.2 m to 5.5 m depth below grade. Thicknesses of the hydrocarbon-impacted soils within this area ranged between 0.4 m to 4.1 m (average thickness of 2.0 m). The greatest thicknesses of hydrocarbon contamination were observed in the vicinity of BH09-8, adjacent to the Generator Building, and BH09-7 adjacent to the former UST basin. Shallow hydrocarbon contamination at depths less than 1.5 m was observed nearer to the Generator Building (BH09-8) and adjacent to the ditch further to the north (BH01-16). Based on the average thickness of 2.0 m and an area of approximately 200 m^2, the volume of accessible hydrocarbon-impacted soils (containing F_2 greater than CWSPHC RL and CL standards) above 4 m depth is estimated to be on the order of 400 m^3.

The presence of hydrocarbon-impacted soils north of the Generator Building towards the ditch may be due to the drainage tile (or perforated plastic pipe) from under the Generator Building being directed towards the ditch. As noted previously, fuel released in the Generator Building in 1980 reportedly exited below the building via a floor drain and out towards a drain tile field below the UST basin. In addition, the ground surface also is noted to slope slightly from Generator Building towards the ditch and it is possible that the released fuel flowed overland towards the ditch. The ditch drains towards the east based on surveyed elevations of the ditch invert in 2008. The presence of hydrocarbon contamination in the ditch has not been investigated to date and no evidence of surficial contamination was observed during a site inspection in June 2008. As the depth to bedrock along the ditch is relatively shallow (less than 3 m), it would be feasible to investigate conditions in the ditch using test pits. This could be carried out during removal of the underground fuel piping to the residences which has been previously proposed.

Deep Soil Impacts – Further downgradient from the Generator Building, hydrocarbon-impacted soils appear only at depths below 4 m within the saturated zone above the bedrock surface which slopes to the south from approximately 5.6 m at BH09-6 to 8.2 m at BHs 09-17 and 09-19, as shown in Drawing 131416-907. The bedrock surface also slopes steeply to the southeast of House #5; however, the soil contamination was observed only above the silt and sand till layer which extends across this area at depths ranging between 5.6 m to 8.3 m.

The inferred lateral extent of the hydrocarbon-impacted soils greater than CWSPHC and CSR CL standards over the entire site is shown on Drawing 131416-908. Based on the inferred area of 1,500 m^2 shown, and average thickness across the entire area of 1.5 m, the total volume of hydrocarbon-impacted soils is estimated to be on the order of 2,250 m^3. Approximately 500 m^3 of this estimated volume is located off-site on MoTI Land.

Underground Fuel Line – An additional borehole BH09-11 was drilled adjacent to the underground fuel line within the northeast portion of the investigation area in the vicinity of BH08-2. Hydrocarbon-impacted soils greater than CWSPHC CL and RL standards were observed in BH09-11 between 5.6 m and 7.6 m depth, consistent with the depth of impacts observed previously in BH08-2. The impacts at these locations are several metres deeper than the fuel line (expected to be between 0.6 m and 1.5 m depth) suggesting the fuel line may not be the source of contamination observed at this location. The source of hydrocarbon contamination may instead be related to irregular bedrock topography in this area (as shown on Drawing 131416-907) and/or influence from the operation of the air sparging system (i.e., air flow has forced contamination upgradient). Further investigation of the fuel line as a potential source of contamination is still warranted however and it is recommended that soil quality be observed during removal of the fuel line when this proceeds.

Fuel Transfer Area – Presence of shallow contamination was not observed in soils at BH09-9 located adjacent to the existing fuel transfer area. It is noted however that the existing fuel transfer area is not compliant with requirements under the *2008 Federal Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations* (STR).

5.3.2. Comparison of Pre- and Post-Remediation Soil Quality

A total of eight (8) confirmatory boreholes were drilled in 2009 at approximately the same locations as previous boreholes advanced prior to the operation of the SVE/AS remedial system. The purpose of the confirmatory boreholes was to compare current soil quality with historic data at these locations (where available) to evaluate whether soil contamination persists following the shutdown of the SVE/AS system. This information was obtained for purposes of closure reporting (refer to Section 7.0).

The soil data are plotted on graphs which have been superimposed on to a site plan (Drawing 131416-909) for easy reference. The dark blue plotted line on the graph represents historical data while the fuscia line represents current 2009 data. A summary of the results is provided in Table E, below. It is noted that in many of the locations the existing pre-remediation soil data were limited (i.e., less samples collected and analyzed) and the sample collection method (split spoons and/or ODEX air return) was different between drilling events. The majority of samples collected in 2009 were obtained by ODEX air return as the driller broke both split spoons (2” and 3”) early in the drilling program.

Overall, the soil results from the recent boreholes indicate that hydrocarbons in excess of the CCME CL guideline are still present within the areas where the AS/SVE system was in operation. The hydrocarbon concentrations were generally lower where F2 or EPH exceedances were historically measured and the improvement in soil quality from pre- to post-remediation may be the result of remedial system operation; natural attenuation and/or the sample collection method used. Since the contaminants of concern are heavier end hydrocarbons (i.e., not as volatile) the sample method is not expected to be a significant factor in reducing hydrocarbon concentrations. In any case, it is difficult to determine how effective the system was on its own.

TABLE E: Comparison of Pre- and Post-Remedial Soil Quality

Previous BH Location	Confirmatory Borehole	Historical Condition	2009 Condition
Federal Lands			
BH01-16	BH09-3	• Hydrocarbon odour at 1.2 m bgs. • CCME (CL) F1, F2, naphthalene and phenanthrene exceedances at 1.5 m to 2.1 m bgs. • Sample collected from split spoon sampler.	• No hydrocarbon odour until 2.7 m to 3.3 m bgs within sand and gravel. • Analyzed sample from 2.7 m to 3.0 m bgs. • F1, naphthalene and phenanthrene concentrations significantly lower (less than detection) and below CCME CL guidelines. • F2 concentration was significantly lower but still in excess of CCME CL guideline. • Sample collected from ODEX air return.
BHP4	BH09-12	• Two CCME (CL) F2 exceedances in the 4.8 m to 5.2 m bgs range. • Samples collected from solid stem augers.	• Hydrocarbon odour below 4.9 m bgs. • Analyzed three samples between 4.9 m and 7.2 m depth. • F2 concentrations were lower; two samples did not exceed the CCME CL guideline while the third sample collected from 5.6 m to 5.9 m bgs exceeded the CCME CL guideline. • Phenanthrene exceeded the CCME CL guideline in two samples between 5.6 m and 7.2 m bgs. • Fluorene exceeded the CCME CL guideline in the sample analyzed between 5.6 m and 5.9 m bgs. • Samples collected from ODEX air return.
BH01-24	BH09-6	• Hydrocarbon odour between 4.1 m and 5.5 m bgs. • One CCME (CL) F1 and F2 exceedance at approximately 4.6 m to 5.2 m bgs. • F1 and F2 concentrations in sample from 5.5 m to 5.8 m bgs were below the CCME CL guideline. • Sample collected from split spoon sampler.	• Hydrocarbon odour below 4.1 m bgs. • Analyzed samples from 4.3 m to 4.6 m bgs and 5.3 m to 5.6 m bgs. • In shallower sample, F1 concentrations were lower (less than detection) and F2 concentrations were lower, but still exceeded the CCME CL guideline. • In deeper sample, F2 concentrations were higher and exceeded the CCME CL guideline and Phenanthrene concentration exceeded the CCME CL guideline. • Samples collected from ODEX air return.
BH03-3	BH09-21	• Hydrocarbon odour at 5.9 m bgs. • One CCME (CL) F2 exceedance and one CSR (CL) EPH exceedance at 6.2 m to 6.6 m bgs. • Sample collected from split spoon sampler.	• Hydrocarbon odour between 7.0 m and 8.4 m bgs. • Analyzed four samples between 5.8 m to 8.8 m depth. • F2 concentrations were lower; three samples did not exceed the CCME CL guideline including one sample collected between 5.8 m and 6.1 m bgs, while the fourth sample analyzed from 7.5 m to 7.8 m bgs exceeded the CCME CL guideline. • Samples collected from ODEX air return.

TABLE E (Cont'd): Comparison of Pre- and Post-Remedial Soil Quality

Previous BH Location	Confirmatory Borehole	Historical Condition	2009 Condition
Federal Lands (Cont'd)			
BHP2 & BH01-15	BH09-7	• Hydrocarbon odour below 2.3 m bgs in BH01-15. • One CCME (CL) F2 exceedance and one CSR (CL) fluorene and phenanthrene exceedance and elevated naphthalene concentration (due to high detection limit) in excess of CSR CL standard at 2.1 m bgs in BHP2 • One CCME (CL) F2 exceedance and one CSR (CL) naphthalene and phenanthrene exceedance at 2.1 m to 2.4 m bgs in BH01-15. • Sample collected from solid stem augers from BHP2 and split spoon sampler from BH01-15.	• Hydrocarbon odour between 1.6 m and 1.8 m depth and between 3.5 m and 5.2 m depth. • Analyzed five samples between 1.6 m and 5.5 m depth. • F2 concentrations were significantly lower in two samples analyzed between 1.6 m and 2.6 m bgs, which were below the CCME CL guideline. • F2 concentrations in two samples analyzed between 3.8 m and 5.0 m bgs exceeded the CCME CL guideline. • Naphthalene, fluorene and phenanthrene concentrations in one sample analyzed between 3.8 m and 4.1 m bgs were below the CCME CL guidelines. • F2 concentrations between 5.2 and 5.5 m bgs were below the CCME CL guideline. • Samples collected from ODEX air return.
BH01-17D & BH03-4	BH09-13	• Hydrocarbon odour between 5.5 m and 5.6 m bgs in BH01-17D. • Hydrocarbon odour at 5.9 m bgs and between 6.7 m and 7.3 m bgs in BH03-4 • One CCME (CL) F2 exceedance and one CSR (CL) EPH exceedance between 6.1 m and 6.3 m bgs in BH01-17D. • One CCME (CL) F2 exceedance (no CSR [CL] exceedance) between 5.9 and 6.2 m bgs in BH03-4. • Samples collected from split spoon sampler.	• Hydrocarbon odour between 6.0 m and 7.3 m depth. • Analyzed two samples between 6.2 m and 8.1 m depth. • F2 concentration was lower than in BH01-17D but higher than in BH03-4 in sample analyzed between 6.2 m and 6.6 m bgs and still in excess of the CCME CL guideline. • EPH concentration was slightly lower than in BH01-17D but significantly higher than in BH03-4 in sample analyzed between 6.2 m and 6.6 m bgs and still in excess of the CSR CL standard. • F2 concentration in sample analyzed between 7.8 m and 8.1 m bgs was below the CCME CL guideline. • Samples collected from split spoon sampler.

TABLE E (Cont'd): Comparison of Pre- and Post-Remedial Soil Quality

Previous BH Location	Confirmatory Borehole	Historical Condition	2009 Condition
Provincial Lands			
BH03-8	BH09-15	• Hydrocarbon odour between 7.2 m and 7.5 m bgs and between 7.6 m and 7.9 m bgs. • No CSR CL exceedances identified in the one sample analyzed between 4.1 m and 4.4 m bgs. • Sample collected from split spoon sampler.	• Hydrocarbon odour between 7.9 m and 8.4 m depth. • EPH concentration significantly lower (less than detection) in sample analyzed between 4.3 m and 4.6 m bgs. • No CSR CL exceedances identified in the remaining three samples analyzed between 7.2 m and 9.0 m bgs. • Samples from 4.3 m to 4.6 m bgs and 8.7 m to 9.0 m bgs collected from split spoon sampler. • Samples between 7.2 m and 8.2 m bgs collected from ODEX air return.
BH03-11	BH09-17	• Hydrocarbon odour at 5.5 m depth. • One CSR EPH exceedance between 5.5 m and 6.1 m bgs. • Sample collected from split spoon sampler.	• Hydrocarbon odour between 5.5 m and 7.5 m depth. • Analyzed four samples between 5.5 m and 8.2 m depth. • EPH concentration is significantly lower in sample analyzed between 5.5 m and 5.8 m bgs, but still in excess of CSR CL standard. • Remaining three samples analyzed between 6.6 m and 8.2 m bgs did not exceed the CSR CL standards. • Samples from 5.5 m to 5.8 m bgs and 7.2 m to 7.5 m bgs collected from split spoon sampler. • Samples from 6.6 m to 6.9 m bgs and 7.9 m to 8.2 m bgs collected from ODEX air return.

6. GROUNDWATER RESULTS AND DISCUSSION

6.1. 2009 Monitoring

Monitoring reports for 2009 are included in Appendix IV. The potentiometric elevations developed from the July 2009 monitoring event were contoured and presented on Drawing 131416-910. All monitoring data from the site since 2001 are provided in Table IV-1 in Appendix IV. The inferred occurrences of LNAPL prior to operation of the remedial system in 2006 (historic) and in 2009 (current) are indicated on Drawing 131416-912.

The water table was on average, approximately 0.8 m higher during the July 2009 monitoring event, than during the September 2009 monitoring event. Figure 2, attached, shows potentiometric elevations plotted versus time for several monitoring wells on the site (see Graphs B and D). No monitoring data currently exists for winter months at the site (November to April). Groundwater levels are expected to be low during this period due to the presence of snow cover and freezing conditions.

The apparent groundwater flow direction is to the south/southeast which is similar to other monitoring events dating from September 2001 to September 2007 and also similar to the slope of the bedrock surface (Drawing 131416-907) indicating that bedrock is most likely controlling groundwater flow, at least in the western portion of the study area. As indicated previously, the bedrock contours show two bedrock highs on the south side of Haines Highway, where monitoring wells are periodically dry and also where the historic dissolved hydrocarbon plume was not detected (i.e., explains the “finger-like” appearance of the historic plume). It is presently unknown if hydrocarbons migrate through the upper weathered portion of the bedrock surface; this may occur only seasonally when groundwater levels are lowest within the bedrock zone.

Hydrocarbon vapour concentrations ranged between 5 ppm to 450 ppm during the July 2009 monitoring event and ranged between 25 ppm to 175 ppm during the September 2009 monitoring event. The highest HVCs of 450 ppm and 175 ppm were measured at MW-AS-3, which is located downgradient from the inferred dissolved phase hydrocarbon plume.

No LNAPL accumulations were observed in groundwater. A hydrocarbon sheen was noted in seven (7) monitoring wells (MWs AS-13, AS-22, 01-17D, 03-3, 03-8, 03-10 and 08-2) during purging of the wells for the July 2009 sampling event and noted in thirteen (13) monitoring wells (MWs AS-4, P4, P13, 01-17D, 03-3, 03-8, 03-10, 03-11, 06-2, 08-2, 08-7, 08-8 and 09-5) during purging of the wells for the September 2009 sampling event. No other indicators of apparent hydrocarbon contamination (odours or sheen) were observed in groundwater during monitoring, purging or sampling.

6.2. Groundwater Analytical Results

All current and historic groundwater hydrocarbon analytical results are presented on Tables 4 to 6 and on Drawing 131416-911. Table F below and Figure 2, attached, presents a comparison of selected current and historical $EPHw_{10\text{-}19}$ concentrations in groundwater over time.

6.2.1. Hydrocarbons

- Concentrations of $EPHw_{10\text{-}19}$ were greater than the CSR AW standard of 500 µg/L in groundwater samples collected from MWs 01-17D, 03-8, 03-10, 06-2, 08-2, 08-7, 08-8 and AS-22 in July 2009, and from MWs 01-17D, 03-8, 03-10, 08-2, 09-5, AS-4, AS-11, AS-13, AS-22 and P4 in September 2009. $EPHw_{10\text{-}19}$ exceedences measured in July 2009 were not measured in samples collected from MWs 06-2, 08-7 and 08-8 in September 2009 when water levels were approximately 0.5 m higher. Four of the wells which contained the September exceedences were not sampled in July.

- Concentrations of PAHs were greater than the CCME CEQG AW guidelines in groundwater samples collected from MWs 01-17D, 08-2 and AS-22 in July 2009, and from MWs 08-2, 09-5 and P4 in September 2009. PAH concentrations also exceeded the CSR AW standards in a sample collected from MW09-5 in September. PAH exceedences measured in July 2009 were not measured in samples collected from MWs 01-17D or AS-13 in September when water levels were approximately 0.5 m higher.

- Hydrocarbon concentrations were less than the CSR AW standards in the remaining groundwater samples analyzed, including MWs 04-5, and 06-5, which previously exceeded the CSR AW standard for $EPHw_{10\text{-}19}$.

- No evidence of migration of hydrocarbons towards Granite Creek is evident from 2009 groundwater results obtained from downgradient monitoring wells located along the edge of the embankment above Granite Creek (i.e., southernmost row of wells between MW09-20 at the western end of the monitoring grid to the eastern end at MW03-1), as shown on Drawing 131416-911. Concentrations of $EPHw_{10\text{-}19}$ and LEPHw were all below the laboratory method detection limit of 250 mg/L or 100 mg/L from 14 downgradient monitoring wells. Only MWs 01-21 (260 µg/L) and 08-5 (120 µg/L), located adjacent from one another on the southeast downgradient limit of the plume, contained detectable concentrations; these wells are bounded by downgradient wells.

TABLE F: Summary of EPHw$_{10\text{-}19}$ – Current and Historical

MW ID	Location With Respect to 2006 Plume	EPHw$_{10\text{-}19}$ Concentration (µg/L)										General Comment
		2003	2004	2005	July 2006	Sept 2006	Sept 2007	June 2008	Sept / Oct 2008	July 2009	Sept 2009	
03-3	Within Plume	**6,700**	-	-	-	-	-	280	<250	170	<250	Decreased
03-8		**3,800**	**1,100**	**810**	**1,300**	**4,200**	**8,900**	**1,500**	**880**	**540**	**1,100**	Stable
03-10		**6,600**	**3,600**	-	-	**11,000**	**1,200**	**2,300**	**3,000**	**34,000***	**3,900**	Undetermined
04-5		-	**1,400**	**1,400**	**590**	**1,100**	**1,200**	470	< 250	-	<100	Decreased
06-2		-	-	-	-	**3,200**	**1,100**	< 250	**1,100**	**600**	330	Decreased
06-4		-	-	-	-	**550**	< 250	< 250	< 250	-	-	Decreased to stable
06-5		-	-	-	-	**10,000**	**1,400**	< 250	320	120	-	Decreased
01-21	Downgradient	500	**710**	**580**	300	310	310	**830**	**650**	420	260	Stable
03-9		370	**1,100**	**800**	< 250	< 250	Dry	< 250	-	490	<100	Stable
03-11		**2,600**	**1,300**	-	-	-	-	**950**	**1,600**	-	250	Decreased
04-2		-	**750**	300	< 250	< 250	< 250	< 250	< 250	160	<100	Decreased
04-3		-	< 250	**560**	< 250	< 250	< 250	-	< 250	-	<100	Stable
03-7	Cross- gradient	< 250	< 250	< 250	< 250	-	Dry	< 250	< 250	<100	<100	Stable
01-19		< 250	-	-	-	< 250	< 250	< 250	< 250	<100	<250	Stable
04-6		-	440	< 250	< 250	< 250	< 250	**980**	< 250	110	<100	Stable

UNDERLINE denotes greater than CSR AW standard for LEPHw of 500 µg/L.

* - a sheen was noted during this sampling event as was the case with six other wells in which EPHw$_{10\text{-}19}$ concentrations ranged between 430 µg/L and 7,200 µg/L in July 2009. MW03-10 was resampled in August and September and EPHw$_{10\text{-}19}$ concentrations were 2,600 µg/L and 3,900 µg/L, respectively.

6.2.2. Geochemistry

In order to assess the biodegradation of hydrocarbons, geochemical parameters such as dissolved iron, manganese, nitrate and sulphate were analyzed. Geochemical conditions that indicate when natural attenuation of hydrocarbons through biodegradation is occurring are low dissolved oxygen concentrations, low nitrate concentrations, elevated dissolved iron and/or manganese concentrations and occasionally low sulphate concentrations.

The distribution of nitrate, dissolved iron and manganese and sulphate concentrations measured during the July and September 2009 sampling events are plotted on Drawing 131416-913. The distribution of each parameter are similar to previous events, with exception to sulphate, and signify that geochemical conditions within the vicinity of the hydrocarbon impacted area are reducing (i.e., the presence of relatively low nitrate and elevated dissolved iron and manganese concentrations) and that anaerobic biodegradation of hydrocarbons is continuing to occur. Prior to 2009, relatively lower sulphate concentrations were measured within the hydrocarbon impacted area which suggested that conditions were not as reducing in 2009 as they were in the past. Interestingly, the distribution of pattern of nitrate and dissolved iron and manganese is similar to the “finger-like” shape of the historic (pre-remediation) dissolved hydrocarbon plume.

6.2.3. Inorganics

There are some metals concentrations that exceeded the CCME AW guideline but do not exceed 10x the CCME guideline as indicated in Table 6. As discussed in the regulatory section of this report, the federal CEQG guidelines are intended for evaluating ambient water quality of a receiving body of water and may not be suitable for direct application to groundwater. Dilution-attenuation of constituent concentrations between the groundwater zone and the receiving surface water body (Granite Creek) are expected to occur at the site and it is considered reasonable to apply a correction factor to the guidelines to account for this effect. This is consistent with the BC CSR aquatic life standards which assume a minimum dilution factor of 10:1. With the application of the 10x dilution factor, one iron concentration (6,090 mg/L in a groundwater sample collected from MW08-2) still exceeded 10x CCME AW guideline of 3,000 μg/L. Since this elevated concentration appears to be a one time occurrence and isolated in the northeast portion of the site it is not considered to be a concern.

6.2.4. Quality Assurance/Quality Control (QA/QC) Results

Concentrations of LEPHw in groundwater sample MW01-17D-090713 and its duplicate sample MW-C-090713 did not meet SLE's acceptable limits of analytical variability (i.e., less than 100% RPD_{DUP}). A sheen was noted in the purged water from this well during sampling and is most likely the cause of the analytical variability. In any case, since both the results exceed the applicable standards, the conclusions of this report do not change.

The RPD values of the remaining duplicate samples for EPH, PAH and geochemical parameters were within the SLE's acceptable limits indicating that the analytical data are considered acceptable and reliable.

A review of internal CanTest QA/QC indicated reproducibility of laboratory data is acceptable.

6.3. Discussion – Groundwater Quality

6.3.1. LNAPL Occurrence

Based on the 2009 analytical and monitoring results, the size of the inferred LNAPL plume appears to be decreasing compared to historical pre-remediation (2006) results as shown on Drawing 131416-912. Elevated $EPHw_{10-19}$ concentrations (greater than 5,000 μg/L) measured in groundwater and the associated presence of a hydrocarbon sheen observed during sampling in 2009 confirm that LNAPL is most likely present at MWs 01-17D, 03-10, 08-2 and 09-5. However, analytical data from surrounding wells suggests that the LNAPL is not migrating and that the plume has been reduced to three smaller plumes compared to the size of the former inferred LNAPL plume as indicated on Drawing 131416-913.

None of the wells contained measurable product during the monitoring events carried out in 2009; however, a sheen was noted in water purged from MWs 01-17D, 03-3, 03-8, 03-10, 08-2, AS-13 and AS-22 during the July sampling event and from these same wells (except AS-13 and AS-22) and also MWs 03-11, 04-5, 06-2, 08-7, 08-8, 09-5, AS-4, MWP4 and MWP13 during the September 2009 sampling event. Analytical results from the 2009 sampling events support the potential presence of LNAPL in MWs 01-17D, 03-10, 08-2 and 09-5 since measured $EPHw_{10-19}$ concentrations were greater than 5,000 μg/L (i.e., CSR standard indicating the potential presence of LNAPL). However, the analytical results do not confirm the presence of LNAPL in the remaining wells, specifically MWs 03-3, 04-5, 08-7 and 08-8 in which groundwater samples collected and analyzed from these wells did not contain $EPHw_{10-19}$ above 250 μg/L, the laboratory method detection limit.

Observations of hydrocarbon sheens during well purging have been a common occurrence in the past and typically the analytical data for many of these wells does not support the presence of LNAPL. It is possible that residual LNAPL exists within the pore spaces of the unconsolidated soils which is immobile (i.e., not connected) but is extracted and released from the pore spaces as the well is purged. Since the well is not sampled immediately, any traces of LNAPL left in the well overnight most likely dissolve into groundwater prior to sample collection.

A sheen was noted in the limited volume of water purged from MWP13 before the well went dry and could not be sampled to confirm the presence of LNAPL. This well is usually dry and has not been previously sampled; therefore, it is believed that the observed sheen was from stagnant water that has been sitting in the well for years and not representative of current day conditions.

6.3.2. Dissolved Phase Hydrocarbons

As of 2009, elevated dissolved phase hydrocarbon concentrations greater than the CCME AW guidelines and CSR AW standards appear to occur in three separate areas of the site; 1) in the vicinity of the source are around House #5; 2) east of House #5 near the underground fuel line and 3) in the vicinity of MW 01-17D, southeast of the source area. The plumes are currently delineated on all sides with exception to the northeast of MW08-2, where bedrock is shallow and MW06-2 is dry.

In order to assess EPH concentrations and geochemical conditions over time, the GroundWater Spatial-Temporal Data Analysis Tool (GWSDAT) was used. This program is free software developed by Shell Global Solutions (who accept no liability for its use) to be used to analyze spatial and temporal trends in groundwater monitoring data related to their sites. Through GWSDAT, trends in both space and time of chemical solute concentrations are simultaneously estimated and visually presented. A clearer interpretation of chemical concentrations over time and space is obtained by smoothing the data. In using the smoother function, predictions may not necessarily overlie observed data points.

The following GWSDAT outputs were generated and are provided in Appendix V:

1) a series of time slice plots for concentrations measured from 2001 to 2009 for each of the following parameters; $EPHw_{10-19}$, field measured dissolved oxygen, nitrate, dissolved iron, dissolved manganese and sulphate. Concentrations are colour contoured and analytical results and groundwater elevation contours are also presented;

2) a series of time slices from 2001 to 2009 for $EPHw_{10\text{-}19}$ using terrain circles, instead of terrain colours as used above, to better visualize LNAPL occurrence across the site. LNAPL locations are indicated by larger grey circles; and

3) graphs of $EPHw_{10\text{-}19}$ concentrations and groundwater elevations for each well sampled are also presented.

Discussion of the outputs is provided below:

$EPHw_{10\text{-}19}$ Colour Contoured Concentrations – The plot for 2001 shows a large LNAPL plume (grey area) which decreases slightly over the years and then separates into two areas around 2006 when the AS/SVE system started up. The plume of hydrocarbon impacted groundwater is elongated in the direction of groundwater flow. The plots show the LNAPL diminishes after 2006 except in the northeastern portion of the site near MW08-2. This series of time slice plots generally show $EPHw_{10\text{-}19}$ concentrations decreasing with time. The last few plots do not show LNAPL in the vicinity of MWs 01-24/AS-22, 01-17D or 03-10 which is slightly misleading since analytical data suggest that LNAPL is present in these areas. It is likely that the significant differences in $EPHw_{10\text{-}19}$ concentrations measured at these wells compared to surrounding wells has resulted in a certain degree of uncertainty and for this reason, the outputs have been carefully interpreted. To better visualize the occurrence of LNAPL, an output using terrain-circles was created.

$EPHw_{10\text{-}19}$ Terrain-Circle Concentrations – In 2003, the plots show that LNAPL is present in the majority of wells located in the source area and then the number of wells decrease until 2006 when LNAPL appears in four wells further east of the source area in the vicinity of MW01-17D. Once the SVE/AS system is started in 2006, LNAPL continues to appear in two separate areas; in the source area (i.e., MW01-24) and at MW01-17D and appears sporadically at MW03-10 (southward) and then in 2009 LNAPL is found in a third area adjacent to the fuel line (i.e., MW08-2 to the northeast). LNAPL was identified in the third area due to additional drilling carried out in 2008 and sampling in 2009 and as such, it is unknown how long the LNAPL has been present. Dissolved $EPHw_{10\text{-}19}$ concentrations appear to decrease as indicated by the increasing number of green circles on the last few plots. The plots show that concentrations decrease to the north, southwest and southeast of the hydrocarbon impacted area.

Both $EPHw_{10-19}$ output plots show plumes separating after system start up. Currently, the data are limited for determining the effect of shutting the down the remediation system in January 2010 since only two sampling events have been carried within 9 months of shut down.

Dissolved Oxygen (DO) Colour Contoured Concentrations – The distribution of dissolved oxygen shows relatively low concentrations before 2006 with concentrations increasing slightly in 2007 and then decreasing again in 2008 and 2009. The outputs show that there may some evidence of oxygen enhancement due to the remediation system in 2007 but this is not apparent in 2008 and as expected with system shutdown in 2009, the area of lower dissolved oxygen concentrations has increased. Since dissolved oxygen is rapidly depleted in hydrocarbon impacted areas and that the system was temporarily shutdown prior to site monitoring visits, any potential oxygen enhancing effects from the system may not have been fully realized when DO monitoring was carried out.

Nitrate Colour Contoured Concentrations – The time slice plots of nitrate do not vary significantly throughout 2001 to 2009 except that the depleted nitrate zone appeared to decrease after 2006. Overall, concentrations remained depleted within the hydrocarbon impacted area as would be expected if hydrocarbons are being consumed. Interestingly, relatively high nitrate concentrations (i.e., a potential source) appears to present to the east of the plume towards the other residences. The decrease in size of the nitrate depletion zone after 2006 suggests that the remedial system may have been effective at increasing dissolved oxygen concentrations in groundwater so that oxygen becomes the more favourable electron acceptor than nitrate during the biodegradation process.

Dissolved Iron Colour Contoured Concentrations – The output shows that dissolved iron concentrations are elevated in the hydrocarbon impacted area as expected but concentrations seem to be higher pre-remediation than post-remediation. As time progresses, the dissolved iron concentrations decrease on the outskirts of the plume (i.e., become green) which may occur when dissolved hydrocarbons are depleted. The green contouring may not be as extensive as indicated on the that last two plots for 2009 because geochemical parameters were not analyzed in groundwater collected from MW 01-17D which is known to contain groundwater with elevated dissolved hydrocarbons and thus, likely to contain elevated dissolved iron concentrations also.

Dissolved Manganese Colour Contoured Concentrations – Similar to dissolved iron, the plots show elevated concentrations of manganese in the central area of the site. Manganese concentrations appear to specifically increase in 2008 in the main source area, west of House #5. These conditions provide evidence that biodegradation of hydrocarbons is occurring within the hydrocarbon impacted area.

Sulphate Colour Contoured Concentrations – From 2001 to 2005, lower sulphate concentrations are observed within the hydrocarbon impacted area and then subsequent to 2005, higher sulphate concentrations (i.e., at least one order of magnitude higher) are measured in groundwater throughout the site. The lower sulphate concentrations prior to system start-up indicate that geochemical conditions were most likely sulphate reducing due to the biodegradation of hydrocarbons. It is expected that sulphate concentrations would become more depleted as hydrocarbons continue to be degraded but this did not occur likely as a result of the increased oxygen that was injected by the remediation system.

Groundwater Elevation and EPHw$_{10\text{-}19}$ Concentrations versus Time – The graphs (contained in Appendix V) indicate that there is no obvious correlation between water levels and concentrations (i.e., no apparent trends exist). It should be noted however that no sampling and monitoring data exists for winter months at the site (November to April) and water levels may be lower during this period due to the presence of snow cover and freezing conditions.

With respect to EPH concentration trends over time. GWSDAT employs Mann-Kendall statistical analysis to determine if trends in concentrations are apparent and if so the estimated half life of the specific solute. With some of these wells, data are limited and therefore the concentration trend is indeterminate. Conditions in wells which contain groundwater with no detectable hydrocarbons over a period of time would be considered stable rather than indeterminate. The results of the Mann-Kendall analysis are indicated at the top of the graph for each well that has sufficient data. The Mann-Kendall results are green if the there is significant variability in the data, and as such, a trend cannot be determined (i.e., if the P-value is >0.05 there is no evidence of a trend). The red text indicates that a trend exists (i.e., if the P-value is < 0.05 a trend is present).

With reference to the individual graphs, concentration trends are apparent or may exist in the wells listed in Table G below. No apparent increasing trends were indicated for groundwater conditions in any of the remaining wells not listed in Table G. The EPHw$_{10\text{-}19}$ concentrations for these wells are shown plotted versus time in Figure 2 (See Graphs A and C).

TABLE G: Results of Mann-Kendall Trend Test for $EPHw_{10-19}$ Concentrations (P-value <0.05)

Well ID	Trend	Estimated Half Life of $EPHw_{10-19}$
P-value <0.05		
MW03-03	Decreasing	256 days
MW04-5	Decreasing	441 days
MW06-5	Decreasing	91 days
P-value in range of 0.05		
MW03-11	Decreasing	351 days
MW04-2	Decreasing	753 days
MW04-6	Decreasing	1,625 days

6.3.3. Summary

Overall, a general trend towards decreasing $EPHw_{10-19}$ concentrations in groundwater is observed at the downgradient leading edge of the hydrocarbon impacted area. The leading edge of the historical dissolved hydrocarbon plume has moved closer to the site (i.e., hydrocarbons in excess of the CSR AW standard were not measured in downgradient wells, MWs 03-9, 04-2, and 04-5, in 2008 and 2009 compared to previous events).

Both the dissolved hydrocarbon plume and LNAPL plumes appear to have separated into at least three smaller areas; 1) the source area; 2) in the vicinity of MW 01-17D and 3) near the fuel line at MW 08-2. It is possible that the separation into the three smaller areas of groundwater impacts most likely resulted from the operation of the remediation system.

In addition, a study of the changes in distribution patterns of the geochemical parameters that indicate biodegradation of hydrocarbons suggest that more reducing conditions existed prior to remedial system operation than during remedial system operation indicating that the system was effective in increasing oxygen to the subsurface allowing biodegradation to readily occur.

The AS system was shut down indefinitely in January 2009 and there is potential for a rebounding and/or remobilizing effect in hydrocarbon concentrations in groundwater and soil vapour in the vadose zone. Ongoing groundwater monitoring and sampling events will be important in order to evaluate potential increasing trends in groundwater. Currently, the data are limited for determining the effect of shutting the down the remediation system since only two sampling events have been carried within 9 months of shut down.

7. GRANITE CREEK WATER QUALITY

7.1. Observations During Sampling

Sample station locations along Granite Creek are presented on Drawing 131416-904. Field observations of Granite Creek during the June 2009 and September 2009 sampling events were as follows.

- During the June 2009 sampling event, weather conditions were dry with an approximate temperature of 25°C.
- During the September 2009 sampling event, weather conditions were dry with an approximate temperature of 12°C.
- No hydrocarbon-like odours or sheen were detected in the water at the time of both 2009 sampling events.

The following Table H summarizes the field parameter results measured during sample collection at each of the four (4) Granite Creek sampling stations.

TABLE H: Results of 2009 Granite Creek Field Parameter Measurements

Sampling Station	2009 Sampling Event	pH	Conductivity (μS/cm)	Temperature (°C)	Dissolved Oxygen (mg/L)	Redox Potential (mV)
SW04-1	June	8.76	50	12.5	11.33	91
	September	7.56	40	8.1	-	183.2
SW04-2	June	8.00	50	12.1	11.25	68
	September	7.81	50	9.6	-	169.3
SW04-3	June	8.25	50	12.2	11.20	97
	September	8.01	50	7.8	-	198.6
SW04-4	June	7.84	50	12.1	10.92	97
	September	7.95	50	8.3	-	206.9

7.2. Analytical Results

Analytical findings for the July and September 2009 surface water sampling are presented on the attached Tables 7 to 9. Analytical laboratory reports are contained in Appendix IX. Azimuth completed a review of the findings, their report is provided in Appendix VI.

The results indicate that hydrocarbon concentrations (BETX, VPH, EPH and PAH) were not detected and did not exceed the BCWQG AW guidelines or the CCME AW guidelines in any of the samples collected from the four surface water stations along Granite Creek. With respect to total metals, an aluminum concentration of 110 μg/L exceeded the CEQG AW guideline of 100 μg/L at surface water location SW04-2 (mid-stream) while no other metals exceeded applicable guidelines in the remaining samples.

7.3. Discussion – Granite Creek Surface Water Quality

Surface water geochemistry was similar at both upstream, midstream and downstream sample stations in 2009 and both sampling events during 2009 were reported with all concentrations of hydrocarbon parameters below the method detection limit. These are the same conditions as those measured since 2004. Historically, detectable concentrations were reported for toluene and xylenes (2003) and pyrene was reported above the BCWQG AW at the upstream and midstream stations in 2004.

The elevated total aluminum concentration above CEQG measured in surface water samples collected from the mid-stream location in 2009 and from all other stations previously is not considered to be a concern in surface water and aluminum is not a contaminant of concern related to the Pleasant Camp site. Aluminum is widely abundant and naturally occurring and the elevated concentration is related to background conditions. Historical aluminum exceedances are noted in Table 9 where the concentrations were compared to the most stringent pH dependent guideline due to the absence of field pH data for those samples. Surface water sampling results have since indicated that pH values are above 7.0 and therefore it is considered likely that historical aluminum concentrations most did not exceed the appropriate pH dependent guideline established for aluminum.

The water quality results to date suggest that Granite Creek is not being impacted from the COCs (hydrocarbons or metals) originating from the site. This is supported by the Preliminary Quantitative Ecological Risk Assessment (Azimuth, 2006), the subsequent follow up monitoring events in 2007 and 2008 (refer to Azimuth's reports appended in Morrow, 2008 and SLE, 2009), and Azimuth's review of the 2009 data (contained in Appendix VI). Continued monitoring of surface water is still recommended on an annual basis, however based on the observed elevated groundwater concentrations of hydrocarbons and hydrocarbon-degradation products (dissolved iron, manganese, and nitrate) in monitoring wells near the highway above the creek.

8. HOUSE #5 AIR QUALITY

8.1. Analytical Results

Analytical results from the four post SVE shutdown sampling events for indoor air in the main floor and basement, and soil vapour from the new soil vapour wells (SVWs) installed in the basement are presented in Tables 10 (hydrocarbons), 11 (PAHs), and 12 (VOCs). Laboratory analytical reports are contained in Appendix IX.

The air sampling results were as follows:

- Basement Indoor Air - Detectable concentrations of volatile petroleum hydrocarbons ($VPH_{6\text{-}10}$), and hydrocarbons in the $>C_{10}$-C_{19} range, and aliphatics (all ranges C_6 to C_{19}) were detected in one more samples of the basement indoor air during the four events. The concentrations of these parameters were observed to decrease over the sampling events between July and January 2009. These parameters were previously measured at detectable concentrations during sampling events since 2006. No detectable concentrations of BTEX, PAHs, or VOCs were measured in the samples.

- Main Floor Indoor Air - Detectable concentrations of hydrocarbons in the $>C_{10}$-C_{19} range, and aliphatics (all ranges C_6 to C_{19}) were detected in one more samples of the main floor indoor air during the four events. These parameters were also measured at detectable concentrations during previous sampling events since 2006. No detectable concentrations of BTEX, PAHs, or VOCs were measured in the samples.

- Sub-slab Soil Vapour Wells – No detectable concentrations of any parameters were measured with exception of hydrocarbons in the $>C_{10}$-C_{19} range and aliphatics in the $>C_{10}$-C_{12} range in one sample from SVW-2 located on the southeast side of the building in January 2010.

8.2. HHRA Update

Following an approach similar to that used to evaluate human health risks for previous sampling events and reported in greater detail by SLE previously, analysis of the indoor air and soil vapour data collected in July, August, September, and October 2009 indicates continued acceptable risks for persons spending time in House #5. Specifically, all measured indoor air concentrations are less than values considered to be protective of human health by Health

Canada and the US EPA. As a result, House #5 can be continued to be used by persons spending time at the site without unacceptable risks. If ongoing monitoring of soil or groundwater conditions indicates a potential for increased concentrations, then the HHRA will need to be re-visited with additional vapour sampling; however, at the current time, it would seem justified that further vapour sampling is not required.

For persons spending time in the outside areas of the site, no unacceptable risks were anticipated (provided that they are not involved in excavation activities). With regard to outdoor exposures, important elements for consideration include the following:

- Most soil impacts are deeper than 1.5 m with no soil impacts shallower than 1 metre. In the few areas with impacts in the range of 1 to 1.5 m, the site contains only grass with no deep rooting plants at these areas (see photos attached). See Section 4.3.1 (delineation of Soil Impacts) and Drawing 131416-908 (attached) showing area where these impacts have been observed.
- The site is considered to be fully investigated from a DSI perspective with the exception of:
    - ➢ Potential impacts associated with the underground fuel line running from the main tank to the residences.
    - ➢ Potential impacts at the ditch located north of the generator building.

Consequently, there is no opportunity for outdoor exposures to contaminants aside from the vapour pathway which is already considered to be acceptable due to the measured soil vapour concentrations and the large outdoor air attenuation factors. These conclusions will need to be re-visited after underground fuel line and ditch are investigated.

Although the HHRA has concluded that indoor and outdoor exposures are acceptable, a worker health and safety plan is recommended for any excavation activities that occur in the future. In some circumstances, trenches can accumulate vapours at greater concentrations than outdoor air. In addition, an HHRA has not been completed for evaluation of workers directly contacting the subsurface soil. Consequently, if trench work or other excavation work is planned, a worker health and safety plan to minimize exposures would be recommended. Alternatively, a more thorough risk analysis could possibly be completed for such work; however, this was not considered to be necessary at the current time.

9. REMEDIAL SYSTEM CLOSURE

As outlined in Section 2.6, the objective of the AS/SVE system was to 1) reduce hydrocarbon concentrations in soil and groundwater by volatization of contaminants and enhanced biodegradation (through bioventing) and, 2) to use SVE to reduce impacts to House # 5 from potentially mobilized vapours in soil and ambient air.

The combined air sparge (AS) and soil vapour extraction (SVE) system was installed at the site in early 2006 and operated from mid-June 2006 until January 23, 2009 when the AS system was shut down. The SVE system remained in operation until July 9, 2009 until an air quality monitoring program in House #5 could be carried out to ensure that air quality remained at safe levels for CBSA staff living in the house following the shutdown.

The AS/SVE system was originally proposed to operate for a period of three (3) years (until late 2009) after which a performance review of the remedial progress would be carried out to determine if continued operation was warranted. The system was shutdown earlier than planned in 2009 (as noted above) based on a review of system performance following the 2008 biannual monitoring events which concluded there was minimal remedial benefit in continuing to operate the system. Rationale for shutting down the remediation system included: poor performance of the AS in the eastern portion of the site due to presence of low permeability layers; an apparent reduced effectiveness for hydrocarbon mass extraction by the AS and SVE systems (both appeared to have reached asymptotic conditions); no significant decline observed in groundwater hydrocarbon concentrations since system start-up; and high power costs to run the system (power costs greater than $100,000 annually). It was recommended to PWGSC and CBSA in December, 2008 that the AS and SVE system be shut down in favor of a risk management approach for the site.

The following provides an overview of the system operation and performance with respect to remediation of both hydrocarbons in soil and groundwater. The section is intended to satisfy requirements for a federal Remediation (REM) / Risk Management Closure Report as requested by CBSA.

9.1. System Overview

The combined AS/SVE system comprises twenty-six (26) AS and nine (9) SVE wells and a system enclosure housing the mechanical equipment and carbon treatment vessels. A general description of the AS/SVE system components is summarized in Table I below and locations of the AS and SVE wells and piping are shown on Drawing 131416-904. Several photographs of the system components are included in Attachment 1 (Photographs 19 to 27).

TABLE I: Air Sparging and Soil Vapour Extraction System Components

Item	Description
AS/SVE Remediation wells	In total, the remediation system design includes 26 AS wells and nine (9) SVE wells.
SVE System	Includes: blower, knockout drum (including drain valve and high level sensor), inlet air filter, vacuum gauge, vacuum bleed valve and muffler, inlet and bleed air flow meters, blower discharge muffler, and high temperature hose.
AS System	Includes: compressor, inlet muffler and air filter, discharge pressure gauge, bleed valve and muffler, pressure relief valve, and temperature gauges. Pressure rated liquid vapour separator equipped with timer controlled automatic drain valve.
AS Rotameter Manifold and Discharge Piping	Includes: rotameter, solenoid valves to cycle flow through the four headers, suitable high temperature hoses to connect to piping.
SVE/AS Electrical Control Panel	208V, three phase, 200 amp power supply.
Enclosure for AS and SVE system	Insulated shed equipped with vents to allow for airflow, and sufficient space to house all remediation equipment. Control panel mounted on exterior of enclose. Sound dampening insulation around equipment enclosure and cedar fence surround. Enclosure has a heater to maintain the temperature above zero.
Vapour Treatment	Includes: carbon vessel(s) drums, fittings, high temperature hose, and carbon
Piping and Connections	Connections between AS and SVE wells including trenching and installation.

The AS/SVE design was based on a conservative SVE zone of influence of 10 m which translated into a 20 m SVE well spacing and a conservative AS zone of influence of 4 m which corresponds to an 8 m AS well spacing.

The SVE system was installed with a single primary header and an auxiliary header to allow for operational modifications or switching to the auxiliary header in the event the primary header failed. The SVE system was designed to operate with 100% of the flow originating from the subsurface (i.e., no dilution air). The extraction flow rate upon start-up was 240 cfm (141 m^3/hr) at a vacuum of 24” of H_2O developed at the inlet of the blower in accordance with the design specifications for the system and the SVE performance curve. Vapour discharge pressure from the blower was approximately 60” H_2O, in accordance with observed pressures for discharge through similarly sized air phase carbon vessels at the above noted flow rate.

The AS system was configured to operate with four headers that distributed air to six or seven sparging wells per header. Each header operated for 30 minutes and cycled to the next header, thus cycling the air injection to each header every 90 minutes. Discharge pressures from the blower were noted to be between 10 psi and 15 psi during system commissioning in June 2006 in accordance with design and operating parameters. The total flow rate for the AS system was estimated to be between 150 cfm and 155 cfm during individual header operation. Depths of air sparging wells ranged between 4.2 m (AS-18 to northwest) and 10.4 m (AS-1 on Haines Highway) across the site.

9.2. System Operational History

A chronology of the system operational history is summarized in Table J below and a system journal showing details of all maintenance activities is contained in Appendix VII.

The initial design of the remedial system conservatively anticipated that the equipment may only be able to operate nine (9) months of the year due to the severe winter conditions at Pleasant Camp. However, the snow build-up was manageable during the winter of 2006/2007 and the equipment was able to operate year round. Winter operation was considered to be beneficial as the seasonal water table is likely lower during the winter months thus exposing more of the zone of hydrocarbon impacted soil to air flow from the AS and SVE systems. The remediation mechanisms of volatilization and biodegradation were expected to be maximized during this low water table period.

TABLE J: Remedial System Operational History

Date	Event
October 16, 2005	Contract award for remediation infrastructure installation
October 24, 2005	Commence with remediation infrastructure installation
November 11, 2005	Completion of remediation infrastructure installation
February 9, 2006	Contract award for remediation equipment supply
March 30, 2006	Inspection of remediation equipment in Regina
June 14, 2006	Commence with remediation equipment set-up
June 16, 2006	Commissioning complete
June 18 to July 5. 2006	System down for 11 days due to loose wiring at junction box for AS blower motor which tripped breaker; was repaired by electrician.
July 15 to 19, 2006	System shutdown 4 days for SLE monitoring event; AS 03-4, 03-5 and AS-9 re-developed to improve air flow; air flow improved to AS 9 but no flow at AS 03-4 and 03-5
September 27 to 30, 2006	System shutdown for approximately 4 days during SLE monitoring event
December 3 to 4, 2006	System shutdown for approximately 2 days due to power outage
April 11 to 14, 2007	System shutdown for approximately 125 hrs due to SVE knockout tank not draining properly; problem fixed
September 23 to 24, 2007	SLE monitoring event; evaluated SVE well performance and drilled replacement wells AS07-1 and 07-2 for AS 03-4 and 03-5 due to low flow. Still unable to develop flow in AS 07-1. AS header arrangement reconfigured.
October 8, 2007	System shutdown for approximately 1 day due to power outage

TABLE J (Cont'd): Remedial System Operational History

Date	Event
March 17, 2008	Contractor checked AS flow rates (AS-2, 5 and 10 not flowing)
April 14, 2008	System shutdown for approximately 4 days due to power outage; was restarted
May 7 to 30, 2008	System shutdown twice during period for total of 4 days; shutdowns not recorded in system journal but likely to related to power outages.
June 14 to 22, 2008	System shutdown for 9 days for SLE monitoring event. AS wells heads fitted to allow groundwater monitoring. AS-2 and 10 redeveloped/purged and flow returned. AS-5 and 9 not flowing. AS-15 has suspected break in supply line. AS system re-balancing
September 27 to October 4, 2008	System shutdown for 8 days for SLE monitoring event. Completed evaluation of AS performance and re-developed AS wells. Repaired piping in AS-15.
January 23, 2009	AS system permanently shutdown by contractor
July 9, 2009	SVE system shutdown permanently by SLE following system monitoring event. The discharge stack was removed and the associated flange at the discharge of the building was blocked and all drains on the vessels within the building were opened to facilitate drying and reduce the potential for corrosion.
July 15, 2009	Electrical service for AS/SVE equipment disconnected

In addition to the major system shutdowns noted above for planned monitoring events, maintenance, or power outages, the system was shutdown daily for 15 minutes during draining of the SVE knockout tank.

Overall, the system was operated with few mechanical issues and minimal downtime. Prior to shutdown on January 23, 2009, the AS system operated a total of approximately 21,000 hrs and was operational approximately 93% of the time since start-up on June 16 2006. The SVE system operated between June 16, 2006 and July 9, 2009 for approximately 25,200 hrs and was also operational approximately 94% percent of the time. As noted above, the system was shutdown earlier than anticipated (late 2009); however, as the system was not originally intended to be operational during the winter months, the overall length of time in operation (approx 37 months) was more than with winter period shutdown periods (approx 29 months assuming the system ran to October 2009).

Maintenance activities on the system included routine system performance checks carried out by local contractors weekly (monitoring checklist completed) which documented that all equipment was working as well as regular monthly, 3 month, and 6 month maintenance checks as specified by the equipment supplier (Ground Effects Environmental). While on-site, SLE technicians or systems engineers performed detailed system checks (e.g., vacuum on SVE wells, condition of well heads, recording of system run hours, flow rates of the air sparge system wells, hydrocarbon vapour concentrations, condition of vapour phase carbon, etc.). The dates for all system checks performed and any comments or issues noted by the contractors or SLE technicians while on-site are contained in the system journal in Appendix VII.

The system operation and maintenance was reported to PWGSC in monthly update reports prepared by SLE for the first year of operation followed by quarterly reports thereafter.

9.3. System Performance and Remedial Progress

Performance of the AS/SVE system was evaluated based on 1) maintaining AS air pressures and flow rates into the subsurface, 2) estimates of the mass of hydrocarbons extracted by the SVE system from weekly hydrocarbon vapour measurements, 3) groundwater quality based on biannual groundwater monitoring and sampling events using a network of up to 31 monitoring wells, and 4) soil quality based on confirmatory soil sampling following shut down of the system. The performance of the system is summarized based on these four performance criteria below.

9.3.1. Air Sparge System Performance

The objective of the air sparging system was to inject air into groundwater to volatize hydrocarbons and enhance biodegradation. Air sparging works by removing volatile and less soluble contaminants by physical contact with injected air (i.e., physical stripping) resulting in phase transfer of hydrocarbons from a dissolved state to a vapor phase. The air is then vented through the unsaturated zone. High air flow rates are therefore needed during air sparging in order to maintain increased contact between groundwater and soil and strip more groundwater. The addition of oxygen to contaminated groundwater and soils also acts as a nutrient for bacteria and enhances aerobic biodegradation of hydrocarbons in and above the water table. Soil vapour extraction is often combined with air sparging to control vapours emitted during the sparging process. Limitations of air sparging systems can include non-uniform air flow through the saturated zone, uncontrolled movement of potentially dangerous vapours, and presence of soil heterogeneity which causes some zones to be unaffected. .

Table K summarizes the total flow rates (in cubic feet per minute [cfm]) and average discharge pressures measured at the four AS system headers on various monitoring dates during the period of operation. Both flow rates and discharge pressures were noted to decline over the period of operation, particularly by the third year of operation in 2008, and this was likely due to the gradual clogging of the sparging wells with silt which reduced air flow. The poor air flow measured at Header 4 in June 2008 was due to clogged and broken piping in AS-15 was which was repaired in September, 2008 and re-tested in October 2008.

TABLE K: Flow Rates (cfm) and Discharge Pressures at Air Sparge Headers

Date	Header 1			Header 2			Header 3			Header 4		
	No. of Wells	Avg P (psi)	Total Q (cfm)	No. of Wells	Avg P (psi)	Total Q (cfm)	No. of Wells	Avg P (psi)	Total Q (cfm)	No. of Wells	Avg P (psi)	Total Q (cfm)
2006-06-17	6	12	134	7	10.5	140	7	13	132	6	14	115.5
2006-07-19	6	9	126	7	8.5	132	7	10	120	6	8.5	123
2007-09-17	6	10	125	7	10	111	7	10	122	6	10	71.5
2008-03-17	6	-	95	7	-	86	7	-	76	6	-	65
2008-06-20	6	7.5	82	7	5	85	7	7	72	6	5	0
2008-06-20	6	10.4	70	7	10	63	7	10	77	6	9.5	69

Notes:
1) AS 5 and AS 9 switched to header 2 from 4 AS-13 and MW03-4 switched to header 4 in July 2006.
2) AS 04-4 and 03-5 disconnected and AS 07-1 and 07-2 added to system in September 2007; no improvement in flow rates
3) No flow in header 4 in June 2008 due to broken piping at AS-15; was repaired in Sept 2008.

The flow rates recorded in individual air sparge wells are presented in Table L below. Redevelopment of a number of wells was carried to remove fines which resulted in improved air flow in some cases (e.g., AS-2, AS-5 and AS-10 all improved after June 2008 redevelopment); however, air flow could not be induced or improved in several wells located in the eastern portion of the site (03-4 and 03-5, AS-9, AS07-1 and 07-2). It was concluded that presence of locally occurring lower permeability silt layers in this portion of the site were the cause for the poor air sparging results. The hydrocarbon impacts are primarily located near or at the water table at approximately 5 m depth in this area.

Overall, the AS system achieved the injection of air into the subsurface which was expected to result in physical stripping of hydrocarbons in the saturated zone and enhanced biodegradation. The mass of hydrocarbon remediation through biodegradation was not quantified. As noted in Section 6.3.2, the AS system resulted in increased dissolved oxygen levels in groundwater and enhanced aerobic biodegradation of hydrocarbons. The effectiveness of the AS system was limited by the siltation of the sparging wells which likely resulted in a smaller radius of influence (4 m design radius based on initial design flow rates), particularly during the final year of operation in 2008. In addition, the presence of heterogeneous soil conditions (boulders and intermittent silt layers) likely reduced the effectiveness of the sparging system in some areas; the lower permeability silt layers prevented any air flow from being induced in the eastern portion of the remediation area at AS 03-4 and 03-5 and subsequently 07-1 and 07-2. Lastly, as diesel fuel and its constituents are semi-volatile and have relatively low Henry's Law[1] constants, sparging was likely less effective as would be expected for more volatile contaminants.

TABLE L: Flow Rates (cfm) at Individual Air Sparge System Wells

AS Well ID	Monitoring Date					
	06/17/06	07/19/06	09/17/07	03/17/08	6/20/08	10/04/08
AS 1	22	22	21	7	10	13
AS 2	7.5	26	24	0	15[b]	14.5
AS 3	27	23	24	7	18.5	14.5
AS 4	27.5	24	24.5	10.5	20.5	14.5
AS 5	15	9	16	0	8[b]	7.5
AS 6	7[a]	7	7	8	12	9.5
AS 7	24	27	28	9	18	11.5
AS 8	27.5	27	26	23.5	16	12
AS 9	0	9.5	3.5[b]	0	0	0
AS 10	23.5	5.5	6	0	11.5[b]	7
AS 11	26.5	23	24	17.5	14.5	11.5
AS 12	27	26	26	25	15	10.5
AS 13	24.5	24.5	>28	26	19.5	14
AS 14	26.5	26	24	19	15	15
AS 15	28	27	0[b,c]	0	0	13
AS 16	23	19.5	24	22.5	15	14.5
AS 17	19.5	18.5	18.5	13	13	11
AS 18	21.5	21	17.5	28	18	11
AS 19	18	24.5	23	21.5	19	13
AS 20	23.5	21	21	13.5	14	13
AS 21	25.5	21	13	13.5	10	11.5
AS 22	26	22.5	23	27	18	11
AS 23	25.5	22	25	21	15	14.5
MW 03-3	24.5	24	4.5	9	10	10.5
MW 03-4	0	0	removed	removed	removed	removed
MW 03-5	0	0	removed	removed	removed	removed
AS 07-1	-	-	0[c]	0	0	0
AS 07-2	-	-	6	0	0	0

a. Well throttled as bubbling at adjacent well noted.
b Measured after well re-developed.
c. Maximum applied pressure (20 psi) applied at AS blower.

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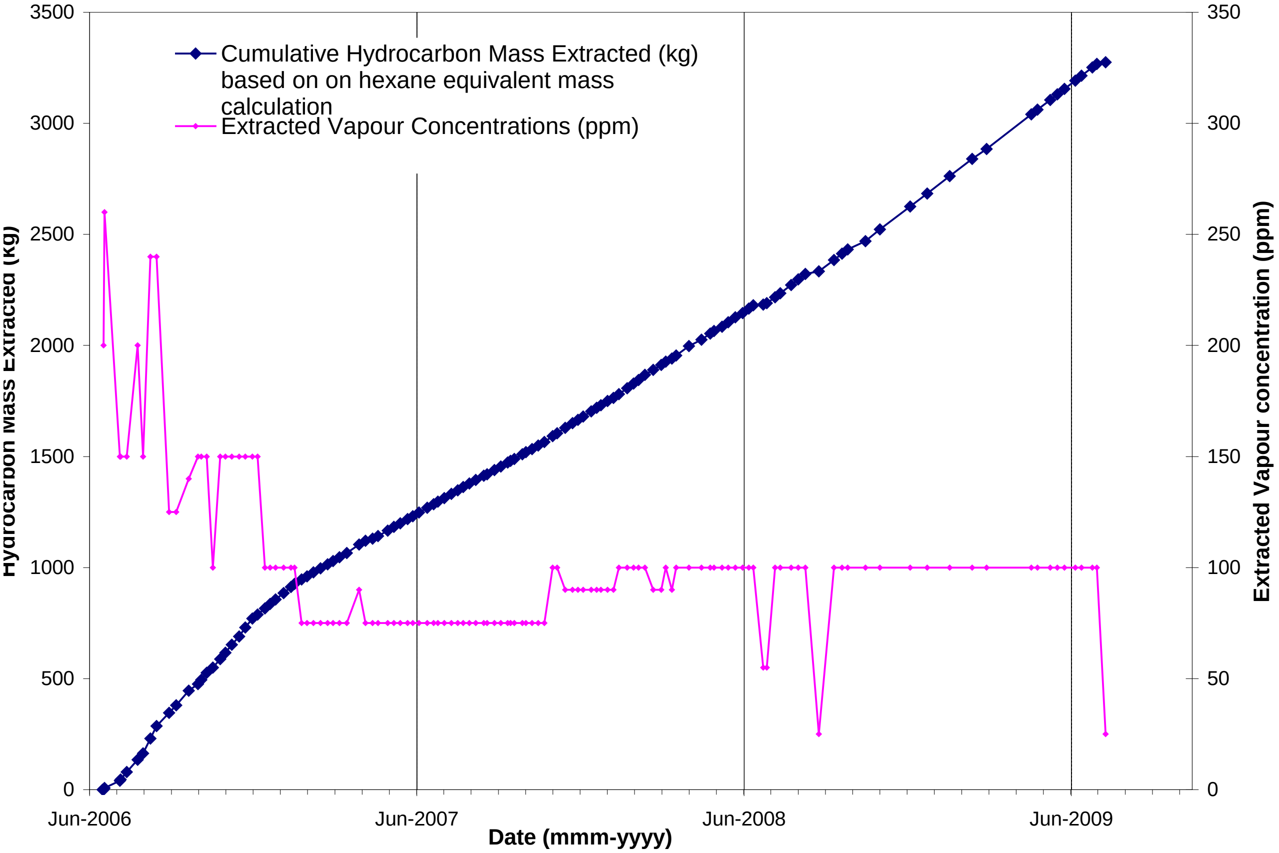
[1] The stripping of various chemicals from water depends on vapour pressure, solubility, density and the molecular weight of the chemical. The higher the numerical value of Henry's Law constant, the easier the stripping for a particular chemical.

9.3.2. *Soil Vapour Extraction System Performance*

The SVE system was designed to reduce impacts to House #5 as it was expected that the AS system could potentially mobilize potentially dangerous hydrocarbon vapours in soil and ambient air. SVE reduces concentrations of volatile constituents in hydrocarbons adsorbed to soils in the unsaturated zone. A vacuum is applied to soil matrix to create a negative pressure gradient that causes movement of vapours towards the extraction wells. Similar to air sparging, the effectiveness of SVE is limited by soil permeability and volatility of the fuel. The depth to water table and soil moisture content are also important factors.

Figure A below illustrates the cumulative hydrocarbon mass extracted from system start-up in June 2006 to July 2009. The SVE system recovered an estimated 3,275 kg of hydrocarbons (approximately 3 kg/day) since system start up in June 2006.

FIGURE A: Cumulative Hydrocarbon Mass Extracted



The total mass estimate is based on hydrocarbon vapour concentrations for the pretreated stream using a Gastech Tracetechtor hydrocarbon analyzer (Gastech), flow rate for the extracted stream, and runtime for the system. Vapours were extracted at flow rates ranging between 340 m^3/hr (200 cfm) and 408 m^3/hr (240 cfm); the average flow rate was approximately 374 m^3/hr (220 cfm). Measurements of extracted hydrocarbon vapour concentrations during the period of operation ranged between 25 ppm and 260 ppm (average 100 ppm). Monitoring of the discharge from the carbon vessels indicated hydrocarbon vapour concentrations ranging from 0 ppm to 150 ppm (average 33 ppm). It should be noted while there is confidence in the numbers for the flow rate and runtime of the system, measured Gastech concentrations may provide an overestimate (versus carbon tube sampling). The extracted concentrations are fairly low (on the order of 100 ppm), and given the error/variability in Gastech measurements the actual vapour concentration could be lower. As noted previously, this mass estimate does not include in situ bioremediation, which may exceed the volatile extracted portion particularly when the contaminant is a heavier hydrocarbon (e.g., diesel fuel) such as at this site.

To evaluate the effects of the SVE system on soil vapour conditions around the foundation of House #5, hydrocarbon vapour concentrations (HVC) and pressures were measured at soil vapour wells (SVWs) 1 through 4 around House #5 during monitoring events in 2006 and 2007. Table M below presents system pressure and HVC measured at SVW 1 to SVW 4 in 2006 through 2007. The evaluation determined that a vacuum was developed at SVW 1 through SVW 4 while operating on each of the four (4) air sparge system headers. Correspondingly, HVC were non-detectable in all SVWs. Based on these results, these soil vapour wells were not monitored during subsequent events in 2008 and 2009.

TABLE M: Pressure and Hydrocarbon Vapour Concentrations at SVW-1 through SVW-4

Soil Vapour Well	Year	Header 1		Header 2		Header 3		Header 4	
		Pressure (H_2O)	HVC (ppm)	Pressure (H_2O)	HVC (ppm)	Pressure (H_2O)	HVC (ppm)	Pressure (H_2O)	HVC (ppm)
SVW 1	2006	-0.11	0	-0.17	0	-0.10	0	-0.11	0
	2007	-0.2	0	-0.15	0	-0.24	0	-0.18	0
SVW 2	2006	-0.17	10	-0.17	0	-0.17	0	-0.15	0
	2007	-0.22	0	-0.2	0	-0.17	0	-0.22	0
SVW 3	2006	-0.19	0	-0.22	0	-0.18	0	-0.20	0
	2007	-0.2	0	-0.22	0	-0.2	0	-0.25	0
SVW 4	2006	-0.22	0	-0.29	0	-0.27	0	-0.20	0
	2007	-0.13	0	-0.25	0	-0.28	0	-0.27	0

Overall the SVE system appears to have been effective in removing hydrocarbons in the vapour phase from the subsurface within the impacted areas. No impacts from hydrocarbon vapours released by the air sparging system were detected in House #5 based on the results of indoor air sampling.

9.3.3. Groundwater Hydrocarbon Concentrations

As reported in Section 5.3, an overall general trend towards decreasing $EPHw_{10-19}$ concentrations in groundwater was observed at the downgradient leading edge of the hydrocarbon impacted area and the leading edge of the historical (pre-remediation) dissolved phase hydrocarbon plume appears to have moved closer to the site.

The overall area of the dissolved and LNAPL plumes appears reduced from the inferred extent of the plumes observed prior to operation of the remediation system in mid 2006; the dissolved phase plume has reduced to 950 m^2 from approximately 2,700 m^2 (assumes larger area based on additional delineation wells installed in 2008) while the LNAPL plume has reduced to 400 m^2 from 1,650 m^2 (assumes EPH concentrations greater than 5,000 µg/L indicative of presence of LNAPL).

Both the dissolved phase hydrocarbon plume and LNAPL plumes appear to have separated into at least three smaller areas located: 1) in the source area between the Generator Building and House #5; 2) on the east side of the former plume in the vicinity of MW01-17D; and 3) further to the northeast near the fuel line at MW08-2. It is possible that operation of the AS system caused the separation of the plume to occur (i.e., resulting from presence of heterogeneous soils and preferential air flow to some areas versus poor air flow to others and its effective radius). The leading edge of the plumes for 1) and 2) above remain off-site on MoTI land.

In addition, the distribution patterns of geochemical parameters indicate that operation of the air sparging system resulted in enhanced aerobic biodegradation of hydrocarbons. There was evidence of more reducing conditions prior to operation of the remedial system.

Currently, the data are limited for determining the effect of shutting down the AS system in January 2010 since only two sampling events have been carried out within 9 months of shut down. There is potential for a rebound effect in hydrocarbon concentrations in groundwater and soil vapour in the vadose zone. Ongoing groundwater monitoring and sampling events will be important in order to evaluate potential increasing trends in groundwater. There is also potential for re-mobilization of the dissolved phase and LNAPL plumes following cessation of air sparging as the AS system may have been acting as a hydraulic control or barrier on plume migration.

9.3.4. Soil Hydrocarbon Concentrations

As presented in Section 4.3.2, the soil results from confirmatory boreholes drilled in 2009 indicate that hydrocarbons in excess of the CCME CL guidelines are still present within the areas where the AS/SVE system was in operation. The hydrocarbon concentrations were generally lower where F2 or EPH exceedances were historically measured and the improvement in soil quality from pre- to post-remediation may be the result of remedial system operation and/or natural attenuation; however, it is difficult to determine how effective the system was on its own. The decrease in soil concentrations may also be related to the sample collection method used (i.e., split spoon versus air return). However, since the hydrocarbons of concern were not highly volatile the sampling method is not expected to be a significant cause of the observed decrease in concentrations. In any case, it is difficult to determine how effective the system was on its own.

The overall volume of residual hydrocarbon-impacted soils is currently estimated to be on the order of 2,250 m^3 based on the inferred area of 1,500 m^2 shown on Drawing 131416-908 and an average thickness across the entire area of 1.5 m. This is generally comparable to the area previously estimated prior to operation of the remedial system (refer to Morrow, 2005b; Remedial Action Plan), however the volume is greater based on the average contamination thickness which has now increased from 1.0 m to 1.5 m based on the subsequent delineation drilling investigation in 2009 (i.e., due to improved vertical delineation of impacts in some areas).

9.4. Remedial System Closure Summary

The combined AS/SVE system operated for a period of approximately 3 years and was successful in achieving remedial objectives despite the limitations and challenges presented by heterogeneous soil and drilling conditions (i.e., silt and clay lenses and boulders) at the site. The SVE system was successful in removing approximately 3,275 kg of hydrocarbons from the subsurface (extracted in the vapor phase) and the AS system appears to have substantially reduced the areal footprint of the dissolved phase and LNAPL plumes in groundwater (by up to 65% and 75%, respectively) at the site based on 2009 groundwater monitoring results. The extent of hydrocarbon-impacted soils appears unchanged; however, post-remedial confirmatory drilling has indicated an overall reduction in post-remedial hydrocarbon concentrations in soil which could be a result of system operation. Finally, the absence of elevated hydrocarbon vapours in House #5 while the system was operating (based on indoor air sampling results) suggests the SVE system was successful in preventing hydrocarbon vapours from entering the foundation and basement of House #5 during operation of the AS system.

The dissolved phase hydrocarbon and LNAPL plumes in groundwater presently show stable or decreasing trends in many locations; however, further monitoring is required to evaluate groundwater conditions as potential remains for a rebound effect in hydrocarbon concentrations in groundwater and soil vapour in the vadose zone. Sentry wells along the embankment above Granite Creek should be routinely monitored to ensure that the off-site leading edge of the dissolved phase and LNAPL plumes do not re-mobilize following cessation of air sparging (i.e., air sparging may have also acted as a hydraulic control or barrier for plume migration).

10. CONTAMINATED SITE SUMMARY

10.1. NCSCS Score

Based on the 2009 data, the National Classification System for Contaminated Sites (NCSCS) was updated using the revised NCSCS scoresheet. A revised NCSCS scoring system has been developed and put into use in 2008 to replace the 1992 NCSCS and FCSAP scoring systems.

The updated NCSCS score for the Site is 48.7 resulting in a Class 3 ranking of "Low Priority for Action". The completed 2009 revised NCSCS score sheets are provided in Appendix VIII.

The updated score is based on the known contamination characteristics, known migration potential for contamination in groundwater and potential for surface soil contamination to exist (< 1.5 m depth), potential for human exposure to contaminated surface soils (assumes contamination present at 1.5 m depth) and vapours, and potential for terrestrial and aquatic exposure. The scoring assumes that the LNAPL present on the site is immobile (i.e., not mobile and migrating). It is noted that if presence of mobile LNAPL is assumes the score increases to 50.3 which falls within a Class 2 ranking and a medium priority for action.

Additional investigation of the north ditch and underground fuel line identified in Section 5.3.1 is expected to provide more certainty regarding the potential presence of impacted surface soils on the site at depths < 1.5 m. The NCSCS scoring should be updated once additional investigation (or remediation) of shallow surface soils has been completed.

11. CONCLUSIONS

SLE makes the following conclusions from the work conducted at the site in FY 2009/2010.

11.1. Additional Delineation Drilling

Boreholes advanced in the vicinity of the Generator Building and House #5 to improve delineation of hydrocarbon-impacted soils indicate an area of hydrocarbon-impacted soils at depths above 4 m (depth accessible by most excavation equipment) was identified extending from below the Generator Building (inferred) and north towards the ditch that traverses the base of the slope. The total volume of hydrocarbon impacted-soils in this area (containing F2 greater than CWSPHC CL and RL) was estimated to be on the order of 400 m^3. Hydrocarbon impacted-soils were observed ranging between 1.2 m to 5.5 m depth in this area.

Further downgradient from the Generator Building, hydrocarbon-impacted soils appear only at depths below 4 m within the saturated zone above the bedrock surface which slopes to the south and to the southeast of House #5. The bedrock surface also slopes steeply to the southeast of House #5; however, the soil contamination is observed above a silt and sand till layer which extends across this area at depths between 5.6 m to 8.3 m.

The total volume of residual hydrocarbon-impacted soils on the site is estimated to be on the order of 2,250 m^3. Approximately 500 m^3 of this volume is located off-site on MoTI Land, and 400 m^3 is accessible in the vicinity of the Generator Building as noted above. The hydrocarbon contaminated soil continues to be a source of dissolved phase hydrocarbons in groundwater.

11.2. Biannual Monitoring and Sampling

The leading edge of the dissolved phase and LNAPL plume in groundwater remains delineated off-site on Haines Highway and has not moved closer to Granite Creek. The cross-gradient extent of the plume along its western limit is now bounded by monitoring wells installed in 2009. Both the dissolved hydrocarbon plume and LNAPL plumes appear to have separated into at least three smaller areas; 1) the source area; 2) in the vicinity of MW 01-17D and 3) near the fuel line at MW 08-2.

Overall, there is a general trend towards decreasing dissolved phase hydrocarbon concentrations ($EPHw_{10-19}$) in groundwater at the downgradient leading edge of the hydrocarbon impacted area. The leading edge of the historical dissolved hydrocarbon plume has moved closer to the site.

Hydrocarbons in excess of the CSR AW standard were not measured in several downgradient wells in 2008 and 2009 compared to previous events.

The distribution of hydrocarbons in groundwater appears controlled by the irregular bedrock topography across the site, particularly on the south side of Haines Highway where bedrock highs occur and the dissolved phase plume follows bedrock lows or "channels". Vertical migration of hydrocarbons in bedrock is not expected due to the properties of diesel fuel; however, the upper weathered portion of the bedrock zone may act as a pathway for hydrocarbon plume migration in some areas, particularly during seasonal low water levels. Investigation of groundwater flow and migration of hydrocarbons in bedrock has not been carried out with exception of a deep monitoring well (MW08-4) drilled at the location of the former water well to the west of Generator Building in 2008; no hydrocarbon impacts were observed in bedrock in this location.

Natural attenuation of hydrocarbons in groundwater is occurring; however, the current data are limited for determining the effect of shutting the down the remediation system in January 2010 since only two sampling events have been carried within 9 months of shut down.

There is potential for re-mobilization of dissolved phase and LNAPL plumes in groundwater as well as a rebound effect in hydrocarbon concentrations in both groundwater and soil vapour in the vadose zone following shut down of the remedial system. Ongoing groundwater monitoring and sampling events will be important in order to evaluate potential increasing trends in groundwater.

11.3. Granite Creek Monitoring

The results of surface water sampling indicated there is no chemical evidence of ecologically significant contamination of Granite Creek related to potential migration of petroleum hydrocarbons from the site.

11.4. Remedial System Shutdown and Closure

11.4.1. SVE System Shutdown and Air Quality Monitoring

Authorization to shut the AS system down was obtained in late 2008 and the system was shut down in January 23, 2009 by the local operator. The SVE system was subsequently shut down on July 9, 2009.

The results of indoor air quality monitoring and soil vapour sampling in House #5 indicate air quality within House#5 remained acceptable following shutdown of the remedial system in 2009.

11.4.2. Closure

The combined AS/SVE system operated for a period of approximately 3 years with few mechanical issues and minimal downtime (system was operation 94% of the time) and was successful in achieving remedial objectives despite the limitations and challenges presented by heterogeneous soil and drilling conditions (i.e., silt and clay lenses and boulders) at the site.

Performance of the AS/SVE system was evaluated based on 1) maintaining AS air pressures and flow rates into the subsurface, 2) estimates of the mass of hydrocarbons extracted by the SVE system from weekly hydrocarbon vapour measurements, 3) groundwater quality based on biannual groundwater monitoring and sampling events using a network of up to 31 monitoring wells, and 4) soil quality based on confirmatory soil sampling following shut down of the system.

The AS system achieved an average flow rate of 94 cfm during the period of operation and the air injected into the subsurface was expected to result in physical stripping of hydrocarbons in the saturated zone and enhanced biodegradation. The effectiveness of the AS system was limited by the siltation of the sparging wells which likely resulted in a smaller radius of influence, particularly during the final year of operation in 2008 when AS air pressured where noted to decline. The presence of heterogeneous soil conditions (boulders and intermittent silt layers) likely reduced the effectiveness of the sparging system in some areas; the lower permeability silt layers prevented any air flow from being induced in the eastern portion of the remediation area at AS 03-4 and 03-5 (and subsequently 07-1 and 07-2).

The SVE system was successful in removing approximately 3,275 kg of hydrocarbons in the vapour phase from the subsurface. No impacts from hydrocarbon vapours released by the air sparging system were detected in House #5 based on the results of indoor air sampling.

In groundwater, the overall area of the dissolved and LNAPL plumes appears reduced from the inferred extent of the plumes observed prior to operation of the remediation system in mid 2006. The separation into the three smaller areas of groundwater impacts most likely resulted from the operation of the remediation system. The dissolved phase plume has reduced to 950 m^2 from approximately 2,700 m^2 while the LNAPL plume has reduced to 400 m^2 from 1,650 m^2 (reduced by up to 65% and 75%, respectively) based on 2009 groundwater monitoring results. In addition, the distribution patterns of geochemical parameters indicate that operation of the air sparging system resulted in enhanced aerobic biodegradation of hydrocarbons.

Soil results from the confirmatory drilling program completed in 2009 indicate that hydrocarbons in excess of the CCME CL guidelines are still present within the areas where the AS/SVE system was in operation. The overall extent of impacted soils remains the unchanged. The hydrocarbon concentrations were generally lower where F2 or EPH exceedances were historically measured; the improvement in soil quality from pre- to post-remediation may be the result of remedial system operation.

12. RECOMMENDATIONS

Based on the results of work completed in FY 2009/2010, and assuming the border crossing facility is to remain in it current state (i.e., no re-development) the following tasks are recommended for FY 2010/2011:

- Biannual groundwater monitoring and sampling should be continued to confirm plume stability and biodegradation and ensure protection of human and ecological receptors. The groundwater monitoring should include as a minimum sampling of key “sentry” wells located along the top of the embankment upgradient from Granite Creek. This data will be used to support an ongoing long term monitoring as part of a risk management approach for the site. Once sufficient data has been collected (post AS -shutdown) to determine that the plume is stable or continuing to show a decreasing trend, the monitoring frequency can likely be reduced.

- Installation of dataloggers in selected wells to determine seasonal variations in groundwater levels (no monitoring data from November to April) and determine potential for hydrocarbons to seasonally migrate through the upper weathered portion of the bedrock surface in some areas.

- Confirm if the underground fuel lines to Houses #1 to 4 are leaking and if a secondary source of hydrocarbon contamination exists. Leak testing of the fuel line is required prior to June 2010 and soil quality can be assessed during replacement of the fuel line which has been proposed as part of ongoing fuel system upgrades for the site.

- Investigate soil quality in the ditch located north of the facility to evaluate whether fuel escaped into the ditch during the spill event in 1980.

- Removal of all accessible shallow impacted soils in the vicinity of the Generator Building as part of future re-development of the port facility. The hydrocarbon contaminated soil continues to be a source of dissolved phase hydrocarbons in groundwater and removal of impacted soils from the source zone would likely enhance the timeframe for biodegradation of hydrocarbons in groundwater and improve groundwater quality at the site. This will also provide opportunity to observe bedrock conditions and determine if hydrocarbons have impacted the upper weathered zone of the bedrock unit.

- It is recommended to leave the AS and SVE system equipment on site until it is confirmed that groundwater concentrations do not rebound. When it is determined that the system is no longer required at the site a plan for decommissioning should be determined.

13. GENERAL LIMITATIONS AND CONFIDENTIALITY

This report has been prepared by SNC-Lavalin Environment, Division of SNC-Lavalin Inc. (SLE, formerly Morrow), for the exclusive use of Real Property Services of Public Works and Government Services Canada (PWGSC) and Canada Customs and Revenue Agency, who has been party to the development of the scope of work for this project and understands its limitations.

This report is intended to provide information to PWGSC, to assist it in making business decisions. SLE is not a party to the various considerations underlying the business decisions, and does not make recommendations regarding such business decisions. In providing this report, SLE accepts no liability or responsibility in respect of the site described in this report or for any business decisions relating to the site, including decisions in respect of the purchase, sale or investment in the site.

Any use, reliance on, or decision made by a third party based on this report is the sole responsibility of such third party. SLE accepts no liability or responsibility for any damages that may be suffered or incurred by any third party as a result of the use of, reliance on, or any decision made based on this report.

The findings, conclusions and recommendations in this report have been developed in a manner consistent with the level of skill normally exercised by environmental professionals currently practising under similar conditions in the area. The findings contained in this report are based, in part, upon information provided by others. If any of the information is inaccurate, modifications to the findings, conclusions and recommendations may be necessary.

The findings, conclusions and recommendations presented by SLE in this report reflect SLE’s best judgement based on the site conditions at the time of the site inspection on the date(s) set out in this report and on information available at the time of preparation of this report. They have been prepared for specific application to this site and are based, in part, upon visual observation of the site, subsurface investigation at discrete locations and depths, and specific analysis of specific materials as described in this report during a specific time interval. The findings cannot be extended to previous or future site conditions or to portions of the site, which were unavailable for direct observation, subsurface locations, which were not investigated directly, or materials or analysis, which were not specified. Substances other than those described may exist within the site, reported substance parameters may exist in areas of the site not investigated, and concentrations of substances greater or less than those reported may exist between sample locations.

The findings and conclusions of this report are valid only as of the date of this report. If site conditions change, new information is discovered, or unexpected site conditions are encountered in future work, including excavations, borings, or other studies, SLE should be requested to re-evaluate the findings, conclusions and/or recommendations of this report, and to provide amendments as required.

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TABLES

TABLE 1: Summary of Analytical Results for Hydrocarbons in Soil

						Monocyclic Aromatic Hydrocarbons				Gross Parameters			Petroleum Hydrocarbon Fractions			
Sample Location	Sample ID	Sample Date (yyyy mm dd)	Depth Interval (m)	Grain Size	Field Screen[b] (ppm)	Benzene (µg/g)	Ethyl-benzene (µg/g)	Toluene (µg/g)	Xylenes (µg/g)	VPH (C6-C10) (µg/g)	EPH (C10-C19) (µg/g)	EPH (C19-C32) (µg/g)	F1 (C6-C10) (µg/g)	F2 (>C10-C16) (µg/g)	F3 (>C16-C34) (µg/g)	F4 (>C34-C50) (µg/g)
Port of Pleasant Camp																
BH-P1	BH-P1-2	2000 08 23	1.5	fine	225	-	-	-	-	-	-	-	-	***2,800***	1,900	<10
BH-P2	BH-P2-4	2000 08 23	2.1	coarse	500	< 0.04[a]	<0.1	<0.1	<0.1	-	-	-	***67***	***1,800***	370	<10
	BH-P2-6	2000 08 23	3.6	coarse	350	< 0.04[a]	<0.1	<0.1	<0.1	-	-	-	***34***	***450***	100	<10
BH-P3	BH-P3-7	2000 08 23	4.6	coarse	100	-	-	-	-	-	-	-	-	***350***	110	<10
	BH-P3-8	2000 08 23	5.5	coarse	75	-	-	-	-	-	-	-	-	***500***	130	<10
BH-P4	BH-P4-7	2000 08 24	4.8	coarse	150	-	-	-	-	-	-	-	-	***5,400***	2,100	<10
	BH-P4-8	2000 08 24	5.2	coarse	310	< 0.04[a]	<0.1	<0.1	<0.1	-	-	-	***66***	***1,600***	730	<10
BH-P5	BH-P5-4	2000 08 24	2.6		75	-	-	-	-	-	53	<10	-	-	-	-
BH-P11	BH-P11-6	2000 08 25	5.5	fine	325	-	-	-	-	-	-	-	-	***2,500***	1,200	<10
	BH-P11-8	2000 08 25	6.4	fine	225	-	-	-	-	-	-	-	-	***830***	420	<10
BH-P12	BH-P12-3	2000 08 25	1.8	coarse	250	-	-	-	-	-	***2,100***	130	-	-	-	-
	BH-P12-4	2000 08 25	2.4	coarse	125	-	-	-	-	-	540	110	-	-	-	-
BH01-15	BH01-15-1	2001 09 22	2.1 - 2.4		385	< 0.04[a]	< 0.5[a]	< 0.5[a]	< 0.5	-	-	-	< 25	***1,300***	480	< 250
BH01-16	BH01-16-1	2001 09 22	1.5 - 2.1		600	< 0.04[a]	0.7	< 0.5[a]	4.6	-	-	-	***410***	***6,000***	***2,700***	< 250
	BH01-16-3	2001 09 23	2.9 - 3.2		-	-	-	-	-	-	-	-	-	100	< 250	< 250
BH01-17D	BH01-17-2	2001 09 23	4.4 - 4.8		150	< 0.04[a]	< 0.5[a]	< 0.5[a]	< 0.5	-	-	-	< 25	< 80	< 250	< 250
	BH01-17-5	2001 09 23	6.1 - 6.3		-	< 0.04[a]	< 0.5[a]	< 0.5[a]	< 0.5	-	***2,700***	300	< 25	***1,900***	1,100	< 250
BH01-18	BH01-18-2	2001 09 23	4.6 - 5.0		180	< 0.04[a]	< 0.5[a]	< 0.5[a]	< 0.5	-	-	-	< 25	< 80	< 250	< 250
BH01-19	BH01-19-1	2001 09 24	4.1 - 4.4		210	< 0.04[a]	< 0.5[a]	< 0.5[a]	< 0.5	-	-	-	< 25	< 80	< 250	< 250
	BH01-19-2	2001 09 24	4.6 - 5.2		180	-	-	-	-	-	-	-	-	< 80	< 250	< 250
BH01-24	BH01-24-5	2001 09 27	4.6 - 5.2		425	< 0.04[a]	< 0.5[a]	< 0.5[a]	< 0.5	-	-	-	***340***	***5,900***	2,100	< 250
	BH01-24-6	2001 09 27	5.5 - 5.8		330	< 0.04[a]	< 0.5[a]	< 0.5[a]	< 0.5	-	-	-	< 25	100	< 250	< 250
BH03-03	BH03-03-2-030905	2003 09 05	6.2 - 6.6		30	< 0.04[a]	< 0.5[a]	< 0.5[a]	< 0.5	< 100	***3,500***	430	< 25	***1,200***	850	-
BH03-04	BH03-04-2-030905	2003 09 05	5.9 - 6.2	coarse	375	< 0.04[a]	< 0.5[a]	< 0.5[a]	< 0.5	< 100	***1,400***	< 250	< 25	***910***	680	-
BH08-1	BH08-1-4-080820	2008 08 20	4.3 - 4.6		15	-	-	-	-	-	< 250	< 250	-	-	-	-
	BH08-1-5-080820	2008 08 20	4.9 - 5.2		15	-	-	-	-	-	< 250	< 250	-	-	-	-
	BH08-1-6-080820	2008 08 20	4.9 - 5.2		15	-	-	-	-	-	< 250	< 250	-	-	-	-
	QA/QC RPD %					-	-	-	-	-	*	*	-	-	-	-
	BH08-1-7-080820	2008 08 20	5.8 - 6.1		5	-	-	-	-	-	< 250	< 250	-	-	-	-
BH08-2	BH08-2-6-080820	2008 08 20	4.7 - 4.9		15	-	-	-	-	-	300	< 250	-	-	-	-
	BH08-2-7-080820	2008 08 20	4.9 - 5.2		25	-	-	-	-	-	< 250	< 250	-	-	-	-
	BH08-2-9-080820	2008 08 20	6.0 - 6.1		20	-	-	-	-	-	***2,900***	480	-	-	-	-
BH08-3	BH08-3-2-080820	2008 08 20	2.0 - 2.3		5	-	-	-	-	-	< 250	< 250	-	-	-	-
	BH08-3-4-080820	2008 08 20	4.0 - 4.3		10	-	-	-	-	-	< 250	< 250	-	-	-	-
	BH08-3-6-080820	2008 08 20	4.4 - 4.7		5	-	-	-	-	-	< 250	< 250	-	-	-	-
BH09-1	**BH09-1-4-090821**	**2009 08 21**	**1.7 - 1.8**	coarse	35	-	-	-	-	-	540	< 250	-	-	-	-
	BH09-1-5-090830	**2009 08 30**	**2.3 - 2.6**	coarse	35	-	-	-	-	-	-	-	-	***160***	220	-
	BH09-1-6-090830	**2009 08 30**	**3.2 - 3.5**	coarse	70	< 0.005	< 0.018	< 0.02	< 0.02	-	750[e]	< 250[e]	< 10	***460***	400	-
	BH09-1-7-090830	**2009 08 30**	**4.3 - 4.6**	coarse	90	-	-	-	-	-	-	-	-	***580***	520	-
BH09-2	**BH09-2-3-090821**	**2009 08 21**	**1.5 - 1.7**	coarse	10	-	-	-	-	-	-	-	-	< 5	18	-
BH09-3	**BH09-3-5-090830**	**2009 08 30**	**2.7 - 3.0**	coarse	55	< 0.005	< 0.018	< 0.02	< 0.02	-	-	-	< 10	***1,100***	1,000	-
BH09-4	**BH09-4-4-090830**	**2009 08 30**	**1.8 - 2.1**	coarse	10	-	-	-	-	-	-	-	-	28	100	-
BH09-5	**BH09-5-6-090831**	**2009 08 31**	**4.9 - 5.2**	coarse	55	< 0.005	< 0.018	< 0.02	< 0.02	-	830[e]	340[e]	< 10	***450***	450	-
BH09-6	**BH09-6-5-090829**	**2009 08 29**	**4.3 - 4.6**	coarse	190	< 0.005	< 0.018	< 0.02	< 0.02	-	***1,200*** [e]	280[e]	< 10	***720***	550	-
	BH09-6-6-090829	**2009 08 29**	**4.3 - 4.6**	coarse	190	< 0.005	< 0.018	< 0.02	< 0.02	-	***1,400*** [e]	300[e]	< 10	***810***	610	-
	QA/QC RPD %					*	*	*	*	-	*	*	*	12	10	-
	BH09-6-7-090829	**2009 08 29**	**5.3 - 5.6**	coarse	105	-	-	-	-	-	-	-	-	***1,500***	1,000	-
BH09-7	**BH09-7-3-090822**	**2009 08 22**	**1.6**	coarse	45	-	-	-	-	-	660	340	-	***170***	460	-
	BH09-7-5-090830	**2009 08 30**	**2.3 - 2.6**	coarse	20	-	-	-	-	-	-	-	-	***230***	410	-
	BH09-7-6-090829	**2009 08 29**	**3.8 - 4.1**	coarse	70	< 0.005	< 0.018	< 0.02	< 0.02	-	-	-	< 10	***600***	490	-
	BH09-7-7-090830	**2009 08 30**	**4.7 - 5.0**	coarse	55	-	-	-	-	-	-	-	-	***1,000***	890	-
	BH09-7-8-090830	**2009 08 30**	**5.2 - 5.5**	coarse	10	-	-	-	-	-	-	-	-	***380***	350	-
BH09-8	**BH09-8-4-090830**	**2009 08 30**	**1.5 - 1.8**	coarse	75	< 0.005	< 0.018	< 0.02	0.09	-	-	-	23	***580***	240	-
	BH09-8-8-090830	**2009 08 30**	**3.0 - 3.4**	coarse	100	-	-	-	-	-	-	-	-	***380***	310	-
	BH09-8-9-090830	**2009 08 30**	**4.3 - 4.6**	coarse	165	< 0.005	< 0.018	< 0.02	< 0.02	-	-	-	< 10	***970***	510	-
	BH09-8-12-090830	**2009 08 30**	**5.3 - 5.5**	coarse	5	-	-	-	-	-	-	-	-	***150***	250	-
BH09-9	**BH09-9-7-090829**	**2009 08 29**	**5.6 - 5.8**	coarse	85	< 0.005	< 0.018	< 0.02	< 0.02	-	-	-	< 10	***1,000***	600	-
BH09-11	**BH09-11-7-090831**	**2009 08 31**	**5.8 - 6.1**	coarse	65	< 0.005	< 0.018	< 0.02	< 0.02	-	***2,600*** [e]	300[e]	< 10	***1,400***	830	-
	BH09-11-9-090831	**2009 08 31**	**6.6 - 6.9**	coarse	80	-	-	-	-	-	-	-	-	***800***	610	-
	BH09-11-10-090831	**2009 08 31**	**7.3 - 7.6**	coarse	40	-	-	-	-	-	-	-	-	***340***	340	-
BH09-12	**BH09-12-5-090829**	**2009 08 29**	**4.9 - 5.2**	coarse	90	-	-	-	-	-	990	330	-	***500***	500	-
	BH09-12-6-090829	**2009 08 29**	**4.9 - 5.2**	coarse	90	-	-	-	-	-	910	450	-	***480***	500	-
	QA/QC RPD %					-	-	-	-	-	*	*	-	4	0	-
	BH09-12-7-090829	**2009 08 29**	**5.6 - 5.9**	coarse	115	< 0.005	< 0.018	< 0.02	< 0.02	-	-	-	< 10	***1,500***	990	-
	BH09-12-10-090829	**2009 08 29**	**6.9 - 7.2**	coarse	10	-	-	-	-	-	-	-	-	***440***	560	-
BH09-13	**BH09-13-5-090825**	**2009 08 25**	**6.2 - 6.6**	coarse	95	< 0.005	< 0.018	< 0.02	< 0.02	< 100	***2,600*** [e]	550[e]	21	***1,300***	800	-
	BH09-13-6-090825	**2009 08 25**	**7.8 - 8.1**	coarse	15	-	-	-	-	-	-	-	-	< 5	22	-
BC Standards																
CSR Residential Land Use (RL)[c]						10	1	1.5	5	200	1,000	1,000	n/a	n/a	n/a	n/a
CSR Commercial Land Use (CL)[c]						10	20	25	50	200	2,000	5,000	n/a	n/a	n/a	n/a
Federal Guidelines/Standards																
CCME CEQG/CWS Residential Coarse-Grained Subsoil (sample depth > 1.5m)[d]						0.03	50	0.1	16	n/a	n/a	n/a	30	150	2,500	10,000
CCME CEQG/CWS Commercial Coarse-Grained Subsoil (sample depth > 1.5m)[d]						0.03	50	0.1	37	n/a	n/a	n/a	320	600	3,500	10,000
CCME CEQG/CWS Residential Fine-Grained Subsoil (sample depth > 1.5m)[d]						0.0068	240	220	130	n/a	n/a	n/a	610	1,000	3,500	10,000
CCME CEQG/CWS Commercial Fine-Grained Subsoil (sample depth > 1.5m)[d]						0.0068	860	660	460	n/a	n/a	n/a	800	1,000	5,000	10,000

Associated CanTest files: 11002056, 11002077, 11030054, 40926062, 51020107, 90826022, 91003109, 100831018, 100901127, 100905044, 100910069.
All terms defined within the body of SLE's report.

< Denotes concentration less than indicated detection limit or RPD less than indicated value.
\- Denotes analysis not conducted.
n/a Denotes no applicable standard.
* RPDs are not normally calculated where one or more concentrations are less than five times MDL.
BOLDED sample denotes most recent sampling event

BOLD Concentration greater than/and or equal to CSR/CCME CEQG/CWS Residential Land Use (RL) standard.
SHADOW Concentration greater than/and or equal to CSR/CCME CEQG/CWS Commercial Land Use (CL) standard.

[a] Laboratory detection limit exceeds regulatory standard.
[b] Field screening results are measured based on a 'dry headspace' method using a combustible gas meter calibrated to a hexane standard.
[c] The site-specific factors used for determining the matrix standards for this site include: intake of contaminated soil, toxicity to soil invertebrates and plants, and groundwater flow to surface water used by freshwater aquatic life (whichever is most stringent).
[d] The exposure pathway(s) used for determining the standards for this site include: general, direct contact, vapour inhalation (indoor, slab-on-grade), eco soil contact, offsite migration, general incl. gw.
[e] Value corrected for the presence of individual PAH.
[f] CCME CEQG/CWS guidelines are not applied to soil collected from off-site locations on provincial lands.

TABLE 1: Summary of Analytical Results for Hydrocarbons in Soil

						Monocyclic Aromatic Hydrocarbons				Gross Parameters			Petroleum Hydrocarbon Fractions			
Sample Location	Sample ID	Sample Date (yyyy mm dd)	Depth Interval (m)	Grain Size	Field Screen[b] (ppm)	Benzene (µg/g)	Ethyl-benzene (µg/g)	Toluene (µg/g)	Xylenes (µg/g)	VPH (C6-C10) (µg/g)	EPH (C10-C19) (µg/g)	EPH (C19-C32) (µg/g)	F1 (C6-C10) (µg/g)	F2 (>C10-C16) (µg/g)	F3 (>C16-C34) (µg/g)	F4 (>C34-C50) (µg/g)
Port of Pleasant Camp (Cont'd)																
BH09-14	**BH09-14-1-090827**	**2009 08 27**	**5.6 - 5.9**	coarse	90	-	-	-	-	-	-	-	-	***270***	300	-
	BH09-14-3-090827	**2009 08 27**	**6.9 - 7.0**	coarse	180	< 0.005	< 0.018	< 0.02	0.037	< 100	-	-	10	***790***	470	-
	BH09-14-4-090827	**2009 08 27**	**6.9 - 7.0**	coarse	180	< 0.005	< 0.018	< 0.02	< 0.02	-	< 250[e]	< 250[e]	< 10	***540***	310	-
	QA/QC RPD %					*	*	*	*	*	*	*	*	38	*	-
	BH09-14-6-090827	**2009 08 27**	**7.9 - 8.2**	coarse	60	-	-	-	-	-	-	-	-	***410***	350	-
BH09-16	**BH09-16-3-090828**	**2009 08 28**	**5.0 - 5.3**	coarse	10	-	-	-	-	-	< 250	< 250	-	-	-	-
BH09-18	**BH09-18-2-090829**	**2009 08 29**	**5.0 - 5.2**	coarse	80	< 0.005	< 0.018	< 0.02	< 0.02	-	390[e]	460[e]	< 10	***200***	380	-
BH09-21	**BH09-21-2-090831**	**2009 08 31**	**5.8 - 6.1**	coarse	10	-	-	-	-	-	-	-	-	< 5	44	-
	BH09-21-3-090831	**2009 08 31**	**7.0 - 7.3**	coarse	55	-	-	-	-	-	-	-	-	***350***	380	-
	BH09-21-4-090831	**2009 08 31**	**7.5 - 7.8**	coarse	75	< 0.005	< 0.018	< 0.02	< 0.02	-	***1,500*** [e]	< 250[e]	< 10	***870***	720	-
	BH09-21-6-090831	**2009 08 31**	**8.5 - 8.8**		10	-	-	-	-	-	-	-	-	120	150	-
Fill 2009	**Fill-1-090827**	**2009 08 27**	**-**		-	-	-	-	-	-	< 250	< 250	-	-	-	-
	Fill-1a-090827	**2009 08 27**	**-**		-	-	-	-	-	-	< 250	< 250	-	-	-	-
	QA/QC RPD %					-	-	-	-	-	*	*	-	-	-	-
Provincial Lands[f]																
BH01-14	BH01-14-2	2001 09 22	2.3 - 2.9		110	< 0.04	< 0.5	< 0.5	< 0.5	-	-	-	< 25	< 80	< 250	< 250
BH01-20	BH01-20-1	2001 09 25	5.2 - 5.5		-	< 0.04	< 0.5	< 0.5	< 0.5	-	-	-	< 25	< 80	< 250	< 250
BH01-22	BH01-22-1	2001 09 25	2.4 - 3.0		170	< 0.04	< 0.5	< 0.5	< 0.5	-	< 250	< 250	< 25	< 80	< 250	< 250
BH03-01	BH03-01-1-030904	2003 09 04	-		-	< 0.04	< 0.5	< 0.5	< 0.5	< 100	< 250	< 250	-	-	-	-
BH03-02	BH03-02-2-030904	2003 09 04	6.1 - 6.5		45	< 0.04	< 0.5	< 0.5	< 0.5	< 100	< 250	< 250	-	-	-	-
BH03-06	BH03-06-2-030906	2003 09 06	6.9 - 7.2		-	< 0.04	< 0.5	< 0.5	< 0.5	< 100	< 250	< 250	-	-	-	-
BH03-07	BH03-07-2-030906	2003 09 06	5.8 - 6.2		20	< 0.04	< 0.5	< 0.5	< 0.5	< 100	< 250	< 250	-	-	-	-
BH03-08	BH03-08-1-030906	2003 09 06	4.1 - 4.4		325	< 0.04	< 0.5	< 0.5	< 0.5	< 100	1,000	< 250	< 25	430	350	-
BH03-09	BH03-09-1-030907	2003 09 07	6.9 - 7.2		30	< 0.04	< 0.5	< 0.5	< 0.5	< 100	< 250	< 250	-	-	-	-
BH03-10	BH03-10-1-030907	2003 09 07	7.0 - 7.4		-	< 0.04	< 0.5	< 0.5	< 0.5	< 100	470	< 250	-	-	-	-
BH03-11	BH03-11-1-030907	2003 09 07	5.5 - 6.1		500	< 0.04	< 0.5	< 0.5	< 0.5	< 100	***4,800***	440	50	2,000	1,100	-
BH04-1	BH04-1-4	2004 10 14	6.1 - 6.4		-	-	-	-	-	-	< 250	< 250	-	-	-	-
BH04-4	BH04-4-3	2004 10 15	6.1 - 6.4		-	-	-	-	-	-	< 250	< 250	-	-	-	-
	BH04-4-4	2004 10 15	6.9 - 7.0		-	-	-	-	-	-	< 250	< 250	-	-	-	-
BH04-5	BH04-5-4	2004 10 15	6.1 - 6.4		-	-	-	-	-	-	< 250	< 250	-	-	-	-
	BH04-5-5	2004 10 15	6.9 - 7.5		-	-	-	-	-	-	< 250	< 250	-	-	-	-
	BH04-5-6	2004 10 15	7.6 - 8.2		-	-	-	-	-	-	< 250	< 250	-	-	-	-
BH04-6	BH04-6-2	2004 10 16	6.9 - 7.4		-	-	-	-	-	-	< 250	< 250	-	-	-	-
	BH04-6-3	2004 10 16	6.9 - 7.4		-	-	-	-	-	-	< 250	< 250	-	-	-	-
	QA/QC RPD %					-	-	-	-	-	*	*	-	-	-	-
	BH04-6-4	2004 10 16	7.6 - 7.7		-	-	-	-	-	-	< 250	< 250	-	-	-	-
BH08-5	BH08-5-7-080927	2008 09 27	6.7 - 7.0		10	-	-	-	-	-	< 250	< 250	-	-	-	-
BH08-6	BH08-6-7-080928	2008 09 28	5.8 - 6.1		5	-	-	-	-	-	< 250	< 250	-	-	-	-
	BH08-6-8-080928	2008 09 28	6.2 - 6.4		10	-	-	-	-	-	< 250	< 250	-	-	-	-
BH08-7	BH08-7-4-080928	2008 09 28	5.5 - 5.8		10	-	-	-	-	-	< 250	< 250	-	-	-	-
	BH08-7-7-080928	2008 09 28	6.9 - 7.2		15	-	-	-	-	-	530	< 250	-	-	-	-
	BH08-7-8-080928	2008 09 28	6.9 - 7.2		15	-	-	-	-	-	640	< 250	-	-	-	-
	QA/QC RPD %					-	-	-	-	-	*	*	-	-	-	-
BH08-8	BH08-8-5-080928	2008 09 28	7.3 - 7.6		5	-	-	-	-	-	< 250	< 250	-	-	-	-
	BH08-8-6-080928	2008 09 28	8.1 - 8.2		25	< 0.04	< 0.5	< 0.5	< 0.1	< 100	***1,600*** [e]	330[e]	-	-	-	-
BH09-10	**BH09-10-2-090831**	**2009 08 31**	**0.8 - 1.0**	coarse	5	< 0.005	< 0.018	< 0.02	< 0.02	-	690[e]	< 250[e]	< 10	520	220	-
BH09-15	**BH09-15-1-090828**	**2009 08 28**	**4.3 - 4.6**	coarse	5	-	-	-	-	-	< 250	< 250	-	-	-	-
	BH09-15-2-090828	**2009 08 28**	**7.2 - 7.5**	coarse	50	-	-	-	-	-	< 250	< 250	-	-	-	-
	BH09-15-3-090828	**2009 08 28**	**7.9 - 8.2**	coarse	75	< 0.005	< 0.018	< 0.02	< 0.02	< 100	-	-	< 10	590	800	-
	BH09-15-4-090828	**2009 08 28**	**7.9 - 8.2**	coarse	75	-	-	-	-	-	-	-	-	680	580	-
	QA/QC RPD %					*	*	*	*	*	-	-	*	14	32	-
	BH09-15-5-090828	**2009 08 28**	**8.7 - 9.0**	coarse	10	-	-	-	-	-	< 250	< 250	-	-	-	-
BH09-17	**BH09-17-2-090828**	**2009 08 28**	**5.5 - 5.8**	coarse	10	-	-	-	-	-	***3,300***	570	-	-	-	-
	BH09-17-3-090828	**2009 08 28**	**6.6 - 6.9**	coarse	60	< 0.005	< 0.018	< 0.02	< 0.02	< 100	620[e]	< 250[e]	< 10	330	310	-
	BH09-17-5-090828	**2009 08 28**	**7.2 - 7.5**	coarse	40	-	-	-	-	-	< 250	< 250	-	-	-	-
	BH09-17-6-090828	**2009 08 28**	**7.9 - 8.2**	coarse	15	-	-	-	-	-	880	< 250	-	-	-	-
BH09-19	**BH09-19-4-090829**	**2009 08 29**	**5.8 - 6.1**	coarse	60	< 0.005	< 0.018	< 0.02	< 0.02	-	620[e]	< 250[e]	< 10	420	430	-
	BH09-19-8-090829	**2009 08 29**	**7.9 - 8.2**	coarse	105	-	-	-	-	-	***2,200***	460	-	-	-	-
BH09-20	**BH09-20-3-090831**	**2009 08 31**	**5.8 - 6.1**	coarse	5	-	-	-	-	-	< 250	< 250	-	-	-	-
	BH09-20-4-090831	**2009 08 31**	**6.9 - 7.2**	coarse	10	-	-	-	-	-	< 250	< 250	-	-	-	-
BC Standards																
CSR Residential Land Use (RL)[c]						10	1	1.5	5	200	1,000	1,000	n/a	n/a	n/a	n/a
CSR Commercial Land Use (CL)[c]						10	20	25	50	200	2,000	5,000	n/a	n/a	n/a	n/a
Federal Guidelines/Standards																
CCME CEQG/CWS Residential Coarse-Grained Subsoil (sample depth > 1.5m)[d]						0.03	50	0.1	16	n/a	n/a	n/a	30	150	2,500	10,000
CCME CEQG/CWS Commercial Coarse-Grained Subsoil (sample depth > 1.5m)[d]						0.03	50	0.1	37	n/a	n/a	n/a	320	600	3,500	10,000
CCME CEQG/CWS Residential Fine-Grained Subsoil (sample depth > 1.5m)[d]						0.0068	240	220	130	n/a	n/a	n/a	610	1,000	3,500	10,000
CCME CEQG/CWS Commercial Fine-Grained Subsoil (sample depth > 1.5m)[d]						0.0068	860	660	460	n/a	n/a	n/a	800	1,000	5,000	10,000

Associated CanTest files: 11002056, 11002077, 11030054, 40926062, 51020107, 90826022, 91003109, 100831018, 100901127, 100905044, 100910069.
All terms defined within the body of SLE's report.

<	Denotes concentration less than indicated detection limit or RPD less than indicated value.
-	Denotes analysis not conducted.
n/a	Denotes no applicable standard.
*	RPDs are not normally calculated where one or more concentrations are less than five times MDL.

BOLDED sample denotes most recent sampling event

BOLD	Concentration greater than/and or equal to CSR/CCME CEQG/CWS Residential Land Use (RL) standard.
SHADOW	Concentration greater than/and or equal to CSR/CCME CEQG/CWS Commercial Land Use (CL) standard.

[a] Laboratory detection limit exceeds regulatory standard.
[b] Field screening results are measured based on a 'dry headspace' method using a combustible gas meter calibrated to a hexane standard.
[c] The site-specific factors used for determining the matrix standards for this site include: intake of contaminated soil, toxicity to soil invertebrates and plants, and groundwater flow to surface water used by freshwater aquatic life (whichever is most stringent).
[d] The exposure pathway(s) used for determining the standards for this site include: general, direct contact, vapour inhalation (indoor, slab-on-grade), eco soil contact, offsite migration, general incl. gw.
[e] Value corrected for the presence of individual PAH.
[f] CCME CEQG/CWS guidelines are not applied to soil collected from off-site locations on provincial lands.

TABLE 2: Summary of Analytical Results for Soil - PAH

					Polycyclic Aromatic Hydrocarbons																
Sample Location	**Sample ID**	**Sample Date (yyyy mm dd)**	**Depth Interval (m)**	**Field Screen (ppm)[b]**	**Naphthalene (µg/g)**	**Acenaphthylene (µg/g)**	**Acenaphthene (µg/g)**	**Fluorene (µg/g)**	**Phenanthrene (µg/g)**	**Anthracene (µg/g)**	**Fluoranthene (µg/g)**	**Pyrene (µg/g)**	**Benzo(a) anthracene (µg/g)**	**Chrysene (µg/g)**	**Benzo(b) fluoranthene (µg/g)**	**Benzo(k) fluoranthene (µg/g)**	**Benzo(a) pyrene (µg/g)**	**Indeno(1,2,3-cd) pyrene (µg/g)**	**Dibenz(a,h) anthracene (µg/g)**	**Benzo(g,h,i) perylene (µg/g)**	**2-Methylnaphthalene (µg/g)**
Port of Pleasant Camp																					
BH-P2	BH-P2-4	2000 08 23	2.1	500	< 1.2[a]	< 0.06	< 0.12	***0.66***	***0.36***	< 0.02	< 0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.02	< 0.02	-
BH01-15	BH01-15-1	2001 09 22	2.1 - 2.4	385	***0.13***	< 0.025	< 0.025	0.19	***0.3***	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	< 0.05	< 0.05	< 0.025	< 0.05	-
BH01-16	BH01-16-1	2001 09 22	1.5 - 2.1	600	***2.2***	< 0.5	< 0.5[a]	< 0.5[a]	***2.4***	< 0.5	< 0.5	1	< 0.5	< 0.5	< 0.5	-	< 0.5	< 0.5	< 0.5	< 0.5	-
BH09-1	**BH09-1-6-090830**	**2009 08 30**	**3.2 - 3.5**	70	< 0.01	< 0.005	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.05
BH09-3	**BH09-3-5-090830**	**2009 08 30**	**2.7 - 3.0**	55	< 0.01	< 0.005	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.21	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.05
BH09-5	**BH09-5-6-090831**	**2009 08 31**	**4.9 - 5.2**	55	< 0.01	< 0.005	< 0.005	< 0.01	***0.07***	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.05
BH09-6	**BH09-6-5-090829**	**2009 08 29**	**4.3 - 4.6**	190	< 0.01	< 0.005	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.05
	BH09-6-6-090829	**2009 08 29**	**4.3 - 4.6**	190	< 0.01	< 0.005	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.05
	QA/QC RPD %				*	*	*	*	*	*	*	0	*	*	*	*	*	*	*	*	*
	BH09-6-7-090829	**2009 08 29**	**5.3 - 5.6**	105	< 0.01	< 0.005	< 0.005	0.16	***0.28***	< 0.01	< 0.01	0.09	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.05
BH09-7	**BH09-7-6-090829**	**2009 08 29**	**3.8 - 4.1**	70	< 0.01	< 0.005	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.05
BH09-8	**BH09-8-4-090830**	**2009 08 30**	**1.5 - 1.8**	75	***0.37***	< 0.005	< 0.005	0.09	***0.09***	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	1
BH09-9	**BH09-9-7-090829**	**2009 08 29**	**5.6 - 5.8**	85	< 0.01	< 0.005	< 0.005	0.02	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	0.03
BH09-11	**BH09-11-7-090831**	**2009 08 31**	**5.8 - 6.1**	65	< 0.01	< 0.005	< 0.005	***0.26***	***0.37***	< 0.01	< 0.01	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.05
BH09-12	**BH09-12-10-090829**	**2009 08 29**	**6.9 - 7.2**	10	< 0.01	< 0.005	< 0.005	0.18	***0.29***	< 0.01	< 0.01	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	0.33
	BH09-12-7-090829	**2009 08 29**	**5.6 - 5.9**	115	< 0.01	< 0.005	< 0.005	***0.43***	***0.73***	< 0.01	< 0.01	0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	1.2
BH09-13	**BH09-13-5-090825**	**2009 08 25**	**6.2 - 6.6**	95	< 0.01	< 0.005	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.05
BH09-14	**BH09-14-3-090827**	**2009 08 27**	**6.9 - 7.0**	180	< 0.01	< 0.005	< 0.005	***0.27***	***0.37***	< 0.01	< 0.01	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.05
	BH09-14-4-090827	**2009 08 27**	**6.9 - 7.0**	180	< 0.01	< 0.005	< 0.005	0.19	***0.26***	< 0.01	< 0.01	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.05
	QA/QC RPD %				*	*	*	35	35	*	*	*	*	*	*	*	*	*	*	*	*
BH09-18	**BH09-18-2-090829**	**2009 08 29**	**5.0 - 5.2**	80	< 0.01	< 0.005	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.05
BH09-21	**BH09-21-4-090831**	**2009 08 31**	**7.5 - 7.8**	75	< 0.01	< 0.005	< 0.005	0.11	0.13	< 0.01	< 0.01	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.05
Provincial Lands																					
BH08-8	BH08-8-6-080928	2008 09 28	8.1 - 8.2	25	< 0.05[a]	< 0.05	< 0.05	< 0.05	0.06	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
BH09-10	**BH09-10-2-090831**	**2009 08 31**	**0.8 - 1.0**	5	< 0.01	< 0.005	< 0.005	0.09	0.07	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.05
BH09-15	**BH09-15-3-090828**	**2009 08 28**	**7.9 - 8.2**	75	< 0.01	< 0.005	< 0.005	0.14	0.17	< 0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.05
BH09-17	**BH09-17-3-090828**	**2009 08 28**	**6.6 - 6.9**	60	< 0.01	< 0.005	< 0.005	0.04	0.04	< 0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.05
BH09-19	**BH09-19-3-090829**	**2009 08 29**	**5.2 - 5.5**	40	< 0.01	< 0.005	< 0.005	0.02	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	0.04
	BH09-19-4-090829	**2009 08 29**	**5.8 - 6.1**	60	< 0.01	< 0.005	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.05
	BH09-19-6-090829	**2009 08 29**	**7.0 - 7.3**	75	< 0.01	< 0.005	< 0.005	0.19	0.16	< 0.01	< 0.01	0.06	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.05
BH09-21	**BH09-21-4-090831**	**2009 08 31**	**7.5 - 7.8**	75	< 0.01	< 0.005	< 0.005	0.11	0.13	< 0.01	< 0.01	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.05
BC Standards																					
CSR Commercial Land Use (CL)[c]					50	n/a	n/a	n/a	50	n/a	n/a	100	10	n/a	10	10	10	10	10	n/a	n/a
CSR Residential Land Use (RL)[c,e]					5	n/a	n/a	n/a	5	n/a	n/a	10	1	n/a	1	1	1	1	1	n/a	n/a
Federal Guidelines																					
CCME CEQG Residential Land Use (RL)					0.013	320	0.28	0.25	0.046	2.5	15.4	7.7	6.2	6.2	n/a	6.2	0.6	n/a	n/a	n/a	n/a
CCME CEQG Commercial Land Use (CL)[d]					0.013	320	0.28	0.25	0.046	32	180	n/a	n/a	n/a	n/a	n/a	72	n/a	n/a	n/a	n/a

Associated CanTest files: 100901127, 100905044, 11002056, 11030054, 91003109.
All terms defined within the body of SLE's report.

< Denotes concentration less than indicated detection limit or RPD less than indicated value.
\- Denotes analysis not conducted.
n/a Denotes no applicable standard.
* RPDs are not normally calculated where one or more concentrations are less than five times MDL.
BOLDED sample denotes most recent sampling event

BOLD	Concentration greater than/and or equal to CSR/CCME CEQG/CWSResidential Land Use (RL) standard.
SHADOW	Concentration greater than/and or equal to CSR/CCME CEQG/CWSCommercial Land Use (CL) standard.

[a] Laboratory detection limit exceeds regulatory standard.
[b] Field screening results are measured based on a 'dry headspace' method using a combustible gas meter calibrated to a hexane standard.
[c] The site-specific factors used for determining the matrix standards for this site include: intake of contaminated soil, toxicity to soil invertebrates and plants, and groundwater flow to surface water used by freshwater aquatic life (whichever is most stringent).
[d] The exposure pathway(s) used for determining the standards for this site include: general, general incl. gw, direct contact, vapour inhalation (indoor), eco soil contact and management limit (whichever is most stringent).
[e] CSR Residential Land Use (RL) standards apply to Port of Pleasant Camp only.

TABLE 3 : Summary of Analytical Results for Soil - Total Metals

		Port of Pleasant Camp				BC Standards		Federal Guidelines	
Sample Location		BH-P12	Fill 2009						
Sample ID		BH-P12-3	Fill-1-090827	Fill-1a-090827	**QA/QC RPD** %	**CSR Residential Land Use[a] (RL)**	**CSR Commercial Land Use[b] (CL)**	**CCME CEQG Residential Land Use (RL)**	**CCME CEQG Commercial Land Use (CL)**
Sample Date (yyyy mm dd)		2000 08 25	2009 08 27	2009 08 27					
Parameter	**Units**	**Analytical Results**							
Physical Parameters									
pH	pH	6.8	**5.5**	**4.4**	22	n/a	n/a	(pH 6 - 8)	(pH 6 - 8)
Total Metals									
Antimony	µg/g	<2	< 0.1	< 0.1	*	20	40	20	40
Arsenic	µg/g	4	2.3	3.5	41	20	20	12	12
Barium	µg/g	79.2	32	50	44	1,000	1,500	500	2,000
Beryllium	µg/g	0.3	< 1	< 1	*	4	8	4	8
Cadmium	µg/g	1	< 0.2	< 0.2	*	2 (pH<7.0)	2 (pH<7.0)	10	22
Chromium	µg/g	33.5	9	27	*	60[c]	60[c]	64	87
Cobalt	µg/g	11.2	5	10	67	50	300	50	300
Copper	µg/g			**64**	59	90 (pH<5.0)	90 (pH<5.0)	63	91
		37	35			150	200 (pH 5.5-<6.0)		
Lead	µg/g			3.2	17	150 (pH<5.5)	150 (pH<5.5)	140	260
		8	2.7			250 (pH 5.5-<6.0)	250 (pH 5.5-<6.0)		
Manganese	µg/g	484	235	335	35	1,800	19,000	n/a	n/a
Mercury	µg/g	<0.05	0.04	0.02	*	15	40	6.6	24
Molybdenum	µg/g	1.1	0.5	0.5	0	10	40	10	40
Nickel	µg/g	21.4	8	19	*	100	500	50	50
Selenium	µg/g	<0.5	0.2	0.2	0	3	10	1	2.9
Silver	µg/g	<1	< 0.1	< 0.1	*	20	40	20	40
Strontium	µg/g	37.9	8	13	48	47,000	100,000	n/a	n/a
Thallium	µg/g	<0.2	< 0.1	-	*	n/a	n/a	1	1
Tin	µg/g	<2	< 5	< 5	*	50	300	50	300
Vanadium	µg/g	52.7	30	64	72	200	n/a	130	130
Zinc	µg/g	81	24	37	43	150 (pH<6.0)	150 (pH<6.0)	200	360

Associated CanTest files: 100831018, 100901127.
All terms defined within the body of SLE's report.

< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard.
BOLDED sample denotes most recent sampling event

BOLD	Concentration greater than/and or equal to CSR/CCME CEQG/CWSResidential Land Use (RL) standard.
SHADOW	Concentration greater than/and or equal to CSR/CCME CEQG/CWSCommercial Land Use (CL) standard.

[a] The site-specific factors used for determining the matrix standards for this site include: intake of contaminated soil, toxicity to soil invertebrates and plants, and groundwater flow to surface water used by freshwater aquatic life (whichever is most stringent).

[b] The exposure pathway(s) used for determining the standards for this site include: general, general incl. gw, direct contact, vapour inhalation (indoor), eco soil contact and management limit (whichever is most stringent).

[c] Individual standards exist for Cr +3 and Cr +6. Reported value represents more stringent standard.

[d] CSR Residential Land Use (RL) standards apply to Port of Pleasant Camp only.

TABLE 4: Summary of Analytical Results for Groundwater - Hydrocarbons

			Monocyclic Aromatic Hydrocarbons				**Gross Parameters**				
Monitoring Well ID	**Sample ID**	**Sample Date (yyyy mm dd)**	**Benzene (µg/L)**	**Ethyl-benzene (µg/L)**	**Toluene (µg/L)**	**Xylenes (µg/L)**	**VHw$_{6-10}$ (µg/L)**	**VPHw (C6-C10) (µg/L)**	**EPHw$_{10-19}$ (µg/L)**	**LEPHw (C10-C19)[D] (µg/L)**	**EPHw$_{19-32}$ (µg/L)**
Port of Pleasant Camp											
P3	MWP3	2000 08 27	<0.5	<0.5	<0.5	<0.5	<0.1	<0.1	<100	<100	<100
	MWP3	2001 09 28	< 0.1	< 0.1	0.1	0.2	< 100	< 100	1,000	***1,000***[b]	< 250
	MWP3-050708	2005 07 07	-	-	-	-	-	-	< 250	< 250	< 250
P4	MWP4	2000 09 08	-	-	-	-	-	-	2,300	***2,300***	<100
	MWP4-080620	2008 06 20	-	-	-	-	-	-	1,500	***1,500***	300
	MWP4-081002	2008 10 02	-	-	-	-	-	-	4,100	***4,100***	810
	MWP4-090927	**2009 09 27**	-	-	-	-	-	-	3,700	***3,700***	1,000
P11	MWP11	2000 08 31	<0.5	2	<0.5	1.3	200	200	***120,000***	***120,000***	12,000
	MWP11	2001 09 28							5,000	***5,000***	790
	MWP11	2001 09 29	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	5,000	***5,000***	790
	MW01-DUP1	2001 09 29	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	4,200	***4,200***[b]	690
	QA/QC RPD %		*	*	*	*	*	*	17	17	*
	MWP11-050708	2005 07 08	-	-	-	-	-	-	< 250	< 250[c]	< 250
MWP13	MWP13 09-29	2001 09 29	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	-	-	-
AS-11	AS-11-081002	2008 10 02	-	-	-	-	-	-	2,800	***2,800***	800
	AS-11-090926	**2009 09 27**	-	-	-	-	-	-	1,500	***1,500***	450
AS-13	AS-13-081002	2008 10 02	-	-	-	-	-	-	1,900	***1,900***	510
	AS-13-090714	2009 07 14	-	-	-	-	-	-	430	430	200
	AS-13-090927	**2009 09 26**	-	-	-	-	-	-	610	***610***	< 250
AS-15	AS-15-080620	2008 06 20	-	-	-	-	-	-	< 250	< 250	< 250
	AS-15-081002	2008 10 02	-	-	-	-	-	-	< 250	< 250	250
	AS-15-090927	**2009 09 27**	-	-	-	-	-	-	< 250	< 250	310
AS-22	AS-22-080620	2008 06 20	-	-	-	-	-	-	710	***710***	< 250
	AS-22-081004	2008 10 04	-	-	-	-	-	-	1,600	***1,600***	750
	AS-22-090714	2009 07 14	-	-	-	-	-	-	650	***650***	120
	AS-22-090927	**2009 09 27**	-	-	-	-	-	-	1,900	***1,900***	590
AS-23	AS-23-081002	2008 10 02	-	-	-	-	-	-	360	360	< 250
	AS-23-090714	2009 07 14	-	-	-	-	-	-	< 100	< 100	< 100
	MW-D-090714	2009 07 14	-	-	-	-	-	-	< 100	< 100	< 100
	QA/QC RPD %		-	-	-	-	-	-	*	*	*
01-16	MW01-16	2001 09 28	< 0.1	< 0.1	< 0.1	0.2	< 100	< 100	1,100	***1,100***[b]	330
01-17D	MW01-17D	2001 09 29	< 0.1	3	< 0.1	1.1	-	< 100	***17,000***	***17,000***	1,900
	MW01-17D-030909/10	2003 09 09/10	< 0.2	2	< 0.2	0.3	-	-	700	***700***	< 250
	MW01-17D 031025	2003 10 25	-	-	-	-	-	-	630	***630***	< 250
	MW01-17D-061001	2006 10 01	-	-	-	-	-	-	***2,300,000***	***2,300,000***	180,000
	MW01-17D-080619	2008 06 19	-	-	-	-	-	-	***9,700***	***9,700***	1,500
	MW01-17D-081004	2008 10 04	-	-	-	-	-	-	***7,200***	***7,200***	1,300
	MW01-17D-090713	2009 07 13	-	-	-	-	-	-	***7,200***	***7,200***	1,200
	MW-C-090713	2009 07 13	-	-	-	-	-	-	2,300	***2,300***	440
	QA/QC RPD %		-	-	-	-	-	-	103	103	*
	MW01-17D-090926	**2009 09 26**	-	-	-	-	-	-	***72,000***	***72,000***	10,000
	MW-C-090926	**2009 09 26**	-	-	-	-	-	-	***170,000***	***170,000***	22,000
	QA/QC RPD %		-	-	-	-	-	-	81	81	75
01-18	MW01-18	2001 09 28	< 0.1	< 0.1	< 0.1	0.1	-	< 100	< 250	< 250	< 250
	MW01-18 031025	2003 10 25	-	-	-	-	-	-	< 250	< 250	< 250
01-19	MW01-19	2001 09 29	< 0.1	< 0.1	0.3	0.3	-	< 100	< 250	< 250	< 250
	MW01-19 031025	2003 10 25	-	-	-	-	-	-	< 250	< 250	< 250
	MW01-19-061001	2006 10 01	-	-	-	-	-	-	< 250	< 250	< 250
	MW01-19-070925	2007 09 25	-	-	-	-	-	-	< 250	< 250	< 250
	MW01-19-080619	2008 06 19	-	-	-	-	-	-	< 250	< 250	< 250
	MW-A-080619	2008 06 19	-	-	-	-	-	-	< 250	< 250	< 250
	QA/QC RPD %		-	-	-	-	-	-	*	*	*
	MW01-19-081004	2008 10 04	-	-	-	-	-	-	< 250	< 250	< 250
	MW01-19-090712	2009 07 12	-	-	-	-	-	-	< 100	< 100	< 100
	MW-A-090712	2009 07 12	-	-	-	-	-	-	< 100	< 100	< 100
	QA/QC RPD %		-	-	-	-	-	-	*	*	*
	MW01-19-090926	**2009 09 26**	-	-	-	-	-	-	< 250	< 250	< 250
	MW-B-090926	**2009 09 26**	-	-	-	-	-	-	< 250	< 250	< 250
	QA/QC RPD %		-	-	-	-	-	-	*	-	*
03-03	MW03-03-030909/10	2003 09 09/10	< 0.2	3.4	0.6	1.8	-	-	***6,700***	***6,700***[c]	870
	MW03-03 031025	2003 10 25	-	-	-	-	-	-	2,100	***2,100***[c]	630
	MW03-3-080620	2008 06 20	-	-	-	-	-	-	280	280	< 250
	MW03-3-081002	2008 10 02	-	-	-	-	-	-	< 250	< 250	< 250
	MWA-081002	2008 10 02	-	-	-	-	-	-	< 250	< 250	< 250
	QA/QC RPD %		-	-	-	-	-	-	*	*	*
	MW03-3-090713	2009 07 13	-	-	-	-	-	-	170	170	< 100
	MW03-3-090926	**2009 09 26**	-	-	-	-	-	-	< 250	< 250	< 250
03-04	MW03-04-030909/10	2003 09 09/10	< 0.1	< 0.1	0.2	0.2	-	-	800	***800***[c]	400
	MW03-04 031025	2003 10 25	-	-	-	-	-	-	< 250	< 250[c]	250
03-05	MW03-05-030909/10	2003 09 09/10	0.1	0.4	0.6	1.2	-	-	350	350[c]	520
	MW03-05 031025	2003 10 25	-	-	-	-	-	-	360	360[c]	< 250
06-1	MW06-1-061001	2006 10 01	-	-	-	-	-	-	< 250	< 250	< 250
	MW06-1-090926	**2009 09 26**	-	-	-	-	-	-	< 250	< 250	< 250
BC Standards											
CSR Aquatic Life (AW)[a, e]			4,000	2,000	390	n/a	15,000	1,500	5,000	500	n/a
Federal Guidelines											
CCME CEQG Aquatic Life (AW)[b]			370	90	2	n/a	n/a	n/a	n/a	n/a	n/a

Associated CanTest files: 11002077, 40916043, 41007033, 41030015, 51004045, 51020086, 51020107, 60711045, 70720118, 71002069, 80920016, 80927170, 81001087, 90619137, 90623067, 90623069, 90623071, 90623079, 91002010, 91006083, 100714077, 100718016, 100831012, 100928032, 100929013.

All terms defined within the body of Morrow's report.

< Denotes concentration less than indicated detection limit or RPD less than indicated value.

- Denotes analysis not conducted.

n/a Denotes no applicable standard.

* RPDs are not normally calculated where one or more concentrations are less than five times MDL.

BOLDED sample denotes most recent sampling event

BOLD	Concentration greater than CSR Aquatic Life (AW) standard.
SHADOW	Concentration greater than the EPHw$_{10-19}$ or VHw$_{6-10}$ standard "could be considered proof of non-aqueous phase liquids presence" (per CSR Protocol 7).
SHADED	Concentration greater than or equal to CCME CEQG Aquatic Life (AW) guideline.

[a] Standard/Guideline to protect freshwater aquatic life.

[b] EPHw$_{10-19}$ concentration has been compared to the CSR AW standard for LEPHw, which is a conservative comparison.

[c] Value corrected for the presence of individual PAH.

[d] Sample Id corrected.

[e] Only CSR Aquatic Life (AW) standards apply to Provincial Lands.

TABLE 4 (Cont'd): Summary of Analytical Results for Groundwater - Hydrocarbons

			Monocyclic Aromatic Hydrocarbons				Gross Parameters				
Monitoring Well ID	Sample ID	Sample Date (yyyy mm dd)	Benzene (µg/L)	Ethyl-benzene (µg/L)	Toluene (µg/L)	Xylenes (µg/L)	VHw$_{6-10}$ (µg/L)	VPHw (C6-C10) (µg/L)	EPHw$_{10-19}$ (µg/L)	LEPHw (C10-C19)[b] (µg/L)	EPHw$_{19-32}$ (µg/L)
Port of Pleasant Camp (Cont'd)											
06-2	MW06-2-061001	2006 10 01	-	-	-	-	-	-	3,200	***3,200***	600
	MW06-2-070926	2007 09 26	-	-	-	-	-	-	1,100	***1,100***	250
	MW06-2-080619	2008 06 19	-	-	-	-	-	-	< 250	< 250	< 250
	MW06-2-081002	2008 10 02	-	-	-	-	-	-	1,100	***1,100***	530
	MW06-2-090713	2009 07 13	-	-	-	-	-	-	600	***600***	120
	MW06-2-090926	**2009 09 26**	-	-	-	-	-	-	330	330	270
06-4	MW06-4-061001	2006 10 01	-	-	-	-	-	-	550	***550***	< 250
	MW06-4-070926	2007 09 26	-	-	-	-	-	-	< 250	< 250	< 250
	MW06-4-080619	2008 06 19	-	-	-	-	-	-	< 250	< 250	< 250
	MW06-4-081002	2008 10 02	-	-	-	-	-	-	< 250	< 250	< 250
06-5	MW06-5-061001	2006 10 01	-	-	-	-	-	-	***9,000***	***9,000***	1,100
	MW06-A-061001	2006 10 01	-	-	-	-	-	-	***10,000***	***10,000***	1,200
	QA/QC RPD %		-	-	-	-	-	-	11	11	*
	MW06-5-070926	2007 09 26	-	-	-	-	-	-	1,400	***1,400***	430
	MW06-5-080619	2008 06 19	-	-	-	-	-	-	< 250	< 250	< 250
	MW06-5-081004	2008 10 04	-	-	-	-	-	-	320	320	560
	MW06-5-090713	2009 07 13	-	-	-	-	-	-	120	120	110
06-6	MW06-6-061001	2006 10 01	-	-	-	-	-	-	< 250	< 250	< 250
	MW06-6-070926	2007 09 26	-	-	-	-	-	-	< 250	< 250	< 250
	MW06-6-080619	2008 06 19	-	-	-	-	-	-	< 250	< 250	< 250
	MW06-6-081002	2008 10 02	-	-	-	-	-	-	< 250	< 250	< 250
	MW06-6-090715	2009 07 15	-	-	-	-	-	-	< 100	< 100	< 100
08-1	MW08-1-081004	2008 10 04	-	-	-	-	-	-	310	310	750
	MW08-1-090713	2009 07 13	-	-	-	-	-	-	< 100	< 100	< 100
08-2	MW08-2-081004	2008 10 04	-	-	-	-	-	-	360	360	< 250
	MW08-2-090712	2009 07 12	-	-	-	-	-	-	2,200	***2,200***	360
	MW08-2-090926	**2009 09 26**	-	-	-	-	-	-	***6,600***	***6,600***	1,100
08-3	MW08-3-081004	2008 10 04	-	-	-	-	-	-	550	***550***	660
	MW08-3-090715	2009 07 15	-	-	-	-	-	-	180	180	140
	MW08-3-090926	**2009 09 26**	-	-	-	-	-	-	< 250	< 250	260
08-4	MW08-4-081003	2008 10 03	-	-	-	-	-	-	< 250	< 250	< 250
	MW08-4-090927	**2009 09 27**	-	-	-	-	-	-	< 250	< 250	< 250
09-5	**MW09-5-090926**	**2009 09 26**	-	-	-	-	-	-	***14,000***	***14,000***	1,900
	MW-D-090926	**2009 09 26**	-	-	-	-	-	-	***17,000***	***17,000***	2,200
	QA/QC RPD %		-	-	-	-	-	-	*	*	*
09-16	**MW09-16-090927**	**2009 09 27**	-	-	-	-	-	-	< 250	< 250	< 250
Travel Blank	TB60713A	2006 07 17	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	-	-	-
Provincial Lands[e]											
AS-4	AS-4-080620	2008 06 20	-	-	-	-	-	-	< 250	< 250	< 250
	AS-4-081002	2008 10 02	-	-	-	-	-	-	1,300	***1,300***	860
	AS-4-090927	**2009 09 27**	-	-	-	-	-	-	1,600	***1,600***	760
AS-12	AS-12-080930	2008 09 30	-	-	-	-	-	-	< 250	< 250	< 250
01-20	MW01-20	2001 09 29	< 0.1	< 0.1	< 0.1	< 0.1	-	< 100	< 250	< 250	< 250
	MW01-20 031024/25	2003 10 24/25	< 0.1	< 0.1	0.5	0.4	-	-	< 250	< 250	< 250
	MW01-20-0100204	2004 10 02	-	-	-	-	-	-	< 250	< 250	< 250
	MW01-20-041019	2004 10 19	-	-	-	-	-	-	< 250	< 250	< 250
	MW01-20-061001	2006 10 01	-	-	-	-	-	-	< 250	< 250	< 250
	MW01-20-080619	2008 06 19	-	-	-	-	-	-	< 250	< 250	< 250
	MW01-20-081003	2008 10 03	-	-	-	-	-	-	< 250	< 250	< 250
	MW01-20-090925	**2009 09 25**	-	-	-	-	-	-	< 100	< 100[c]	< 100
01-21	MW01-21	2001 09 28	< 0.1	0.2	0.2	0.2	-	< 100	370	370	< 250
	MW01-DUP2	2001 09 28	< 0.1	0.2	0.3	0.2	-	< 100	390	390	< 250
	QA/QC RPD %		*	*	*	*	-	*	*	*	*
	MW01-21-030909/10	2003 09 09/10	< 0.1	0.6	0.3	0.1	-	-	340	340	< 250
	MW01-21 031025	2003 10 25	-	-	-	-	-	-	500	500[c]	< 250
	MW01-21-100204	2004 10 02	-	-	-	-	-	-	710	***710***	< 250
	MW-A-100204	2004 10 02	-	-	-	-	-	-	470	470	< 250
	QA/QC RPD %		-	-	-	-	-	-	*	*	*
	MW01-21-041018/19	2004 10 18/19	< 0.1	0.2	< 0.1	< 0.1	< 100	< 100	500	500	< 250
	MWD-041018/19	2004 10 18/19	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	-	-	-
	QA/QC RPD %		*	*	*	*	*	*	-	-	-
	MW01-21-050708	2005 07 08	-	-	-	-	-	-	590	***580*** [c]	< 250
	MW01-21-060718	2006 07 18	-	-	-	-	-	-	300	300[c]	< 250
	MW01-21-061001	2006 10 01	-	-	-	-	-	-	310	310	< 250
	MW01-21-070925	2007 09 25	-	-	-	-	-	-	310	310	< 250
	MW01-21-080619	2008 06 19	-	-	-	-	-	-	830	***830***	< 250
	MW01-21-081003	2008 10 03	-	-	-	-	-	-	650	***650***	250
	MW01-21-090714	2009 07 14	-	-	-	-	-	-	420	420	130
	MW01-21-090926	**2009 09 26**	-	-	-	-	-	-	260	260	< 250
BC Standards											
CSR Aquatic Life (AW)[a, e]			4,000	2,000	390	n/a	15,000	1,500	5,000	500	n/a
Federal Guidelines											
CCME CEQG Aquatic Life (AW)[b]			370	90	2	n/a	n/a	n/a	n/a	n/a	n/a

Associated CanTest files: 11002077, 40916043, 41007033, 41030015, 51004045, 51020086, 51020107, 60711045, 70720118, 71002069, 80920016, 80927170, 81001087, 90619137, 90623067, 90623069, 90623071, 90623079, 91002010, 91006083, 100714077, 100718016, 100831012, 100928032, 100929013.

All terms defined within the body of Morrow's report.

< Denotes concentration less than indicated detection limit or RPD less than indicated value.

\- Denotes analysis not conducted.

n/a Denotes no applicable standard.

* RPDs are not normally calculated where one or more concentrations are less than five times MDL.

BOLDED sample denotes most recent sampling event

BOLD	Concentration greater than CSR Aquatic Life (AW) standard.
SHADOW	Concentration greater than the EPHw$_{10-19}$ or VHw$_{6-10}$ standard "could be considered proof of non-aqueous phase liquids presence" (per CSR Protocol 7).
SHADED	Concentration greater than or equal to CCME CEQG Aquatic Life (AW) guideline.

[a] Standard/Guideline to protect freshwater aquatic life.

[b] EPHw$_{10-19}$ concentration has been compared to the CSR AW standard for LEPHw, which is a conservative comparison.

[c] Value corrected for the presence of individual PAH.

[d] Sample Id corrected.

[e] Only CSR Aquatic Life (AW) standards apply to Provincial Lands.

TABLE 4 (Cont'd): Summary of Analytical Results for Groundwater - Hydrocarbons

			Monocyclic Aromatic Hydrocarbons				Gross Parameters				
Monitoring Well ID	Sample ID	Sample Date (yyyy mm dd)	Benzene (µg/L)	Ethyl-benzene (µg/L)	Toluene (µg/L)	Xylenes (µg/L)	VHw$_{6-10}$ (µg/L)	VPHw (C6-C10) (µg/L)	EPHw$_{10-19}$ (µg/L)	LEPHw (C10-C19)[b] (µg/L)	EPHw$_{19-32}$ (µg/L)
Provincial Lands[e] (Cont'd)											
01-23	MW01-23	2001 09 28	< 0.1	< 0.1	< 0.1	< 0.1	-	< 100	< 250	< 250	< 250
	MW01-23 031025	2003 10 25	-	-	-	-	-	-	< 250	< 250[c]	570
	MW01-23-100204	2004 10 02	-	-	-	-	-	-	< 250	< 250	< 250
	MW01-23-041019	2004 10 19	-	-	-	-	-	-	< 250	< 250	< 250
	MW01-23-050708	2005 07 08	-	-	-	-	-	-	< 250	< 250	< 250
	MW01-23-060718	2006 07 18	-	-	-	-	-	-	< 250	< 250	< 250
	MW01-23-061001	2006 10 01	-	-	-	-	-	-	< 250	< 250	< 250
	MW01-23-070925	2007 09 25	-	-	-	-	-	-	< 250	< 250	< 250
03-01	MW03-01-030909/10	2003 09 09/10	< 0.1	< 0.1	0.1	0.1	-	-	< 250	< 250[c]	< 250
	MW03-1-100204	2004 10 02	-	-	-	-	-	-	< 250	< 250	< 250
	MW03-01 031025	2003 10 25	-	-	-	-	-	-	< 250	< 250	< 250
	MW03-1-050708	2005 07 08	-	-	-	-	-	-	< 250	< 250	< 250
	MW03-1-070925	2007 09 25	-	-	-	-	-	-	< 250	< 250	< 250
	MW03-1-080619	2008 06 19	-	-	-	-	-	-	< 250	< 250	< 250
	MW03-1-081003	2008 10 03	-	-	-	-	-	-	< 250	< 250	< 250
	MW03-1-090714	2009 07 14	-	-	-	-	-	-	< 100	< 100	< 100
03-06	MW03-06-030909/10	2003 09 09/10	< 0.1	< 0.1	0.1	0.2	-	-	< 250	< 250[c]	< 250
	MW03-6-100204	2004 10 02	-	-	-	-	-	-	< 250	< 250	< 250
	MW03-06 031025	2003 10 25	-	-	-	-	-	-	< 250	< 250[c]	< 250
	MW03-6-060717	2006 07 17	-	-	-	-	-	-	< 250	< 250	< 250
	MW03-6-060930	2006 09 30	-	-	-	-	-	-	< 250	< 250	< 250
	MW03-6-070917	2007 09 17	-	-	-	-	-	-	< 250	< 250	< 250
	MW03-6-080618	2008 06 18	-	-	-	-	-	-	< 250	< 250	< 250
03-07	MW03-07 031025	2003 10 25	-	-	-	-	-	-	< 250	< 250	< 250
	MW03-7-041018/19	2004 10 18/19	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 250	< 250	< 250
	MW03-7-050707	2005 07 07	-	-	-	-	-	-	< 250	< 250	< 250
	MW03-7-060717	2006 07 17	-	-	-	-	-	-	< 250	< 250[c]	< 250
	MW03-7-080618	2008 06 18	-	-	-	-	-	-	< 250	< 250	< 250
	MW03-7-080930	2008 09 30	-	-	-	-	-	-	< 250	< 250	< 250
	MW03-7-090712	2009 07 12	-	-	-	-	-	-	< 100	< 100	< 100
	MW03-7-090925	**2009 09 25**	-	-	-	-	-	-	< 100	< 100[c]	< 100
03-08	MW03-08-030909/10	2003 09 09/10	< 0.1	2.5	< 0.1	0.4	-	-	2,700	**2,700**	630
	MW03-08 031024/25	2003 10 24/25	< 0.1	2.1	< 0.1	0.7	-	-	3,800	**3,800**	610
	MW03-8-041019	2004 10 19	-	-	-	-	-	-	1,100	**1,100**	< 250
	MW03-8-050707	2005 07 07	-	-	-	-	-	-	810	**810**	< 250
	MW03-8-060717	2006 07 17	-	-	-	-	-	-	1,300	**1,300** [c]	< 250
	MW06-A-060717	2006 07 17	-	-	-	-	-	-	1,300	**1,300** [c]	< 250
	QA/QC RPD %		-	-	-	-	-	-	*	*	*
	MW03-8-060930	2006 09 30	-	-	-	-	-	-	4,200	**4,200**	370
	MW03-8-070925	2007 09 25	-	-	-	-	-	-	**8,900**	**8,900**	1,400
	MW03-8-080618	2008 06 18	-	-	-	-	-	-	1,500	**1,500**	400
	MW03-8-080930	2008 09 30	-	-	-	-	-	-	880	**880**	330
	MW03-8-090712	2009 07 12	-	-	-	-	-	-	540	**540**	170
	MW03-8-090925	**2009 09 25**	-	-	-	-	-	-	1,100	**1,100** [c]	380
03-09	MW03-09-030909/10	2003 09 09/10	< 0.1	2.1	< 0.1	0.5	-	-	370	370	< 250
	MW03-09 031025	2003 10 25	-	-	-	-	-	-	< 250	< 250	< 250
	MW03-9-100204	2004 10 02	-	-	-	-	-	-	1,100	**1,100**	< 250
	MW03-9-041018/19	2004 10 18/19	< 0.1	1.3	< 0.1	0.3	< 100	< 100	< 250	< 250	< 250
	MW03-9-050707	2005 07 07	-	-	-	-	-	-	800	**800**	< 250
	MW03-9-060717	2006 07 17	-	-	-	-	-	-	< 250	< 250[c]	< 250
	MW03-9-060930	2006 09 30	-	-	-	-	-	-	250	250	< 250
	MW03-9-080618	2008 06 18	-	-	-	-	-	-	< 250	< 250	430
	MW03-9-090712	2009 07 12	-	-	-	-	-	-	490	490	140
	MW03-9-090925	**2009 09 25**	-	-	-	-	-	-	< 100	< 100[c]	< 100
03-10	MW03-10-030909/10	2003 09 09/10	< 0.1	0.3	< 0.1	0.1	-	-	**6,600**	**6,600**	890
	MW03-10 031024/25	2003 10 24/25	< 0.1	0.2	< 0.1	< 0.1	-	-	4,100	**4,100**	810
	MW03-10-100204	2004 10 02	-						3,600	**3,600**	280
	MW03-10-060930	2006 09 30	-	-	-	-	-	-	**11,000**	**11,000**	1,500
	MW03-10-070917	2007 09 17	-	-	-	-	-	-	1,200	**1,200**	< 250
	MW03-10-080618	2008 06 18	-	-	-	-	-	-	2,300	**2,300**	370
	MW03-10-080930	2008 09 30	-	-	-	-	-	-	3,000	**3,000**	640
	MW03-10-090712	2009 07 12	-	-	-	-	-	-	**34,000**	**34,000**	3,900
	MW03-10-090829	2009 08 29	-	-	-	-	-	-	2,600	**2,600**	470
	MW03-10-090925	**2009 09 25**	-	-	-	-	-	-	3,900	**3,900** [c]	1,000
03-11	MW03-11 031024/25	2003 10 24/25	< 0.1	1.5	< 0.1	0.3	-	-	2,600	**2,600**	510
	MW03-11-100204	2004 10 02	-	-	-	-	-	-	2,400	**2,400**	< 250
	MW03-11-041018/19	2004 10 18/19	< 0.1	0.6	< 0.1	0.3	1,300	1,300	1,300	**1,300**	< 250
	MW03-11-080620	2008 06 20	-	-	-	-	-	-	950	**950**	360
	MW03-11-081004	2008 10 04	-	-	-	-	-	-	1,600	**1,600**	1,000
	MW03-11-090925	**2009 09 25**	-	-	-	-	-	-	250	250[c]	400
04-1	MW04-1-041019	2004 10 19	-	-	-	-	-	-	< 250	< 250[c]	< 250
	MW04-1-080619	2008 06 19	-	-	-	-	-	-	< 250	< 250	< 250
	MW04-1-081003	2008 10 03	-	-	-	-	-	-	< 250	< 250	< 250
	MW04-1-090925	**2009 09 25**	-	-	-	-	-	-	< 100	< 100[c]	< 100
BC Standards											
CSR Aquatic Life (AW)[a, e]			4,000	2,000	390	n/a	15,000	1,500	5,000	500	n/a
Federal Guidelines											
CCME CEQG Aquatic Life (AW)[b]			370	90	2	n/a	n/a	n/a	n/a	n/a	n/a

Associated CanTest files: 11002077, 40916043, 41007033, 41030015, 51004045, 51020086, 51020107, 60711045, 70720118, 71002069, 80920016, 80927170, 81001087, 90619137, 90623067, 90623069, 90623071, 90623079, 91002010, 91006083, 100714077, 100718016, 100831012, 100928032, 100929013.

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\- Denotes analysis not conducted.

n/a Denotes no applicable standard.

* RPDs are not normally calculated where one or more concentrations are less than five times MDL.

BOLDED sample denotes most recent sampling event

BOLD	Concentration greater than CSR Aquatic Life (AW) standard.
SHADOW	Concentration greater than the EPHw$_{10-19}$ or VHw$_{6-10}$ standard "could be considered proof of non-aqueous phase liquids presence" (per CSR Protocol 7).
SHADED	Concentration greater than or equal to CCME CEQG Aquatic Life (AW) guideline.

[a] Standard/Guideline to protect freshwater aquatic life.

[b] EPHw$_{10-19}$ concentration has been compared to the CSR AW standard for LEPHw, which is a conservative comparison.

[c] Value corrected for the presence of individual PAH.

[d] Sample Id corrected.

[e] Only CSR Aquatic Life (AW) standards apply to Provincial Lands.

TABLE 4 (Cont'd): Summary of Analytical Results for Groundwater - Hydrocarbons

			Monocyclic Aromatic Hydrocarbons				Gross Parameters				
Monitoring Well ID	**Sample ID**	**Sample Date (yyyy mm dd)**	**Benzene (µg/L)**	**Ethyl-benzene (µg/L)**	**Toluene (µg/L)**	**Xylenes (µg/L)**	**VHw$_{6-10}$ (µg/L)**	**VPHw (C6-C10) (µg/L)**	**EPHw$_{10-19}$ (µg/L)**	**LEPHw (C10-C19)[b] (µg/L)**	**EPHw$_{19-32}$ (µg/L)**
Provincial Lands[e] (Cont'd)											
04-2	MW04-2-041019	2004 10 19	-	-	-	-	-	-	750	***750***[c]	250
	MW04-2-050708	2005 07 08	-	-	-	-	-	-	300	300[c]	< 250
	MW04-2-060718	2006 07 18	-	-	-	-	-	-	< 250	< 250[c]	< 250
	MW04-2-061001	2006 10 01	-	-	-	-	-	-	< 250	< 250	< 250
	MW04-2-070925	2007 09 25	-	-	-	-	-	-	< 250	< 250	< 250
	MW04-2-080619	2008 06 19	-	-	-	-	-	-	< 250	< 250	< 250
	MW04-2-081003	2008 10 03	-	-	-	-	-	-	< 250	< 250	< 250
	MW04-2-090713	2009 07 13	-	-	-	-	-	-	160	160	< 100
	MW04-2-090925	**2009 09 25**	-	-	-	-	-	-	< 100	< 100[c]	< 100
04-3	MW04-3-041018/19	2004 10 18/19	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 250	< 250[c]	310
	MW04-3-050708	2005 07 08	-	-	-	-	-	-	560	***560***	< 250
	MW05-A-050708	2005 07 08	-	-	-	-	-	-	420	420	< 250
	QA/QC RPD %		-	-	-	-	-	-	29	29	*
	MW04-3-060718	2006 07 18	-	-	-	-	-	-	< 250	< 250	< 250
	MW04-3-061001	2006 10 01	-	-	-	-	-	-	< 250	< 250	< 250
	MW04-3-070925	2007 09 25	-	-	-	-	-	-	< 250	< 250	< 250
	MWA-070925	2007 09 25	-	-	-	-	-	-	< 250	< 250	< 250
	QA/QC RPD %		-	-	-	-	-	-	*	*	*
	MW04-3-081003	2008 10 03	-	-	-	-	-	-	< 250	< 250	< 250
	MW04-3-090714	2009 07 14	-	-	-	-	-	-	< 100	< 100	< 100
04-4	MW04-4-041018/19	2004 10 18/19	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 250	< 250[c]	< 250
	MWB-041018/19	2004 10 18/19	-	-	-	-	-	-	< 250	< 250[c]	< 250
	QA/QC RPD %		-	-	-	-	-	-	*	*	*
	MW04-4-050708	2005 07 08	-	-	-	-	-	-	< 250	< 250	< 250
	MW04-4-060717	2006 07 17	-	-	-	-	-	-	< 250	< 250	< 250
	MW04-4-061001	2006 10 01	-	-	-	-	-	-	< 250	< 250	< 250
	MW04-4-070917	2007 09 17	-	-	-	-	-	-	< 250	< 250	< 250
	MW04-4-080618	2008 06 18	-	-	-	-	-	-	< 250	< 250	< 250
	MW04-4-081003	2008 10 03	-	-	-	-	-	-	< 250	< 250	< 250
	MW04-4-090712	2009 07 12	-	-	-	-	-	-	120	120	190
	MW04-4-090925	**2009 09 25**	-	-	-	-	-	-	< 100	< 100[c]	< 100
04-5	MW04-5-041018/19	2004 10 18/19	< 0.1	1.4	< 0.1	0.3	170	170	1,400	***1,400***[c]	< 250
	MWA-041018/19	2004 10 18/19	-	-	-	-	-	-	1,100	***1,100***[c]	400
	QA/QC RPD %		-	-	-	-	-	-	24	24	*
	MW04-5-050708	2005 07 08	-	-	-	-	-	-	810	***810***	< 250
	MW05-B-050708	2005 07 08	-	-	-	-	-	-	1,400	***1,400***[c]	< 250
	QA/QC RPD %		-	-	-	-	-	-	53	53	*
	MW04-5-060717	2006 07 17	-	-	-	-	-	-	590	***590***[c]	< 250
	MW04-5-061001	2006 10 01	-	-	-	-	-	-	1,100	***1,100***	< 250
	MW04-5-070925	2007 09 25	-	-	-	-	-	-	1,200	***1,200***	270
	MW04-5-080618	2008 06 18	-	-	-	-	-	-	470	470	280
	MW04-5-081003	2008 10 03	-	-	-	-	-	-	< 250	< 250	350
	MW04-5-090925	**2009 09 25**	-	-	-	-	-	-	< 100	< 100[c]	170
04-6	MW04-6-041018/19	2004 10 18/19	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	440	440[c]	280
	MW04-6-050707	2005 07 07	-	-	-	-	-	-	< 250	< 250	< 250
	MW04-6-060717	2006 07 17	-	-	-	-	-	-	< 250	< 250	< 250
	MW04-6-060930	2006 09 30	-	-	-	-	-	-	< 250	< 250	< 250
	MW04-6-070917	2007 09 17	-	-	-	-	-	-	< 250	< 250	< 250
	MW04-6-080618[d]	2008 06 18	-	-	-	-	-	-	980	***980***	450
	MW04-6-080930	2008 09 30	-	-	-	-	-	-	< 250	< 250	< 250
	MW04-6-090712	2009 07 12	-	-	-	-	-	-	110	110	190
	MW04-6-090925	**2009 09 25**	-	-	-	-	-	-	< 100	< 100[c]	150
08-5	MW08-5-081003	2008 10 03	-	-	-	-	-	-	< 250	< 250	< 250
	MW08-5-090714	2009 07 14	-	-	-	-	-	-	120	120	120
08-6	MW08-6-081003	2008 10 03	-	-	-	-	-	-	< 250	< 250	< 250
	MW08-6-090714	2009 07 14	-	-	-	-	-	-	360	360	170
	MW08-6-090827	2009 08 27	-	-	-	-	-	-	370	370	< 250
	MW08-6-090926	**2009 09 26**	-	-	-	-	-	-	< 250	< 250	< 250
	MW-A-090926	**2009 09 26**	-	-	-	-	-	-	< 250	< 250	< 250
	QA/QC RPD %		-	-	-	-	-	-	*	-	*
08-7	MW08-7-081003	2008 10 03	-	-	-	-	-	-	< 250	< 250	< 250
	MWB-081003	2008 10 03	-	-	-	-	-	-	< 250	< 250	< 250
	MW08-7-090713	2009 07 13	-	-	-	-	-	-	730	***730***	180
	MW-B-090713	2009 07 13	-	-	-	-	-	-	580	***580***	170
	QA/QC RPD %		-	-	-	-	-	-	*	*	*
	MW08-7-090827	2009 08 27	-	-	-	-	-	-	410	410	< 250
	MW08-7-090925	**2009 09 25**	-	-	-	-	-	-	< 100	< 100[c]	< 100
08-8	MW08-8-081003	2008 10 03	-	-	-	-	-	-	370	370	< 250
	MW08-8-090712	2009 07 12	-	-	-	-	-	-	580	***580***	220
	MW08-8-090827	2009 08 27	-	-	-	-	-	-	450	450	< 250
	MW08-8-090926	**2009 09 26**	-	-	-	-	-	-	< 250	< 250	< 250
Purge Water											
Yellow Drum	Yellow Drum - 070927	2007 09 27	-	-	-	-	-	-	4,700	***4,700***	740
Blue Drum	Blue Drum - 070927	2007 09 27	-	-	-	-	-	-	410	410	< 250
BC Standards											
CSR Aquatic Life (AW)[a, e]			4,000	2,000	390	n/a	15,000	1,500	5,000	500	n/a
Federal Guidelines											
CCME CEQG Aquatic Life (AW)[b]			370	90	2	n/a	n/a	n/a	n/a	n/a	n/a

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SHADED	Concentration greater than or equal to CCME CEQG Aquatic Life (AW) guideline.

[a] Standard/Guideline to protect freshwater aquatic life.

[b] EPHw$_{10-19}$ concentration has been compared to the CSR AW standard for LEPHw, which is a conservative comparison.

[c] Value corrected for the presence of individual PAH.

[d] Sample Id corrected.

[e] Only CSR Aquatic Life (AW) standards apply to Provincial Lands.

TABLE 5: Summary of Analytical Results for Groundwater - PAHs

			Polycyclic Aromatic Hydrocarbons																		
Monitoring Well ID	**Sample ID**	**Sample Date (yyyy mm dd)**	**Naphthalene (µg/L)**	**Acenaphthylene (µg/L)**	**Acenaphthene (µg/L)**	**Fluorene (µg/L)**	**Phenanthrene (µg/L)**	**Anthracene (µg/L)**	**Acridine (µg/L)**	**Fluoranthene (µg/L)**	**Pyrene (µg/L)**	**Benzo(a) anthracene (µg/L)**	**Chrysene (µg/L)**	**Benzo(b) fluoranthene (µg/L)**	**Benzo(k) fluoranthene (µg/L)**	**Benzo(a) pyrene (µg/L)**	**Indeno(1,2,3-cd) pyrene (µg/L)**	**Dibenz(a,h) anthracene (µg/L)**	**Benzo(g,h,i) perylene (µg/L)**	**Quinoline (µg/L)**
Port of Pleasant Camp																					
P3	MWP3	2000 08 27	< 0.04	< 0.01	< 0.02	0.05	0.06	< 0.01	< 0.05	< 0.05[a]	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.02	< 0.02	-
	MWP3-050708	2005 07 08	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
P4	MWP4	2000 09 08	< 1.3[a]	< 0.03	0.4	0.28	< 0.02	< 0.04[a]	< 0.11	< 0.01	**0.05**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.02	< 0.02	-
	MWP4-090927	**2009 09 27**	< 0.6	< 0.2	1	2.3	**1.3**	< 0.02[a]	< 0.1	< 0.08[a]	**0.05**	< 0.02[a]	< 0.02	< 0.02	< 0.02	< 0.02[a]	< 0.02	< 0.02	< 0.02	< 1
P11	MWP11	2000 08 27	**8.1**	< 0.68	< 1.9	**6**	***6.6***	< 0.4[a]	< 0.05	**0.06**	***0.22***	< 0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.02	< 0.02	< 0.02	-
	MWP11-050708	2005 07 08	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
AS-11	**AS-11-090926**	**2009 09 27**	< 0.3	< 0.1	0.13	0.25	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
AS-13	AS-13-090714	2009 07 14	< 0.3	< 0.1	0.12	0.28	0.1	< 0.01	< 0.05	< 0.04	**0.03**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	AS-13-090927	**2009 09 26**	< 0.3	< 0.1	< 0.1	0.11	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
AS-15	**AS-15-090927**	**2009 09 27**	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
AS-22	AS-22-090714	2009 07 14	< 0.3	< 0.1	0.49	0.91	0.17	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	AS-22-090927	**2009 09 27**	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
AS-23	AS-23-090714	2009 07 14	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	MW-D-090714	2009 07 14	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	QA/QC RPD %		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
01-17D	MW01-17D-090713	2009 07 13	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	**0.12**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	MW-C-090713	2009 07 13	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	**0.05**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	QA/QC RPD %		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	MW01-17D-090926	**2009 09 26**	< 3[a]	< 1	< 1	< 0.5	< 0.5[a]	< 0.1[a]	< 0.5	< 0.4[a]	< 0.2[a]	< 0.1[a]	< 0.1	< 0.1	< 0.1	< 0.1[a]	< 0.1	< 0.1	< 0.1	< 5[a]
	MW-C-090926	**2009 09 26**	< 3[a]	< 1	< 1	< 0.5	< 0.5[a]	< 0.1[a]	< 0.5	< 0.4[a]	< 0.2[a]	< 0.1[a]	< 0.1	< 0.1	< 0.1	< 0.1[a]	< 0.1	< 0.1	< 0.1	< 5[a]
	QA/QC RPD %		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
01-19	MW01-19-090712	2009 07 12	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	MW-A-090712	2009 07 12	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	QA/QC RPD %		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	MW01-19-090926	**2009 09 26**	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	MW-B-090926	**2009 09 26**	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	QA/QC RPD %		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
03-03	MW03-03 030910	2003 09 10	**9.9**	< 0.1	1.4	**3.8**	***3.7***	**0.38**	< 0.05	**0.05**	**0.18**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	MW03-03 031025	2003 10 25	< 0.3	< 0.1	< 0.1	0.06	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	MW03-3-090713	2009 07 13	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	MW03-3-090926	**2009 09 26**	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
03-04	MW03-04 030910	2003 09 10	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	**0.07**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	MW03-04 031025	2003 10 25	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
03-05	MW03-05 030910	2003 09 10	< 0.3	< 0.1	< 0.1	< 0.05	0.07	< 0.01	< 0.05	< 0.04	**0.06**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	MW03-05 031025	2003 10 25	0.4	< 0.1	< 0.1	0.11	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
06-1	**MW06-1-090926**	**2009 09 26**	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
BC Standards																					
CSR Aquatic Life (AW)[b,d]			10	n/a	60	120	3	1	0.5	2	0.2	1	1	n/a	n/a	0.1	n/a	n/a	n/a	34
CCME CEQG Aquatic Life (AW)[c]			1.1	n/a	5.8	3	0.4	0.012	4.4	0.04	0.025	0.018	n/a	n/a	n/a	0.015	n/a	n/a	n/a	3.4

Associated CanTest files: 100714077, 100718016, 41007033, 41030015, 51020086, 60711045, 70720118, 100928032, 100929013.
All terms defined within the body of SLE's report.

< Denotes concentration less than indicated detection limit or RPD less than indicated value.
n/a Denotes no applicable standard.
* RPDs are not normally calculated where one or more concentrations are less than five times MDL.
BOLDED sample denotes most recent sampling event

BOLD Concentration greater than CSR Aquatic Life (AW) standard.
SHADED Concentration greater than or equal to CCME CEQG Aquatic Life (AW) guideline.

[a] Laboratory detection limit exceeds regulatory standard.
[b] Standard to protect freshwater aquatic life.
[c] Guidelines for the protection of freshwater aquatic life.
[d] Only CSR Aquatic Life (AW) standards apply to Provincial Lands.

TABLE 5 (Cont'd): Summary of Analytical Results for Groundwater - PAHs

			Polycyclic Aromatic Hydrocarbons																	
Monitoring Well ID	**Sample ID**	**Sample Date (yyyy mm dd)**	**Naphthalene (µg/L)**	**Acenaphthylene (µg/L)**	**Acenaphthene (µg/L)**	**Fluorene (µg/L)**	**Phenanthrene (µg/L)**	**Anthracene (µg/L)**	**Acridine (µg/L)**	**Fluoranthene (µg/L)**	**Pyrene (µg/L)**	**Benzo(a) anthracene (µg/L)**	**Chrysene (µg/L)**	**Benzo(b) fluoranthene (µg/L)**	**Benzo(k) fluoranthene (µg/L)**	**Benzo(a) pyrene (µg/L)**	**Indeno(1,2,3-cd) pyrene (µg/L)**	**Dibenz(a,h) anthracene (µg/L)**	**Benzo(g,h,i) perylene (µg/L)**	**Quinoline (µg/L)**
Port of Pleasant Camp (Cont'd)																				
06-2	MW06-2-090713	2009 07 13	< 0.3	< 0.1	0.29	0.65	< 0.05	< 0.01	< 0.05	< 0.04	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	MW06-2-090926	**2009 09 26**	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
06-5	MW06-5-090713	2009 07 13	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
06-6	MW06-6-090715	2009 07 15	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
08-1	MW08-1-090713	2009 07 13	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
08-2	MW08-2-090712	2009 07 12	< 0.3	< 0.1	0.2	0.37	< 0.05	< 0.01	< 0.05	< 0.04	**0.08**	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	MW08-2-090926	**2009 09 26**	< 0.6	< 0.2	< 0.2	< 0.1	< 0.1	< 0.02[a]	< 0.1	< 0.08[a]	**0.18**	< 0.02[a]	< 0.02	< 0.02	< 0.02	< 0.02[a]	< 0.02	< 0.02	< 0.02	< 1
08-3	MW08-3-090715	2009 07 15	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	MW08-3-090926	**2009 09 26**	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
08-4	**MW08-4-090927**	**2009 09 27**	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
09-5	**MW09-5-090926**	**2009 09 26**	< 0.6	< 0.2	< 0.2	< 0.1	**1.4**	< 0.02[a]	< 0.1	< 0.08[a]	***0.36***	< 0.02[a]	< 0.02	< 0.02	< 0.02	< 0.02[a]	< 0.02	< 0.02	< 0.02	< 1
	MW-D-090926	**2009 09 26**	< 0.6	< 0.2	< 0.2	< 0.1	**1.8**	< 0.02[a]	< 0.1	< 0.08[a]	***0.43***	< 0.02[a]	< 0.02	< 0.02	< 0.02	**0.02**	< 0.02	< 0.02	< 0.02	< 1
	QA/QC RPD %		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
09-16	**MW09-16-090927**	**2009 09 27**	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
Provincial Lands																				
AS-4	**AS-4-090927**	**2009 09 27**	< 3	< 1	< 1	< 0.5	< 0.5	< 0.1	< 0.5	< 0.4	< 0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 5
01-20	**MW01-20-090925**	**2009 09 25**	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
01-21	MW01-21 031025	2003 10 25	1.2	< 0.1	< 0.1	1.1	0.57	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	MW01-21-050708	2005 07 08	< 0.3	< 0.1	1	3.5	1.5	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	MW01-21-060718	2006 07 18	< 0.6	< 0.2	< 0.2	< 0.1	< 0.1	< 0.02	< 0.1	< 0.08	< 0.04	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 1
	MW01-21-090714	2009 07 14	< 0.3	< 0.1	0.43	2.1	1.2	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	0.01	0.01	< 0.5
	MW01-21-090926	**2009 09 26**	< 0.3	< 0.1	0.18	0.95	0.38	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
01-23	MW01-23 031025	2003 10 25	< 0.3	< 0.1	< 0.1	0.12	0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
03-01	MW03-01 030910	2003 09 10	< 0.3	< 0.1	< 0.1	0.25	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	MW03-1-090714	2009 07 14	< 0.3	< 0.1	< 0.1	0.32	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	0.01	0.01	0.01	0.01	< 0.5
03-06	MW03-06 030910	2003 09 10	< 0.3	< 0.1	< 0.1	< 0.05	0.17	< 0.01	< 0.05	0.15	0.16	0.03	0.03	0.03	< 0.01	0.01	0.01	< 0.01	0.01	< 0.5
	MW03-06 031025	2003 10 25	< 0.3	< 0.1	< 0.1	< 0.05	0.05	< 0.01	< 0.05	< 0.04	0.02	< 0.01	< 0.01	< 0.01	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
03-07	MW03-7-060717	2006 07 17	< 0.6	< 0.2	< 0.2	< 0.1	< 0.1	< 0.02	< 0.1	< 0.08	< 0.04	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 1
	MW03-7-090712	2009 07 12	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	MW03-7-090925	**2009 09 25**	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
03-08	MW03-8-060717	2006 07 17	< 0.6	< 0.2	< 0.2	< 0.1	< 0.1	< 0.02	< 0.1	< 0.08	< 0.04	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 1
	MW06-A-060717	2006 07 17	< 0.6	< 0.2	< 0.2	< 0.1	< 0.1	< 0.02	< 0.1	< 0.08	< 0.04	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 1
	QA/QC RPD %		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	MW03-8-090712	2009 07 12	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	0.04	0.02	0.02	0.02	0.01	0.01	0.01	< 0.01	< 0.01	< 0.5
	MW03-8-090925	**2009 09 25**	< 0.3	< 0.1	< 0.1	0.08	< 0.05	< 0.01	< 0.05	< 0.04	0.09	< 0.01	0.02	< 0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.5
BC Standards																				
CSR Aquatic Life (AW)[b,d]			10	n/a	60	120	3	1	0.5	2	0.2	1	1	n/a	n/a	0.1	n/a	n/a	n/a	34
CCME CEQG Aquatic Life (AW)[c]			1.1	n/a	5.8	3	0.4	0.012	4.4	0.04	0.025	0.018	n/a	n/a	n/a	0.015	n/a	n/a	n/a	3.4

Associated CanTest files: 100714077, 100718016, 41007033, 41030015, 51020086, 60711045, 70720118, 100928032, 100929013.
All terms defined within the body of SLE's report.

< Denotes concentration less than indicated detection limit or RPD less than indicated value.
n/a Denotes no applicable standard.
* RPDs are not normally calculated where one or more concentrations are less than five times MDL.
BOLDED sample denotes most recent sampling event

BOLD Concentration greater than CSR Aquatic Life (AW) standard.
SHADED Concentration greater than or equal to CCME CEQG Aquatic Life (AW) guideline.

[a] Laboratory detection limit exceeds regulatory standard.
[b] Standard to protect freshwater aquatic life.
[c] Guidelines for the protection of freshwater aquatic life.
[d] Only CSR Aquatic Life (AW) standards apply to Provincial Lands.

TABLE 5 (Cont'd): Summary of Analytical Results for Groundwater - PAHs

			Polycyclic Aromatic Hydrocarbons																		
Monitoring Well ID	**Sample ID**	**Sample Date (yyyy mm dd)**	**Naphthalene (µg/L)**	**Acenaphthylene (µg/L)**	**Acenaphthene (µg/L)**	**Fluorene (µg/L)**	**Phenanthrene (µg/L)**	**Anthracene (µg/L)**	**Acridine (µg/L)**	**Fluoranthene (µg/L)**	**Pyrene (µg/L)**	**Benzo(a) anthracene (µg/L)**	**Chrysene (µg/L)**	**Benzo(b) fluoranthene (µg/L)**	**Benzo(k) fluoranthene (µg/L)**	**Benzo(a) pyrene (µg/L)**	**Indeno(1,2,3-cd) pyrene (µg/L)**	**Dibenz(a,h) anthracene (µg/L)**	**Benzo(g,h,i) perylene (µg/L)**	**Quinoline (µg/L)**
Provincial Lands (Cont'd)																					
03-09	MW03-9-060717	2006 07 17	< 0.6	< 0.2	< 0.2	< 0.1	< 0.1	< 0.02	< 0.1	< 0.08	< 0.04	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 1
	MW03-9-090712	2009 07 12	< 0.3	< 0.1	0.33	1.1	0.28	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	MW03-9-090925	**2009 09 25**	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
03-10	MW03-10-090712	2009 07 12	< 3	< 1	< 1	6	**4.9**	< 0.1	< 0.5	< 0.4	1.5	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 5
	MW03-10-090925	**2009 09 25**	< 0.3	< 0.1	0.48	0.97	< 0.05	< 0.01	< 0.05	< 0.04	0.12	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
03-11	**MW03-11-090925**	**2009 09 25**	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
04-1	MW04-1-041019	2004 10 19	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	MW04-1-090925	**2009 09 25**	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
04-2	MW04-2-041019	2004 10 19	2.4	< 0.1	0.47	1.1	0.49	< 0.01	< 0.05	0.04	0.04	0.02	0.02	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	MW04-2-050708	2005 07 08	< 0.3	< 0.1	0.42	1.2	0.27	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	MW04-2-060718	2006 07 18	< 0.6	< 0.2	< 0.2	< 0.1	< 0.1	< 0.02	< 0.1	< 0.08	< 0.04	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 1
	MW04-2-090713	2009 07 13	< 0.3	< 0.1	< 0.1	0.23	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	MW04-2-090925	**2009 09 25**	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
04-3	MW04-3-041019	2004 10 19	< 0.3	< 0.1	0.3	1.1	0.38	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	MW04-3-090714	2009 07 14	< 0.3	< 0.1	< 0.1	0.09	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
04-4	MW04-4-041019	2004 10 19	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	MWB-041019	2004 10 19	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	QA/QC RPD %		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	MW04-4-090712	2009 07 12	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	MW04-4-090925	**2009 09 25**	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
04-5	MW04-5-041019	2004 10 19	6.5	< 0.1	1.2	3.2	2	< 0.01	< 0.05	< 0.04	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	MWA-041019	2004 10 19	4.4	< 0.1	< 0.1	1.3	1.4	< 0.01	< 0.05	< 0.04	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	QA/QC RPD %		39	*	*	84	35	*	*	*	*	*	*	*	*	*	*	*	*	*
	MW05-B-050708	2005 07 07	5	< 0.1	0.9	2.8	1.4	0.1	< 0.05	< 0.04	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	MW04-5-060717	2006 07 17	< 0.6	< 0.2	< 0.2	< 0.1	< 0.1	< 0.02	< 0.1	< 0.08	< 0.04	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 1
	MW04-5-090925	**2009 09 25**	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
04-6	MW04-6-041019	2004 10 19	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	MW04-6-090712	2009 07 12	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	MW04-6-090925	**2009 09 25**	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
08-5	MW08-5-090714	2009 07 14	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
08-6	MW08-6-090714	2009 07 14	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	MW08-6-090926	**2009 09 26**	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	MW-A-090926	**2009 09 26**	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	QA/QC RPD %		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
08-7	MW08-7-090713	2009 07 13	< 0.3	< 0.1	0.58	1.5	0.19	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	MW-B-090713	2009 07 13	< 0.3	< 0.1	0.49	1.1	< 0.05	< 0.01	< 0.05	< 0.04	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	QA/QC RPD %		*	*	*		96	*	*	*	*	*	*	*	*	*	*	*	*	*
	MW08-7-090925	**2009 09 25**	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
08-8	MW08-8-090712	2009 07 12	< 0.3	< 0.1	0.13	0.49	0.16	< 0.01	< 0.05	< 0.04	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
	MW08-8-090926	**2009 09 26**	< 0.3	< 0.1	< 0.1	< 0.05	< 0.05	< 0.01	< 0.05	< 0.04	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5
BC Standards																					
CSR Aquatic Life (AW)[b,d]			10	n/a	60	120	3	1	0.5	2	0.2	1	1	n/a	n/a	0.1	n/a	n/a	n/a	34
CCME CEQG Aquatic Life (AW)[c]			1.1	n/a	5.8	3	0.4	0.012	4.4	0.04	0.025	0.018	n/a	n/a	n/a	0.015	n/a	n/a	n/a	3.4

Associated CanTest files: 100714077, 100718016, 41007033, 41030015, 51020086, 60711045, 70720118, 100928032, 100929013.
All terms defined within the body of SLE's report.

< Denotes concentration less than indicated detection limit or RPD less than indicated value.
n/a Denotes no applicable standard.
* RPDs are not normally calculated where one or more concentrations are less than five times MDL.
BOLDED sample denotes most recent sampling event

BOLD Concentration greater than CSR Aquatic Life (AW) standard.
SHADED Concentration greater than or equal to CCME CEQG Aquatic Life (AW) guideline.

[a] Laboratory detection limit exceeds regulatory standard.
[b] Standard to protect freshwater aquatic life.
[c] Guidelines for the protection of freshwater aquatic life.
[d] Only CSR Aquatic Life (AW) standards apply to Provincial Lands.

TABLE 6: Summary of Analytical Results for Groundwater - Inorganics

		Port of Pleasant Camp																		
Monitoring Well ID		P3		P11		AS-22	01-17D			01-19									**BC Standards**	**Federal Guidelines**
Sample ID		MWP3-050707	MWP3	MWP11-050707	MWP11	AS-22-081003/04	MW01-17D 030909	MW01-17D-080618	MW01-17D-081003/04	MW01-19-080618	MWA-080618	**QA/QC**	MW01-19-081003/04	MW01-19-090712	MW-A-090712	**QA/QC**	**MW01-19-090925**	**MW-B-090925**	**QA/QC**	**CSR**
Sample Date (yyyy mm dd)		2005 07 07	2000 08 27	2005 07 07	2000 08 27	2008 10 03/04	2003 09 09[h]	2008 06 18	2008 10 03/04	2008 06 18	2008 06 18	**RPD** %	2008 10 03/04	2009 07 12	2009 07 12	**RPD** %	**2009 09 25**	**2009 09 25**	**RPD** %	**Aquatic Life[b,j] (AW)**	**CCME CEQG Aquatic Life[b,g] (AW)**
Parameter	**Units**	**Analytical Results**																		
Physical Parameters																				
Hardness	mg/L	198	266	269	364	347	275	226	253	224	212	6	254	237	239	< 1	173	247	35	n/a	n/a
pH (field)	pH	7.16	-	7.28	-	7.24	-	7.33	7.11	7.26	7.26	0	7.2	7.56	-	*	7.05	7.05	0	n/a	6.5 - 8.0
Ion Balance %	%	-2.4	-	-1.8	-	-	-	-	-	-	-	-	-				-	-	-	n/a	n/a
Dissolved Inorganics																				
Dissolved Aluminum	µg/L	< 5	< 20	8	< 20	50	-	4	< 50	6	13	74	< 50	< 1	1	*	< 1	< 1	*	n/a	100 (pH>=6.5)
Dissolved Calcium	mg/L	71	96.5	96.4	128	123	-	81.3	90.3	79.1	75.3	5	90.6	83.9	85	1	61.6	87.6	35	n/a	n/a
Dissolved Iron	µg/L	50	73	< 50	130	**820**[i]	**16,600**[h]	**630**[i]	**2,910**[i]	**430**[i]	**370**[i]	15	< 10	< 10	< 10	*	< 10	< 10	*	n/a	300
Dissolved Magnesium	mg/L	4.92	6.03	6.71	-	9.89	-	5.42	6.49	6.41	5.89	9	6.66	6.65	6.47	3	4.74	6.71	34	n/a	n/a
Dissolved Manganese	µg/L	71	177	95	-	2,370	-	343	920	1.5	< 1	*	< 3	0.9	0.8	*	0.2	1.2	*	n/a	n/a
Dissolved Potassium	mg/L	1.1	< 1	1.4	-	1.3	-	1.06	0.9	1.16	1	15	0.6	1.06	0.97	9	0.77	1.1	35	n/a	n/a
Dissolved Sodium	mg/L	0.7	0.92	1.22	-	3	-	2.25	2.4	1.99	1.68	17	2.6	1.95	1.66	16	1.58	2.25	35	n/a	n/a
Ammonia Nitrogen	µg/L	10	-	< 10	-	150	-	100	100	< 10	< 10	*	20	-	-	-	-	-		1,310 - 11.300	n/a
Nitrate	µg/L	< 50	-	< 50	-	2,850	< 50	< 50	< 10	160	190	17	360	240	240	*	-	300	*	400,000	2,900
Nitrite	µg/L	< 2	-	3	-	***228***[i]	< 2	< 2	< 2	< 2	< 2	*	< 2	< 2	< 2	*	-	< 2	*	200 - 2,000	60
Nitrate+Nitrite	µg/L	< 50	-	< 50	-	3,080	< 50	< 50	< 10	160	190	17	360	240	240	*	-	300	*	400,000	n/a
Chloride	mg/L	< 0.2	-	2.1	-	1.27	2.4	0.29	1.47	1.13	1.11	2	1.59	1.65	1.68	2	-	1.32	*	1,500	n/a
Fluoride	µg/L	< 50	-	< 50	-	< 50	< 50	< 50	60	< 50	< 50	*	< 50	< 50	< 50	*	-	< 50	-	3,000 (H>=50)	120
Sulphate	mg/L	2.6	-	8	-	33.4	< 0.5	13.4	22.9	8.64	8.57	< 1	11.1	10.5	10.3	2	-	8.64	*	1,000	n/a
Total Alkalinity (as CaCO3)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	n/a	n/a
Bicarbonate HCO3	mg/L	253	-	332	-	360	-	244	280	-	241	*	298	-	-	-	-	-	-	n/a	n/a
Carbonate CO3	mg/L	< 0.5	-	< 0.5	-	< 0.5	-	< 0.5	< 0.5	-	< 0.5	*	< 0.5	-	-	-	-	-	-	n/a	n/a
Hydroxide	mg/L	< 0.5	-	< 0.5	-	< 0.5	-	< 0.5	< 0.5	-	< 0.5	*	< 0.5	-	-	-	-	-	-	n/a	n/a
Dissolved Metals																				
Antimony	µg/L	< 1	< 50	< 1	< 50	< 50	< 0.2	< 0.2	< 50	< 0.2	< 1	*	< 50	< 0.2	< 0.2	*	< 0.1	< 0.1	*	200	n/a
Arsenic	µg/L	< 1	< 1	< 1	2	< 30[a]	**5.1**[i]	0.8	< 30[a]	< 0.2	< 1	*	< 30[a]	< 0.2	< 0.2	*	< 0.2	< 0.2	*	50	5
Barium	µg/L	49	72	110	219	190	170	60	110	172	170	1	140	159	129	21	102	149	38	10,000	n/a
Beryllium	µg/L	< 1	< 0.2	< 1	< 0.2	< 3	< 0.2	< 0.2	< 3	< 0.2	< 1	*	< 3	< 0.2	< 0.2	*	< 0.1	< 0.1	*	53	n/a
Boron	µg/L	< 50	< 8	< 50	< 8	< 10	< 10	< 10	< 10	< 10	< 50	*	< 10	< 10	< 10	*	< 5	< 5	*	50,000	n/a
Cadmium	µg/L																			0.3 (H 30-<90)	0.01 - 0.13[f]
																				0.5 (H 90-<150)	
																	0.01			0.6 (H 150-<210)	
			< 0.1	< 0.2[a]	< 0.1	< 10[a]	0.04	< 0.04	< 10[a]	< 0.04	< 0.2[a]	*	< 10[a]	0.06	< 0.04	*		0.03	*	0.6 (H>=210)	
Chromium	µg/L	< 1	< 5	< 1	< 5	< 10[a]	0.5	< 0.2	< 10[a]	< 0.2	< 1	*	< 10[a]	0.4	0.3	*	0.2	< 0.2	*	10[c]	1[c]
Cobalt	µg/L	< 1	< 5	< 1	9	< 20	1.1	0.6	< 20	< 0.2	< 1	*	< 20	< 0.2	< 0.2	*	< 0.1	< 0.1	*	40	n/a
Copper	µg/L																			20 (H<50)	2 (H<120)
																				30 (H 50-<75)	3 (H 120-<180)
																				40 (H 75-<100)	4 (H>=180)
																				50 (H 100-<125)	
		< 1					0.2										0.3			70 (H 150-<175)	
				1				0.7		1	< 1	*								80 (H 175-<200)	
			< 5		< 5	< 20[a]			< 20[a]				< 20[a]	< 0.2	< 0.2	*		0.2	*	90 (H>=200)	
Lead	µg/L																			40 (H<50)	1 (H<60)
																				50 (H 50-<100)	2 (H 60-<120)
		< 1					< 0.2										< 0.05			60 (H 100-<200)	4 (H 120-<180)
			< 1	< 1				< 0.2	< 30[a]	< 0.2	< 1	*	< 30[a]	< 0.2	< 0.2	*		< 0.05	*	110 (H 200-<300)	7 (H>=180)
					< 1	< 30[a]						*				-				160 (H>=300)	
Lithium	µg/L	< 1	-	< 1	-	-	0.6	0.4	-	1	< 1	*	-	0.4	0.4	*	0.4	0.6	*	n/a	n/a
Mercury	µg/L	< 0.02	0.06	< 0.02	< 0.05	-	< 0.02	< 0.02	-	< 0.02	< 0.02	*	-	< 0.02	< 0.02	*	< 0.02	< 0.02	*	1	0.026
Molybdenum	µg/L	< 0.5	< 5	< 0.5	< 5	< 20	1	0.4	< 20	0.2	< 0.5	*	< 20	0.2	0.2	*	0.2	0.2	*	10,000	73
Nickel	µg/L																			250 (H<60)	25 (H<60)
																				650 (H 60-<120)	65 (H 60-<120)
																	< 0.2			1,100 (H 120-<180)	110 (H 120-<180)
		< 1	< 8	1	< 8	< 20	1.1	0.6	< 20	0.2	< 1	*	< 20	< 0.2	< 0.2	*		< 0.2	*	1,500 (H>=180)	150 (H>=180)
Selenium	µg/L	< 1	< 1	< 1	< 1	-	< 0.2	0.6	-	0.7	< 1	*	-	0.4	0.5	*	0.4	0.4	*	10	1
Silver	µg/L																			0.5 (H<=100)	0.1
		< 0.25[a]	< 0.1	< 0.25[a]	< 0.1	< 10[a]	< 0.02	< 0.05	< 10[a]	< 0.05	< 0.25[a]	*	< 10[a]	< 0.05	< 0.05	*	< 0.04	< 0.04	*	15 (H>100)	
Thallium	µg/L	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.02	< 0.02	-	< 0.02	< 0.1	*	-	< 0.02	< 0.02	*	< 0.02	< 0.02	*	3	0.8
Titanium	µg/L	< 1	< 3	< 1	< 3	< 5	1.2	0.5	< 5	0.8	< 1	*	< 5	< 0.2	< 0.2	*	0.2	0.3	*	1,000	n/a
Uranium	µg/L	< 0.5	-	< 0.5	-	-	< 0.1	0.4	-	0.2	< 0.5	*	-	0.3	0.3	*	0.21	0.29	*	3,000	n/a
Vanadium	µg/L	< 1	< 5	< 1	< 5	< 10	< 0.2	< 0.2	< 10	< 0.2	< 1	*	< 10	0.6	0.5	*	0.1	0.1	*	n/a	n/a
Zinc	µg/L																			75 (H<=90)	
		< 5																		150 (H 90-<100)	30
				< 5			3	1	9	4	< 5	*	9	< 1	< 1	*	1			900 (H 100-<200)	
			< 5			10										-		1	*	1,650 (H 200-<300)	
					8															2,400 (H 300->400)[e]	

Associated CanTest files: 40916043, 51020086, 60711045, 70720118, 71002069, 80920016, 80927170, 90619137, 90623066, 90623067, 90623069, 90623071, 91002010, 91006083, 91006094, 91029091, 100714077, 100718016, 100831012, 100928032, 100929013.

All terms defined within the body of Morrow's report.

< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard.
* RPDs are not normally calculated where one of more concentrations are less than five times MDL.
BOLDED sample denotes most recent sampling event

BOLD Concentration greater than CSR Aquatic Life (AW) standard.
SHADED Concentration greater than or equal to CCME CEQG Aquatic Life (AW) guideline.

[a] Laboratory detection limit exceeds regulatory standard.
[b] Standard/Guideline to protect freshwater aquatic life.
[c] Individual standards exist for Cr +3 and Cr +6. Reported value represents more stringent standard.
[d] There is no Cadmium standard specified for H >= 210; therefore, the standard for H=150-<210 is applied as a conservative comparison.
[e] There is no Zinc standard specified for H >= 400; therefore, the standard for H=300-<400 is applied as a conservative comparison.
f Criterion for cadmium (mg/L) is determined using the following formula: 10^(0.86[log(hardness)]-3.2)/1000.
[g] Guidelines for total metals. Please refer to report for explanation of applicability to dissolved metals.
h Sample analyzed for Total Metals.
i Concentration less than 10 times the CEQG guidelines - see report text for complete discussion
[j] Only CSR Aquatic Life (AW) standards apply to Provincial Lands.

TABLE 6 (Cont'd): Summary of Analytical Results for Groundwater - Inorganics

		Port of Pleasant Camp (Cont'd)																		
Monitoring Well ID		03-03			03-04	03-05	03-21	06-2	06-4			06-5							**BC Standards**	**Federal Guidelines**
Sample ID		MW03-03 030909	MW03-3-090712	**MW03-3-090925**	MW03-04 030909	MW03-05 030909	MW01-21 030909	MW06-2-070926	MW06-4-061001	MW06-4-080618	**MW06-4-090925**	MW06-5-061001	MW06-A-061001	**QA/QC**	MW06-5-070926	MW06-5-080618	MW06-5-081003	MW06-5-090712	**CSR**	**CCME CEQG**
Sample Date (yyyy mm dd)		2003 09 09[h]	2009 07 12	**2009 09 25**	2003 09 09[h]	2003 09 09	2003 09 09[h]	2007 09 26	2006 10 01	2008 06 18	**2009 09 25**	2006 10 01	2006 10 01	**RPD %**	2007 09 26	2008 06 18	2008 10 03	2009 07 12	**Aquatic Life[b,j] (AW)**	**Aquatic Life[b,g] (AW)**
Parameter	**Units**	**Analytical Results**																		
Physical Parameters																				
Hardness	mg/L	277	245	316	262	262	259	217	325	171	332	355	358	< 1	228	197	219	244	n/a	n/a
pH (field)	pH	-	7.62	7.06	-	-	-	7.44	7.31	7.44	6.87	7.5	7.5	-	7.47	7.41	7.15	7.49	n/a	6.5 - 8.0
Ion Balance %	%	-		-	-	-	-	-	-4.9	-	-	-5.9	-5	*	-	-	-		n/a	n/a
Dissolved Inorganics																				
Dissolved Aluminum	µg/L	-	< 1	< 1	-	-	-	8	< 1	14	< 1	2	14	*	52	< 1	< 50	< 1	n/a	100 (pH>=6.5)
Dissolved Calcium	mg/L	-	86.4	112	-	-	-	77.7	115	60.7	117	128	129	< 1	81.5	69.4	77.5	86.5	n/a	n/a
Dissolved Iron	µg/L	**11,600**	20	< 10	< 10	< 10	**13,200**	**1,010**[i]	280	290	< 10	300	**320**[i]	7	< 10	**380**[i]	< 10	180	n/a	300
Dissolved Magnesium	mg/L	-	6.91	8.95	-	-	-	5.5	9.1	4.61	9.47	8.8	8.8	0	5.89	5.7	6.26	6.77	n/a	n/a
Dissolved Manganese	µg/L	-	1,510	15	-	-	-	457	347	< 1	55	211	213	< 1	36	9.5	< 3	841	n/a	n/a
Dissolved Potassium	mg/L	-	1.24	1.03	-	-	-	1.41	2.79	0.5	0.9	2.55	2.57	< 1	1.68	0.92	0.5	1.29	n/a	n/a
Dissolved Sodium	mg/L	-	1.23	1.78	-	-	-	1.57	3.55	0.99	1.93	2.25	2.29	2	2.52	1.01	1	1.24	n/a	n/a
Ammonia Nitrogen	µg/L	-	-	-	-	-	-	120	< 10	< 10	-	< 10	< 10	*	< 10	< 10	20	-	1,310 - 11.300	n/a
Nitrate	µg/L	< 50	< 50	-	< 50	< 50	< 50	< 10	< 10	< 50	-	< 10	< 10	*	< 10	< 50	660	< 50	400,000	2,900
Nitrite	µg/L	< 2	< 2	-	4	5	< 2	< 2	< 2	< 2	-	< 2	< 2	*	< 2	< 2	6	< 2	200 - 2,000	60
Nitrate+Nitrite	µg/L	< 50	< 50	-	< 50	< 50	< 50	< 10	< 10	< 50	-	< 10	< 10	*	< 10	< 50	670	< 50	400,000	n/a
Chloride	mg/L	3	0.81	-	1.3	1.9	1.5	0.86	1.37	0.34	-	2.47	2.42	2	0.94	< 0.2	0.63	0.77	1,500	n/a
Fluoride	µg/L	< 50	< 50	-	< 50	< 50	< 50	< 50	< 100	50	-	< 100	< 100	*	70	< 50	50	< 50	3,000 (H>=50)	120
Sulphate	mg/L	0.8	8.97	-	6.7	10.7	0.8	32.7	176	4.64	-	245	243	< 1	54.5	4.43	10.2	9.91	1,000	n/a
Total Alkalinity (as CaCO3)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	n/a	n/a
Bicarbonate HCO3	mg/L	-	-	-	-	-	-	255	228	201	-	186	184	1	229	205	245	-	n/a	n/a
Carbonate CO3	mg/L	-	-	-	-	-	-	< 0.5	< 0.5	< 0.5	-	< 0.5	< 0.5	*	< 0.5	< 0.5	< 0.5	-	n/a	n/a
Hydroxide	mg/L	-	-	-	-	-	-	< 0.5	< 0.5	< 0.5	-	< 0.5	< 0.5	*	< 0.5	< 0.5	< 0.5	-	n/a	n/a
Dissolved Metals																				
Antimony	µg/L	< 0.2	< 0.2	< 0.1	< 0.2	0.4	< 0.2	< 0.2	0.2	< 1	< 0.1	0.6	0.7	*	0.2	< 0.2	< 50	< 0.2	200	n/a
Arsenic	µg/L	3.2	0.4	< 0.2	0.2	0.4	4.1	3	0.5	< 1	< 0.2	0.6	0.6	*	0.3	< 0.2	< 30[a]	0.7	50	5
Barium	µg/L	184	91	102	103	107	153	118	166	49	127	208	217	4	130	59	65	99	10,000	n/a
Beryllium	µg/L	< 0.2	< 0.2	< 0.1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 1	< 0.1	< 0.2	< 0.2	*	< 0.2	< 0.2	< 3	< 0.2	53	n/a
Boron	µg/L	< 10	< 10	< 5	< 10	10	< 10	< 10	< 10	< 50	< 5	< 10	< 10	*	10	< 10	< 10	< 10	50,000	n/a
Cadmium	µg/L																		0.3 (H 30-<90)	0.01 - 0.13[f]
																			0.5 (H 90-<150)	
																			0.6 (H 150-<210)	
			0.13[i]	0.04				**0.07**[i]	**0.12**[i]	< 0.2[a]	**0.1**[i]	0.06	0.07	*	0.04	< 0.04	< 10[a]	**0.1**[i]	0.6 (H>=210)	
Chromium	µg/L	0.5	< 0.2	< 0.2	< 0.2	< 0.2	0.4	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2	*	0.2	< 0.2	< 10[a]	0.2	10[c]	1[c]
Cobalt	µg/L	6.6	1.2	< 0.1	5.5	1.5	2.4	1.2	2	< 1	0.1	0.8	0.9	*	< 0.2	< 0.2	< 20	2	40	n/a
Copper	µg/L																		20 (H<50)	2 (H<120)
																			30 (H 50-<75)	3 (H 120-<180)
																			40 (H 75-<100)	4 (H>=180)
										< 1									50 (H 100-<125)	
		0.2			1	0.8	0.6							-		0.8			70 (H 150-<175)	
								0.7	1			1.3	1.9	38	1.3				80 (H 175-<200)	
			0.5	0.7							0.6						< 20[a]	0.6	90 (H>=200)	
Lead	µg/L																		40 (H<50)	1 (H<60)
																			50 (H 50-<100)	2 (H 60-<120)
		< 0.2			< 0.2	< 0.2	< 0.2			< 1				-		< 0.2			60 (H 100-<200)	4 (H 120-<180)
			< 0.2					< 0.2						-	< 0.2		< 30[a]	< 0.2	110 (H 200-<300)	7 (H>=180)
				< 0.05					< 0.2		< 0.05	< 0.2	0.6	*					160 (H>=300)	
Lithium	µg/L	0.6	0.5	0.5	1.4	3	0.6	0.3	68	< 1	0.6	26	16	48	0.5	0.3	-	0.4	n/a	n/a
Mercury	µg/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	-	< 0.02	1	0.026
Molybdenum	µg/L	1.3	1	0.3	1.8	3.3	1.2	2.8	1	< 0.5	0.1	2.3	2.5	8	1.2	0.4	< 20	1.9	10,000	73
Nickel	µg/L																		250 (H<60)	25 (H<60)
																			650 (H 60-<120)	65 (H 60-<120)
										< 1									1,100 (H 120-<180)	110 (H 120-<180)
		9.4	1.6	< 0.2	3.9	3.9	2	2.2	2.8		< 0.2	2.7	2.8	4	0.8	0.3	< 20	1.9	1,500 (H>=180)	150 (H>=180)
Selenium	µg/L	< 0.2	< 0.2	0.9	< 0.2	< 0.2	< 0.2	0.5	0.6	< 1	< 0.2	1	1	0	0.6	0.4	-	< 0.2	10	1
Silver	µg/L																		0.5 (H<=100)	0.1
		< 0.02	< 0.05	< 0.04	< 0.02	< 0.02	< 0.02	< 0.05	< 0.05	< 0.25[a]	< 0.04	< 0.05	< 0.05	*	< 0.05	< 0.05	< 10[a]	< 0.05	15 (H>100)	
Thallium	µg/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.03	< 0.1	< 0.02	0.04	0.05	*	0.04	< 0.02	-	< 0.02	3	0.8
Titanium	µg/L	0.8	< 0.2	0.5	0.7	0.7	1	< 0.2	0.3	< 1	0.5	0.3	0.5	*	< 0.2	0.4	< 5	0.2	1,000	n/a
Uranium	µg/L	0.3	0.4	0.63	0.6	1.5	0.1	1.1	1.5	< 0.5	0.55	2.8	2.9	4	0.7	0.4	-	0.5	3,000	n/a
Vanadium	µg/L	< 0.2	0.6	< 0.1	0.3	0.3	< 0.2	0.3	< 0.2	< 1	0.2	< 0.2	< 0.2	*	0.3	< 0.2	< 10	0.6	n/a	n/a
Zinc	µg/L																		75 (H<=90)	
										< 5				-		< 1			150 (H 90-<100)	30
		3	< 1		2	3	< 2	2						-	3		8	< 1	900 (H 100-<200)	
														-					1,650 (H 200-<300)	
				1					3		< 1	3	8	*					2,400 (H 300->400)[e]	

Associated CanTest files: 40916043, 51020086, 60711045, 70720118, 71002069, 80920016, 80927170, 90619137, 90623066, 90623067, 90623069, 90623071, 91002010, 91006083, 91006094, 91029091, 100714077, 100718016, 100831012, 100928032, 100929013.

All terms defined within the body of Morrow's report.

< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard.
* RPDs are not normally calculated where one of more concentrations are less than five times MDL.
BOLDED sample denotes most recent sampling event

BOLD Concentration greater than CSR Aquatic Life (AW) standard.
SHADED Concentration greater than or equal to CCME CEQG Aquatic Life (AW) guideline.

[a] Laboratory detection limit exceeds regulatory standard.
[b] Standard/Guideline to protect freshwater aquatic life.
[c] Individual standards exist for Cr +3 and Cr +6. Reported value represents more stringent standard.
[d] There is no Cadmium standard specified for H >= 210; therefore, the standard for H=150-<210 is applied as a conservative comparison.
[e] There is no Zinc standard specified for H >= 400; therefore, the standard for H=300-<400 is applied as a conservative comparison.
f Criterion for cadmium (mg/L) is determined using the following formula: 10^(0.86[log{hardness}]-3.2)/1000.
[g] Guidelines for total metals. Please refer to report for explanation of applicability to dissolved metals.
h Sample analyzed for Total Metals.
i Concentration less than 10 times the CEQG guidelines - see report text for complete discussion
[j] Only CSR Aquatic Life (AW) standards apply to Provincial Lands.

TABLE 6 (Cont'd): Summary of Analytical Results for Groundwater - Inorganics

		Port of Pleasant Camp (Cont'd)														
Monitoring Well ID		06-6			08-1	08-2		08-3			08-4		09-5	09-16	BC Standards	Federal Guidelines
Sample ID		MW06-6-061001	MW06-6-070926	MW06-6-080618	MW08-1-081003	MW08-2-081003	MW08-2-090712	MW08-3-081003	MW08-3-090714	**MW08-3-090925**	MW08-4-081003	**MW08-4-090926**	**MW09-5-090925**	**MW09-16-090926**	CSR	CCME CEQG
Sample Date (yyyy mm dd)		2006 10 01	2007 09 26	2008 06 18	2008 10 03	2008 10 03	2009 07 12	2008 10 03	2009 07 14	**2009 09 25**	2008 10 03	**2009 09 26**	**2009 09 25**	**2009 09 26**	Aquatic Life[b,j] (AW)	Aquatic Life[b,g] (AW)
Parameter	Units	Analytical Results														
Physical Parameters																
Hardness	mg/L	229	203	154	317	259	239	268	239	213	101	97.4	273	297	n/a	n/a
pH (field)	pH	7.52	7.38	7.85	7.14	7.14	7.29	7.17	7.92	7	7.15	7.37	6.62	7.08	n/a	6.5 - 8.0
Ion Balance %	%	-1.4	-	-	-	-		-		-	-	-	-	-	n/a	n/a
Dissolved Inorganics																
Dissolved Aluminum	µg/L	1	23	11	50	< 50	2	< 50	6	1	< 50	**5**[i]	3	**6**[i]	n/a	100 (pH>=6.5)
Dissolved Calcium	mg/L	81.6	72.6	55.2	112	92.1	85.2	93.9	82.2	74.6	31.3	30.1	97.9	103	n/a	n/a
Dissolved Iron	µg/L	190	< 10	280	< 10	40	**6,090**	210	60	< 10	< 10	< 10	**1,940**[i]	< 10	n/a	300
Dissolved Magnesium	mg/L	6.1	5.16	3.81	9.05	6.89	6.26	8.15	8.14	6.32	5.54	5.36	6.94	9.65	n/a	n/a
Dissolved Manganese	µg/L	2.6	11	30	91	510	1,290	430	160	242	88	233	550	117	n/a	n/a
Dissolved Potassium	mg/L	1.44	1.08	1	1.1	0.8	1.19	0.3	0.7	1.08	0.9	1.8	1.3	7.34	n/a	n/a
Dissolved Sodium	mg/L	0.99	1.83	0.66	2.7	2.1	1.35	1.2	1.22	2.29	35.9	36.3	0.95	3.18	n/a	n/a
Ammonia Nitrogen	µg/L	20	170	< 10	20	100	-	40	-	-	20	-	-	-	1,310 - 11.300	n/a
Nitrate	µg/L	150	100	< 50	430	< 10	< 50	300	< 50	250	< 10	< 50	< 50	1,220	400,000	2,900
Nitrite	µg/L	< 2	< 2	< 2	< 2	< 2	< 2	11	< 2	7	< 2	< 2	10	3	200 - 2,000	60
Nitrate+Nitrite	µg/L	150	100	< 50	430	< 10	< 50	310	< 50	260	< 10	< 50	< 50	1,220	400,000	n/a
Chloride	mg/L	< 0.2	< 0.2	< 0.2	0.73	1.1	0.55	1.3	2.28	2.02	6.07	4.95	0.99	5	1,500	n/a
Fluoride	µg/L	< 50	< 50	< 50	50	120	110	< 50	< 50	< 50	**1,720**	**1,040**[i]	< 50	< 50	3,000 (H>=50)	120
Sulphate	mg/L	29.5	4.58	3.12	9.97	17.4	20.1	7.42	6	7.45	75.4	46.1	11	18	1,000	n/a
Total Alkalinity (as CaCO3)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	n/a	n/a
Bicarbonate HCO3	mg/L	255	270	172	379	283	-	322	-	-	118	-	-	-	n/a	n/a
Carbonate CO3	mg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5	-	-	< 0.5	-	-	-	n/a	n/a
Hydroxide	mg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5	-	-	< 0.5	-	-	-	n/a	n/a
Dissolved Metals																
Antimony	µg/L	< 0.2	< 0.2	< 1	< 50	< 50	< 0.2	< 50	< 1	0.2	< 50	1.3	0.1	0.2	200	n/a
Arsenic	µg/L	< 0.2	< 0.2	< 1	< 30[a]	< 30[a]	3	< 30[a]	< 1	0.3	< 30[a]	2.8	1.8	0.3	50	5
Barium	µg/L	57	49	32	110	120	122	100	75	100	17	34	120	182	10,000	n/a
Beryllium	µg/L	< 0.2	< 0.2	< 1	< 3	< 3	< 0.2	< 3	< 1	< 0.1	< 3	< 0.1	< 0.1	< 0.1	53	n/a
Boron	µg/L	< 10	20	< 50	< 10	< 10	< 10	< 10	< 50	11	50	47	< 5	7	50,000	n/a
Cadmium	µg/L														0.3 (H 30-<90)	0.01 - 0.13[f]
												< 0.01			0.5 (H 90-<150)	
															0.6 (H 150-<210)	
		< 0.04		< 0.2[a]	< 10[a]	< 10[a]	0.05	< 10[a]	< 0.2[a]	**0.26**[i]	< 10[a]		0.02	0.03	0.6 (H>=210)	
Chromium	µg/L	< 0.2	0.2	< 1	< 10[a]	< 10[a]	< 0.2	< 10[a]	< 1	< 0.2	< 10[a]	**1.1**[i]	< 0.2	< 0.2	10[c]	1[c]
Cobalt	µg/L	< 0.2	< 0.2	< 1	< 20	< 20	3.8	< 20	2	0.8	< 20	1.4	2.3	0.7	40	n/a
Copper	µg/L														20 (H<50)	2 (H<120)
															30 (H 50-<75)	3 (H 120-<180)
												< 0.1			40 (H 75-<100)	4 (H>=180)
				1							< 20[a]				50 (H 100-<125)	
															70 (H 150-<175)	
		1.1	2												80 (H 175-<200)	
					< 20[a]	< 20[a]	0.5	< 20[a]	< 1	0.7			0.3	0.9	90 (H>=200)	
Lead	µg/L														40 (H<50)	1 (H<60)
												< 0.05			50 (H 50-<100)	2 (H 60-<120)
				< 1							< 30[a]				60 (H 100-<200)	4 (H 120-<180)
		< 0.2	< 0.2			< 30[a]	< 0.2	< 30[a]	< 1	< 0.05			< 0.05	< 0.05	110 (H 200-<300)	7 (H>=180)
					< 30[a]										160 (H>=300)	
Lithium	µg/L	17	0.2	< 1	-	-	0.6	-	< 1	0.5	-	4.7	0.4	1.9	n/a	n/a
Mercury	µg/L	< 0.02	< 0.02	< 0.02	-	-	< 0.02	-	< 0.02	< 0.02	-	< 0.02	< 0.02	< 0.02	1	0.026
Molybdenum	µg/L	0.9	0.7	< 0.5	< 20	< 20	4.5	< 20	< 0.5	0.4	< 20	13	1.1	1.1	10,000	73
Nickel	µg/L														250 (H<60)	25 (H<60)
												26			650 (H 60-<120)	65 (H 60-<120)
				< 1							< 20				1,100 (H 120-<180)	110 (H 120-<180)
		1.2	0.6		< 20	< 20	2.4	< 20	3	2.8			2.6	4.4	1,500 (H>=180)	150 (H>=180)
Selenium	µg/L	0.4	0.4	< 1	-	-	< 0.2	-	< 1	< 0.2	-	0.4	0.3	0.4	10	1
Silver	µg/L											< 0.04			0.5 (H<=100)	0.1
		< 0.05	< 0.05	< 0.25[a]	< 10[a]	< 10[a]	< 0.05	< 10[a]	< 0.25[a]	< 0.04	< 10[a]		< 0.04	< 0.04	15 (H>100)	
Thallium	µg/L	< 0.02	< 0.02	< 0.1	-	-	< 0.02	-	< 0.1	0.04	-	< 0.02	< 0.02	0.05	3	0.8
Titanium	µg/L	0.3	0.2	< 1	< 5	< 5	< 0.2	< 5	< 1	0.2	< 5	0.9	0.4	0.7	1,000	n/a
Uranium	µg/L	0.9	0.3	< 0.5	-	-	1	-	< 0.5	0.33	-	1.1	1	1.5	3,000	n/a
Vanadium	µg/L	< 0.2	0.3	< 1	< 10	< 10	0.7	< 10	< 1	0.3	< 10	1.3	0.2	0.3	n/a	n/a
Zinc	µg/L														75 (H<=90)	
				< 5							12	**43**[i]			150 (H 90-<100)	30
		2	3			10	< 1	11	< 5						900 (H 100-<200)	
					9					3			< 1	< 1	1,650 (H 200-<300)	
															2,400 (H 300->400)[e]	

Associated CanTest files: 40916043, 51020086, 60711045, 70720118, 71002069, 80920016, 80927170, 90619137, 90623066, 90623067, 90623069, 90623071, 91002010, 91006083, 91006094, 91029091, 100714077, 100718016, 100831012, 100928032, 100929013.

All terms defined within the body of Morrow's report.

< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard.
* RPDs are not normally calculated where one of more concentrations are less than five times MDL.
BOLDED sample denotes most recent sampling event

BOLD	Concentration greater than CSR Aquatic Life (AW) standard.
SHADED ▨	Concentration greater than or equal to CCME CEQG Aquatic Life (AW) guideline.

[a] Laboratory detection limit exceeds regulatory standard.
[b] Standard/Guideline to protect freshwater aquatic life.
[c] Individual standards exist for Cr +3 and Cr +6. Reported value represents more stringent standard.
[d] There is no Cadmium standard specified for H >= 210; therefore, the standard for H=150-<210 is applied as a conservative comparison.
[e] There is no Zinc standard specified for H >= 400; therefore, the standard for H=300-<400 is applied as a conservative comparison.
f Criterion for cadmium (mg/L) is determined using the following formula: 10^(0.86[log(hardness)]-3.2)/1000.
[g] Guidelines for total metals. Please refer to report for explanation of applicability to dissolved metals.
h Sample analyzed for Total Metals.
i Concentration less than 10 times the CEQG guidelines - see report text for complete discussion
[j] Only CSR Aquatic Life (AW) standards apply to Provincial Lands.

TABLE 6 (Cont'd): Summary of Analytical Results for Groundwater - Inorganics

		Provincial Lands[j]																
Monitoring Well ID		01-20		01-21			01-21 (cont'd)				01-23	03-01		03-06		03-07	**BC Standards**	**Federal Guidelines**
Sample ID		MW01-20-041018	**MW01-20-090924**	MW01-21-041018	MW01-21-050707	MW01-21-060717	MW01-21-061001	MW01-21-070925	MW01-21-080618	MW01-21-081002	MW01-23-041018	MW03-01 030909	MW03-1-090713	MW03-06 030909	MW03-6-070917	MW03-7-041018	**CSR Aquatic Life[b,j] (AW)**	**CCME CEQG Aquatic Life[b,g] (AW)**
Sample Date (yyyy mm dd)		2004 10 18	**2009 09 24**	2004 10 18	2005 07 07	2006 07 17	2006 10 01	2007 09 25	2008 06 18	2008 10 02	2004 10 18	2003 09 09[h]	2009 07 13	2003 09 09	2007 09 17	2004 10 18		
Parameter	**Units**	**Analytical Results**																
Physical Parameters																		
Hardness	mg/L	308	35.3	296	226	268	332	271	270	253	290	254	236	324	275	424	n/a	n/a
pH (field)	pH	7.58	7.32	-	6.73	7.07	7.05	7.29	7.2	7.26	7.54	-	7.55	-	7.13	7.3	n/a	6.5 - 8.0
Ion Balance %	%	-	-	-	2	-	-2.7	-	-	-	-	-		-	-	-	n/a	n/a
Dissolved Inorganics																		
Dissolved Aluminum	µg/L	< 5	2	< 5	< 5	< 5	8	14	< 1	< 1	< 5	-	6	-	< 5	< 5	n/a	100 (pH>=6.5)
Dissolved Calcium	mg/L	113	12.5	107	81	95.9	120	98.4	98.2	90.7	105	-	84.6	-	99.5	156	n/a	n/a
Dissolved Iron	µg/L	< 50	< 10	7,040	8,000	210	300	< 10	600	430	< 50	30	< 50	< 10	< 50	< 50	n/a	300
Dissolved Magnesium	mg/L	5.89	0.98	7.31	5.77	6.74	8.1	5.98	6.07	6.4	6.8	-	5.92	-	6.26	8.43	n/a	n/a
Dissolved Manganese	µg/L	< 1	< 0.1	1,310	870	940	825	1,000	431	1,550	1,340	-	1	-	3	38	n/a	n/a
Dissolved Potassium	mg/L	1.5	0.15	2	1.3	1.4	1.99	1.66	1.4	1.82	2	-	1.5	-	1	1.8	n/a	n/a
Dissolved Sodium	mg/L	6.84	1.82	2.07	1.59	1.67	2.4	2.08	2.26	1.86	1.7	-	2.16	-	1.36	2.15	n/a	n/a
Ammonia Nitrogen	µg/L	20	-	110	50	60	60	60	20	60	10	-	-	-	< 10	< 10	1,310 - 11.300	n/a
Nitrate	µg/L	190	190	< 50	< 50	< 100	30	< 10	10	50	< 50	80	60	140	130	190	400,000	2,900
Nitrite	µg/L	< 2	< 2	< 2	< 2	< 2	3	< 2	4	2	< 2	5	< 2	4	< 2	< 2	200 - 2,000	60
Nitrate+Nitrite	µg/L	190	190	< 50	< 50	< 100	30	< 10	10	50	< 50	90	60	140	130	190	400,000	n/a
Chloride	mg/L	6.3	12.5	2.6	1.6	1.51	1.89	1.73	3.38	2.71	1.9	1.5	1.5	0.9	0.39	3.2	1,500	n/a
Fluoride	µg/L	< 50	< 50	< 50	< 50	< 100	< 100	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	3,000 (H>=50)	120
Sulphate	mg/L	4.6	5.15	4.5	1.4	41	139	54.1	35.7	25.2	5.6	4.1	10.6	7.5	5.49	8.5	1,000	n/a
Total Alkalinity (as CaCO3)	mg/L	319	-	300	-	-	-	-	-	-	291	-	-	-	-	132	n/a	n/a
Bicarbonate HCO3	mg/L	389	-	366	294	301	262	300	-	281	355	-	-	-	384	161	n/a	n/a
Carbonate CO3	mg/L	< 0.5	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5	< 0.5	-	-	-	< 0.5	< 0.5	n/a	n/a
Hydroxide	mg/L	< 0.5	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5	< 0.5	-	-	-	< 0.5	< 0.5	n/a	n/a
Dissolved Metals																		
Antimony	µg/L	< 1	< 0.1	< 1	< 1	< 1	0.3	< 0.2	< 0.2	< 0.2	< 1	< 0.2	< 1	< 0.2	< 1	< 1	200	n/a
Arsenic	µg/L	< 1	< 0.2	2	2	< 1	0.4	0.3	0.2	0.3	< 1	0.2	< 1	< 0.2	< 1	< 1	50	5
Barium	µg/L	85	7.7	240	150	200	233	100	98	132	180	121	81	129	91	250	10,000	n/a
Beryllium	µg/L	< 1	< 0.1	< 1	< 1	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 1	< 0.2	< 1	< 0.2	< 1	< 1	53	n/a
Boron	µg/L	< 50	< 5	< 50	< 50	< 50	< 10	< 10	< 10	30	< 50	< 10	< 50	< 10	< 50	< 50	50,000	n/a
Cadmium	µg/L		< 0.01														0.3 (H 30-<90)	0.01 - 0.13[f]
																	0.5 (H 90-<150)	
																	0.6 (H 150-<210)	
		< 0.2		< 0.2	< 0.2	< 0.2	0.23	0.26	0.08	0.2	< 0.2		< 0.2		< 0.2	< 0.2	0.6 (H>=210)	
Chromium	µg/L	< 1	< 0.2	< 1	< 1	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 1	< 0.2	< 1	< 0.2	< 1	< 1	10[c]	1[c]
Cobalt	µg/L	< 1	< 0.1	2	1	1	0.7	0.5	0.5	1.2	3	5.1	< 1	0.8	< 1	< 1	40	n/a
Copper	µg/L		< 0.1														20 (H<50)	2 (H<120)
																	30 (H 50-<75)	3 (H 120-<180)
																	40 (H 75-<100)	4 (H>=180)
																	50 (H 100-<125)	
												0.7		0.3			70 (H 150-<175)	
		< 1		2	< 1	2	1.8	1.2	1.2		< 1				< 1	< 1	80 (H 175-<200)	
										1.3			< 1				90 (H>=200)	
Lead	µg/L		< 0.05														40 (H<50)	1 (H<60)
																	50 (H 50-<100)	2 (H 60-<120)
												< 0.2					60 (H 100-<200)	4 (H 120-<180)
				< 1	< 1	< 1		< 0.2	< 0.2	< 0.2	< 1		< 1	< 0.2	< 1		110 (H 200-<300)	7 (H>=180)
		< 1					0.4									< 1	160 (H>=300)	
Lithium	µg/L	< 1	< 0.1	< 1	< 1	2	27	0.6	1.1	0.7	1	1.1	1	0.9	< 1	< 1	n/a	n/a
Mercury	µg/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	1	0.026
Molybdenum	µg/L	< 0.5	< 0.1	1	1	0.9	1.1	1	0.6	1.2	1.1	1.5	< 0.5	0.4	< 0.5	< 0.5	10,000	73
Nickel	µg/L		< 0.2														250 (H<60)	25 (H<60)
																	650 (H 60-<120)	65 (H 60-<120)
																	1,100 (H 120-<180)	110 (H 120-<180)
		< 1		3	1	2	1.8	1.3	3.3	1.2	9	6.8	< 1	1.7	< 1	2	1,500 (H>=180)	150 (H>=180)
Selenium	µg/L	< 1	< 0.2	< 1	< 1	< 1	0.8	0.6	0.6	0.5	< 1	< 0.2	< 1	< 0.2	< 1	< 1	10	1
Silver	µg/L		< 0.04														0.5 (H<=100)	0.1
		< 0.25		< 0.25	< 0.25	< 0.25	< 0.05	< 0.05	< 0.05	< 0.05	< 0.25	< 0.02	< 0.25	< 0.02	< 0.25	< 0.25	15 (H>100)	
Thallium	µg/L	< 0.1	< 0.02	< 0.1	< 0.1	< 0.1	0.03	0.04	0.03	0.04	< 0.1	< 0.02	< 0.1	< 0.02	< 0.1	< 0.1	3	0.8
Titanium	µg/L	< 1	< 0.2	< 1	< 1	< 1	0.4	< 0.2	0.6	< 0.2	< 1	0.8	< 1	0.9	< 1	< 1	1,000	n/a
Uranium	µg/L	< 0.5	< 0.05	< 0.5	< 0.5	0.6	0.9	0.3	0.4	0.5	< 0.5	0.2	< 0.5	0.3	< 0.5	< 0.5	3,000	n/a
Vanadium	µg/L	< 1	< 0.1	< 1	< 1	< 1	< 0.2	0.3	< 0.2	< 0.2	< 1	0.3	< 1	0.3	< 1	< 1	n/a	n/a
Zinc	µg/L		< 1														75 (H<=90)	
																	150 (H 90-<100)	30
				< 5	< 5	< 5		1	1	6	< 5	2	< 5		< 5		900 (H 100-<200)	
														2		< 5	1,650 (H 200-<300)	
		< 5					7										2,400 (H 300->400)[e]	

Associated CanTest files: 40916043, 51020086, 60711045, 70720118, 71002069, 80920016, 80927170, 90619137, 90623066, 90623067, 90623069, 90623071, 91002010, 91006083, 91006094, 91029091, 100714077, 100718016, 100831012, 100928032, 100929013.

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BOLDED sample denotes most recent sampling event

BOLD	Concentration greater than CSR Aquatic Life (AW) standard.
SHADED	Concentration greater than or equal to CCME CEQG Aquatic Life (AW) guideline.

[a] Laboratory detection limit exceeds regulatory standard.
[b] Standard/Guideline to protect freshwater aquatic life.
[c] Individual standards exist for Cr +3 and Cr +6. Reported value represents more stringent standard.
[d] There is no Cadmium standard specified for H >= 210; therefore, the standard for H=150-<210 is applied as a conservative comparison.
[e] There is no Zinc standard specified for H >= 400; therefore, the standard for H=300-<400 is applied as a conservative comparison.
f Criterion for cadmium (mg/L) is determined using the following formula: 10^(0.86[log(hardness)]-3.2)/1000.
[g] Guidelines for total metals. Please refer to report for explanation of applicability to dissolved metals.
h Sample analyzed for Total Metals.
i Concentration less than 10 times the CEQG guidelines - see report text for complete discussion
[j] Only CSR Aquatic Life (AW) standards apply to Provincial Lands.

TABLE 6 (Cont'd): Summary of Analytical Results for Groundwater - Inorganics

		Provincial Lands (Cont'd)																		
Monitoring Well ID		03-07 (Cont'd)			03-08										03-09				**BC Standards**	**Federal Guidelines**
Sample ID		MW03-7-060716	MW03-7-090711	**MW03-7-090924**	MW03-08 030909	MW03-8-041018	MW03-8-050706	MW03-8-060716	MW06-A-060716	**QA/QC RPD %**	MW03-8-060930	MW03-8-070917	MW03-8-080617	MW03-8-080929	MW03-09 030909	MW03-9-041018	MW03-9-050706	MW03-9-060716	**CSR Aquatic Life[b,j] (AW)**	**CCME CEQG Aquatic Life[b,g] (AW)**
Sample Date (yyyy mm dd)		2006 07 16	2009 07 11	**2009 09 24**	2003 09 09[h]	2004 10 18	2005 07 06	2006 07 16	2006 07 16		2006 09 30	2007 09 17	2008 06 17	2008 09 29	2003 09 09[h]	2004 10 18	2005 07 06	2006 07 16		
Parameter	**Units**	**Analytical Results**																		
Physical Parameters																				
Hardness	mg/L	425	312	50.4	268	350	202	240	240	0	378	256	209	272	260	381	230	245	n/a	n/a
pH (field)	pH	7.35	7.86	7.26	-	7.28	7.28	7.61	7.61	0	7.19	7.4	7.29	-	-	7.49	7.22	7.65	n/a	6.5 - 8.0
Ion Balance %	%	-		-	-	-	1.1	-	-	-	-6	-	-	-	-	-	0	-	n/a	n/a
Dissolved Inorganics																				
Dissolved Aluminum	µg/L	25	< 1	< 1	-	< 5	< 5	< 5	< 5	*	< 1	< 5	< 1	< 1	-	< 5	< 5	< 5	n/a	100 (pH>=6.5)
Dissolved Calcium	mg/L	155	113	18	-	126	72.2	86.9	86.6	< 1	137	91.3	77.9	96.2	-	139	83	88.3	n/a	n/a
Dissolved Iron	µg/L	< 50	< 10	< 10	2,240	12,900	8,090	2,090	2,060	1	1,190	160	260	1,130	5,770	7,940	3,180	< 50	n/a	300
Dissolved Magnesium	mg/L	9.24	7.01	1.33	-	8.33	5.19	5.64	5.64	0	8.7	6.71	5.44	7.64	-	8.37	5.54	5.89	n/a	n/a
Dissolved Manganese	µg/L	2	0.2	0.1	-	1,210	790	660	660	0	623	690	294	504	-	1,020	650	220	n/a	n/a
Dissolved Potassium	mg/L	1.2	0.98	0.18	-	1.8	1.2	1.4	1.3	7	2.57	1.8	1.93	2.04	-	1.9	1.2	1.3	n/a	n/a
Dissolved Sodium	mg/L	2.43	1.75	0.47	-	1.66	1.29	1.57	1.6	2	2.16	1.99	1.83	1.73	-	1.6	1.26	1.72	n/a	n/a
Ammonia Nitrogen	µg/L	< 10	-	-	-	90	90	100	120		50	50	< 10	40	-	80	100	20	1,310 - 11.300	n/a
Nitrate	µg/L	420	450	250	< 50	< 50	< 50	< 100	< 100	*	< 10	< 10	50	< 10	< 50	< 50	< 50	< 100	400,000	2,900
Nitrite	µg/L	< 2	< 2	< 2	< 2	5	< 2	2	2	*	< 2	< 2	2	< 2	7	4	< 2	< 2	200 - 2,000	60
Nitrate+Nitrite	µg/L	420	450	250	< 50	< 50	< 50	< 100	< 100	*	< 10	< 10	50	< 10	< 50	< 50	< 50	< 100	400,000	n/a
Chloride	mg/L	3.7	6.14	3.68	1.6	2.7	0.78	0.69	0.95	*	1.17	1.71	1.1	2.28	1.7	3.2	0.58	1.21	1,500	n/a
Fluoride	µg/L	< 100	< 50	< 50	< 50	< 50	< 50	< 100	< 100	*	< 100	< 50	< 50	< 50	< 50	< 50	< 50	< 100	3,000 (H>=50)	120
Sulphate	mg/L	12.2	16	12.1	1.4	1.3	< 0.5	95.6	85.6	11	256	76.7	17.6	30	3	2.4	0.96	25.5	1,000	n/a
Total Alkalinity (as CaCO3)	mg/L	-	-	-	-	284	-	-	-	-	-	-	181		-	386	-	-	n/a	n/a
Bicarbonate HCO3	mg/L	533	-	-	-	346	271	230	232	< 1	210	250	220	274	-	471	295	286	n/a	n/a
Carbonate CO3	mg/L	< 0.5	-	-	-	< 0.5	< 0.5	< 0.5	< 0.5	*	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5	< 0.5	< 0.5	n/a	n/a
Hydroxide	mg/L	< 0.5	-	-	-	< 0.5	< 0.5	< 0.5	< 0.5	*	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5	< 0.5	< 0.5	n/a	n/a
Dissolved Metals																				
Antimony	µg/L	< 1	< 0.2	< 0.1	0.2	< 1	< 1	< 1	< 1	*	0.6	< 1	< 0.2	0.4	< 0.2	< 1	< 1	< 1	200	n/a
Arsenic	µg/L	< 1	< 0.2	< 0.2	2.6	3	3	2	2	*	1.8	1	0.8	2.3	3.4	2	< 1	< 1	50	5
Barium	µg/L	220	124	21	160	300	150	200	200	0	276	180	95	166	169	210	97	88	10,000	n/a
Beryllium	µg/L	< 1	< 0.2	< 0.1	< 0.2	< 1	< 1	< 1	< 1	*	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 1	< 1	< 1	53	n/a
Boron	µg/L	< 50	< 10	10	< 10	< 50	< 50	< 50	< 50	*	< 10	< 50	< 10	< 10	< 10	< 50	< 50	< 50	50,000	n/a
Cadmium	µg/L			< 0.01															0.3 (H 30-<90)	0.01 - 0.13[f]
																			0.5 (H 90-<150)	
																			0.6 (H 150-<210)	
		< 0.2	< 0.04			< 0.2		< 0.2	< 0.2	*	0.05	< 0.2	0.05	< 0.04		< 0.2	< 0.2	< 0.2	0.6 (H>=210)	
Chromium	µg/L	< 1	0.4	< 0.2	0.3	< 1	< 1	< 1	< 1	*	< 0.2	< 1	< 0.2	< 0.2	0.3	< 1	< 1	< 1	10[c]	1[c]
Cobalt	µg/L	< 1	< 0.2	< 0.1	23	1	< 1	1	1	*	1.1	< 1	0.5	0.8	7.6	6	2	< 1	40	n/a
Copper	µg/L																		20 (H<50)	2 (H<120)
				< 0.1															30 (H 50-<75)	3 (H 120-<180)
																			40 (H 75-<100)	4 (H>=180)
																			50 (H 100-<125)	
					< 0.2										< 0.2				70 (H 150-<175)	
		15				< 1	< 1	< 1	3	*	0.9	< 1	0.9			< 1	< 1	< 1	80 (H 175-<200)	
			0.7											0.6					90 (H>=200)	
Lead	µg/L																		40 (H<50)	1 (H<60)
				< 0.05															50 (H 50-<100)	2 (H 60-<120)
					< 0.2										< 0.2				60 (H 100-<200)	4 (H 120-<180)
							< 1	< 1	< 1	*		< 1	< 0.2	< 0.2			< 1	< 1	110 (H 200-<300)	7 (H>=180)
		7	< 0.2			< 1					< 0.2					< 1			160 (H>=300)	
Lithium	µg/L	2	0.5	< 0.1	1.1	< 1	< 1	2	2	*	14	< 1	0.5	0.8	0.9	< 1	< 1	2	n/a	n/a
Mercury	µg/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	1	0.026
Molybdenum	µg/L	< 0.5	< 0.1	< 0.1	5.1	1	0.9	2	2.1	*	2.5	1.8	1.8	2.1	3.9	0.7	< 0.5	< 0.5	10,000	73
Nickel	µg/L			< 0.2															250 (H<60)	25 (H<60)
																			650 (H 60-<120)	65 (H 60-<120)
																			1,100 (H 120-<180)	110 (H 120-<180)
		< 1	0.2		12	2	1	2	2	*	2.9	1	1	1.8	6.9	3	1	2	1,500 (H>=180)	150 (H>=180)
Selenium	µg/L	< 1	< 0.2	< 0.2	< 0.2	< 1	< 1	< 1	< 1	*	1.5	< 1	0.6	< 0.2	< 0.2	< 1	< 1	< 1	10	1
Silver	µg/L			< 0.04															0.5 (H<=100)	0.1
		< 0.25	< 0.05		< 0.02	< 0.25	< 0.25	< 0.25	< 0.25	*	< 0.05	< 0.25	< 0.05	< 0.05	< 0.02	< 0.25	< 0.25	< 0.25	15 (H>100)	
Thallium	µg/L	< 0.1	< 0.02	< 0.02	< 0.02	< 0.1	< 0.1	< 0.1	< 0.1	*	< 0.02	< 0.1	0.06	< 0.02	< 0.02	< 0.1	< 0.1	< 0.1	3	0.8
Titanium	µg/L	< 1	< 0.2	< 0.2	0.9	< 1	< 1	< 1	< 1	*	0.3	< 1	< 0.2	< 0.2	0.9	< 1	< 1	< 1	1,000	n/a
Uranium	µg/L	< 0.5	0.3	0.05	0.7	< 0.5	< 0.5	0.9	0.9	*	2.6	2.9	1	3.2	0.6	< 0.5	< 0.5	0.5	3,000	n/a
Vanadium	µg/L	< 1	0.7	< 0.1	< 0.2	< 1	< 1	< 1	< 1	*	< 0.2	< 1	< 0.2	0.3	< 0.2	< 1	< 1	< 1	n/a	n/a
Zinc	µg/L			< 1															75 (H<=90)	
																			150 (H 90-<100)	30
					2		< 5	< 5	< 5	*		< 5	< 1	< 1	2		< 5	< 5	900 (H 100-<200)	
		170	< 1																1,650 (H 200-<300)	
						< 5					4					< 5			2,400 (H 300->400)[e]	

Associated CanTest files: 40916043, 51020086, 60711045, 70720118, 71002069, 80920016, 80927170, 90619137, 90623066, 90623067, 90623069, 90623071, 91002010, 91006083, 91006094, 91029091, 100714077, 100718016, 100831012, 100928032, 100929013.

All terms defined within the body of Morrow's report.

< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard.
* RPDs are not normally calculated where one of more concentrations are less than five times MDL.
BOLDED sample denotes most recent sampling event

BOLD	Concentration greater than CSR Aquatic Life (AW) standard.
SHADED	Concentration greater than or equal to CCME CEQG Aquatic Life (AW) guideline.

[a] Laboratory detection limit exceeds regulatory standard.
[b] Standard/Guideline to protect freshwater aquatic life.
[c] Individual standards exist for Cr +3 and Cr +6. Reported value represents more stringent standard.
[d] There is no Cadmium standard specified for H >= 210; therefore, the standard for H=150-<210 is applied as a conservative comparison.
[e] There is no Zinc standard specified for H >= 400; therefore, the standard for H=300-<400 is applied as a conservative comparison.
f Criterion for cadmium (mg/L) is determined using the following formula: 10^(0.86[log{hardness}]-3.2)/1000.
[g] Guidelines for total metals. Please refer to report for explanation of applicability to dissolved metals.
h Sample analyzed for Total Metals.
i Concentration less than 10 times the CEQG guidelines - see report text for complete discussion
[j] Only CSR Aquatic Life (AW) standards apply to Provincial Lands.

TABLE 6 (Cont'd): Summary of Analytical Results for Groundwater - Inorganics

		Provincial Lands (Cont'd)																	
Monitoring Well ID		03-09 (Cont'd)				03-10				03-11		04-1	04-2					**BC Standards**	**Federal Guidelines**
Sample ID		MW03-9-060930	MW03-9-080617	MW03-9-090711	**MW03-9-090924**	MW03-10 030909	MW03-10-070917	MW03-10-080929	MW03-10-090828	MW03-11-041018	MW03-11-081003	**MW04-1-090924**	MW04-2-050707	MW04-2-060717	MW04-2-061001	MW04-2-070925	MW04-2-080618	**CSR**	**CCME CEQG**
Sample Date (yyyy mm dd)		2006 09 30	2008 06 17	2009 07 11	**2009 09 24**	2003 09 09[h]	2007 09 17	2008 09 29	2009 08 28	2004 10 18	2008 10 03	**2009 09 24**	2005 07 07	2006 07 17	2006 10 01	2007 09 25	2008 06 18	**Aquatic Life[b,j] (AW)**	**Aquatic Life[b,g] (AW)**
Parameter	**Units**	**Analytical Results**																	
Physical Parameters																			
Hardness	mg/L	283	194	248	55.8	427	206	270	302	380	301	36.2	225	254	229	226	202	n/a	n/a
pH (field)	pH	7.36	7.36	7.3	6.93	-	7.17	-	7.11	6.85	7.3	7.45	7.15	7	7.36	7.27	7.31	n/a	6.5 - 8.0
Ion Balance %	%	-4.5	-		-	-	-	-	-	-	-	-	-4.2	-	-5.5	-	-	n/a	n/a
Dissolved Inorganics																			
Dissolved Aluminum	µg/L	< 1	< 1	1	2	-	< 5	< 1	7	< 5	**60**	< 1	< 5	< 5	< 1	3	1	n/a	100 (pH>=6.5)
Dissolved Calcium	mg/L	102	72	88.2	19.3	-	73.9	96.9	109	139	110	12.4	80.8	91.1	82.3	81.1	72.5	n/a	n/a
Dissolved Iron	µg/L	250	< 10	< 10	100	11,800	< 50	610	6,000	17,300	490	< 10	6,630	2,720	690	1,210	1,510	n/a	300
Dissolved Magnesium	mg/L	7	4.8	6.74	1.83	-	5.04	6.74	7.01	7.99	6.4	1.28	5.5	6.3	5.6	5.56	5.03	n/a	n/a
Dissolved Manganese	µg/L	177	< 0.2	362	179	-	710	1,290	1,370	1,030	1,170	0.4	600	600	355	233	381	n/a	n/a
Dissolved Potassium	mg/L	2.02	0.94	1.26	0.3	-	1.6	1.52	2.2	1.9	1.2	0.24	1.3	1.3	1.62	1.47	1.38	n/a	n/a
Dissolved Sodium	mg/L	2.54	1.34	1.31	0.46	-	1.43	0.97	1.21	2.16	3.5	0.69	1.46	1.98	2.11	2.04	1.63	n/a	n/a
Ammonia Nitrogen	µg/L	20	20	-	-	-	280	80	-	230	70	-	110	30	40	30	20	1,310 - 11.300	n/a
Nitrate	µg/L	< 10	150	< 50	230	< 50	< 10	40	< 50	< 50	20	460	< 50	< 100	< 10	20	10	400,000	2,900
Nitrite	µg/L	< 2	< 2	< 2	< 2	5	< 2	3	-	5	< 2	< 2	4	< 2	< 2	< 2	< 2	200 - 2,000	60
Nitrate+Nitrite	µg/L	< 10	150	< 50	230	< 50	< 10	40	-	< 50	20	460	< 50	< 100	< 10	20	10	400,000	n/a
Chloride	mg/L	< 0.2	1.04	1.26	5.18	6	0.56	3.61	1.55	3.3	24.9	7.17	0.9	1.89	2.82	2.07	1.4	1,500	n/a
Fluoride	µg/L	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 100	< 50	< 50	< 50	3,000 (H>=50)	120
Sulphate	mg/L	86.4	10.7	8.05	13.1	2.9	37.3	23.5	19.9	3.7	30.3	4.56	2.2	15.9	54.3	27.3	11	1,000	n/a
Total Alkalinity (as CaCO3)	mg/L	-	170	-	-	-	-	-	-	380	-	-	-	-	-	-	-	n/a	n/a
Bicarbonate HCO3	mg/L	281	208	-	-	-	232	273	-	464	287	-	300	284	250	275	-	n/a	n/a
Carbonate CO3	mg/L	< 0.5	< 0.5	-	-	-	< 0.5	< 0.5	-	< 0.5	< 0.5	-	< 0.5	< 0.5	< 0.5	< 0.5	-	n/a	n/a
Hydroxide	mg/L	< 0.5	< 0.5	-	-	-	< 0.5	< 0.5	-	< 0.5	< 0.5	-	< 0.5	< 0.5	< 0.5	< 0.5	-	n/a	n/a
Dissolved Metals																			
Antimony	µg/L	< 0.2	< 0.2	< 0.2	< 0.1	< 0.2	2	< 0.2	< 1	< 1	< 50	< 0.1	< 1	< 1	< 0.2	< 0.2	< 0.2	200	n/a
Arsenic	µg/L	0.3	< 0.2	< 0.2	< 0.2	4.2	3	1.8	6	5	< 30	< 0.2	3	1	0.6	1.2	1.2	50	5
Barium	µg/L	150	49	76	24	232	110	138	250	270	150	12	140	150	151	132	104	10,000	n/a
Beryllium	µg/L	< 0.2	< 0.2	< 0.2	< 0.1	< 0.2	< 1	< 0.2	< 1	< 1	< 3	< 0.1	< 1	< 1	< 0.2	< 0.2	< 0.2	53	n/a
Boron	µg/L	< 10	< 10	< 10	15	< 10	< 50	< 10	< 50	< 50	< 10	8	< 50	< 50	< 10	< 10	< 10	50,000	n/a
Cadmium	µg/L				0.03							< 0.01						0.3 (H 30-<90)	0.01 - 0.13[f]
																		0.5 (H 90-<150)	
																		0.6 (H 150-<210)	
		0.11	< 0.04	0.19				< 0.04	< 0.2	< 0.2	< 10[a]		< 0.2	< 0.2	0.05	< 0.04	< 0.04	0.6 (H>=210)	
Chromium	µg/L	< 0.2	< 0.2	0.3	< 0.2	0.9	< 1	< 0.2	< 1	< 1	< 10	< 0.2	< 1	< 1	< 0.2	0.2	< 0.2	10[c]	1[c]
Cobalt	µg/L	0.8	< 0.2	0.8	0.5	20	6	1.9	3	6	< 20	< 0.1	< 1	1	0.8	0.3	0.5	40	n/a
Copper	µg/L											< 0.1						20 (H<50)	2 (H<120)
					0.1													30 (H 50-<75)	3 (H 120-<180)
																		40 (H 75-<100)	4 (H>=180)
																		50 (H 100-<125)	
			0.6			< 0.2												70 (H 150-<175)	
		1.1					2			< 1			< 1	< 1	0.6	0.3	0.3	80 (H 175-<200)	
				0.7				0.7	< 1		< 20							90 (H>=200)	
Lead	µg/L											< 0.05						40 (H<50)	1 (H<60)
					< 0.05													50 (H 50-<100)	2 (H 60-<120)
			< 0.2															60 (H 100-<200)	4 (H 120-<180)
		< 0.2		< 0.2		< 0.2	< 1	< 0.2					< 1	< 1	< 0.2	< 0.2	< 0.2	110 (H 200-<300)	7 (H>=180)
									< 1	< 1	< 30							160 (H>=300)	
Lithium	µg/L	44	0.3	0.5	0.2	1	< 1	0.4	< 1	< 1	-	< 0.1	< 1	2	18	0.5	0.9	n/a	n/a
Mercury	µg/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	-	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	1	0.026
Molybdenum	µg/L	0.6	0.3	0.4	0.1	1.4	22	1.1	2.7	1.2	< 20	< 0.1	0.9	0.8	0.8	1.3	1.4	10,000	73
Nickel	µg/L				< 0.2							< 0.2						250 (H<60)	25 (H<60)
																		650 (H 60-<120)	65 (H 60-<120)
																		1,100 (H 120-<180)	110 (H 120-<180)
		2.3	0.2	1		13	41	3.4	15	7	< 20		1	< 1	0.7	0.4	0.4	1,500 (H>=180)	150 (H>=180)
Selenium	µg/L	0.6	< 0.2	< 0.2	< 0.2	< 0.2	< 1	0.5	< 1	< 1	-	< 0.2	< 1	< 1	< 0.2	< 0.2	0.5	10	1
Silver	µg/L				< 0.04							< 0.04						0.5 (H<=100)	0.1
		< 0.05	< 0.05	< 0.05		< 0.02	< 0.25	< 0.05	< 0.25	< 0.25	< 10		< 0.25	< 0.25	< 0.05	< 0.05	< 0.05	15 (H>100)	
Thallium	µg/L	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.1	< 0.02	< 0.1	< 0.1	-	< 0.02	< 0.1	< 0.1	< 0.02	< 0.02	< 0.02	3	0.8
Titanium	µg/L	0.4	< 0.2	< 0.2	< 0.2	1.3	< 1	< 0.2	< 1	< 1	< 5	< 0.2	< 1	< 1	0.2	< 0.2	0.5	1,000	n/a
Uranium	µg/L	1.1	0.3	0.3	0.09	0.7	27	1.2	6.9	0.5	-	0.07	< 0.5	< 0.5	0.4	0.3	0.4	3,000	n/a
Vanadium	µg/L	< 0.2	< 0.2	0.6	< 0.1	< 0.2	< 1	< 0.2	< 1	< 1	< 10	< 0.1	< 1	< 1	< 0.2	0.2	< 0.2	n/a	n/a
Zinc	µg/L				< 1							< 1						75 (H<=90)	
			< 1															150 (H 90-<100)	30
		5		< 1			< 5	< 1					< 5	< 5	4	2	< 1	900 (H 100-<200)	
									< 5		10							1,650 (H 200-<300)	
						3				< 5								2,400 (H 300->400)[e]	

Associated CanTest files: 40916043, 51020086, 60711045, 70720118, 71002069, 80920016, 80927170, 90619137, 90623066, 90623067, 90623069, 90623071, 91002010, 91006083, 91006094, 91029091, 100714077, 100718016, 100831012, 100928032, 100929013.

All terms defined within the body of Morrow's report.

<   Denotes concentration less than indicated detection limit or RPD less than indicated value.
-    Denotes analysis not conducted.
n/a Denotes no applicable standard.
*   RPDs are not normally calculated where one of more concentrations are less than five times MDL.
BOLDED sample denotes most recent sampling event

BOLD	Concentration greater than CSR Aquatic Life (AW) standard.
SHADED	Concentration greater than or equal to CCME CEQG Aquatic Life (AW) guideline.

[a] Laboratory detection limit exceeds regulatory standard.
[b] Standard/Guideline to protect freshwater aquatic life.
[c] Individual standards exist for Cr +3 and Cr +6. Reported value represents more stringent standard.
[d] There is no Cadmium standard specified for H >= 210; therefore, the standard for H=150-<210 is applied as a conservative comparison.
[e] There is no Zinc standard specified for H >= 400; therefore, the standard for H=300-<400 is applied as a conservative comparison.
f Criterion for cadmium (mg/L) is determined using the following formula: 10^(0.86[log(hardness)]-3.2)/1000.
[g] Guidelines for total metals. Please refer to report for explanation of applicability to dissolved metals.
h Sample analyzed for Total Metals.
i Concentration less than 10 times the CEQG guidelines - see report text for complete discussion
[j] Only CSR Aquatic Life (AW) standards apply to Provincial Lands.

TABLE 6 (Cont'd): Summary of Analytical Results for Groundwater - Inorganics

		Provincial Lands (Cont'd)																				
Monitoring Well ID		04-2 (Cont'd)			04-3										04-4			04-5			**BC Standards**	**Federal Guidelines**
Sample ID		MW04-2-081002	MW04-2-090712	**MW04-2-090924**	MW04-3-041018	MW04-3-050707	MW05-A-050707	**QA/QC RPD %**	MW04-3-060717	MW04-3-061001	MW04-3-070925	MWA-070925	**QA/QC RPD %**	MW04-3-090713	MW04-4-041018	MW04-4-090711	**MW04-4-090924**	MW04-5-041018	MWC-041018	**QA/QC RPD %**	**CSR Aquatic Life[b,j] (AW)**	**CCME CEQG Aquatic Life[b,g] (AW)**
Sample Date (yyyy mm dd)		2008 10 02	2009 07 12	**2009 09 24**	2004 10 18	2005 07 07	2005 07 07		2006 07 17	2006 10 01	2007 09 25	2007 09 25		2009 07 13	2004 10 18	2009 07 11	**2009 09 24**	2004 10 18	2004 10 18			
Parameter	**Units**	**Analytical Results**																				
Physical Parameters																						
Hardness	mg/L	244	234	52.2	278	217	218	< 1	207	258	256	263	3	254	352	287	44.5	330	340	3	n/a	n/a
pH (field)	pH	7.16	7.69	7.22	7.65	7.21	7.2	< 1	6.91	7.18	7.33	7.33	-	7.52	7.38	7.85	7.28	6.9	6.9	-	n/a	6.5 - 8.0
Ion Balance %	%	-		-	-	0	-	*	-	-1.7	-	-	-		-		-	-	-	-	n/a	n/a
Dissolved Inorganics																						
Dissolved Aluminum	µg/L	< 50	< 1	1	< 5	< 5	< 5	*	< 5	< 1	16	24	40	11	< 5	2	3	< 5	< 5	*	n/a	100 (pH>=6.5)
Dissolved Calcium	mg/L	87.3	83.4	18	98.9	77.2	77.7	< 1	74	92.2	91.8	94.5	3	90.1	128	103	15.6	117	120	3	n/a	n/a
Dissolved Iron	µg/L	290	1,360	230	2,110	6,960	6,860	1	3,540	2,700	1,810	1,820	< 1	410	< 50	< 10	< 10	7,120	7,270	2	n/a	300
Dissolved Magnesium	mg/L	6.22	6.14	1.72	7.33	5.81	5.87	1	5.45	6.8	6.55	6.57	< 1	6.92	7.76	6.99	1.33	9.29	9.66	4	n/a	n/a
Dissolved Manganese	µg/L	150	341	74	1,450	880	870	1	830	1,040	565	565	0	480	150	87	3.7	1,080	1,120	4	n/a	n/a
Dissolved Potassium	mg/L	0.7	1.43	0.31	2	1.3	1.3	0	1.2	1.69	1.74	1.83	5	2.1	3.6	1.79	0.35	2.8	2.9	4	n/a	n/a
Dissolved Sodium	mg/L	3.4	1.51	0.81	1.78	1.54	1.57	2	1.56	1.98	2.63	2.79	6	2.42	3.74	1.89	1.2	2.09	2.2	5	n/a	n/a
Ammonia Nitrogen	µg/L	20	-	-	80	160	-		80	110	60	60	0	-	< 10	-	-	160	-	*	1,310 - 11.300	n/a
Nitrate	µg/L	50	< 50	< 50	100	< 50	-	*	< 100	< 10	10	10	*	< 50	290	80	380	140	-	*	400,000	2,900
Nitrite	µg/L	4	< 2	< 2	5	6	-	*	3	2	< 2	< 2	*	< 2	7	< 2	< 2	13	-	-	200 - 2,000	60
Nitrate+Nitrite	µg/L	50	< 50	< 50	110	< 50	-	*	< 100	10	10	10	*	< 50	300	80	380	150	-	*	400,000	n/a
Chloride	mg/L	7.77	2.99	5.2	3	1.2	-	*	1.58	1.77	3.04	2.98	2	2.34	14.7	10.8	16.9	4.5	-	*	1,500	n/a
Fluoride	µg/L	< 50	< 50	< 50	< 50	< 50	-	*	< 100	< 50	< 50	< 50	*	< 50	< 50	< 50	< 50	< 50	-	*	3,000 (H>=50)	120
Sulphate	mg/L	13.6	9.03	11.8	1.1	1	-	*	19.3	64.8	51.9	51.8	< 1	13	11.3	23.6	11.8	4	-	*	1,000	n/a
Total Alkalinity (as CaCO3)	mg/L	-	-	-	282	-	-	-	-	-	-	-		-	329	-	-	345	-	*	n/a	n/a
Bicarbonate HCO3	mg/L	267	-	-	343	289	-	*	272	261	274	276	< 1	-	402	-	-	421	-	*	n/a	n/a
Carbonate CO3	mg/L	< 0.5	-	-	< 0.5	< 0.5	-	*	< 0.5	< 0.5	< 0.5	< 0.5	*	-	< 0.5	-	-	< 0.5	-	*	n/a	n/a
Hydroxide	mg/L	< 0.5	-	-	< 0.5	< 0.5	-	*	< 0.5	< 0.5	< 0.5	< 0.5	*	-	< 0.5	-	-	< 0.5	-	*	n/a	n/a
Dissolved Metals																						
Antimony	µg/L	< 50	< 0.2	< 0.1	< 1	< 1	< 1	*	< 1	< 0.2	< 0.2	< 0.2	*	< 1	< 1	< 0.2	< 0.1	< 1	< 1	*	200	n/a
Arsenic	µg/L	< 30[a]	1.1	0.3	2	4	4	*	2	0.9	0.9	0.9	*	< 1	< 1	< 0.2	< 0.2	4	4	*	50	5
Barium	µg/L	110	126	29	240	150	160	7	160	228	185	185	0	190	240	127	21	260	260	0	10,000	n/a
Beryllium	µg/L	< 3	< 0.2	< 0.1	< 1	< 1	< 1	*	< 1	< 0.2	< 0.2	< 0.2	*	< 1	< 1	< 0.2	< 0.1	< 1	< 1	*	53	n/a
Boron	µg/L	< 10	< 10	9	< 50	< 50	< 50	*	< 50	< 10	10	10	*	< 50	< 50	< 10	15	< 50	< 50	*	50,000	n/a
Cadmium	µg/L			< 0.01													< 0.01				0.3 (H 30-<90)	0.01 - 0.13[f]
																					0.5 (H 90-<150)	
																					0.6 (H 150-<210)	
		< 10[a]	< 0.04		< 0.2	< 0.2	< 0.2	*		0.07	< 0.04	< 0.04	*	< 0.2	< 0.2	< 0.04		< 0.2	< 0.2	*	0.6 (H>=210)	
Chromium	µg/L	< 10	< 0.2	< 0.2	< 1	< 1	< 1	*	< 1	< 0.2	0.2	0.2	*	< 1	< 1	0.3	< 0.2	< 1	< 1	*	10[c]	1[c]
Cobalt	µg/L	< 20	0.4	0.1	6	2	2	*	2	1.9	1.1	1.1	0	< 1	2	0.4	< 0.1	6	6	0	40	n/a
Copper	µg/L																0.1				20 (H<50)	2 (H<120)
				< 0.1																	30 (H 50-<75)	3 (H 120-<180)
																					40 (H 75-<100)	4 (H>=180)
																					50 (H 100-<125)	
																					70 (H 150-<175)	
					< 1	< 1	< 1	*	1	0.6	1	1	0		4			< 1	< 1	*	80 (H 175-<200)	
		< 20	< 0.2											< 1		0.6					90 (H>=200)	
Lead	µg/L																< 0.05				40 (H<50)	1 (H<60)
				< 0.05																	50 (H 50-<100)	2 (H 60-<120)
																				-	60 (H 100-<200)	4 (H 120-<180)
		< 30	< 0.2		< 1	< 1	< 1	*	< 1	< 0.2	< 0.2	< 0.2	*	< 1		< 0.2					110 (H 200-<300)	7 (H>=180)
															< 1			< 1	< 1	*	160 (H>=300)	
Lithium	µg/L	-	0.6	< 0.1	< 1	< 1	< 1	*	2	16	0.7	0.7	*	1	1	0.7	< 0.1	1	1	*	n/a	n/a
Mercury	µg/L	-	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	*	1	0.026
Molybdenum	µg/L	< 20	1.1	0.2	1.2	1.3	1.2	*	1.3	1.4	1.7	1.7	0	1.4	0.9	0.4	< 0.1	1.7	1.7	*	10,000	73
Nickel	µg/L			< 0.2													< 0.2				250 (H<60)	25 (H<60)
																					650 (H 60-<120)	65 (H 60-<120)
																					1,100 (H 120-<180)	110 (H 120-<180)
		< 20	0.4		7	2	2	*	1	1.8	1.3	1.2	8	< 1	7	0.9		9	9	0	1,500 (H>=180)	150 (H>=180)
Selenium	µg/L	-	< 0.2	< 0.2	< 1	< 1	< 1	*	< 1	0.5	< 0.2	< 0.2	*	< 1	< 1	< 0.2	< 0.2	< 1	< 1	*	10	1
Silver	µg/L			< 0.04													< 0.04				0.5 (H<=100)	0.1
		< 10	< 0.05		< 0.25	< 0.25	< 0.25	*	< 0.25	< 0.05	< 0.05	< 0.05	*	< 0.25	< 0.25	< 0.05		< 0.25	< 0.25	*	15 (H>100)	
Thallium	µg/L	-	< 0.02	< 0.02	< 0.1	< 0.1	< 0.1	*	< 0.1	0.02	< 0.02	< 0.02	*	< 0.1	< 0.1	< 0.02	< 0.02	< 0.1	< 0.1	*	3	0.8
Titanium	µg/L	< 5	< 0.2	< 0.2	< 1	< 1	< 1	*	< 1	0.3	< 0.2	< 0.2	*	< 1	< 1	< 0.2	< 0.2	< 1	< 1	*	1,000	n/a
Uranium	µg/L	-	0.7	0.13	0.5	< 0.5	< 0.5	*	< 0.5	0.6	0.4	0.4	*	0.5	0.5	0.6	0.08	1	1	*	3,000	n/a
Vanadium	µg/L	< 10	0.4	< 0.1	< 1	< 1	< 1	*	< 1	< 0.2	0.3	0.3	*	< 1	< 1	0.7	< 0.1	< 1	< 1	*	n/a	n/a
Zinc	µg/L			< 1													< 1				75 (H<=90)	
																					150 (H 90-<100)	30
		8	< 1		< 5	< 5	< 5	*	< 5	3	< 1	1	*	< 5		< 1					900 (H 100-<200)	
																					1,650 (H 200-<300)	
															5			< 5	< 5	*	2,400 (H 300->400)[e]	

Associated CanTest files: 40916043, 51020086, 60711045, 70720118, 71002069, 80920016, 80927170, 90619137, 90623066, 90623067, 90623069, 90623071, 91002010, 91006083, 91006094, 91029091, 100714077, 100718016, 100831012, 100928032, 100929013.

All terms defined within the body of Morrow's report.

< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard.
* RPDs are not normally calculated where one of more concentrations are less than five times MDL.
BOLDED sample denotes most recent sampling event

BOLD	Concentration greater than CSR Aquatic Life (AW) standard.
SHADED	Concentration greater than or equal to CCME CEQG Aquatic Life (AW) guideline.

[a] Laboratory detection limit exceeds regulatory standard.
[b] Standard/Guideline to protect freshwater aquatic life.
[c] Individual standards exist for Cr +3 and Cr +6. Reported value represents more stringent standard.
[d] There is no Cadmium standard specified for H >= 210; therefore, the standard for H=150-<210 is applied as a conservative comparison.
[e] There is no Zinc standard specified for H >= 400; therefore, the standard for H=300-<400 is applied as a conservative comparison.
f Criterion for cadmium (mg/L) is determined using the following formula: 10^(0.86[log(hardness)]-3.2)/1000.
[g] Guidelines for total metals. Please refer to report for explanation of applicability to dissolved metals.
h Sample analyzed for Total Metals.
i Concentration less than 10 times the CEQG guidelines - see report text for complete discussion
[j] Only CSR Aquatic Life (AW) standards apply to Provincial Lands.

TABLE 6 (Cont'd): Summary of Analytical Results for Groundwater - Inorganics

		Provincial Lands (Cont'd)																		
Monitoring Well ID		04-5 (Cont'd)						04-6			08-5		08-6						**BC Standards**	**Federal Guidelines**
Sample ID		MW04-5-050707	MW04-5-060715/17	MW04-5-061001	MW04-5-080617	MW04-5-081002	**MW04-5-090924**	MW04-6-041018	MW04-6-050706	MW04-6-070917	MW08-5-081002	MW08-5-090713	MW08-6-081002	MW08-6-090713	MW08-6-090826	**MW08-6-090924**	**MW08-A-090924**	**QA/QC RPD %**	**CSR Aquatic Life^{b,j} (AW)**	**CCME CEQG Aquatic Life^{b,g} (AW)**
Sample Date (yyyy mm dd)		2005 07 07	2006 07 15/17	2006 10 01	2008 06 17	2008 10 02	**2009 09 24**	2004 10 18	2005 07 06	2007 09 17	2008 10 02	2009 07 13	2008 10 02	2009 07 13	2009 08 26	**2009 09 24**	**2009 09 24**			
Parameter	**Units**	**Analytical Results**																		
Physical Parameters																				
Hardness	mg/L	247	228	355	203	271	56.9	489	307	231	250	233	280	235	232	50.8	51.4	1	n/a	n/a
pH (field)	pH	7.2	7.13	7.45	6.89	7.18	7.58	6.75	6.96	7.28	7.3	7.51	7.17	7.32	7.11	7.46	7.46	0	n/a	6.5 - 8.0
Ion Balance %	%	-2.9	-	-3.9	-	-	-	-	-7.5	-	-		-		-	-	-	-	n/a	n/a
Dissolved Inorganics																				
Dissolved Aluminum	µg/L	< 5	< 5	< 1	< 1	< 50	1	< 5	< 5	< 5	< 50	6	60	< 5	10	1	2	*	n/a	100 (pH>=6.5)
Dissolved Calcium	mg/L	88.3	82.3	127	78	96.9	19.4	169	108	81.1	89.2	82.8	97.5	83.1	81.9	17.5	17.7	1	n/a	n/a
Dissolved Iron	µg/L	10,500	3,380	310	1,170	790	520	80	< 50	< 50	< 10	< 50	20	120	1,450	240	220	9	n/a	300
Dissolved Magnesium	mg/L	6.5	5.49	8.8	5.12	7.01	2.01	16.2	8.75	6.78	6.46	6.34	8.85	6.65	6.58	1.73	1.75	1	n/a	n/a
Dissolved Manganese	µg/L	660	600	338	326	310	174	340	2	110	200	250	180	720	660	110	109	< 1	n/a	n/a
Dissolved Potassium	mg/L	1.3	1.4	3.24	1.48	1	0.38	6.4	1.7	1.1	1.2	1.7	2.3	2	2	0.39	0.39	0	n/a	n/a
Dissolved Sodium	mg/L	1.33	1.36	2.42	1.19	1.9	0.76	3.29	1.63	1.15	2.1	1.99	3.5	1.78	1.6	0.59	0.59	0	n/a	n/a
Ammonia Nitrogen	µg/L	110	70	20	60	90	-	20	< 10	10	40	-	20	-	-	-	-	-	1,310 - 11.300	n/a
Nitrate	µg/L	< 50	< 100	140	20	680	140	2,300	70	30	60	< 50	330	70	< 50	50	80	*	400,000	2,900
Nitrite	µg/L	9	< 2	3	< 2	< 2	8	30	< 2	< 2	< 2	< 2	< 2	< 2	-	4	3	-	200 - 2,000	60
Nitrate+Nitrite	µg/L	< 50	< 100	140	20	680	150	2,300	70	30	60	< 50	330	70	-	50	80	*	400,000	n/a
Chloride	mg/L	2.6	2.36	10.7	0.65	8.13	9.24	4.2	1.1	0.57	4.29	1.78	10.9	4.17	4.34	7.79	7.93	2	1,500	n/a
Fluoride	µg/L	< 50	< 100	< 100	< 50	< 50	< 50	< 50	< 50	< 50	50	< 50	< 50	< 50	< 50	< 50	< 50	-	3,000 (H>=50)	120
Sulphate	mg/L	2.1	29.3	168	4.31	14.6	8.33	29.2	7.2	13	24.2	8.16	16.5	6.64	3.52	10.3	10.8	5	1,000	n/a
Total Alkalinity (as CaCO3)	mg/L	-	-	-	190	-	-	428	-	-	-	-	-	-	-	-	-	-	n/a	n/a
Bicarbonate HCO3	mg/L	325	267	248	231	298	-	522	427	308	265	-	309	-	-	-	-	-	n/a	n/a
Carbonate CO3	mg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5	-	-	-	-	-	n/a	n/a
Hydroxide	mg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5	-	-	-	-	-	n/a	n/a
Dissolved Metals																				
Antimony	µg/L	< 1	< 1	0.8	< 0.2	< 50	< 0.1	< 1	< 1	< 1	< 50	< 1	< 50	< 1	< 1	< 0.1	< 0.1	*	200	n/a
Arsenic	µg/L	3	1	0.8	1.2	< 30	0.4	< 1	< 1	< 1	< 30	< 1	< 30	2	2	0.3	0.3	*	50	5
Barium	µg/L	160	140	254	98	130	33	310	120	84	130	150	160	180	180	36	34	6	10,000	n/a
Beryllium	µg/L	< 1	< 1	< 0.2	< 0.2	< 3	< 0.1	< 1	< 1	< 1	< 3	< 1	< 3	< 1	< 1	< 0.1	< 0.1	*	53	n/a
Boron	µg/L	< 50	< 50	< 10	< 10	< 10	12	< 50	< 50	< 50	< 10	< 50	< 10	< 50	< 50	20	< 5	*	50,000	n/a
Cadmium	µg/L						< 0.01									< 0.01	< 0.01	*	0.3 (H 30-<90)	0.01 - 0.13^{f}
																			0.5 (H 90-<150)	
																			0.6 (H 150-<210)	
		< 0.2	< 0.2	0.08	< 0.04	< 10		< 0.2	< 0.2	< 0.2	< 10	< 0.2	< 10	< 0.2	< 0.2				0.6 (H>=210)	
Chromium	µg/L	< 1	< 1	< 0.2	< 0.2	< 10	< 0.2	< 1	< 1	< 1	< 10	< 1	< 10	< 1	< 1	< 0.2	< 0.2	*	10^{c}	1^{c}
Cobalt	µg/L	2	1	0.8	0.4	< 20	0.2	4	< 1	< 1	< 20	< 1	< 20	1	< 1	0.4	0.4	*	40	n/a
Copper	µg/L																		20 (H<50)	2 (H<120)
							< 0.1									< 0.1	< 0.1	*	30 (H 50-<75)	3 (H 120-<180)
																			40 (H 75-<100)	4 (H>=180)
																			50 (H 100-<125)	
																			70 (H 150-<175)	
		< 1	< 1	1.3	0.6			1	1	1									80 (H 175-<200)	
						< 20					< 20	1	< 20	< 1	< 1				90 (H>=200)	
Lead	µg/L																		40 (H<50)	1 (H<60)
							< 0.05									< 0.05	< 0.05	*	50 (H 50-<100)	2 (H 60-<120)
																			60 (H 100-<200)	4 (H 120-<180)
		< 1	< 1		< 0.2	< 30				< 1	< 30	< 1	< 30	< 1	< 1				110 (H 200-<300)	7 (H>=180)
				< 0.2				< 1	< 1										160 (H>=300)	
Lithium	µg/L	< 1	2	21	0.4	-	0.2	3	< 1	< 1	-	1	-	< 1	1	0.2	0.2	*	n/a	n/a
Mercury	µg/L	< 0.02	< 0.02	< 0.02	< 0.02	-	< 0.02	< 0.02	< 0.02	< 0.02	-	< 0.02	-	< 0.02	< 0.02	< 0.02	< 0.02	*	1	0.026
Molybdenum	µg/L	< 0.5	0.7	1.6	0.6	< 20	0.1	1.6	< 0.5	< 0.5	< 20	1.1	< 20	1.8	1.3	0.2	0.2	*	10,000	73
Nickel	µg/L						< 0.2									< 0.2	< 0.2	*	250 (H<60)	25 (H<60)
																			650 (H 60-<120)	65 (H 60-<120)
																			1,100 (H 120-<180)	110 (H 120-<180)
		2	1	2.5	0.5	< 20		14	2	< 1	< 20	1	< 20	< 1	1				1,500 (H>=180)	150 (H>=180)
Selenium	µg/L	< 1	< 1	1.8	0.5	-	< 0.2	< 1	< 1	< 1	-	< 1	-	< 1	< 1	< 0.2	< 0.2	*	10	1
Silver	µg/L						< 0.04									< 0.04	< 0.04	*	0.5 (H<=100)	0.1
		< 0.25	< 0.25	< 0.05	< 0.05	< 10		< 0.25	< 0.25	< 0.25	< 10	< 0.25	< 10	< 0.25	< 0.25				15 (H>100)	
Thallium	µg/L	< 0.1	< 0.1	0.05	< 0.02	-	< 0.02	< 0.1	< 0.1	< 0.1	-	< 0.1	-	< 0.1	< 0.1	< 0.02	< 0.02	*	3	0.8
Titanium	µg/L	< 1	< 1	0.2	< 0.2	< 5	< 0.2	< 1	< 1	< 1	< 5	< 1	< 5	< 1	< 1	< 0.2	< 0.2	*	1,000	n/a
Uranium	µg/L	< 0.5	< 0.5	2.8	0.4	-	0.19	2.4	< 0.5	< 0.5	-	< 0.5	-	0.8	< 0.5	0.12	0.11	*	3,000	n/a
Vanadium	µg/L	< 1	< 1	< 0.2	0.3	< 10	< 0.1	< 1	< 1	< 1	< 10	< 1	< 10	< 1	< 1	< 0.1	< 0.1	*	n/a	n/a
Zinc	µg/L						< 1									< 1	< 1	*	75 (H<=90)	
																			150 (H 90-<100)	30
		< 5	< 5		< 1	9				< 5	9	< 5	10	< 5	5				900 (H 100-<200)	
								5											1,650 (H 200-<300)	
				3					< 5										2,400 (H 300->400)^{e}	

Associated CanTest files: 40916043, 51020086, 60711045, 70720118, 71002069, 80920016, 80927170, 90619137, 90623066, 90623067, 90623069, 90623071, 91002010, 91006083, 91006094, 91029091, 100714077, 100718016, 100831012, 100928032, 100929013.

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n/a Denotes no applicable standard.
* RPDs are not normally calculated where one of more concentrations are less than five times MDL.
BOLDED sample denotes most recent sampling event

BOLD	Concentration greater than CSR Aquatic Life (AW) standard.
SHADED	Concentration greater than or equal to CCME CEQG Aquatic Life (AW) guideline.

[a] Laboratory detection limit exceeds regulatory standard.
[b] Standard/Guideline to protect freshwater aquatic life.
[c] Individual standards exist for Cr +3 and Cr +6. Reported value represents more stringent standard.
[d] There is no Cadmium standard specified for H >= 210; therefore, the standard for H=150-<210 is applied as a conservative comparison.
[e] There is no Zinc standard specified for H >= 400; therefore, the standard for H=300-<400 is applied as a conservative comparison.
f Criterion for cadmium (mg/L) is determined using the following formula: 10^(0.86[log{hardness}]-3.2)/1000.
[g] Guidelines for total metals. Please refer to report for explanation of applicability to dissolved metals.
h Sample analyzed for Total Metals.
i Concentration less than 10 times the CEQG guidelines - see report text for complete discussion
[j] Only CSR Aquatic Life (AW) standards apply to Provincial Lands.

TABLE 6 (Cont'd): Summary of Analytical Results for Groundwater - Inorganics

		Provincial Lands (Cont'd)													
Monitoring Well ID		08-7								08-8				BC Standards	Federal Guidelines
Sample ID		MW08-7-081002	MWB-081002	**QA/QC**	MW08-7-090712	MW-B-090712	**QA/QC**	MW08-7-090826	**MW08-7-090924**	MW08-8-081002	MW08-8-090711	MW08-8-090826	**MW08-8-090926**	**CSR**	**CCME CEQG**
Sample Date (yyyy mm dd)		2008 10 02	2008 10 02	**RPD** %	2009 07 12	2009 07 12	**RPD** %	2009 08 26	**2009 09 24**	2008 10 02	2009 07 11	2009 08 26	**2009 09 26**	**Aquatic Life^{b,j} (AW)**	**Aquatic Life^{b,g} (AW)**
Parameter	**Units**	**Analytical Results**													
Physical Parameters															
Hardness	mg/L	305	303	< 1	248	250	< 1	276	56.1	312	322	347	264	n/a	n/a
pH (field)	pH	7.36	-	*	7.4	7.4	0	7.29	7.17	7.26	7.45	7.16	7.13	n/a	6.5 - 8.0
Ion Balance %	%	-	-	-				-	-	-		-	-	n/a	n/a
Dissolved Inorganics															
Dissolved Aluminum	µg/L	< 50	< 50	*	2	2	*	11	< 1	< 50	2	12	1	n/a	100 (pH>=6.5)
Dissolved Calcium	mg/L	106	105	< 1	86.7	87.5	< 1	95.7	18.9	108	112	120	91.1	n/a	n/a
Dissolved Iron	µg/L	480	480	0	1,700	1,750	3	1,550	570	< 10	110	2,920	< 10	n/a	300
Dissolved Magnesium	mg/L	9.85	9.8	< 1	7.67	7.66	< 1	8.99	2.14	10.4	10.2	11.6	8.84	n/a	n/a
Dissolved Manganese	µg/L	730	730	0	903	897	< 1	1,280	216	120	641	800	85	n/a	n/a
Dissolved Potassium	mg/L	1.5	1.5	0	1.51	1.53	1	1.9	0.38	1.6	2.13	2.6	1.76	n/a	n/a
Dissolved Sodium	mg/L	3.2	3.2	0	1.76	1.76	0	2.34	0.81	4.1	2.73	3.43	7.15	n/a	n/a
Ammonia Nitrogen	µg/L	40	50		-	-	-	-	-	30	-	-	-	1,310 - 11.300	n/a
Nitrate	µg/L	20	30	*	< 50	< 50	*	< 50	< 50	2,140	< 50	< 50	1,530	400,000	2,900
Nitrite	µg/L	6	< 2	*	< 2	2	*	-	7	56	< 2	-	20	200 - 2,000	60
Nitrate+Nitrite	µg/L	30	30	*	< 50	< 50	*	-	< 50	2,200	< 50	-	1,550	400,000	n/a
Chloride	mg/L	4.66	4.62	< 1	5.59	5.62	< 1	5.38	9.91	8.16	8.61	7.98	8.08	1,500	n/a
Fluoride	µg/L	< 50	< 50	*	< 50	< 50	*	< 50	< 50	< 50	< 50	< 50	< 50	3,000 (H>=50)	120
Sulphate	mg/L	14.1	14.1	0	4.7	4.74	< 1	7.6	8.26	11.4	17.9	61.2	7.16	1,000	n/a
Total Alkalinity (as CaCO3)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	n/a	n/a
Bicarbonate HCO3	mg/L	339	343	1	-	-	-	-	-	350	-	-	-	n/a	n/a
Carbonate CO3	mg/L	< 0.5	< 0.5	*	-	-	-	-	-	< 0.5	-	-	-	n/a	n/a
Hydroxide	mg/L	< 0.5	< 0.5	*	-	-	-	-	-	< 0.5	-	-	-	n/a	n/a
Dissolved Metals															
Antimony	µg/L	< 50	< 50	*	< 0.2	< 0.2	*	< 1	< 0.1	< 50	0.2	< 1	0.1	200	n/a
Arsenic	µg/L	< 30	< 30	*	1.9	2	5	3	0.4	< 30	1.8	1	< 0.2	50	5
Barium	µg/L	130	130	0	120	118	2	140	24	110	104	120	84	10,000	n/a
Beryllium	µg/L	< 3	< 3	*	< 0.2	< 0.2	*	< 1	< 0.1	< 3	< 0.2	< 1	< 0.1	53	n/a
Boron	µg/L	< 10	< 10	*	< 10	< 10	*	< 50	< 5	< 10	< 10	< 50	< 5	50,000	n/a
Cadmium	µg/L								< 0.01					0.3 (H 30-<90)	0.01 - 0.13^{f}
														0.5 (H 90-<150)	
														0.6 (H 150-<210)	
		< 10	< 10	-	< 0.04	0.07	*	< 0.2		< 10	0.07	< 0.2	0.24	0.6 (H>=210)	
Chromium	µg/L	< 10	< 10	*	0.2	0.3	*	< 1	< 0.2	< 10	0.3	< 1	0.3	10^{c}	1^{c}
Cobalt	µg/L	< 20	< 20	*	1.9	1.8	5	2	0.3	< 20	2.4	2	0.2	40	n/a
Copper	µg/L													20 (H<50)	2 (H<120)
									< 0.1					30 (H 50-<75)	3 (H 120-<180)
														40 (H 75-<100)	4 (H>=180)
														50 (H 100-<125)	
				-										70 (H 150-<175)	
														80 (H 175-<200)	
		< 20	< 20	*	< 0.2	< 0.2	*	< 1		< 20	0.2	< 1	4.3	90 (H>=200)	
Lead	µg/L													40 (H<50)	1 (H<60)
									< 0.05					50 (H 50-<100)	2 (H 60-<120)
				-										60 (H 100-<200)	4 (H 120-<180)
				-	< 0.2	< 0.2	*	< 1					0.21	110 (H 200-<300)	7 (H>=180)
		< 30	< 30	*			-			< 30	< 0.2	< 1		160 (H>=300)	
Lithium	µg/L	-	-	-	0.6	0.7	*	< 1	< 0.1	-	0.8	1	0.5	n/a	n/a
Mercury	µg/L	-	-	-	< 0.02	< 0.02	*	< 0.02	< 0.02	-	< 0.02	< 0.02	< 0.02	1	0.026
Molybdenum	µg/L	< 20	< 20	*	0.9	0.9	0	1.7	0.1	< 20	1	0.6	0.3	10,000	73
Nickel	µg/L								< 0.2					250 (H<60)	25 (H<60)
														650 (H 60-<120)	65 (H 60-<120)
				-										1,100 (H 120-<180)	110 (H 120-<180)
		< 20	< 20	*	1.1	1.2	9	3		< 20	3.1	3	1.2	1,500 (H>=180)	150 (H>=180)
Selenium	µg/L	-	-	-	< 0.2	< 0.2	*	< 1	< 0.2	-	< 0.2	< 1	0.2	10	1
Silver	µg/L								< 0.04					0.5 (H<=100)	0.1
		< 10	< 10	*	< 0.05	< 0.05	*	< 0.25		< 10	< 0.05	< 0.25	< 0.04	15 (H>100)	
Thallium	µg/L	-	-	-	< 0.02	0.02	*	< 0.1	< 0.02	-	< 0.02	< 0.1	0.04	3	0.8
Titanium	µg/L	< 5	< 5	*	< 0.2	< 0.2	*	< 1	< 0.2	< 5	< 0.2	< 1	0.3	1,000	n/a
Uranium	µg/L	-	-	-	0.5	0.5	0	1	0.11	-	0.7	0.7	0.48	3,000	n/a
Vanadium	µg/L	< 10	< 10	*	0.8	0.8	*	< 1	< 0.1	< 10	1.2	< 1	0.1	n/a	n/a
Zinc	µg/L								< 1					75 (H<=90)	
				-										150 (H 90-<100)	30
				-	< 1	< 1	*	< 5						900 (H 100-<200)	
		10	10	*			-			10	< 1	< 5	2	1,650 (H 200-<300)	
														2,400 (H 300->400)^{e}	

Associated CanTest files: 40916043, 51020086, 60711045, 70720118, 71002069, 80920016, 80927170, 90619137, 90623066, 90623067, 90623069, 90623071, 91002010, 91006083, 91006094, 91029091, 100714077, 100718016, 100831012, 100928032, 100929013.

All terms defined within the body of Morrow's report.

< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard.
* RPDs are not normally calculated where one of more concentrations are less than five times MDL.
BOLDED sample denotes most recent sampling event

BOLD	Concentration greater than CSR Aquatic Life (AW) standard.
SHADED	Concentration greater than or equal to CCME CEQG Aquatic Life (AW) guideline.

[a] Laboratory detection limit exceeds regulatory standard.
[b] Standard/Guideline to protect freshwater aquatic life.
[c] Individual standards exist for Cr +3 and Cr +6. Reported value represents more stringent standard.
[d] There is no Cadmium standard specified for H >= 210; therefore, the standard for H=150-<210 is applied as a conservative comparison.
[e] There is no Zinc standard specified for H >= 400; therefore, the standard for H=300-<400 is applied as a conservative comparison.
f Criterion for cadmium (mg/L) is determined using the following formula: 10^(0.86[log(hardness)]-3.2)/1000.
[g] Guidelines for total metals. Please refer to report for explanation of applicability to dissolved metals.
h Sample analyzed for Total Metals.
i Concentration less than 10 times the CEQG guidelines - see report text for complete discussion
[j] Only CSR Aquatic Life (AW) standards apply to Provincial Lands.

TABLE 7: Summary of Analytical Results for Surface Water - Hydrocarbons

Sample Location	Sample ID	Sample Date (yyyy mm dd)	Monocyclic Aromatic Hydrocarbons				Gross Parameters				
			Benzene (µg/L)	Ethyl-benzene (µg/L)	Toluene (µg/L)	Xylenes (µg/L)	VHw_{6-10} (µg/L)	VPHw (C6-C10) (µg/L)	$EPHw_{10-19}$ (µg/L)	LEPHw (C10-C19) (µg/L)	$EPHw_{19-32}$ (µg/L)
SS01 (upstream)	SS01 031025	2003 10 25	< 0.1	< 0.1	0.2	0.3	-	-	< 250	-	< 250
SS02 (mid-stream)	SS02 031025	2003 10 25	< 0.1	< 0.1	0.1	0.1	-	-	< 250	-	< 250
SW04-1 (upgradient)	SW04-1	2004 10 16	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 250	< 250	< 250
	SW04-1-050707	2005 07 07	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 250	< 250	< 250
	SW04-1-060717	2006 07 17	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 250	< 250	< 250
	SW04-1-060926	2006 09 26	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 100	-	< 100
	SW04-1-080619	2008 06 19	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 250	< 250	< 250
	SW08-1-081004	2008 10 04	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 250	< 250	< 250
	SW04-1-090711	2009 07 11	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 100	-	< 100
	SW-A-090711	2009 07 11	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 100	-	< 100
	QA/QC RPD %		*	*	*	*	*	*	*	-	*
	SW04-1-090926	**2009 09 26**	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 250	< 250	< 250
SW04-2 (mid-stream)	SW04-2	2004 10 16	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 250	< 250	< 250
	SW04-2-050707	2005 07 07	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 250	< 250	< 250
	SW04-2-060717	2006 07 17	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 250	< 250	< 250
	SW04-2-060926	2006 09 26	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 100	-	< 100
	SW04-2-080619	2008 06 19	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 250	< 250	< 250
	SW08-2-081004	2008 10 04	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 250	< 250	< 250
	SW04-2-090711	2009 07 11	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 100	-	< 100
	SW04-2-090926	**2009 09 26**	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 250	< 250	< 250
SW04-3 (mid-stream)	SW04-3	2004 10 16	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 250	< 250	< 250
	SW04-3-050707	2005 07 07	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 250	< 250	< 250
	SW04-3-060717	2006 07 17	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 250	< 250	< 250
	SW04-3-060926	2006 09 26	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 100	-	< 100
	SW04-3-080619	2008 06 19	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 250	< 250	< 250
	SW08-3-081004	2008 10 04	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 250	< 250	< 250
	SW04-3-090711	2009 07 11	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 100	-	< 100
	SW04-3-090926	**2009 09 26**	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 250	< 250	< 250
SW04-4 (downstream)	SW04-4	2004 10 16	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 250	< 250	< 250
	SW04-4-050707	2005 07 07	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 250	< 250	< 250
	SW04-4-060717	2006 07 17	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 250	< 250	< 250
	SW04-4-060926	2006 09 26	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 100	-	< 100
	SW04-4-080619	2008 06 19	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 250	< 250	< 250
	SW08-4-081004	2008 10 04	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 250	< 250	< 250
	SW04-4-090711	2009 07 11	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 100	-	< 100
	SW04-4-090926	**2009 09 26**	< 0.1	< 0.1	< 0.1	< 0.1	< 100	< 100	< 250	< 250	< 250
BC Standards											
BCWQG Aquatic Life (AW) [a]			400	200	39	30	n/a	n/a	n/a	n/a	n/a
Federal Guidelines											
CCME CEQG Aquatic Life (AW) [a]			370	90	2	n/a	n/a	n/a	n/a	n/a	n/a

Associated CanTest files: 51020107, 60711045, 70720118, 70930027, 90623066, 91006094, 100714077, 100929013.
All terms defined within the body of Morrow's report.

< Denotes concentration less than indicated detection limit.
\- Denotes analysis not conducted.
n/a Denotes no applicable standard.
BOLDED sample denotes most recent sampling event

BOLD	Concentration greater than or equal to BCWQG Aquatic Life (AW) guideline.
SHADED	Concentration greater than or equal to CCME CEQG Aquatic Life (AW) guideline.

[b] Standard/Guideline to protect freshwater aquatic life.

TABLE 8: Summary of Analytical Results for Surface Water - PAHs

Sample Location		SW04-1 (upstream)					SW04-2 (mid-stream)					**BC Standards**	**Federal Guidelines**
Sample ID		SW04-1	SW04-1-050707	SW04-1-060717	SW08-1-081004	**SW04-1-090926**	SW04-2	SW04-2-050707	SW04-2-060717	SW08-2-081004	**SW04-2-090926**	**BCWQG Aquatic Life[a]**	**CCME CEQG Aquatic Life[a]**
Sample Date (yyyy mm dd)		2004 10 16	2005 07 07	2006 07 17	2008 10 04	**2009 09 26**	2004 10 16	2005 07 07	2006 07 17	2008 10 04	**2009 09 26**		
Parameter	**Units**	**Analytical Results**										**(AW)**	**(AW)**
Polycyclic Aromatic Hydrocarbons													
Naphthalene	µg/L	< 0.3	< 0.3	< 0.6	< 0.3	< 0.3	< 0.3	< 0.3	< 0.6	< 0.3	< 0.3	1	1.1
Acenaphthylene	µg/L	< 0.1	< 0.1	< 0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	< 0.1	n/a	n/a
Acenaphthene	µg/L	< 0.1	< 0.1	< 0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	< 0.1	6	5.8
Fluorene	µg/L	< 0.05	< 0.05	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.1	< 0.05	< 0.05	12	3
Phenanthrene	µg/L	< 0.05	< 0.05	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.1	< 0.05	< 0.05	0.3	0.4
Anthracene	µg/L	< 0.01	< 0.01	< 0.02[c]	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02[c]	< 0.01	< 0.01	0.1	0.012
Acridine	µg/L	< 0.05	< 0.05	< 0.1[c]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.1[c]	< 0.05	< 0.05	0.05	4.4
Fluoranthene	µg/L	< 0.04	< 0.04	< 0.08[c]	< 0.04	< 0.04	< 0.04	< 0.04	< 0.08[c]	< 0.04	< 0.04	0.2	0.04
Pyrene	µg/L	***0.02***	< 0.02	< 0.04[c]	< 0.02	< 0.02	***0.02***	< 0.02	< 0.04[c]	< 0.02	< 0.02	0.02	0.025
Benzo(a)anthracene	µg/L	0.02	< 0.01	< 0.02[c]	< 0.01	< 0.01	0.02	< 0.01	< 0.02[c]	< 0.01	< 0.01	0.1	0.018
Chrysene	µg/L	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	n/a	n/a
Benzo(b)fluoranthene	µg/L	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	n/a	n/a
Benzo(k)fluoranthene	µg/L	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	n/a	n/a
Benzo(a)pyrene	µg/L	< 0.01	< 0.01	< 0.02[c]	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02[c]	< 0.01	< 0.01	0.01	0.015
Indeno(1,2,3-cd)pyrene	µg/L	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	n/a	n/a
Dibenz(a,h)anthracene	µg/L	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	n/a	n/a
Benzo(g,h,i)perylene	µg/L	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	n/a	n/a
Quinoline	µg/L	< 0.5	< 0.5	< 1	< 0.5	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 0.5	n/a	3.4

Associated CanTest files: 51020107, 60711045, 70720118, 91006094, 100929013.
All terms defined within the body of Morrow's report.

< Denotes concentration less than indicated detection limit.
n/a Denotes no applicable standard.

BOLD Concentration greater than or equal to BCWQG Aquatic Life (AW) guideline.

SHADED Concentration greater than or equal to CCME CEQG Aquatic Life (AW) guideline.

[a] Standard/Guideline to protect freshwater aquatic life.
[b] The range presented in the Compendium is not defined, therefore results exceeding the lower limit are shown as exceeding the BC criteria.
[c] Laboratory detection limit exceeds regulatory standard.

TABLE 8 (Cont'd): Summary of Analytical Results for Surface Water - PAHs

Sample Location		SW04-3 (mid-stream)					SW04-4 (downstream)					**BC Standards**	**Federal Guidelines**
Sample ID		SW04-3	SW04-3-050707	SW04-3-060717	SW08-3-081004	**SW04-3-090926**	SW04-4	SW04-4-050707	SW04-4-060717	SW08-4-081004	**SW04-4-090926**	**BCWQG Aquatic Life[a]**	**CCME CEQG Aquatic Life[a]**
Sample Date (yyyy mm dd)		2004 10 16	2005 07 07	2006 07 17	2008 10 04	**2009 09 26**	2004 10 16	2005 07 07	2006 07 17	2008 10 04	**2009 09 26**		
Parameter	**Units**	**Analytical Results**										**(AW)**	**(AW)**
Polycyclic Aromatic Hydrocarbons													
Naphthalene	µg/L	< 0.3	< 0.3	< 0.6	< 0.3	< 0.3	< 0.3	< 0.3	< 0.6	< 0.3	< 0.3	1	1.1
Acenaphthylene	µg/L	< 0.1	< 0.1	< 0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	< 0.1	n/a	n/a
Acenaphthene	µg/L	< 0.1	< 0.1	< 0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	< 0.1	6	5.8
Fluorene	µg/L	< 0.05	< 0.05	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.1	< 0.05	< 0.05	12	3
Phenanthrene	µg/L	< 0.05	< 0.05	< 0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.1	< 0.05	< 0.05	0.3	0.4
Anthracene	µg/L	< 0.01	< 0.01	< 0.02[c]	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02[c]	< 0.01	< 0.01	0.1	0.012
Acridine	µg/L	< 0.05	< 0.05	< 0.1[c]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.1[c]	< 0.05	< 0.05	0.05	4.4
Fluoranthene	µg/L	< 0.04	< 0.04	< 0.08[c]	< 0.04	< 0.04	< 0.04	< 0.04	< 0.08[c]	< 0.04	< 0.04	0.2	0.04
Pyrene	µg/L	< 0.02	< 0.02	< 0.04[c]	< 0.02	< 0.02	< 0.02	< 0.02	< 0.04[c]	< 0.02	< 0.02	0.02	0.025
Benzo(a)anthracene	µg/L	< 0.01	< 0.01	< 0.02[c]	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02[c]	< 0.01	< 0.01	0.1	0.018
Chrysene	µg/L	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	n/a	n/a
Benzo(b)fluoranthene	µg/L	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	n/a	n/a
Benzo(k)fluoranthene	µg/L	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	n/a	n/a
Benzo(a)pyrene	µg/L	< 0.01	< 0.01	< 0.02[c]	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02[c]	< 0.01	< 0.01	0.01	0.015
Indeno(1,2,3-cd)pyrene	µg/L	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	n/a	n/a
Dibenz(a,h)anthracene	µg/L	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	n/a	n/a
Benzo(g,h,i)perylene	µg/L	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01	n/a	n/a
Quinoline	µg/L	< 0.5	< 0.5	< 1	< 0.5	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 0.5	n/a	3.4

Associated CanTest files: 51020107, 60711045, 70720118, 91006094, 100929013.
All terms defined within the body of Morrow's report.

< Denotes concentration less than indicated detection limit.
n/a Denotes no applicable standard.

BOLD	Concentration greater than or equal to BCWQG Aquatic Life (AW) guideline.
SHADED	Concentration greater than or equal to CCME CEQG Aquatic Life (AW) guideline.

[a] Standard/Guideline to protect freshwater aquatic life.
[b] The range presented in the Compendium is not defined, therefore results exceeding the lower limit are shown as exceeding the BC criteria.
[c] Laboratory detection limit exceeds regulatory standard.

TABLE 9: Summary of Analytical Results for Surface Water - Inorganics

Sample Location		SW04-1 (Upstream)										SW04-2 (Mid-Stream)								BC Standards	Federal Guidelines
Sample ID		SW04-1	SW04-1-050707	SW04-1-060717	SW04-1-060926	SW04-1-080619	SW08-1-081004	SW04-1-090711	SW-A-090711	**QA/QC**	**SW04-1-090926**	SW04-2	SW04-2-050707	SW04-2-060717	SW04-2-060926	SW04-2-080619	SW08-2-081004	SW04-2-090711	**SW04-2-090926**	**BCWQG Aquatic Life[b,c,h] (AW)**	**CCME CEQG Aquatic Life[h] (AW)**
Sample Date (yyyy mm dd)		2004 10 16	2005 07 07	2006 07 17	2006 09 26	2008 06 19	2008 10 04	2009 07 11	2009 07 11	**RPD** %	**2009 09 26**	2004 10 16	2005 07 07	2006 07 17	2006 09 26	2008 06 19	2008 10 04	2009 07 11	**2009 09 26**		
Parameter	**Units**	**Analytical Results**										**Analytical Results**									
Physical Parameters																					
Hardness	mg/L	22.3	16.9	13	20.7	13.4	16.8	18.1	18.2	*	15.1	23.2	17.8	15	21.7	13.6	17.1	19.1	16.3	n/a	n/a
pH (field)	pH	-	-	-	-	-	7.27	8.76	8.76	*	7.56	-	-	-	-	-	7.26	8	7.81	n/a	n/a
Dissolved Inorganics																					
Ammonia Nitrogen	µg/L	< 10	-	< 10	< 10	< 10	20	< 10	< 10	*	< 10	< 10	-	-	< 10	< 10	10	< 10	< 10	n/a	n/a
Nitrate	µg/L	500	-	210	480	280	460	250	270	*	280	490	-	210	480	280	470	260	-	200,000 (max)	2,900
Nitrite	µg/L	< 2	-	< 2	< 2	< 2	< 2	< 2	< 2	*	< 2	< 2	-	< 2	< 2	< 2	< 2	< 2	-	60 (Cl<2.0)	60
Nitrate+Nitrite	µg/L	500	-	210	480	280	460	250	270	*	280	490	-	210	480	280	470	260	-	200,000 (max)	n/a
Chloride	mg/L	0.3	-	< 0.2	0.22	< 0.2	0.22	< 0.2	< 0.2	*	< 0.2	0.29	-	< 0.2	0.23	< 0.2	0.23	< 0.2	-	600	n/a
Fluoride	µg/L	< 50	-	< 50	< 50	< 50	< 50	< 50	< 50	*	< 50	< 50	-	< 50	< 50	< 50	< 50	< 50	-	200 (H<50)	120
Sulphate	mg/L	2.8	-	1.59	2	1.3	1.42	1.93	2.01	*	1.3	2.9	-	1.59	2	1.33	1.44	2.09	-	100 (max)	n/a
Total Alkalinity (as CaCO3)	mg/L	24.2	-	-	21.7	-	-	-	-	-	-	24.8	-	-	21.8	-	-	-	-	n/a	n/a
Bicarbonate HCO3	mg/L	29.5	-	21.4	26.5	17.6	23.6	27.5	27.2	*	20.2	30.3	-	22.6	26.6	17.6	23.7	29.1	20.7	n/a	n/a
Carbonate CO3	mg/L	< 0.5	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	*	< 0.5	< 0.5	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	n/a	n/a
Hydroxide	mg/L	< 0.5	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	*	< 0.5	< 0.5	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	n/a	n/a
Total Metals																					
Aluminum	µg/L	**29**	**26**	**15**	**22**	**51**	**100**	25	26	*	81	**26**	**26**	**31**	**22**	**51**	94	26	**110**	n/a	5 - 100[f]
Antimony	µg/L	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	*	< 0.1	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.1	20	n/a
Arsenic	µg/L	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	*	< 0.2	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	5	5
Barium	µg/L	6.7	5.1	5	6.6	4.9	5.6	6.2	6.3	*	5.6	6.9	5.1	5	7.1	5.1	5.8	6.6	6	5,000 (max)	n/a
Beryllium	µg/L	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	*	< 0.1	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.1	5.3 (chronic)	n/a
Bismuth	µg/L	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	*	< 0.1	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.1	n/a	n/a
Boron	µg/L	< 10	< 10	< 50	10	< 10	< 10	< 10	< 10	*	< 5	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 5	1,200	n/a
Cadmium	µg/L	-	-	< 0.2[a]	< 0.04[a]	< 0.04[a]	< 0.04[a]	< 0.04[a]	< 0.04[a]	-	< 0.01[a]	-	-	< 0.2[a]	< 0.04[a]	< 0.04[a]	< 0.04[a]	< 0.04[a]	< 0.01[a]	0.005 - 0.09[d]	0.005 - 0.09[d]
Calcium	µg/L	7,930	6,000	4,720	7,570	4,680	6,050	6,470	6,520	*	5,280	8,240	6,340	5,270	7,910	4,760	6,180	6,820	5,680	n/a	n/a
Chromium	µg/L	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	*	< 0.2	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	1 (Cr(+6))	1
Cobalt	µg/L	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	*	< 0.1	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.1	110	n/a
Copper	µg/L	0.4	0.2	< 1	0.6	1.1	0.4	< 0.2	< 0.2	*	0.4	0.5	0.3	< 1	0.5	0.4	0.4	0.2	0.4	3.2 - 4.2[e]	2 (H<120)
Iron	µg/L	20	< 10	< 50	20	20	20	< 10	< 10	*	< 10	< 10	< 10	< 50	20	20	20	< 10	< 10	1,000	300
Lead	µg/L	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	*	< 0.05	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.05	6.0 - 13.0 (max)[g]	1 (H<60)
Lithium	µg/L	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	*	< 0.1	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.1	870	n/a
Magnesium	µg/L	600	460	330	430	400	400	460	470	*	460	640	470	390	460	410	400	510	520	n/a	n/a
Manganese	µg/L	0.7	0.5	< 1	0.3	0.4	1.1	0.3	0.3	*	0.6	0.5	0.4	< 1	0.3	0.9	1.1	0.4	0.8	683.3 - 800.1 (acute max)	n/a
Mercury	µg/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.1	0.026
Molybdenum	µg/L	0.3	0.2	< 0.5	0.3	< 0.1	0.3	0.3	0.3	*	0.2	0.3	0.2	< 0.5	0.3	< 0.1	0.2	0.3	0.2	2,000 (max)	73
Nickel	µg/L	< 0.2	< 0.2	< 1	< 0.2	0.3	< 0.2	< 0.2	< 0.2	*	< 0.2	< 0.2	< 0.2	< 1	< 0.2	0.5	< 0.2	< 0.2	< 0.2	25 (H 0-60)	25 (H<60)
Selenium	µg/L	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	*	< 0.2	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	2	1
Silver	µg/L	< 0.05	< 0.05	< 0.25[a]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	*	< 0.04	< 0.05	< 0.05	< 0.25[a]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.04	0.1 (H<=100)	0.1
Thallium	µg/L	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	*	< 0.02	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.3	0.8
Titanium	µg/L	0.5	0.3	< 1	0.3	0.4	1	< 0.2	0.2	*	0.8	0.4	0.3	< 1	0.3	0.4	0.9	0.2	0.9	2,000	n/a
Uranium	µg/L	< 0.1	< 0.1	< 0.5	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	*	0.08	< 0.1	< 0.1	< 0.5	< 0.1	< 0.1	< 0.1	< 0.1	0.08	300 (max)	n/a
Vanadium	µg/L	0.2	0.2	< 1	< 0.2	0.2	0.2	0.3	0.3	*	0.3	0.2	0.2	< 1	< 0.2	< 0.2	0.2	0.3	0.3	6	n/a
Zinc	µg/L	2	< 1	< 5	< 1	4	10	< 1	< 1	*	< 1	1	2	< 5	< 1	9	< 1	< 1	< 1	33 (H<=90)	30

Associated CanTest files: 51020107, 60711045, 70720118, 70930027, 90623066, 91006094, 100714077, 100929013.
All terms defined within the body of Morrow's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard.
BOLDED sample denotes most recent sampling event

BOLD	Concentration greater than or equal to BCWQG Aquatic Life (AW) guideline.
SHADED	Concentration greater than or equal to CCME CEQG Aquatic Life (AW) guideline.

[a] Laboratory detection limit exceeds regulatory standard.
[b] British Columbia Approved Water Quality Guidelines 2006 Edition, updated August 2006.
[c] A Compendium of Working Water Quality Guidelines for British Columbia, updated August 2006.
[d] Criterion for cadmium (mg/L) is determined using the following formula: 10^(0.86[log(hardness)]-3.2)/1000.
[e] Criterion for copper (mg/L) is determined using the following formula: [0.094*(hardness)+2]/1000.
[f] Guideline varies with pH.
[g] If hardness is <= 8mg/L CaCO3, guideline for Total Pb = 0.003 mg/L, otherwise Total Pb = exp[1.273*ln(hardness)-1.460] / 1000.
[h] Guideline to protect freshwater aquatic life.

TABLE 9 (Cont'd): Summary of Analytical Results for Surface Water - Inorganics

Sample Location		SW04-3 (Mid-Stream)								SW04-4 (Downstream)								BC Standards	Federal Guidelines
Sample ID		SW04-3	SW04-3-050707	SW04-3-060717	SW04-3-060926	SW04-3-080619	SW08-3-081004	SW04-3-090711	**SW04-3-090926**	SW04-4	SW04-4-050707	SW04-4-060717	SW04-4-060926	SW04-4-080619	SW08-4-081004	SW04-4-090711	**SW04-4-090926**	**BCWQG Aquatic Life[b,c,h] (AW)**	**CCME CEQG Aquatic Life[h] (AW)**
Sample Date (yyyy mm dd)		2004 10 16	2005 07 07	2006 07 17	2006 09 26	2008 06 19	2008 10 04	2009 07 11	**2009 09 26**	2004 10 16	2005 07 07	2006 07 17	2006 09 26	2008 06 19	2008 10 04	2009 07 11	**2009 09 26**		
Parameter	**Units**	**Analytical Results**																	
Physical Parameters																			
Hardness	mg/L	23.6	17.9	14	23.1	13.7	17.2	19.7	16.3	22.9	18.3	15	23.5	13.9	18.3	20.7	16.5	n/a	n/a
pH (field)	pH	-	-	-	-	-	7.27	8.25	8.01	-	-	-	-	-	7.23	7.84	7.95	n/a	n/a
Dissolved Inorganics																			
Ammonia Nitrogen	µg/L	< 10	-	-	< 10	< 10	20	< 10	< 10	< 10	-	-	< 10	20	40	< 10	< 10	n/a	n/a
Nitrate	µg/L	510	-	220	480	280	470	270	280	510	-	210	490	270	470	270	280	200,000 (max)	2,900
Nitrite	µg/L	< 2	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	-	< 2	< 2	< 2	< 2	< 2	< 2	60 (Cl<2.0)	60
Nitrate+Nitrite	µg/L	510	-	220	480	280	470	270	280	510	-	210	490	270	470	270	280	200,000 (max)	n/a
Chloride	mg/L	0.31	-	< 0.2	0.22	<0.2	0.23	< 0.2	< 0.2	0.33	-	< 0.2	0.27	<0.2	0.33	< 0.2	< 0.2	600	n/a
Fluoride	µg/L	< 50	-	< 50	< 50	< 50	< 50	< 50	< 50	< 50	-	< 50	< 50	< 50	< 50	< 50	< 50	200 (H<50)	120
Sulphate	mg/L	2.8	-	1.64	2.06	1.30	1.43	2.04	1.3	2.9	-	1.65	2.06	1.3	1.46	2.11	1.28	100 (max)	n/a
Total Alkalinity (as CaCO3)	mg/L	26.5	-	-	22.2	-	-	-	-	25.9	-	-	22.8	-	-	-	-	n/a	n/a
Bicarbonate HCO3	mg/L	32.3	-	22.6	27.1	18.1	24.3	29.7	20.8	31.6	-	22.8	27.8	18.0	24.8	29.5	21.1	n/a	n/a
Carbonate CO3	mg/L	< 0.5	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	n/a	n/a
Hydroxide	mg/L	< 0.5	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	n/a	n/a
Total Metals																			
Aluminum	µg/L	**24**	**32**	**22**	**20**	**53**	97	30	89	**44**	**56**	**32**	**34**	**68**	96	27	82	n/a	5 - 100[f]
Antimony	µg/L	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.1	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.1	20	n/a
Arsenic	µg/L	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	5	5
Barium	µg/L	7	5.3	5	7.3	5	5.9	6.9	6	6.9	5.6	6	7.6	5.2	6.4	7.4	6.1	5,000 (max)	n/a
Beryllium	µg/L	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.1	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.1	5.3 (chronic)	n/a
Bismuth	µg/L	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.1	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.1	n/a	n/a
Boron	µg/L	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 5	< 10	< 10	< 50	< 10	< 10	< 10	< 10	< 5	1,200	n/a
Cadmium	µg/L	-	-	< 0.2[a]	< 0.04[a]	< 0.04[a]	< 0.04[a]	< 0.04[a]	< 0.01[a]	-	-	< 0.2[a]	< 0.04[a]	< 0.04[a]	< 0.04[a]	< 0.04[a]	< 0.01[a]	0.005 - 0.09[d]	0.005 - 0.09[d]
Calcium	µg/L	8,330	6,340	5,130	8,400	4,800	6,200	7,020	5,680	8,070	6,480	5,270	8,540	4,880	6,610	7,370	5,790	n/a	n/a
Chromium	µg/L	0.3	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.7	0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	1 (Cr(+6))	1
Cobalt	µg/L	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.1	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.1	110	n/a
Copper	µg/L	0.5	0.3	< 1	0.5	0.4	0.4	0.2	0.4	0.6	0.6	< 1	0.6	1	0.4	0.2	0.5	3.2 - 4.2[e]	2 (H<120)
Iron	µg/L	< 10	10	< 50	30	20	20	< 10	20	20	30	< 50	30	30	20	< 10	< 10	1,000	300
Lead	µg/L	0.6	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.05	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.05	6.0 - 13.0 (max)[g]	1 (H<60)
Lithium	µg/L	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.1	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.1	870	n/a
Magnesium	µg/L	660	480	370	500	410	420	510	500	660	520	370	520	410	440	540	500	n/a	n/a
Manganese	µg/L	0.4	0.5	< 1	< 0.2	0.4	1.1	0.4	0.9	1	1.3	< 1	0.7	1	1.1	0.4	0.7	683.3 - 800.1 (acute max)	n/a
Mercury	µg/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.1	0.026
Molybdenum	µg/L	0.3	0.2	< 0.5	0.3	< 0.1	0.2	0.2	0.2	0.3	0.3	< 0.5	0.3	< 0.1	0.2	0.3	0.2	2,000 (max)	73
Nickel	µg/L	< 0.2	< 0.2	< 1	< 0.2	0.4	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 1	< 0.2	0.5	< 0.2	< 0.2	< 0.2	25 (H 0-60)	25 (H<60)
Selenium	µg/L	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	2	1
Silver	µg/L	< 0.05	< 0.05	< 0.25[a]	< 0.05	3.9	< 0.05	< 0.05	< 0.04	< 0.05	< 0.05	< 0.25[a]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.04	0.1 (H<=100)	0.1
Thallium	µg/L	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.3	0.8
Titanium	µg/L	0.3	0.4	< 1	0.3	0.4	0.9	0.4	1	1	1.8	< 1	0.8	1.4	0.9	0.4	0.8	2,000 (Check BCWQG)	n/a
Uranium	µg/L	< 0.1	< 0.1	< 0.5	< 0.1	< 0.1	< 0.1	< 0.1	0.08	< 0.1	< 0.1	< 0.5	< 0.1	< 0.1	< 0.1	< 0.1	0.08	300 (max)	n/a
Vanadium	µg/L	< 0.2	0.2	< 1	< 0.2	< 0.2	0.2	0.3	0.3	0.2	0.3	< 1	< 0.2	0.2	0.2	0.3	0.3	6	n/a
Zinc	µg/L	< 1	< 1	< 5	< 1	3	< 1	< 1	< 1	1	1	< 5	< 1	4	< 1	< 1	< 1	33 (H<=90)	30

Associated CanTest files: 51020107, 60711045, 70720118, 70930027, 90623066, 91006094, 100714077, 100929013.
All terms defined within the body of Morrow's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard.
BOLDED sample denotes most recent sampling event

BOLD Concentration greater than or equal to BCWQG Aquatic Life (AW) guideline.
SHADED Concentration greater than or equal to CCME CEQG Aquatic Life (AW) guideline.

[a] Laboratory detection limit exceeds regulatory standard.
[b] British Columbia Approved Water Quality Guidelines 2006 Edition, updated August 2006.
[c] A Compendium of Working Water Quality Guidelines for British Columbia, updated August 2006.
[d] Criterion for cadmium (mg/L) is determined using the following formula: 10^(0.86[log{hardness}]-3.2)/1000.
[e] Criterion for copper (mg/L) is determined using the following formula: [0.094*(hardness)+2]/1000.
[f] Guideline varies with pH.
[g] If hardness is <= 8mg/L CaCO3, guideline for Total Pb = 0.003 mg/L, otherwise Total Pb = exp[1.273*ln(hardness)-1.460] / 1000.
[h] Guideline to protect freshwater aquatic life.

TABLE 10: Summary of Analytical Results for Hydrocarbons - Indoor Air and Soil Vapour

					Monocyclic Aromatic Hydrocarbons				Hydrocarbons						Aliphatics					Aromatics			
Sample Location	Sample ID	Sample Date (yyyy mm dd)	Time (hr)	Sample Type	Benzene (mg/m^3)	Ethyl-benzene (mg/m^3)	Toluene (mg/m^3)	Xylenes (mg/m^3)	VH (mg/m^3)	VPH (C6-C10) (mg/m^3)	Naphthalene (mg/m^3)	n-Hexane (mg/m^3)	>C10-C19 (mg/m^3)	> C10-C16 (mg/m^3)	C6-C8 (mg/m^3)	>C8-C10 (mg/m^3)	>C10-C12 (mg/m^3)	>C12-C16 (mg/m^3)	>C16-C19 (mg/m^3)	>C8-C10 (mg/m^3)	>C10-C12 (mg/m^3)	>C12-C16 (mg/m^3)	>C16-C19 (mg/m^3)
House #5 Basement	AA-1-031024	2003 10 24	4	Indoor Air	< 0.02	< 0.02	< 0.02	< 0.02	< 0.2	< 0.2	-	-	< 0.2	< 0.2	-	-	-	-	-	-	-	-	-
	AA-1-031025	2003 10 25	4	Indoor Air	< 0.02	< 0.02	< 0.02	< 0.02	< 0.2	< 0.2	-	-	< 0.2	< 0.2	-	-	-	-	-	-	-	-	-
	H5-Basement-050913(A/A)	2005 09 13	8	Indoor Air	< 0.005	< 0.005	< 0.005	< 0.005	< 0.5	< 0.5	< 0.005	< 0.005	-	< 0.02	< 0.004	< 0.004	< 0.002	< 0.02	< 0.02	< 0.002	< 0.002	< 0.02	< 0.02
	H5-A-050913(A/A)	Dup of H5-Basement-050913 (A/A)			< 0.005	< 0.005	< 0.005	< 0.005	< 0.5	< 0.5	< 0.005	< 0.005	-	< 0.02	< 0.004	< 0.004	< 0.002	< 0.02	< 0.02	< 0.002	< 0.002	< 0.02	< 0.02
	QA/QC RPD %				*	*	*	*	*	*	*	*	-	*	*	*	*	*	*	*	*	*	*
	H5-Basement-060324(A/A)	2006 03 24	8	Indoor Air	< 0.005	< 0.005	0.028	< 0.005	< 0.05	< 0.05	< 0.005	< 0.005	0.75	-	< 0.04	< 0.04	0.17	0.58	< 0.02	0.01	< 0.002	< 0.02	< 0.02
	H5-B-060321(A/A)	Dup of H5-Basement-060324 (A/A)			< 0.005	< 0.005	0.027	< 0.005	0.085	0.0554	< 0.005	< 0.005	0.18	-	< 0.04	0.046	0.08	0.096	< 0.02	0.008	< 0.002	< 0.02	< 0.02
	QA/QC RPD %				*	*	4	*	*	*	*	*	123	-	*	*	72	143	*	22	*	*	*
	H5-Basement-060614 (A/A)	2006 06 14	4	Indoor Air	< 0.005	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05	< 0.005	< 0.005	0.49	-	< 0.004	< 0.004	0.14	0.26	0.084	< 0.002	< 0.002	< 0.02	< 0.02
	H5-A-060614 (A/A)	Dup of H5-Basement-060614 (A/A)			< 0.005	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05	< 0.005	< 0.005	0.46	-	< 0.004	< 0.004	0.18	0.22	0.061	< 0.002	< 0.002	< 0.02	< 0.02
	QA/QC RPD %				*	*		*	*	*	*	*	6	-	*	*	25	17	32	*	*	*	*
	H5-Basement-060618 (A/A)	2006 06 18	4	Indoor Air	< 0.005	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05	< 0.005	< 0.005	0.3	-	< 0.004	< 0.004	0.1	0.2	< 0.02	< 0.002	< 0.002	< 0.02	< 0.02
	H5-A-060618 (A/A)	Dup of H5-Basement-060618 (A/A)			< 0.005	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05	< 0.005	< 0.005	0.29	-	< 0.004	< 0.004	0.12	0.18	< 0.02	< 0.002	< 0.002	< 0.02	< 0.02
	QA/QC RPD %				*	*	*	*	*	*	*	*	3	-	*	*	18	11	*	*	*	*	*
	H5-Basement-060719 (A/A)	2006 07 19	8	Indoor Air	< 0.005	< 0.005	0.15	< 0.005	0.13	< 0.05	< 0.005	< 0.005	0.42	-	< 0.004	0.019	0.16	0.26	< 0.02	0.004	< 0.002	< 0.02	< 0.02
	H5-Basement-060921(A/P)	2006 09 21	8	Indoor Air	< 0.005	< 0.005	0.023	< 0.005	0.11	0.087	< 0.005	< 0.005	0.21	-	0.06	0.026	0.054	0.151	< 0.02	0.0058	< 0.002	< 0.02	< 0.02
	H5-Basement-070925 (A/A)	2007 09 25	8	Indoor Air	< 0.005	<0.005	0.014	< 0.005	0.18	0.16	< 0.005	< 0.005	0.32	-	0.05	0.113	0.095	0.19	0.03	< 0.00208	< 0.00208	< 0.0208	< 0.0208
	H5-A-070925 (A/A)	Dup of H5-Basement-070925 (A/A)			< 0.005	<0.005	<0.005	<0.005	0.12	0.12	< 0.005	< 0.005	0.36	-	0.044	0.077	0.309	0.05	< 0.0208	< 0.00208	< 0.00208	< 0.0208	< 0.0208
	QA/QC RPD %				*	*	*	*	*	*	*	*	12	-	*	*	106	117	*	*	*	*	*
	H5-Basement-080619 (A/A)	2008 06 19	8	Indoor Air	0.024	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05	< 0.005	< 0.005	0.28	-	0.007	0.015	0.066	0.22	< 0.0208	< 0.00208	-	-	-
	H5-Basement-080926 (A/A)	2008 09 26	8	Indoor Air	< 0.005	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05	< 0.002083	< 0.005	0.36	-	< 0.00417	< 0.00417	0.031	0.32	< 0.0208	< 0.00208	< 0.00417	< 0.0417	< 0.0417
	H5-A-080926 (A/A)	Dup of H5-Basement-080926 (A/A)			< 0.005	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05	< 0.002083	< 0.005	0.31	-	< 0.00417	< 0.00417	0.039	0.25	< 0.0208	< 0.00208	< 0.00417	< 0.0417	< 0.0417
	QA/QC RPD %				*	*	*	*	*	*	-	*	15	-	*	*	23	25	*	*	-	-	-
	H5-Basement-090716 (A/A)	2009 07 16	8	Indoor Air	< 0.005	< 0.005	< 0.005	< 0.005	0.19	0.19	< 0.005	< 0.005	0.37	-	0.007	0.02	0.11	0.25	< 0.0208	< 0.00208	< 0.00417	< 0.00417	< 0.0417
	H5-B-090716 (A/A)	Dup of H5-Basement-090716 (A/A)			< 0.005	< 0.005	< 0.005	< 0.005	0.15	0.15	< 0.005	< 0.005	0.35	-	< 0.00417	0.006	0.084	0.25	< 0.0208	< 0.00208	< 0.00426	< 0.00426	< 0.0426
	QA/QC RPD %				*	*	*	*	*	*	*	*	6	-	*	*	*	*	*	*	*	*	*
	H5-BASEMENT-090826 (A/A)	2009 08 26	8	Indoor Air	< 0.005	< 0.005	< 0.005	< 0.005	0.07	0.07	< 0.005	< 0.005	0.19	-	< 0.00417	< 0.00417	0.049	0.14	< 0.0208	< 0.00208	< 0.00417	< 0.00417	< 0.0417
	H5-A-090826 (A/A)	Dup of H5-BASEMENT-090826 (A/A)			< 0.005	< 0.005	< 0.005	< 0.005	0.06	0.06	< 0.005	< 0.005	0.19	-	< 0.00415	< 0.00415	0.034	0.16	< 0.0207	< 0.00207	< 0.00417	< 0.00417	< 0.0417
	QA/QC RPD %				*	*	*	*	*	*	*	*	0		*	*	36	13	*	*	-	-	-
	H5-Basement-090925 (A/A)	2009 09 25	8	Indoor Air	< 0.005	< 0.005	< 0.005	< 0.005	0.07	0.07	< 0.005	< 0.005	0.15	-	< 0.00417	< 0.00417	0.035	0.16	< 0.0208	< 0.00208	< 0.00417	< 0.00417	< 0.0417
	H5-B-090925 (A/A)	Dup of H5-Basement-090925 (A/A)			< 0.005	< 0.005	< 0.005	< 0.005	0.1	0.1	< 0.005	< 0.005	0.25	-	< 0.00417	< 0.00417	0.044	0.2	< 0.0208	< 0.00208	< 0.00417	< 0.00417	< 0.0417
	QA/QC RPD %				*	*	*	*	*	*	*	*	50	-	*	*	23	22	*	*	-	-	-
	H5-Basement-100127 (A/A)	**2010 01 27**	4	Indoor Air	< 0.005	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05	< 0.005	< 0.005	0.08	-	< 0.00417	0.022	0.024	0.021	0.04	< 0.00208	< 0.00417	< 0.00417	< 0.0417
	H5-B-100127 (A/A)	**2010 01 27**	4	Indoor Air	< 0.005	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05	< 0.005	< 0.005	0.1	-	< 0.00417	0.017	0.028	< 0.0208	0.06	< 0.00208	< 0.00417	< 0.00417	< 0.0417
	QA/QC RPD %				*	*	*	*	*	*	*	*	*	-	*	*	*	*	*	*	*	*	*
House #5 Main Floor	H5-Main-050913(A/A)	2005 09 13	8	Indoor Air	< 0.005	< 0.005	< 0.005	< 0.005	< 0.5	< 0.5	< 0.005	< 0.005	-	< 0.02	< 0.004	< 0.004	< 0.002	< 0.02	< 0.02	< 0.002	< 0.002	< 0.02	< 0.02
	H5-Main-060324(A/A)	2006 03 24	8	Indoor Air	< 0.005	< 0.005	0.016	0.005	< 0.05	< 0.05	< 0.005	< 0.005	0.24	-	< 0.04	< 0.04	0.11	0.13	< 0.02	0.01	< 0.002	< 0.02	< 0.02
	H5-Main-060614 (A/A)	2006 06 14	4	Indoor Air	< 0.005	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05	< 0.005	< 0.005	0.29	-	< 0.004	< 0.004	0.24	0.047	< 0.02	< 0.002	< 0.002	< 0.02	< 0.02
	H5-Main-060618 (A/A)	2006 06 18	4	Indoor Air	< 0.005	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05	< 0.005	< 0.005	0.33	-	< 0.004	< 0.004	0.27	0.057	< 0.02	< 0.002	< 0.002	< 0.02	< 0.02
	H5-Main-060719 (A/A)	2006 07 19	8	Indoor Air	< 0.005	< 0.005	0.021	< 0.005	0.13	0.1	< 0.005	< 0.005	0.1	-	< 0.004	0.13	0.1	< 0.02	< 0.02	< 0.002	< 0.002	< 0.02	< 0.02
	H5-A-060719 (A/A)	Dup of 5-Main-060719 (A/A)			< 0.005	< 0.005	0.031	< 0.005	0.12	0.083	< 0.005	< 0.005	0.099	-	< 0.004	0.12	0.099	< 0.02	< 0.02	< 0.002	< 0.002	< 0.02	< 0.02
	QA/QC RPD %				*	*	*	*	*	*	*	*	*	-	*	145	47	*	*	*	*	*	*
	H5-Main-060921 (A/A)	2006 09 21	8	Indoor Air	< 0.005	< 0.005	0.014	< 0.005	< 0.05	< 0.05	< 0.005	< 0.005	< 0.02	-	< 0.004	< 0.004	< 0.002	< 0.02	< 0.02	< 0.002	< 0.002	< 0.02	< 0.02
	H5-A-060921 (A/A)	Dup of 5-Main-060921 (A/A)			< 0.005	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05	< 0.005	< 0.005	< 0.02	-	< 0.004	< 0.004	< 0.002	< 0.02	< 0.02	< 0.002	< 0.002	< 0.02	< 0.02
	QA/QC RPD %				*	*	*	*	*	*	*	*	*	-	*	*	*	*	*	*	*	*	*
	H5-Main-070925	2007 09 25	8	Indoor Air	< 0.005	< 0.005	< 0.005	< 0.005	0.07	0.07	< 0.005	< 0.005	0.17	-	0.016	0.058	0.043	0.12	< 0.0208	< 0.00208	< 0.00208	< 0.0208	< 0.0208
	H5-Main-080619 (A/A)	2008 06 19	8	Indoor Air	0.059	< 0.005	< 0.005	< 0.005	0.12	0.06	< 0.005	< 0.005	0.09	-	< 0.00417	0.059	0.090	< 0.0208	< 0.0208	< 0.00208	-	-	-
	H5-A-080619 (A/A)	Dup of H5-Main-080619 (A/A)			0.021	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05	< 0.005	< 0.005	0.19	-	< 0.00417	0.015	0.043	0.15	< 0.0208	< 0.00208	-	-	-
	QA/QC RPD %				*	*	*	*	*	*	*	*	-	-	*	*	42	38	*	*	-	-	-
	H5-Main-080926 (A/A)	2008 09 26	8	Indoor Air	< 0.005	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05	< 0.002083	< 0.005	< 0.0208	-	< 0.00417	< 0.00417	< 0.00208	< 0.0208	< 0.0208	< 0.00208	< 0.00417	< 0.0417	< 0.0417
	H5-Main-090716 (A/A)	2009 07 16	8	Indoor Air	< 0.005	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05	< 0.005	< 0.005	0.04	-	0.007	0.014	0.011	0.023	< 0.0208	< 0.00208	< 0.00417	< 0.00417	< 0.0417
	H5-MAIN-090826 (A/A)	2009 08 26	8	Indoor Air	< 0.005	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05	< 0.005	< 0.005	< 0.0208	-	< 0.00417	< 0.00417	< 0.00208	< 0.0208	< 0.0208	< 0.00208	< 0.00417	< 0.00417	< 0.0417
	H5-Main-090925 (A/A)	2009 09 25	-	Indoor Air	< 0.005	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05	< 0.005	< 0.005	0.06	-	< 0.00417	< 0.00417	0.022	0.03	< 0.0208	< 0.00208	< 0.00417	< 0.00417	< 0.0417
	H5-Main-100127 (A/A)	**2010 01 27**	4	Indoor Air	< 0.005	< 0.005	< 0.005	< 0.005	< 0.05	< 0.05	< 0.005	< 0.005	0.05	-	< 0.00417	0.022	0.01	< 0.0208	0.03	< 0.00208	< 0.00417	< 0.00417	< 0.0417
SVW-1	SVW-1-050912(A/A)	2005 09 12	2	Soil Vapour	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.08	-	< 0.016	< 0.016	< 0.008	< 0.08	< 0.08	< 0.008	< 0.008	< 0.08	< 0.08
SVW-2	SVW-2-050912(A/A)	2005 09 12	2	Soil Vapour	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.08	-	< 0.016	< 0.016	< 0.008	< 0.08	< 0.08	< 0.008	< 0.008	< 0.08	< 0.08
SVW-3	SVW-3-050912(A/A)	2005 09 12	2	Soil Vapour	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.08	-	< 0.016	< 0.016	< 0.008	< 0.08	< 0.08	< 0.008	< 0.008	< 0.08	< 0.08
SVW-4	SVW-4-050912(A/A)	2005 09 12	2	Soil Vapour	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.08	-	< 0.016	< 0.016	< 0.008	< 0.08	< 0.08	< 0.008	< 0.008	< 0.08	< 0.08
SVW09-1	SVW09-1-090715 (A/A)	2009 07 15	2	Soil Vapour	< 0.02	< 0.02	< 0.02	< 0.02	< 0.2	< 0.2	< 0.02	< 0.02	< 0.0833	-	< 0.0167	< 0.0167	< 0.00833	< 0.0833	< 0.0833	< 0.00833	< 0.00833	< 0.00833	< 0.0833
	SVW09-1-090826 (A/A)	2009 08 26	2	Soil Vapour	< 0.02	< 0.02	< 0.02	< 0.02	< 0.2	< 0.2	< 0.02	< 0.02	< 0.0806	-	< 0.0161	< 0.0161	< 0.00806	< 0.0806	< 0.0806	< 0.00806	< 0.00833	< 0.00833	< 0.0833
	SVW09-1-090924 (A/A)	2009 09 24	2	Soil Vapour	< 0.02	< 0.02	< 0.02	< 0.02	< 0.2	< 0.2	< 0.02	< 0.02	< 0.0833	-	< 0.0167	< 0.0167	< 0.00833	< 0.0833	< 0.0833	< 0.00833	< 0.00833	< 0.00833	< 0.0833
	SVW09-1-100128 (A/A)	**2010 01 28**	2	Soil Vapour	< 0.02	< 0.02	< 0.02	< 0.02	< 0.2	< 0.2	< 0.02	< 0.02	< 0.0833	-	< 0.0167	< 0.0167	< 0.00833	< 0.0833	< 0.0833	< 0.00833	< 0.00833	< 0.00833	< 0.0833
SVW09-2	SVW09-2-090715 (A/A)	2009 07 15	2	Soil Vapour	< 0.02	< 0.02	< 0.02	< 0.02	< 0.2	< 0.2	< 0.02	< 0.02	< 0.0833	-	< 0.0167	< 0.0167	< 0.00833	< 0.0833	< 0.0833	< 0.00833	< 0.008	< 0.008	< 0.08
	SVW09-2-090826 (A/A)	2009 08 26	2	Soil Vapour	< 0.02	< 0.02	< 0.02	< 0.02	< 0.2	< 0.2	< 0.02	< 0.02	< 0.083	-	< 0.0166	< 0.0166	< 0.0083	< 0.083	< 0.083	< 0.0083	< 0.00833	< 0.00833	< 0.0833
	SVW09-A-090826 (A/A)	Dup of SVW09-2-090826 (A/A)			< 0.02	< 0.02	< 0.02	< 0.02	< 0.2	< 0.2	< 0.02	< 0.02	< 0.083	-	< 0.0166	< 0.0166	< 0.0083	< 0.083	< 0.083	< 0.0083	< 0.00833	< 0.00833	< 0.0833
	QA/QC RPD %				*	*	*	*	*	*	*	*	*	-	*	*	*	*	*	*	-	-	-
	SVW09-2-090924 (A/A)	2009 09 24	2	Soil Vapour	< 0.02	< 0.02	< 0.02	< 0.02	< 0.2	< 0.2	< 0.02	< 0.02	< 0.0833	-	< 0.0167	< 0.0167	< 0.00833	< 0.0833	< 0.0833	< 0.00833	< 0.00833	< 0.00833	< 0.0833
	SVW09-2-100128 (A/A)	**2010 01 28**	2	Soil Vapour	< 0.02	< 0.02	< 0.02	< 0.02	< 0.2	< 0.2	< 0.02	< 0.02	0.09	-	< 0.0167	< 0.0167	0.093	< 0.0833	< 0.0833	< 0.00833	< 0.00833	< 0.00833	< 0.0833
SVW09-3	SVW09-3-090715 (A/A)	2009 07 15	2	Soil Vapour	< 0.02	< 0.02	< 0.02	< 0.02	< 0.2	< 0.2	< 0.02	< 0.02	< 0.0833	-	< 0.0167	< 0.0167	< 0.00833	< 0.0833	< 0.0833	< 0.00833	< 0.00833	< 0.00833	< 0.0833
	SVW09-3-090826 (A/A)	2009 08 26	2	Soil Vapour	< 0.02	< 0.02	< 0.02	< 0.02	< 0.2	< 0.2	< 0.02	< 0.02	< 0.0837	-	< 0.0167	< 0.0167	< 0.00837	< 0.0837	< 0.0837	< 0.00837	< 0.00833	< 0.00833	< 0.0833
	SVW09-3-090924 (A/A)	2009 09 24	2	Soil Vapour	< 0.02	< 0.02	< 0.02	< 0.02	< 0.2	< 0.2	< 0.02	< 0.02	< 0.0833	-	< 0.0167	< 0.0167	< 0.00833	< 0.0833	< 0.0833	< 0.00833	< 0.00833	< 0.00833	< 0.0833
SVW09-3	**SVW09-3-100128 (A/A)**	**2010 01 28**	2	Soil Vapour	< 0.02	< 0.02	< 0.02	< 0.02	< 0.2	< 0.2	< 0.02	< 0.02	< 0.0833	-	< 0.0167	< 0.0167	< 0.00833	< 0.0833	< 0.0833	< 0.00833	< 0.00833	< 0.00833	< 0.0833

Associated CanTest files: 41030015, 60916002, 60919044, 70327006, 70623102, 70724004, 70928025, 80927177, 90623066, 91002115, 100720007, 100831013, 100929015, 110201018

All terms defined within the body of SLE's report.

< Denotes concentration less than indicated detection limit.

\- Denotes analysis not conducted.

BOLDED sample denotes most recent sampling event

131416/2010 02 09

P:\Current Projects\Public Works and Gov't Services Canada\131416\Tables\2010\Copy of x209mbsa(2010 report tables)mbs100310_rev1.xls

TABLE 11: Summary of Analytical Results for PAHs - Indoor Air and Soil Vapour

					Polycyclic Aromatic Hydrocarbons															
Sample Location	Sample ID	Sample Date (yyyy mm dd)	Time (hr)	Sample Type	Naph-thalene (mg/m^3)	Acenaph-thylene (mg/m^3)	Acenaph-thene (mg/m^3)	Fluorene (mg/m^3)	Phenan-threne (mg/m^3)	Anthracene (mg/m^3)	Fluoranthene (mg/m^3)	Pyrene (mg/m^3)	Benzo(a) anthracene (mg/m^3)	Chrysene (mg/m^3)	Benzo(b) fluoranthene (mg/m^3)	Benzo(k) fluoranthene (mg/m^3)	Benzo(a) pyrene (mg/m^3)	Indeno(1,2,3-cd) pyrene (mg/m^3)	Dibenz(a,h) anthracene (mg/m^3)	Benzo(g,h,i) perylene (mg/m^3)
House #5 Basement	H5-Basement-050913(PAH)	2005 09 13	4	Indoor Air	0.00083	< 0.00025	< 0.00025	< 0.000125	0.00017	< 0.000125	< 0.000125	< 0.00005	< 0.000025	< 0.000025	< 0.000025	< 0.000025	< 0.000025	< 0.000025	< 0.000025	< 0.000025
	H5-B-050913(PAH)	Dup of H5-Basement-050913(PAH)			0.001	< 0.0002	< 0.0002	< 0.0001	0.00019	< 0.0001	< 0.0001	< 0.00004	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
	QA/QC RPD %				19	*	*	*	11	*	*	*	*	*	*	*	*	*	*	*
	H5-Basement-060324(PAH)	2006 03 24	4	Indoor Air	< 0.000625	< 0.000208	< 0.000208	< 0.000104	0.0002	< 0.000104	< 0.000104	< 0.000042	< 0.000021	< 0.000021	< 0.000021	< 0.000021	< 0.000021	< 0.000021	< 0.000021	< 0.000021
	H5-B-060321(PAH)	Dup of H5-Basement-060324(PAH)			< 0.000625	< 0.000208	< 0.000208	< 0.000104	0.0002	< 0.000104	< 0.000104	< 0.000042	< 0.000021	< 0.000021	< 0.000021	< 0.000021	< 0.000021	< 0.000021	< 0.000021	< 0.000021
	QA/QC RPD %				*	*	*	*	0	*	*	*	*	*	*	*	*	*	*	*
	H5-Basement-070925 (PAH)	2007 09 25	4	Indoor Air	0.0015	< 0.0002141	< 0.0002141	0.00011	0.00021	< 0.0001071	< 0.0001071	< 0.0000428	< 0.0000214	< 0.0000214	< 0.0000214	< 0.0000214	< 0.0000214	< 0.0000214	< 0.0000214	< 0.0000214
	H5-B-070925(PAH)	Dup of H5-Basement-070925 (PAH)			0.00148	< 0.000211	< 0.000211	0.000127	0.000232	< 0.000106	< 0.000106	< 0.000042	< 0.000021	< 0.000021	< 0.000021	< 0.000021	< 0.000021	< 0.000021	< 0.000021	< 0.000021
	QA/QC RPD %				1	*	*	14	10	*	*	*	*	*	*	*	*	*	*	*
	H5-Basement-080619 (PAH)	2008 06 19	4	Indoor Air	< 0.000625	< 0.000208	< 0.000208	< 0.000104	0.00031	< 0.000104	< 0.000104	< 0.000042	< 0.000021	< 0.000021	< 0.000021	< 0.000021	< 0.000021	< 0.000021	< 0.000021	< 0.000021
	H5-B-080619 (PAH)	Dup of H5-Basement-080619 (PAH)			< 0.000625	< 0.000208	< 0.000208	< 0.000104	0.00038	< 0.000104	< 0.000104	< 0.000042	< 0.000021	< 0.000021	< 0.000021	< 0.000021	< 0.000021	< 0.000021	< 0.000021	< 0.000021
	QA/QC RPD %				*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	H5-Basement-080926 (PAH)	2008 09 26	4	Indoor Air	< 0.002083	< 0.002083	< 0.002083	< 0.001042	< 0.001042	< 0.001042	< 0.001042	< 0.000417	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208
	H5-B-080926 (PAH)	Dup of H5-Basement-080926 (PAH)			< 0.002083	< 0.002083	< 0.002083	< 0.001042	< 0.001042	< 0.001042	< 0.001042	< 0.000417	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208
	QA/QC RPD %				*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	H5-Basement-090716 (PAH)	2009 07 16	4	Indoor Air	< 0.002083	< 0.002083	< 0.002083	< 0.001042	< 0.001042	< 0.001042	< 0.001042	< 0.000417	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208
	H5-A-090716 (PAH)	Dup of H5-Basement-090716 (PAH)			< 0.002128	< 0.002128	< 0.002128	< 0.001064	< 0.001064	< 0.001064	< 0.001064	< 0.000426	< 0.000213	< 0.000213	< 0.000213	< 0.000213	< 0.000213	< 0.000213	< 0.000213	< 0.000213
	QA/QC RPD %				*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	H5-BASEMENT-090826 (PAH)	2009 08 26	4	Indoor Air	< 0.002083	< 0.002083	< 0.002083	< 0.001042	< 0.001042	< 0.001042	< 0.001042	< 0.000417	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208
	H5-A-090826 (PAH)	Dup of H5-BASEMENT-090826 (PAH)			< 0.002083	< 0.002083	< 0.002083	< 0.001042	< 0.001042	< 0.001042	< 0.001042	< 0.000417	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208
	QA/QC RPD %				*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	H5-Basement-090925 (PAH)	2009 09 25	4	Indoor Air	< 0.002083	< 0.002083	< 0.002083	< 0.001042	< 0.001042	< 0.001042	< 0.001042	< 0.000417	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208
	H5-A-090925 (PAH)	Dup of H5-Basement-090925 (PAH)			< 0.002083	< 0.002083	< 0.002083	< 0.001042	< 0.001042	< 0.001042	< 0.001042	< 0.000417	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208
	QA/QC RPD %				*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	H5-Basement-100127 (PAH)	**2010 01 27**	4	Indoor Air	< 0.002083	< 0.002083	< 0.002083	< 0.001042	< 0.001042	< 0.001042	< 0.001042	< 0.000417	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208
	H5-A-100127 (PAH)	**2010 01 27**	4	Indoor Air	< 0.002083	< 0.002083	< 0.002083	< 0.001042	< 0.001042	< 0.001042	< 0.001042	< 0.000417	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208
	QA/QC RPD %				*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
House #5 Main Floor	H5-Main-050913(PAH)	2005 09 13	4	Indoor Air	0.0006	< 0.0002	< 0.0002	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.00004	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002
	H5-Main-060324(PAH)	2006 03 24	4	Indoor Air	< 0.000625	< 0.000208	< 0.000208	< 0.000104	0.00014	< 0.000104	< 0.000104	< 0.000042	< 0.000021	< 0.000021	< 0.000021	< 0.000021	< 0.000021	< 0.000021	< 0.000021	< 0.000021
	H5-Main-07(PAH)	2007 09 25	4	Indoor Air	< 0.000634	< 0.000211	< 0.000211	< 0.000106	< 0.000106	< 0.000106	< 0.000106	< 0.000042	< 0.000021	< 0.000021	< 0.000021	< 0.000021	< 0.000021	< 0.000021	< 0.000021	< 0.000021
	H5-Main-080619 (PAH)	2008 06 19	4	Indoor Air	< 0.000625	< 0.000208	< 0.000208	< 0.000104	< 0.000104	< 0.000104	< 0.000104	< 0.000042	< 0.000021	< 0.000021	< 0.000021	< 0.000021	< 0.000021	< 0.000021	< 0.000021	< 0.000021
	H5-Main-080926 (PAH)	2008 09 26	4	Indoor Air	< 0.002083	< 0.002083	< 0.002083	< 0.001042	< 0.001042	< 0.001042	< 0.001042	< 0.000417	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208
	H5-Main-090716 (PAH)	2009 07 16	4	Indoor Air	< 0.002083	< 0.002083	< 0.002083	< 0.001042	< 0.001042	< 0.001042	< 0.001042	< 0.000417	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208
	H5-MAIN-090826 (PAH)	2009 08 26	4	Indoor Air	< 0.002083	< 0.002083	< 0.002083	< 0.001042	< 0.001042	< 0.001042	< 0.001042	< 0.000417	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208
	H5-Main-090925 (PAH)	2009 09 25	4	Indoor Air	< 0.002083	< 0.002083	< 0.002083	< 0.001042	< 0.001042	< 0.001042	< 0.001042	< 0.000417	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208
	H5-Main-100127 (PAH)	**2010 01 27**	4	Indoor Air	< 0.002083	< 0.002083	< 0.002083	< 0.001042	< 0.001042	< 0.001042	< 0.001042	< 0.000417	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000208
SVW-1	SVW-1-050912(PAH)	2005 09 12	2	Soil Vapour	< 0.00125	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000083	< 0.000042	< 0.000042	< 0.000042	< 0.000042	< 0.000042	< 0.000042	< 0.000042	< 0.000042
SVW-2	SVW-2-050912(PAH)	2005 09 12	2	Soil Vapour	< 0.00125	< 0.000417	< 0.000417	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000083	< 0.000042	< 0.000042	< 0.000042	< 0.000042	< 0.000042	< 0.000042	< 0.000042	< 0.000042
SVW-3	SVW-3-050912(PAH)	2005 09 12	2	Soil Vapour	0.0017	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000083	< 0.000042	< 0.000042	< 0.000042	< 0.000042	< 0.000042	< 0.000042	< 0.000042	< 0.000042
SVW-4	SVW-4-050912(PAH)	2005 09 12	2	Soil Vapour	< 0.00125	< 0.000417	< 0.000417	< 0.000208	< 0.000208	< 0.000208	< 0.000208	< 0.000083	< 0.000042	< 0.000042	< 0.000042	< 0.000042	< 0.000042	< 0.000042	< 0.000042	< 0.000042
SVW09-1	SVW09-1-090715 (PAH)	2009 07 15	2	Soil Vapour	< 0.004167	< 0.004167	< 0.004167	< 0.002083	< 0.002083	< 0.002083	< 0.002083	< 0.000833	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417
	SVW09-1-090826 (PAH)	2009 08 26	2	Soil Vapour	< 0.004167	< 0.004167	< 0.004167	< 0.002083	< 0.002083	< 0.002083	< 0.002083	< 0.000833	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417
	SVW09-1-090924 (PAH)	2009 09 24	2	Soil Vapour	< 0.004167	< 0.004167	< 0.004167	< 0.002083	< 0.002083	< 0.002083	< 0.002083	< 0.000833	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417
	SVW09-1-100128 (PAH)	**2010 01 28**	2	Soil Vapour	< 0.004167	< 0.004167	< 0.004167	< 0.002083	< 0.002083	< 0.002083	< 0.002083	< 0.000833	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417
SVW09-2	SVW09-2-090715 (PAH)	2009 07 15	2	Soil Vapour	< 0.004	< 0.004	< 0.004	< 0.002	< 0.002	< 0.002	< 0.002	< 0.0008	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004
	SVW09-2-090826 (PAH)	2009 08 26	2	Soil Vapour	< 0.004167	< 0.004167	< 0.004167	< 0.002083	< 0.002083	< 0.002083	< 0.002083	< 0.000833	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417
	SVW09-A-090826 (PAH)	Dup of SVW09-2-090826 (PAH)			< 0.004167	< 0.004167	< 0.004167	< 0.002083	< 0.002083	< 0.002083	< 0.002083	< 0.000833	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417
	QA/QC RPD %				*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	SVW09-2-090924 (PAH)	2009 09 24	2	Soil Vapour	< 0.004167	< 0.004167	< 0.004167	< 0.002083	< 0.002083	< 0.002083	< 0.002083	< 0.000833	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417
	SVW09-2-100128 (PAH)	**2010 01 28**	2	Soil Vapour	< 0.004167	< 0.004167	< 0.004167	< 0.002083	< 0.002083	< 0.002083	< 0.002083	< 0.000833	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417
SVW09-3	SVW09-3-090715 (PAH)	2009 07 15	2	Soil Vapour	< 0.004167	< 0.004167	< 0.004167	< 0.002083	< 0.002083	< 0.002083	< 0.002083	< 0.000833	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417
	SVW09-3-090826 (PAH)	2009 08 26	2	Soil Vapour	< 0.004167	< 0.004167	< 0.004167	< 0.002083	< 0.002083	< 0.002083	< 0.002083	< 0.000833	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417
	SVW09-3-090924 (PAH)	2009 09 24	2	Soil Vapour	< 0.004167	< 0.004167	< 0.004167	< 0.002083	< 0.002083	< 0.002083	< 0.002083	< 0.000833	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417
	SVW09-3-100128 (PAH)	**2010 01 28**	2	Soil Vapour	< 0.004167	< 0.004167	< 0.004167	< 0.002083	< 0.002083	< 0.002083	< 0.002083	< 0.000833	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417	< 0.000417

Associated CanTest files: 41030015, 60916002, 60919044, 70327006, 70623102, 70724004, 80927177, 90623066, 100720007, 100831013, 100929015.

All terms defined within the body of SLE's report.

< Denotes concentration less than indicated detection limit.

- Denotes analysis not conducted.

BOLDED sample denotes most recent sampling event

TABLE 12: Summary of Analytical Results for VOCs - Indoor Air

				Volatile Organic Compounds (VOC)							
Sample Location	**Sample ID**	**Sample Date (yyyy mm dd)**	**Sample Duration (min)**	**Cumene (mg/m3)**	**n-Decane (mg/m3)**	**n-Hexane (mg/m3)**	**Methyl ter-butyl ether (mg/m3)**	**Methyl cyclohexane (mg/m3)**	**1,2,3-Trimethylbenzene (mg/m3)**	**1,2,4-Trimethylbenzene (mg/m3)**	**1,3,5-Trimethylbenzene (mg/m3)**
H5-Basement	**H5-Basement-080926 (A/A)**	2008 09 26	-	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	H5-A-080926 (A/A)	**Dup of H5-Basement-080926 (A/A)**		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	QA/QC RPD %			*	*	*	*	*	*	*	*
	H5-Basement-100127 (A/A)	**2010 01 27**	4	< 0.005	-	< 0.005	-	< 0.005	< 0.005	< 0.005	< 0.005
	H5-B-100127 (A/A)	**2010 01 27**	4	< 0.005	-	< 0.005	-	< 0.005	< 0.005	< 0.005	< 0.005
	QA/QC RPD %			*	-	*	-	*	*	*	*
H5-Main	**H5-Main-080926 (A/A)**	2008 09 26	-	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
	H5-Main-100127 (A/A)	**2010 01 27**	4	< 0.005	-	< 0.005	-	< 0.005	< 0.005	< 0.005	< 0.005
SVW09-1	**SVW09-1-100128 (A/A)**	**2010 01 28**	2	< 0.02	-	< 0.02	-	< 0.02	< 0.02	< 0.02	< 0.02
SVW09-2	**SVW09-2-100128 (A/A)**	**2010 01 28**	2	< 0.02	-	< 0.02	-	< 0.02	< 0.02	< 0.02	< 0.02
SVW09-3	**SVW09-3-100128 (A/A)**	**2010 01 28**	2	< 0.02	-	< 0.02	-	< 0.02	< 0.02	< 0.02	< 0.02

Associated CanTest file: 91002115, 110201018.
All terms defined within the body of SLE's report.

<	Denotes concentration less than indicated detection limit or RPD less than indicated value.
-	Denotes analysis not conducted.

DRAWINGS

- 131416-901 – Location Plan
- 131416-902 – Key Plan
- 131416-903 – Wide Area Site Plan
- 131416-904 – Site Plan
- 131416-905 – Geological Cross-sections A-A’ and B-B’
- 131416-906 – Geological Cross-sections C-C’ and D-D’
- 131416-907 – Bedrock Topography
- 131416-908 – Detailed Soil Analytical Results – Hydrocarbons
- 131416-909 – Comparison of Pre- and Post-Remedial Soil Quality
- 131416-910 – Potentiometric Elevations & Inferred Potentiometric Contours (2009 07 10)
- 131416-911 – Detailed Groundwater Analytical Results - Hydrocarbons
- 131416-912 – Current and Historic Inferred LNAPL Occurrence
- 131416-913 – Occurrence of Biodegradation Parameters

SITE LOCATION

SNC·LAVALIN
Morrow Environmental

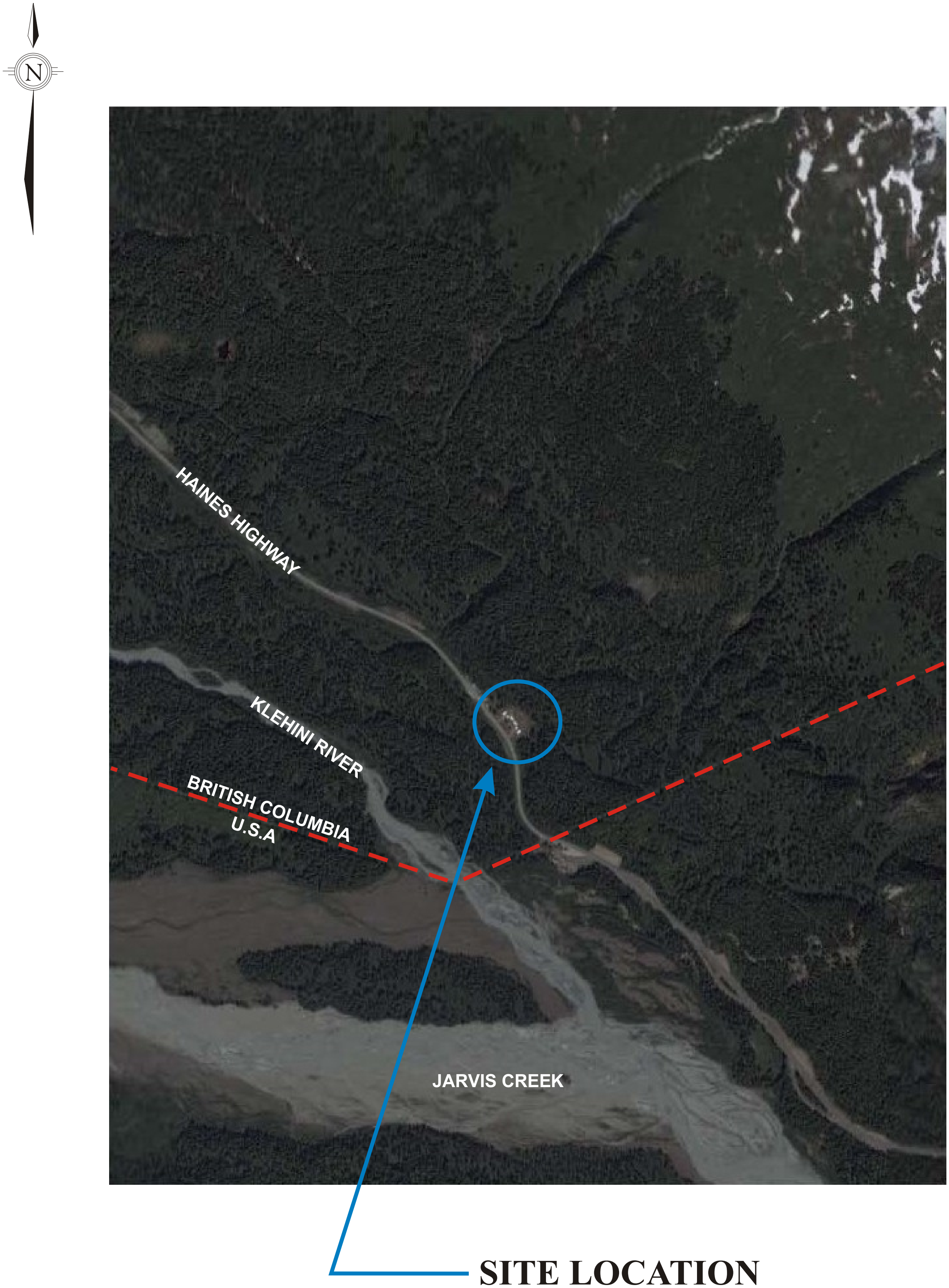
DATE: **2010 03 31**
SCALE: **N.T.S.**
DRN BY: **TR**
CHK BY: **RNS**

CLIENT NAME:
PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT LOCATION:
CBSA BORDER CROSSING PLEASANT CAMP, BC

LOCATION PLAN

DWG NO: **131416-901**
CORELFILE: **131416-901.CDR**



SNC·LAVALIN
Environment

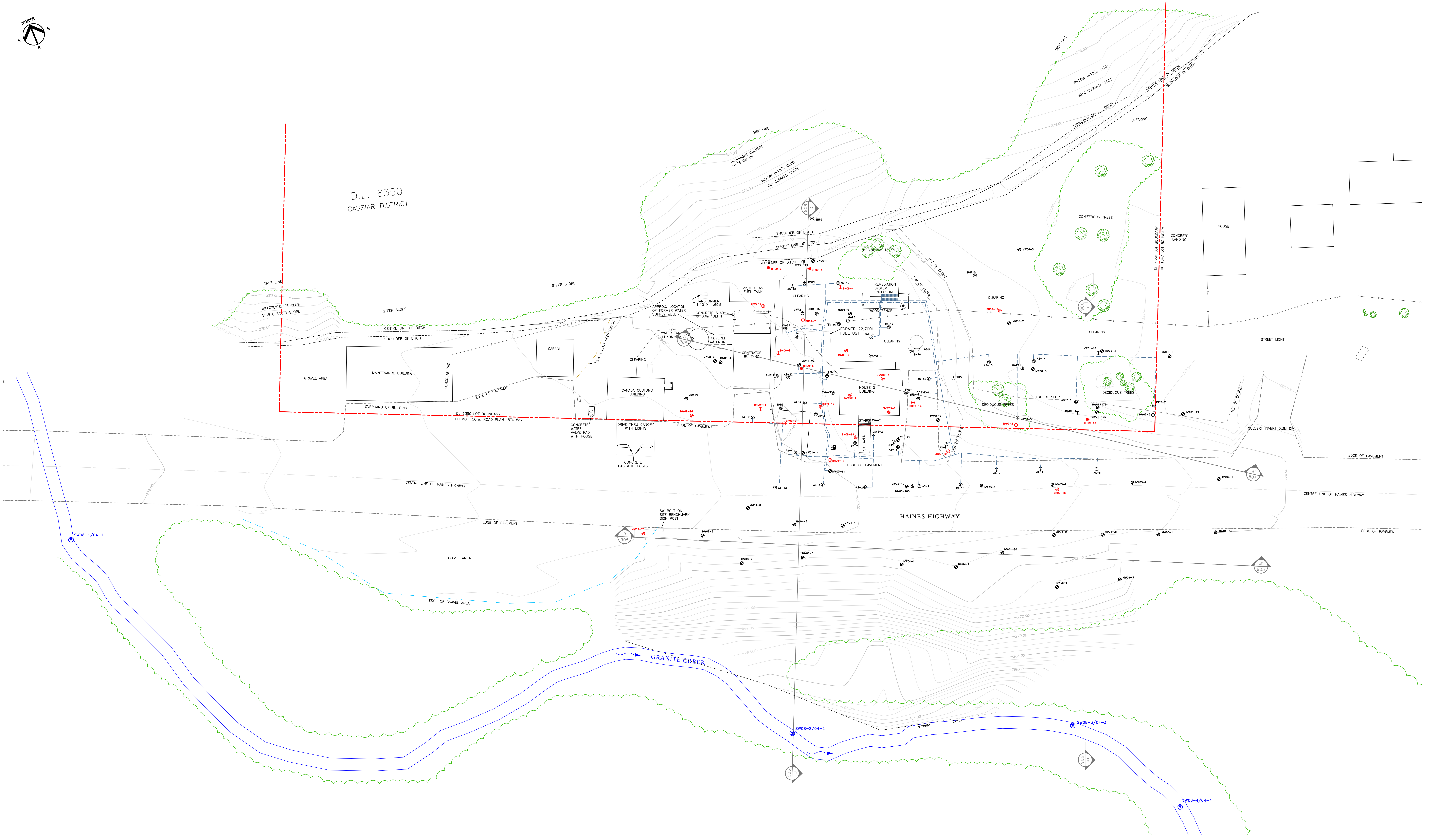
DATE:	2010 03 31
SCALE:	N.T.S
DRN BY:	GJ
CHK BY:	DWB

CLIENT NAME:
PUBLIC WORKS
AND GOVERNMENT
SERVICES CANADA

PROJECT LOCATION:
CBSA BORDER CROSSING
PLEASANT CAMP, BC

KEY PLAN

DWG NO:	CORELFILE:
131416-902	131416-902.CDR



LEGEND

0 5 10 15 METRES

- LOT BOUNDARY
- FORMER STRUCTURES
- TOPOGRAPHIC MAJOR CONTOUR (2m)
- TOPOGRAPHIC MINOR CONTOUR (0.5m)
- AS/SVE SYSTEM PIPING
- FUEL LINE
- FOREST
- Ⓞ BOREHOLE (OTHER)
- ◓ MONITORING WELL (OTHER)
- Ⓢ AIR SPARGE WELL
- Ⓥ SOIL VAPOUR EXTRACTION WELL
- Ⓦ SOIL VAPOUR WELL
- MULTI-LEVEL MONITORING WELL
- DESTROYED MONITORING WELL
- MONITORING WELL
- ⊕ BOREHOLE
- SURFACE WATER SAMPLE
- ⊕ BOREHOLE (2009)
- A — A' SECTION LINE

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED ON SITE. NOT ALL UTILITIES MAY BE SHOWN.

REFERENCE DRAWINGS

No.	DATE	DESCRIPTION
08059/08073	2008-06-28	UNDERHILL GEOMATICS LTD.

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
0	2010-03-31	ISSUED TO CLIENT	AJK	DWB

SNC·LAVALIN

CLIENT NAME:
PUBLIC WORKS &
GOVERNMENT SERVICES CANADA

PROJECT LOCATION:
CANADA BORDER SERVICES AGENCY
PORT OF PLEASANT CAMP, BC

TITLE:

WIDE AREA SITE PLAN

DWN BY: AJK
SCALE: 1:300
DATE: 2010-02-05
DWG No: 131416-903
REV.:
CHK'D: DWB
PLOT: 20150216.1003
CADFILE: 131416R22

PATH: P:\CURRENT PROJECTS\PUBLIC WORKS AND GOV'T SERVICES CANADA\131416\PRE 2014 QMS\GEOMATICS\EXPORTS\FINAL OF 20100331\131416R22.DWG

LEGEND

0 1 2 10 METRES

LOT BOUNDARY	
FORMER STRUCTURES	
TELEPHONE LINE (UG)	
WATER LINE	
ELECTRICAL LINE	
FUEL LINE	
ELECTRICAL/TELEPHONE LINE	
SEPTIC	
AS/SVE SYSTEM PIPING	
FOREST	

- Ⓞ BOREHOLE (OTHER)
- ◓ MONITORING WELL (OTHER)
- ● MONITORING WELL (SLE)
- ⊕ BOREHOLE (SLE 2009)
- Ⓢ AIR SPARGE WELL (SLE)
- Ⓥ SOIL VAPOUR EXTRACTION WELL (SLE)
- Ⓦ SOIL VAPOUR WELL
- TOPOGRAPHIC MAJOR CONTOUR (2m)
- TOPOGRAPHIC MINOR CONTOUR (0.5m)
- ✪ FLAGPOLE (ARBITRARY DATUM)
- ▼ SURFACE WATER SAMPLING LOCATION
- ⚙ FIRE HYDRANT
- ⦶ DESTROYED MONITORING WELL

A A' SECTION LINE

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED ON SITE. NOT ALL UTILITIES MAY BE SHOWN.

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No.	DATE	DESCRIPTION
08059/08073	2008-06-28	UNDERHILL GEOMATICS LTD.

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
0	2010-03-31	ISSUED TO CLIENT	AJK	DWB

SNC • LAVALIN

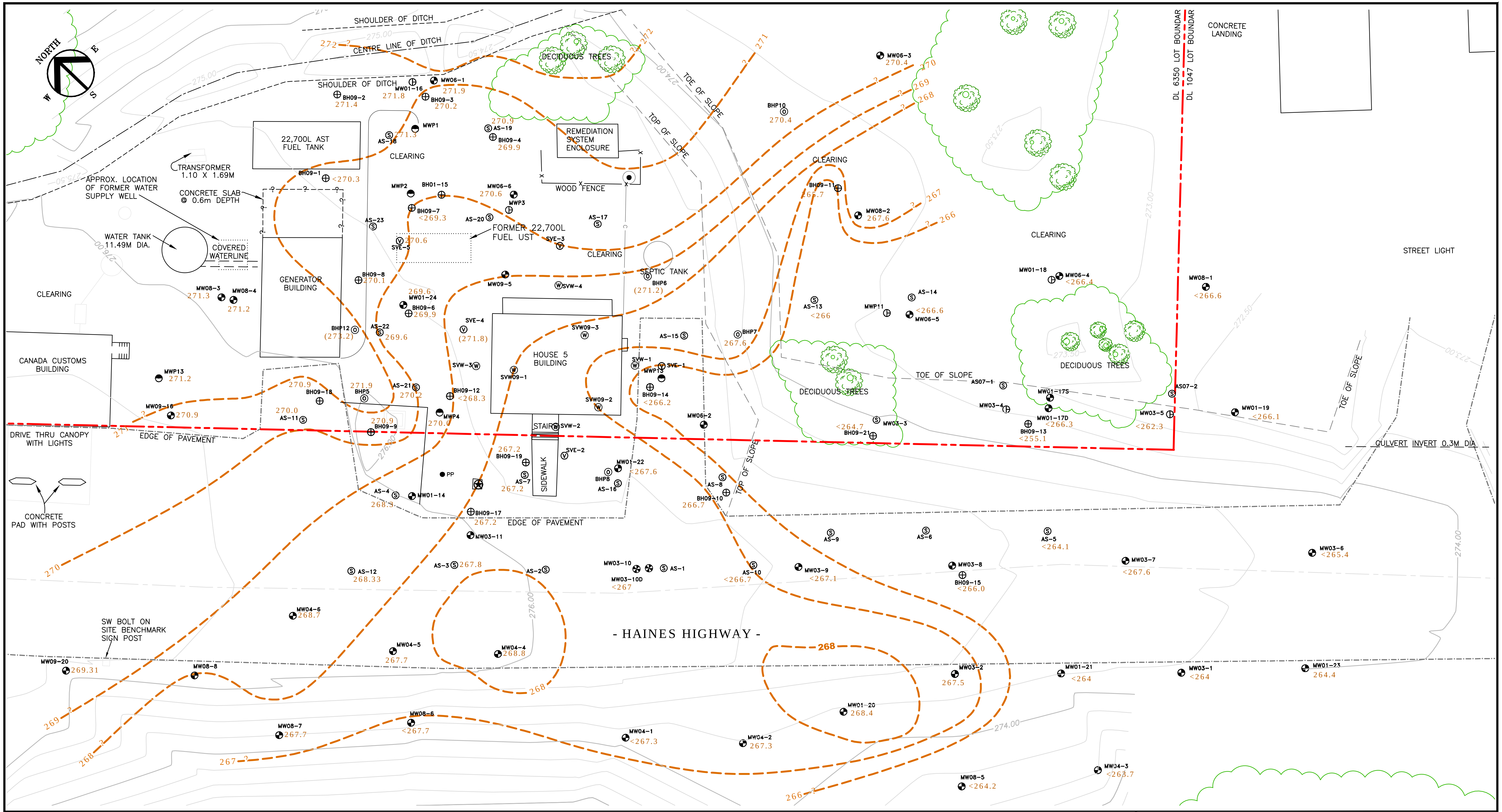
CLIENT NAME:
PUBLIC WORKS &
GOVERNMENT SERVICES CANADA

PROJECT LOCATION:
CANADA BORDER SERVICES AGENCY
PORT OF PLEASANT CAMP, BC

TITLE:
SITE PLAN

DWN BY: AJK	SCALE: 1:200	DATE: 2008-08-13	DWG No: REV.: 0
CHK'D: DWB	PLOT: 20150216.1003	CADFILE: 131416R22	131416-904

PATH: P:\CURRENT PROJECTS\PUBLIC WORKS AND GOV'T SERVICES CANADA\131416\PRE 2014 QMS\GEOMATICS\EXPORTS\FINAL OF 20100331\131416R22.DWG



LEGEND

- LOT BOUNDARY
- FORMER STRUCTURES
- FUEL LINE
- AS/SVE SYSTEM PIPING
- TOPOGRAPHIC MAJOR CONTOUR (2m)
- TOPOGRAPHIC MINOR CONTOUR (0.5m)
- FOREST
- INFERRED BEDROCK CONTOUR
- 267.7 BEDROCK ELEVATION (m)

- ⓞ BOREHOLE (OTHER)
- ◒ MONITORING WELL (OTHER)
- ● MONITORING WELL (SLE)
- ⊕ BOREHOLE (SLE)
- Ⓢ AIR SPARGE WELL (SLE)
- Ⓥ SOIL VAPOUR EXTRACTION WELL (SLE)
- Ⓦ SOIL VAPOUR WELL
- ⊕ DESTROYED MONITORING WELL

NOTES

1. ORIGINAL DRAWING IN COLOUR.
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REFERENCE DRAWINGS

DWG. NO.	DATE	DESCRIPTION
	NOV. 2005	YUKON ENGINEERING SERVICES

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
0	2010-03-31	ISSUED TO CLIENT	AJK	DWB

SNC·LAVALIN

CLIENT NAME:
PUBLIC WORKS &
GOVERNMENT SERVICES CANADA

PROJECT LOCATION:
CANADA BORDER SERVICES AGENCY
PORT OF PLEASANT CAMP, BC

TITLE:
BEDROCK ELEVATIONS AND CONTOURS

DWN BY: KGP
SCALE: 1:300
DATE: 2008-12-05
DWG No: 131416-907
REV.: 0
CHK'D: DWB
PLOT: 20150216.1003
CADFILE: 131416R22

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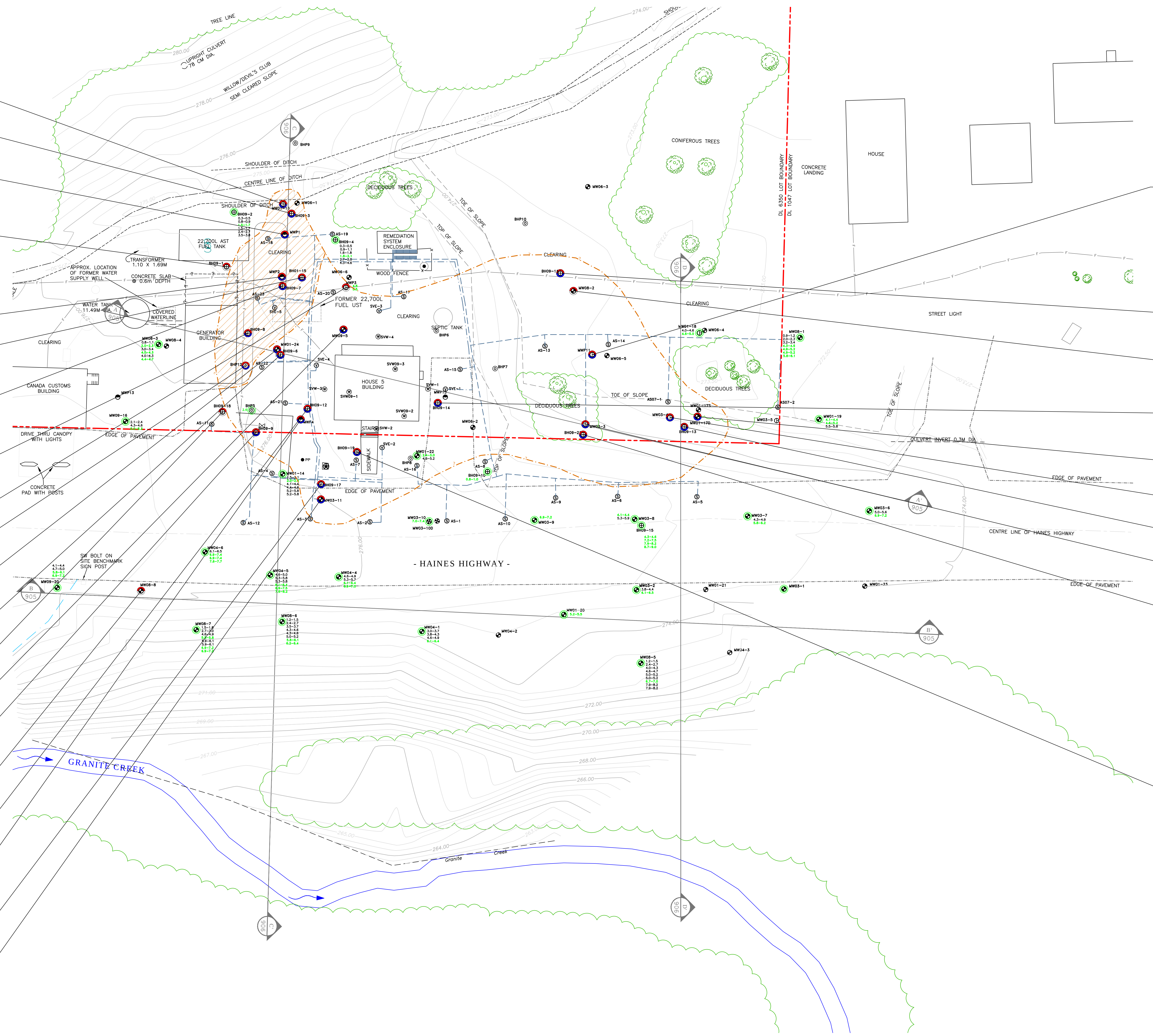

01–16	B	E	T	X	VPH	EPH(10–19)	EPH(19–32)	F1–BTEX	F2	F3	F4	PAH
1.5 – 2.1	<0.04ª	0.7	<0.5ª	4.6	–	–	–	410	6,000	2,700	<250	>STD
2.9 – 3.2	–	–	–	–	–	–	–	–	100	<250	<250	–

09–3	B	E	T	X	VPH	EPH(10–19)	EPH(19–32)	F1–BTEX	F2	F3	F4	PAH
2.7 – 3.0	<0.005	<0.018	<0.02	<0.02	–	–	–	<10	1,100	1,000	–	<STD

BHP1	F1–BTEX	F2	F3	F4	PAH
1.5	–	2,800	1,900	<10	–

09–1	B	E	T	X	VPH	EPH(10–19)	EPH(19–32)	F1–BTEX	F2	F3	F4	PAH
1.7 – 1.8	–	–	–	–	–	540	<250	–		240	–	–
2.3 – 2.6	–	–	–	–	–	–	–	–	160	310	–	–
3.2 – 3.5	<0.005	<0.018	<0.02	<0.02	–	750	<250	<10	460	510	–	<STD
4.3 – 4.6	–	–	–	–	–	–	–	–	580	250	–	–

BHP2	F1–BTEX	F2	F3	F4	PAH
2.1	67	1,800	370	<10	>STD
3.6	34	450	100	<10	–

01–15	B	E	T	X	VPH	EPH(10–19)	EPH(19–32)	F1–BTEX	F2	F3	F4	PAH
2.1 – 2.4	<0.04ª	<0.5ª	<0.5ª	<0.5	–	–	–	<25	1,300	480	<250	>STD

09–7	B	E	T	X	VPH	EPH(10–19)	EPH(19–32)	F1–BTEX	F2	F3	F4	PAH
1.6 – 1.6	–	–	–	–	–	660	340	–	170	460	–	–
2.3 – 2.6	–	–	–	–	–	–	–	–	230	410	–	–
3.8 – 4.1	<0.005	<0.018	<0.02	<0.02	–	–	–	<10	600	490	–	<STD
4.7 – 5.0	–	–	–	–	–	–	–	–	1,000	890	–	–
5.2 – 5.5	–	–	–	–	–	–	–	–	380	350	–	–

09–8	B	E	T	X	VPH	EPH(10–19)	EPH(19–32)	F1–BTEX	F2	F3	F4	PAH
1.5 – 1.8	<0.005	<0.018	<0.02	0.09	–	–	–	23	580	240	–	>STD
3.0 – 3.4	–	–	–	–	–	–	–	–	380	310	–	–
4.3 – 4.6	<0.005	<0.018	<0.02	<0.02	–	–	–	<10	970	510	–	–
5.3 – 5.5	–	–	–	–	–	–	–	–	150	250	–	–

BHP3	F1–BTEX	F2	F3	F4	PAH
4.5	–	350	110	<10	–
5.5	–	500	130	<10	–

BHP12	EPH(10–19)	EPH(19–32)
1.8	2,100	130
2.4	540	110

01–24	B	E	T	X	VPH	EPH(10–19)	EPH(19–32)	F1–BTEX	F2	F3	F4	PAH
4.6 – 5.2	<0.04ª	<0.5ª	<0.5ª	<0.5	–	–	–	340	5,900	2,100	<250	–
5.5 – 5.8	<0.04ª	<0.5ª	<0.5ª	<0.5	–	–	–	<25	100	<250	<250	–

09–6	B	E	T	X	VPH	EPH(10–19)	EPH(19–32)	F1–BTEX	F2	F3	F4	PAH
4.3 – 4.6	<0.005	<0.018	<0.02	<0.02	–	1,200	280	<10	720	550	–	<STD
4.3 – 4.6	<0.005	<0.018	<0.02	<0.02	–	1,400	300	<10	810	610	–	<STD
5.3 – 5.6	–	–	–	–	–	–	–	–	1,500	1,000	–	>STD

09–18	B	E	T	X	VPH	EPH(10–19)	EPH(19–32)	F1–BTEX	F2	F3	F4	PAH
5.0 – 5.2	<0.005	<0.018	<0.02	<0.02	–	390	460	<10	200	380	–	<STD

09–5	B	E	T	X	VPH	EPH(10–19)	EPH(19–32)	F1–BTEX	F2	F3	F4	PAH
4.9 – 5.2	<0.005	<0.018	<0.02	<0.02	–	830	340	<10	450	450	–	>STD

09–9	B	E	T	X	VPH	EPH(10–19)	EPH(19–32)	F1–BTEX	F2	F3	F4	PAH
5.6 – 5.8	<0.005	<0.018	<0.02	<0.02	–	–	–	<10	1,000	600	–	<STD

08–8	B	E	T	X	VPH	EPH(10–19)	EPH(19–32)	F1–BTEX*	F2*	F3*	F4*	PAH
7.3 – 7.6	–	–	–	–	–	<250	<250	–	–	–	–	–
8.1 – 8.2	<0.04ª	<0.5ª	<0.5ª	<0.1	<100	1,600	330	–	–	–	–	<STD

09–12	B	E	T	X	VPH	EPH(10–19)	EPH(19–32)	F1–BTEX	F2	F3	F4	PAH
4.9 – 5.2	–	–	–	–	–	990	330	–	500	500	–	–
4.9 – 5.2	–	–	–	–	–	910	450	–	480	500	–	–
5.6 – 5.9	<0.005	<0.018	<0.02	<0.02	–	–	–	<10	1,500	990	–	>STD
6.9 – 7.2	–	–	–	–	–	–	–	–	440	560	–	>STD

BHP4	B	E	T	X	F1–BTEX	F2	F3	F4	PAH
4.8	–	–	–	–	–	5,400	2,100	<10	–
5.2	<0.04	<0.1	<0.1	<0.1	66	1,600	730	<10	–

09–17	B	E	T	X	VPH	EPH(10–19)	EPH(19–32)	F1–BTEX*	F2*	F3*	F4*	PHE
5.5 – 5.8	–	–	–	–	–	3,300	570	–	–	–	–	–
6.6 – 6.9	<0.005	<0.018	<0.02	<0.02	<100	620	<250	<10	330	310	–	<STD
7.2 – 7.5	–	–	–	–	–	<250	<250	–	–	–	–	–
7.9 – 8.2	–	–	–	–	–	880	<250	–	–	–	–	–

03–11	B	E	T	X	VPH	EPH(10–19)	EPH(19–32)	F1–BTEX*	F2*	F3*	F4*	PAH
5.5 – 6.1	<0.04ª	<0.5ª	<0.5ª	<0.5	<100	4,800	440	50	2,000	1,100	–	–

BHP11	F1–BTEX	F2	F3	F4
5.5	–	2,500	1,200	<10
6.4	–	830	420	<10

09–11	B	E	T	X	VPH	EPH(10–19)	EPH(19–32)	F1–BTEX	F2	F3	F4	PAH
5.8 – 6.1	<0.005	<0.018	<0.02	<0.02	–	2,600	300	<10	1,400	830	–	>STD
6.6 – 6.9	–	–	–	–	–	–	–	–	800	610	–	–
7.3 – 7.6	–	–	–	–	–	–	–	–	340	340	–	–

08–2	B	E	T	X	VPH	EPH(10–19)	EPH(19–32)	F1–BTEX	F2	F3	F4	PAH
4.7 – 4.9	–	–	–	–	–	300	<250	–	–	–	–	–
4.9 – 5.2	–	–	–	–	–	<250	<250	–	–	–	–	–
6.0 – 6.1	–	–	–	–	–	2,900	480	–	–	–	–	–

09–14	B	E	T	X	VPH	EPH(10–19)	EPH(19–32)	F1–BTEX	F2	F3	F4	PAH
5.6 – 5.9	–	–	–	–	–	–	–	–	270	300	–	–
6.9 – 7.0	<0.005	<0.018	<0.02	0.037	<100	–	–	10	790	470	–	>STD
6.9 – 7.0	<0.005	<0.018	<0.02	<0.02	–	<250	<250	<10	540	310	–	>STD
7.9 – 8.2	–	–	–	–	–	–	–	–	410	350	–	–

01–17D	B	E	T	X	VPH	EPH(10–19)	EPH(19–32)	F1–BTEX	F2	F3	F4	PAH
4.4 – 4.8	<0.04ª	<0.5ª	<0.5ª	<0.5	–	–	–	<25	<80	<250	<250	–
6.1 – 6.3	<0.04ª	<0.5ª	<0.5ª	<0.5	–	2,700	300	<25	1,900	1,100	<250	–

03–04	B	E	T	X	VPH	EPH(10–19)	EPH(19–32)	F1–BTEX	F2	F3	F4	PAH
5.9 – 6.2	<0.04ª	<0.5ª	<0.5ª	<0.5	<100	1,400	<250	<25	910	680	–	–

09–13	B	E	T	X	VPH	EPH(10–19)	EPH(19–32)	F1–BTEX	F2	F3	F4	PAH
6.2 – 6.6	<0.005	<0.018	<0.02	<0.02	<100	2,600	550	21	1,300	800	–	<STD
7.8 – 8.1	–	–	–	–	–	–	–	–	<5	22	–	–

03–03	B	E	T	X	VPH	EPH(10–19)	EPH(19–32)	F1–BTEX	F2	F3	F4	PAH
6.2 – 6.6	<0.04ª	<0.5ª	<0.5ª	<0.5	<100	3,500	430	<25	1,200	850	–	–

09–21	B	E	T	X	VPH	EPH(10–19)	EPH(19–32)	F1–BTEX	F2	F3	F4	PAH
5.8 – 6.1	–	–	–	–	–	–	–	–	<5	44	–	–
7.0 – 7.3	–	–	–	–	–	–	–	–	350	380	–	–
7.5 – 7.8	<0.005	<0.018	<0.02	<0.02	–	1,500	<250	<10	870	720	–	>STD
8.5 – 8.8	–	–	–	–	–	–	–	–	120	150	–	–

09–19	B	E	T	X	VPH	EPH(10–19)	EPH(19–32)	F1–BTEX*	F2*	F3*	F4*	PAH
5.2 – 5.5	–	–	–	–	–	–	–	–	–	–	–	<STD
5.8 – 6.1	<0.005	<0.018	<0.02	<0.02	–	620	<250	<10	420	430	–	<STD
7.0 – 7.3	–	–	–	–	–	–	–	–	–	–	–	<STD
7.9 – 8.2	–	–	–	–	–	2,200	460	–	–	–	–	–

	Benzene (µg/g)	Ethyl-benzene (µg/g)	Toluene (µg/g)	Xylenes (µg/g)	VPH (C6-C10) (µg/g)	EPH (C10-C19) (µg/g)	EPH (C19-C32) (µg/g)	F1 (C6-C10) (µg/g)	F2 (>C10-C16) (µg/g)	F3 (>C16-C34) (µg/g)	F4 (>C34-C50) (µg/g)
BC Standards											
CSR Residential Land Use (RL)ᶜ	10	1	1.5	5	200	1,000	1,000	n/a	n/a	n/a	n/a
CSR Commercial Land Use (CL)ᶜ	10	20	25	50	200	2,000	5,000	n/a	n/a	n/a	n/a
Federal Guidelines											
CCME CEQG/CWS Residential Coarse-Grained Subsoilᵈ (samle depth > 1.5m)	0.03	50	0.1	16	n/a	n/a	n/a	30	150	2,500	10,000
CCME CEQG/CWS Commercial Coarse-Grained Subsoilᵈ (samle depth > 1.5m)	0.03	50	0.1	37	n/a	n/a	n/a	320	600	3,500	10,000
CCME CEQG/CWS Residential Fine-Grained Subsoilᵈ (samle depth > 1.5m)	0.0068	240	220	130	n/a	n/a	n/a	610	1,000	3,500	10,000
CCME CEQG/CWS Commercial Fine-Grained Subsoilᵈ (samle depth > 1.5m)	0.0068	860	660	460	n/a	n/a	n/a	800	1,000	5,000	10,000

* FEDERAL STANDARDS NOT APPLIED OFF SITE ON PROVINCIAL LANDS

LEGEND

0 5 10 15 METRES

— – – —	LOT BOUNDARY
········	FORMER STRUCTURES
︶︶︶	FOREST
— — — —	AS/SVE SYSTEM PIPING
—— F ——	FUEL LINE
Ⓢ	AIR SPARGE WELL (SLE)
Ⓥ	SOIL VAPOUR EXTRACTION WELL (SLE)
Ⓦ	SOIL VAPOUR WELL
⊕	DESTROYED MONITORING WELL
— · — · —	APPROXIMATE EXTENT OF SOIL GREATER THAN THE CL GUIDELINES/STANDARDS
▨	APPROXIMATE AREA OF SOIL (<4m DEPTH) GREATER THAN THE CL GUIDELINES/STANDARDS
◕	MONITORING WELL (SLE)
⊕	BOREHOLE (SLE)
⓪	BOREHOLE (OTHER)
◓	MONITORING WELL (OTHER)

LOCATION

ANALYTICAL SOIL RESULTS

03–11	Depth Range	B	E	T	X	VPH	EPH(10–19)	EPH(19–32)	F1	F2	F3	F4	PHE	NAP	FL
11–1	5.5 – 6.1	<0.04ª	<0.5ª	<0.5ª	<0.5	<100	4,800	440	50	2,000	1,100	–	–	–	–

SAMPLE ID

DEPTH OF SAMPLE (m)

DENOTES MDL IS GREATER THAN THE REGULATORY STANDARD

GREEN – CONCENTRATION LESS THAN OR EQUAL TO THE APPLICABLE STANDARDS/GUIDELINES

RED – CONCENTRATION GREATER THAN THE CSR RL STANDARDS/CCME RL GUIDELINES

BLUE – CONCENTRATION GREATER THAN THE CSR CL STANDARDS/CCME CL GUIDELINES

* FEDERAL STANDARDS NOT APPLIED OFF SITE ON PROVINCIAL LANDS

B	BENZENE
E	ETHYLBENZENE
T	TOLUENE
X	XYLENES
VPH	VOLATILE PETROLEUM HYDROCARBONS (C6–C10)
EPH(C10–C19)	EXTRACTABLE PETROLEUM HYDROCARBONS (C10–C19)
EPH(C19–C32)	EXTRACTABLE PETROLEUM HYDROCARBONS (C19–C32)
F1	(C6–C10)
F2	(C10–C16)
F3	(C16–C34)
F4	(C34–C50)
NAP	NAPHTHALENE
FL	FLOURENE
PHE	PHENANTHRENE
<	DENOTES CONCENTRATION LESS THAN INDICATED DETECTION LIMIT
–	NOT ANALYZED FOR

NOTES

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No.	DATE	DESCRIPTION
–	–	–

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
0	2010–03–31	ISSUED TO CLIENT	AJK	PAC

SNC · LAVALIN

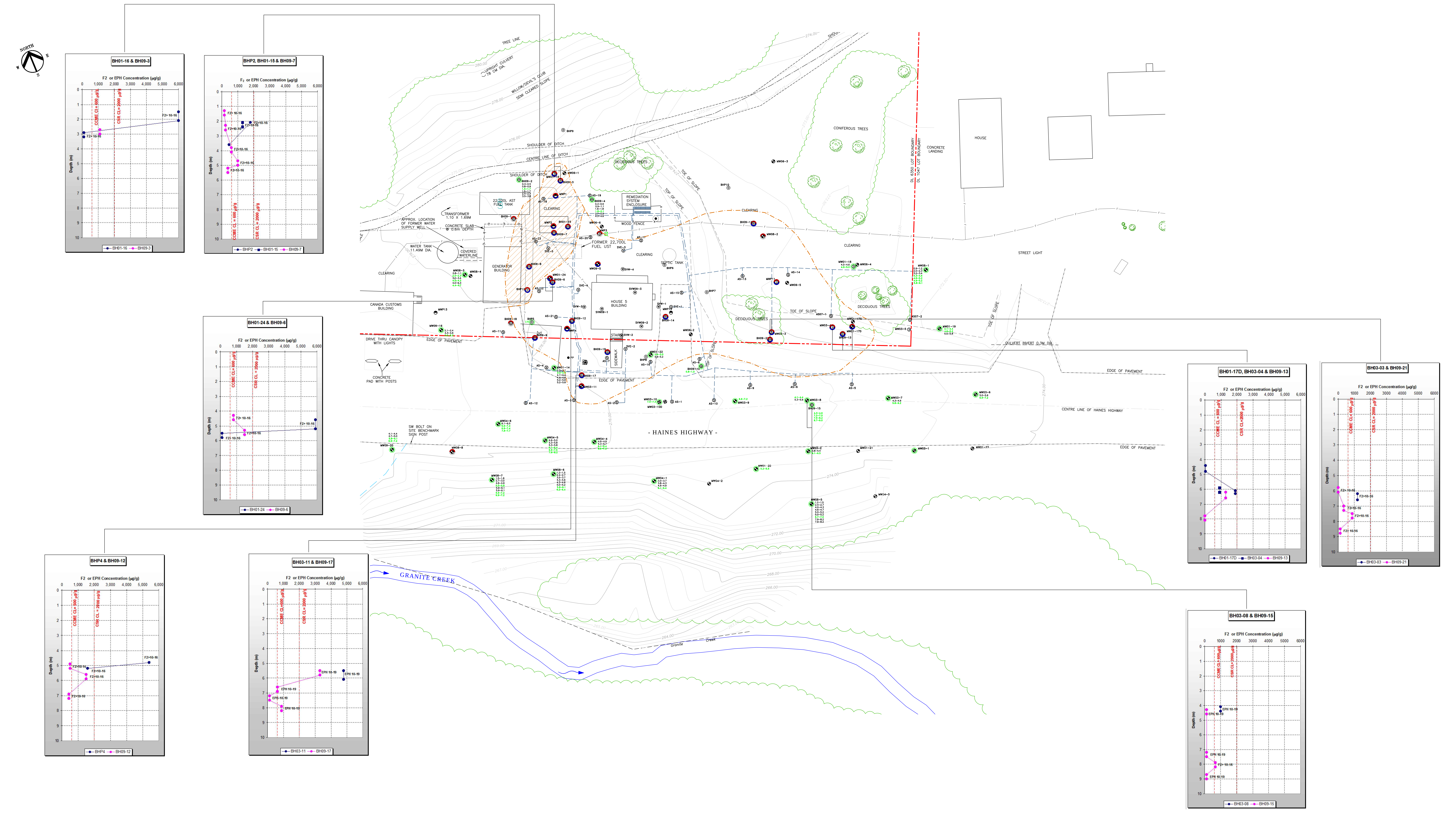
CLIENT NAME:
PUBLIC WORKS &
GOVERNMENT SERVICES CANADA

PROJECT LOCATION:
CANADA BORDER SERVICES AGENCY
PORT OF PLEASANT CAMP, BC

TITLE:
DETAILED SOIL ANALYTICAL
RESULTS - HYDROCARBONS

DWN BY: MGM
SCALE: 1:300
DATE: 2009–02–13
DWG No: 131416-908
REV.: 0
CHK'D: DWB
PLOT: 20150216.1004
CADFILE: 131416R22

PATH: P:\CURRENT PROJECTS\PUBLIC WORKS AND GOV'T SERVICES CANADA\131416\PRE 2014 QMS\GEOMATICS\EXPORTS\FINAL OF 20100331\131416R22.DWG



LEGEND

0 5 10 15 METRES

— - - —	LOT BOUNDARY
········	FORMER STRUCTURES
⌒⌒⌒	FOREST
— — —	AS/SVE SYSTEM PIPING
—F—	FUEL LINE
Ⓢ	AIR SPARGE WELL (SLE)
Ⓥ	SOIL VAPOUR EXTRACTION WELL (SLE)
Ⓦ	SOIL VAPOUR WELL
⦶	DESTROYED MONITORING WELL
—·—·—	APPROXIMATE EXTENT OF SOIL GREATER THAN THE CL GUIDELINES/STANDARDS
▨	APPROXIMATE AREA OF SOIL (<4m DEPTH) GREATER THAN THE CL GUIDELINES/STANDARDS
◕	MONITORING WELL (SLE)
⊕	BOREHOLE (SLE)
ⓞ	BOREHOLE (OTHER)
◒	MONITORING WELL (OTHER)
🟩	GREEN – CONCENTRATION LESS THAN OR EQUAL TO THE APPLICABLE STANDARDS/GUIDELINES
🟥	RED – CONCENTRATION GREATER THAN THE CSR RL STANDARDS/CCME RL GUIDELINES
🟦	BLUE – CONCENTRATION GREATER THAN THE CSR CL STANDARDS/CCME CL GUIDELINES

* FEDERAL STANDARDS NOT APPLIED OFF SITE ON PROVINCIAL LANDS

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SNC · LAVALIN

CLIENT NAME:
PUBLIC WORKS &
GOVERNMENT SERVICES CANADA

PROJECT LOCATION:
CANADA BORDER SERVICES AGENCY
PORT OF PLEASANT CAMP, BC

TITLE:

COMPARISON OF PRE AND POST
REMEDIAL SOIL QUALITY

DWN BY: MGM
CHK'D: DWB
SCALE: 1:300
PLOT: 20150216.1004
DATE: 2009–02–13
CADFILE: 131416R22
DWG No: 131416-909
REV.: 0

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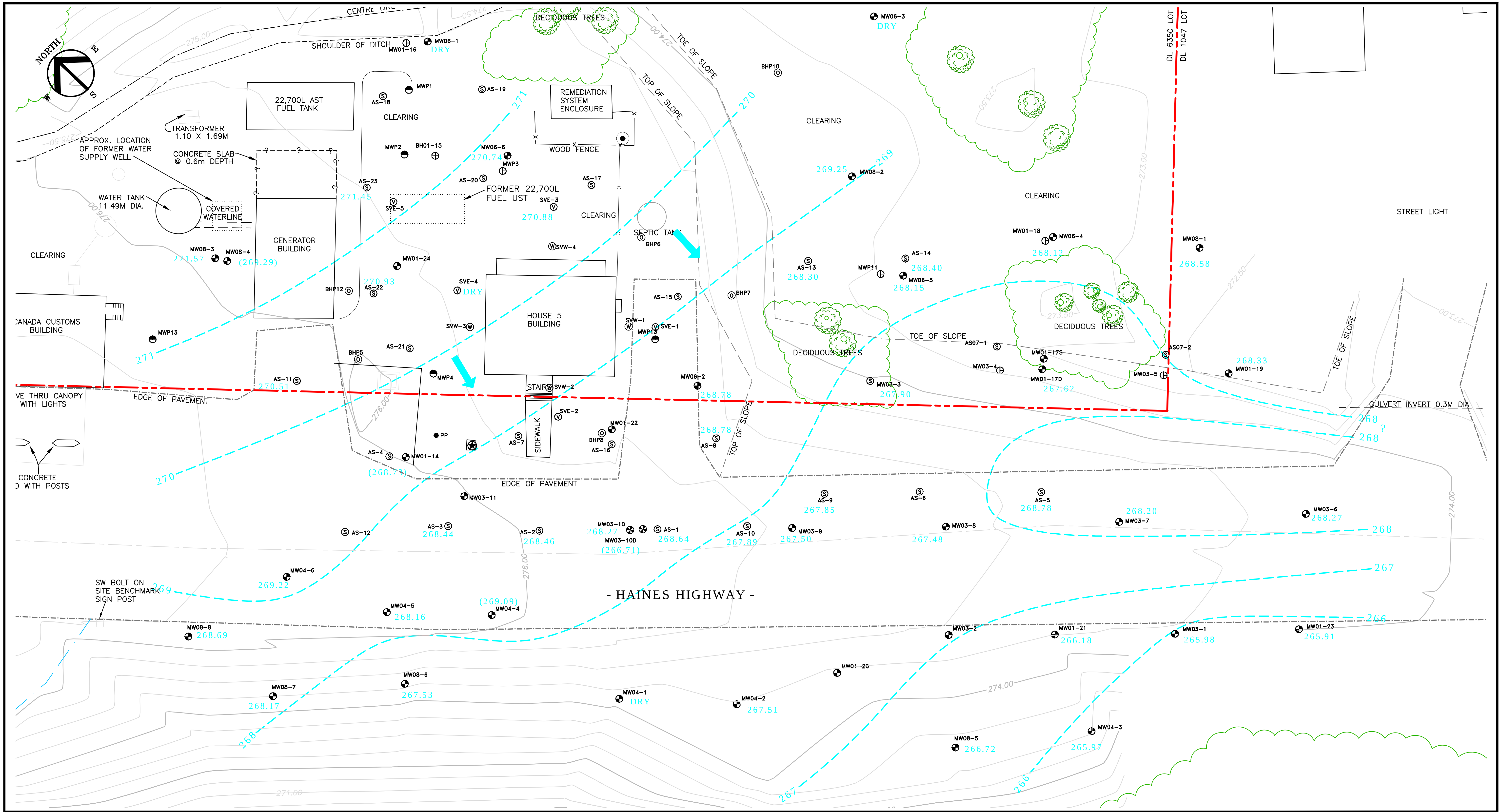

LEGEND

0 5 10 15 METRES

LOT BOUNDARY
FORMER STRUCTURES
FUEL LINE
AS/SVE SYSTEM PIPING
TOPOGRAPHIC MAJOR CONTOUR (2m)
TOPOGRAPHIC MINOR CONTOUR (0.5m)
FOREST
INFERRED POTENTIOMETRIC CONTOUR
292.94 POTENTIOMETRIC ELEVATION (m) 2009 07 10
ESTIMATED GROUNDWATER FLOW DIRECTION

Ⓞ BOREHOLE (OTHER)
◓ MONITORING WELL (OTHER)
⊕ MONITORING WELL (SLE)
⊕ BOREHOLE (SLE)
Ⓢ AIR SPARGE WELL (SLE)
Ⓥ SOIL VAPOUR EXTRACTION WELL (SLE)
Ⓦ SOIL VAPOUR WELL
⦶ DESTROYED MONITORING WELL

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED ON SITE. NOT ALL UTILITIES MAY BE SHOWN.

REFERENCE DRAWINGS

	NOV. 2005	YUKON ENGINEERING SERVICES
DWG. NO.	DATE	DESCRIPTION

REVISIONS

0	2010-03-31	ISSUED TO CLIENT	AJK	PAC
REV.	DATE	DESCRIPTION	BY	CHK

SNC·LAVALIN

CLIENT NAME:
PUBLIC WORKS & GOVERNMENT SERVICES CANADA

PROJECT LOCATION:
CANADA BORDER SERVICES AGENCY
PORT OF PLEASANT CAMP, BC

TITLE: POTENTIOMETRIC ELEVATIONS & INFERRED CONTOURS (JULY 2009)

DWN BY: KGP	SCALE: 1:300	DATE: 2010-03-05	DWG No: REV.: 0
CHK'D: DWB	PLOT: 20150216.1004	CADFILE: 131416R22	131416-910

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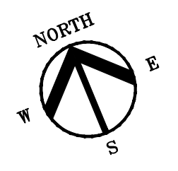


06–2	EPHw10–19	LEPHw	PAH
2006 10 01	3,200	3,200	–
2007 09 26	1,100	1,100	–
2008 06 19	<250	<250	–
2008 10 02	1,100	1,100	–
2009 07 13	600	600	<STD
2009 09 26	330	330	<STD

AS–15	EPHw10–19	LEPHw	PAH
2008 06 20	<250	<250	–
2008 10 02	<250	<250	–
2009 09 27	<250	<250	<STD

03–10	EPHw10–19	LEPHw	PAH
2003 09 10	6,600	6,600	–
2003 10 25	4,100	4,100	–
2006 09 30	11,000	11,000	–
2007 09 17	1,200	1,200	–
2008 06 18	2,300	2,300	–
2008 09 30	3,000	3,000	–
2009 07 12	34,000	34,000	>STD
2009 08 29	2,600	2,600	–
2009 09 25	3,900	3,900	<STD

06–6	EPHw10–19	LEPHw	PAH
2006 10 01	<250	<250	–
2007 09 26	<250	<250	–
2008 06 19	<250	<250	–
2008 10 02	<250	<250	–
2009 07 15	<100	<100	<STD

P3	EPHw10–19	LEPHw	PAH
2000 08 27	<100	<100	–
2001 09 28	1,000	1,000	–
2005 07 08	<250	<250	<STD

09–5	EPHw10–19	LEPHw	PAH
2009 09 26	14,000	14,000	>STD
DUPLICATE	17,000	17,000	>STD

06–1	EPHw10–19	LEPHw	PAH
2006 10 01	<250	<250	–
2009 09 26	<250	<250	<STD

01–16	EPHw10–19	LEPHw	PAH
2001 09 28	1,100	1,100	–

AS–22	EPHw10–19	LEPHw	PAH
2008 06 20	710	710	–
2008 10 04	1,600	1,600	–
2009 07 14	650	650	<STD
2009 09 27	1,900	1,900	<STD

AS–23	EPHw10–19	LEPHw	PAH
2008 10 02	360	360	–
2009 07 14	<100	<100	<STD
DUPLICATE	<100	<100	<STD

08–4	EPHw10–19	LEPHw	PAH
2008 08 22	<250	<250	–
2008 10 03	<250	<250	–
2009 09 27	<250	<250	<STD

08–3	EPHw10–19	LEPHw	PAH
2008 10 04	550	550	–
2009 07 15	180	180	<STD
2009 09 26	<250	<250	<STD

09–16	EPHw10–19	LEPHw	PAH
2009 09 27	<250	<250	<STD

AS–11	EPHw10–19	LEPHw	PAH
2008 10 02	2,800	2,800	–
2009 09 27	1,500	1,500	<STD

AS–4	EPHw10–19	LEPHw	PAH
2008 06 20	<250	<250	–
2008 10 02	1,300	1,300	–
2009 09 27	1,600	1,600	STD^a

P4	EPHw10–19	LEPHw	PAH
2008 06 20	1,500	1,500	–
2008 09 08	2,300	2,300	–
2008 10 02	4,100	4,100	–
2009 09 27	3,700	3,700	>STD

03–11	EPHw10–19	LEPHw	PAH
2003 10 25	2,600	2,600	–
2004 10 19	1,300	1,300	–
2008 06 20	950	950	–
2008 10 04	1,600	1,600	–
2009 09 25	250	250	<STD

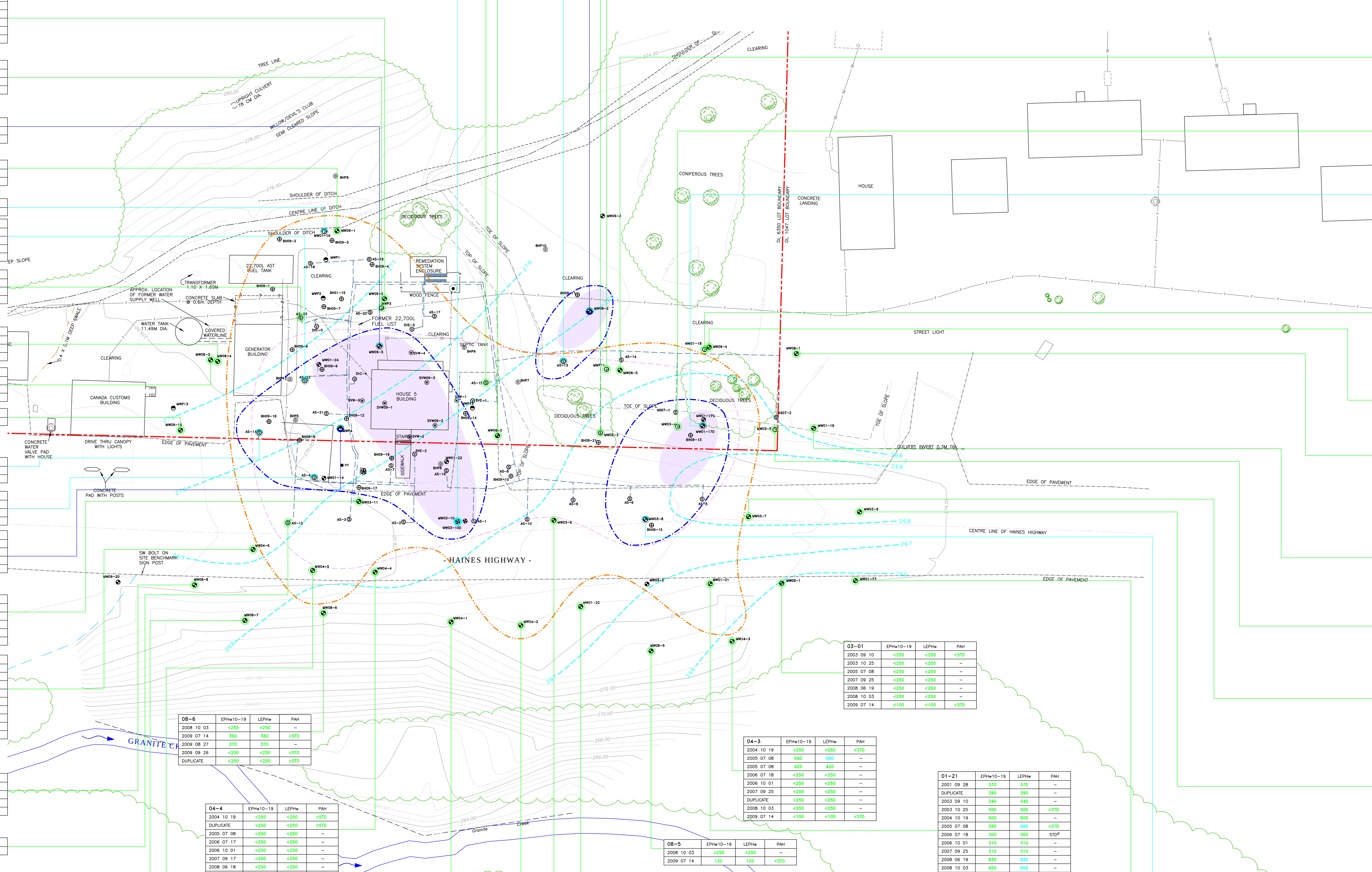
04–6	EPHw10–19	LEPHw	PAH
2004 10 19	440	440	<STD
2005 07 07	<250	<250	–
2006 07 17	<250	<250	–
2006 09 30	<250	<250	–
2007 09 17	<250	<250	–
2008 06 18/19	<250	980	–
2008 09 30	<250	<250	–
2009 07 12	110	110	<STD
2009 09 25	<100	<100	<STD

08–8	EPHw10–19	LEPHw	PAH
2008 10 03	370	370	–
2009 07 12	580	580	<STD
2009 08 27	450	450	–
2009 09 26	<250	<250	<STD

AS–12	EPHw10–19	LEPHw	PAH
2008 09 30	<250	<250	–

08–7	EPHw10–19	LEPHw	PAH
2008 10 03	<250	<250	–
DUPLICATE	<250	<250	–
2009 07 13	730	730	<STD
DUPLICATE	580	580	<STD
2009 08 27	410	410	–
2009 09 25	<100	<100	<STD

04–5	EPHw10–19	LEPHw	PAH
2004 10 19	1,400	1,400	<STD
DUPLICATE	1,100	1,100	<STD
2005 07 07	1,400	1,400	<STD
2005 07 08	810	810	–
2006 07 17	590	590	STD^a
2006 10 01	1,100	1,100	–
2007 09 25	1,200	1,200	–
2008 06 18	470	470	–
2008 10 03	<250	<250	–
2009 09 25	<100	<100	<STD



08–6	EPHw10–19	LEPHw	PAH
2008 10 03	<250	<250	–
2009 07 14	360	360	<STD
2009 08 27	370	370	–
2009 09 26	<250	<250	<STD
DUPLICATE	<250	<250	<STD

04–4	EPHw10–19	LEPHw	PAH
2004 10 19	<250	<250	<STD
DUPLICATE	<250	<250	<STD
2005 07 08	<250	<250	–
2006 07 17	<250	<250	–
2006 10 01	<250	<250	–
2007 09 17	<250	<250	–
2008 06 18	<250	<250	–
2008 10 03	<250	<250	–
2009 07 12	120	120	<STD
2009 09 25	<100	<100	<STD

04–1	EPHw10–19	LEPHw	PAH
2004 10 19	<250	<250	<STD
2008 06 19	<250	<250	–
2008 10 03	<250	<250	–
2009 09 25	<100	<100	<STD

04–2	EPHw10–19	LEPHw	PAH
2004 10 19	750	750	<STD
2005 07 08	300	300	<STD
2006 07 18	<250	<250	STD^a
2006 10 01	<250	<250	–
2007 09 25	<250	<250	–
2008 06 19	<250	<250	–
2008 10 03	<250	<250	–
2009 07 13	160	160	<STD
2009 09 25	<100	<100	<STD

03–01	EPHw10–19	LEPHw	PAH
2003 09 10	<250	<250	<STD
2003 10 25	<250	<250	–
2005 07 08	<250	<250	–
2007 09 25	<250	<250	–
2008 06 19	<250	<250	–
2008 10 03	<250	<250	–
2009 07 14	<100	<100	<STD

04–3	EPHw10–19	LEPHw	PAH
2004 10 19	<250	<250	<STD
2005 07 08	560	560	–
2005 07 08	420	420	–
2006 07 18	<250	<250	–
2006 10 01	<250	<250	–
2007 09 25	<250	<250	–
DUPLICATE	<250	<250	–
2008 10 03	<250	<250	–
2009 07 14	<100	<100	<STD

08–5	EPHw10–19	LEPHw	PAH
2008 10 03	<250	<250	–
2009 07 14	120	120	<STD

01–20	EPHw10–19	LEPHw	PAH
2001 09 29	<250	<250	–
2003 10 25	<250	<250	–
2004 10 19	<250	<250	–
2006 10 01	<250	<250	–
2008 06 19	<250	<250	–
2008 10 03	<250	<250	–
2009 09 25	<100	<100	<STD

03–09	EPHw10–19	LEPHw	PAH
2003 09 10	370	370	–
2003 10 25	<250	<250	–
2004 10 19	<250	<250	–
2005 07 07	800	800	–
2006 07 17	<250	<250	STD^a
2006 09 30	250	250	–
2008 06 18	<250	<250	–
2009 07 12	490	490	<STD
2009 09 25	<100	<100	<STD

01–21	EPHw10–19	LEPHw	PAH
2001 09 28	370	370	–
DUPLICATE	390	390	–
2003 09 10	340	340	–
2003 10 25	500	500	<STD
2004 10 19	500	500	–
2005 07 08	590	580	<STD
2006 07 18	300	300	STD^a
2006 10 01	310	310	–
2007 09 25	310	310	–
2008 06 19	830	830	–
2008 10 03	650	650	–
2009 07 14	420	420	<STD
2009 09 26	260	260	<STD

AS–13	EPHw10–19	LEPHw	PAH
2008 10 02	1,900	1,900	–
2009 07 14	430	430	>STD
2009 09 26	610	610	<STD

08–2	EPHw10–19	LEPHw	PAH
2008 10 04	360	360	–
2009 07 12	2,200	2,200	>STD
2009 09 26	6,600	6,600	>STD

03–03	EPHw10–19	LEPHw	PAH
2003 09 10	6,700	6,700	>STD
2003 10 25	2,100	2,100	<STD
2008 06 20	280	280	–
2008 10 02	<250	<250	–
DUPLICATE	<250	<250	–
2009 07 13	170	170	<STD
2009 09 26	<250	<250	<STD

P11	EPHw10–19	LEPHw	PAH
2000 09 31	120,000	120,000	–
2001 09 29	5,000	5,000	–
DUPLICATE	4,200	4,200	–
2005 07 08	<250	<250	<STD

06–5	EPHw10–19	LEPHw	PAH
2006 10 01	9,000	9,000	–
DUPLICATE	10,000	10,000	–
2007 09 26	1,400	1,400	–
2008 06 19	<250	<250	–
2008 10 04	320	320	–
2009 07 13	120	120	<STD

03–04	EPHw10–19	LEPHw	PAH
2003 09 10	800	800	>STD
2003 10 25	<250	<250	<STD

01–17D	EPHw10–19	LEPHw	PAH
2001 09 29	17,000	17,000	–
2003 09 10	700	700	–
2003 10 25	630	630	–
2006 10 01	2,300,000	2,300,000	–
2008 06 19	9,700	9,700	–
2008 10 04	7,200	7,200	–
2009 07 13	7,200	7,200	>STD
DUPLICATE	2,300	2,300	>STD
2009 09 26	72,000	72,000	STD^a
DUPLICATE	170,000	170,000	STD^a

06–4	EPHw10–19	LEPHw	PAH
2006 10 01	550	550	–
2007 09 26	<250	<250	–
2008 10 02	<250	<250	–

01–18	EPHw10–19	LEPHw	PAH
2001 09 28	<250	<250	–
2003 10 25	<250	<250	–

08–1	EPHw10–19	LEPHw	PAH
2008 10 04	310	310	–
2009 07 13	<100	<100	<STD

01–19	EPHw10–19	LEPHw	PAH
2001 09 29	<250	<250	–
2003 10 25	<250	<250	–
2006 10 01	<250	<250	–
2007 09 25	<250	<250	–
2008 06 19	<250	<250	–
DUPLICATE	<250	<250	–
2008 10 04	<250	<250	–
2009 07 12	<100	<100	<STD
DUPLICATE	<100	<100	<STD
2009 09 26	<250	<250	<STD
DUPLICATE	<250	<250	<STD

03–05	EPHw10–19	LEPHw	PAH
2003 09 10	350	350	>STD
2003 10 25	360	360	<STD

03–07	EPHw10–19	LEPHw	PAH
2003 10 25	<250	<250	–
2004 10 19	<250	<250	–
2005 07 07	<250	<250	–
2006 07 17	<250	<250	STD^a
2008 06 18	<250	<250	–
2008 09 30	<250	<250	–
2009 07 12	<100	<100	<STD
2009 09 25	<100	<100	<STD

03–06	EPHw10–19	LEPHw	PAH
2003 09 10	<250	<250	<STD
2003 10 25	<250	<250	<STD
2006 07 17	<250	<250	–
2006 09 30	<250	<250	–
2007 09 17	<250	<250	–
2008 06 18	<250	<250	–

03–08	EPHw10–19	LEPHw	PAH
2003 09 10	2,700	2,700	–
2003 10 25	3,800	3,800	–
2004 10 19	1,100	1,100	–
2005 07 07	810	810	–
2006 07 17	1,300	1,300	STD^a
DUPLICATE	1,300	1,300	STD^a
2006 09 30	4,200	4,200	–
2007 09 25	8,900	8,900	–
2008 06 18	1,500	1,500	–
2008 09 30	880	880	–
2009 07 12	540	540	<STD
2009 09 25	1,100	1,100	<STD

01–23	EPHw10–19	LEPHw	PAH
2001 09 28	<250	<250	–
2003 10 25	<250	<250	<STD
2004 10 19	<250	<250	–
2005 07 08	<250	<250	–
2006 07 18	<250	<250	–
2006 10 01	<250	<250	–
2007 09 25	<250	<250	–

LEGEND

0 5 10 15 METRES

- LOT BOUNDARY
- FORMER STRUCTURES
- FUEL LINE
- FOREST
- AS/SVE SYSTEM PIPING
- BOREHOLE (OTHER)
- MONITORING WELL (OTHER)
- MONITORING WELL (SLE)
- BOREHOLE (SLE)
- AIR SPARGE WELL (SLE)
- SOIL VAPOUR EXTRACTION WELL (SLE)
- SOIL VAPOUR WELL
- DESTROYED MONITORING WELL

- INFERRED POTENTIOMETRIC CONTOUR (m) JULY 2009
- HISTORIC INFERRED DISSOLVED PHASE HYDROCARBON IMPACTED AREA GREATER THAN CSR AW STANDARDS (PRE–2006)
- CURRENT INFERRED DISSOLVED PHASE HYDROCARBON IMPACTED AREA GREATER THAN CSR/CCME AW STANDARDS (2009)
- CURRENT INFERRED LNAPL PLUME (2009)
- HISTORIC INFERRED EXTENT OF LNAPL PLUME BASED ON EPH CONCENTRATIONS AND OBSERVATIONS (PRE 2006)

LOCATION — ANALYTICAL GROUNDWATER RESULTS

04–2	EPHw10–19	LEPHw	PAH
2004 10 19	750	750	>STD

SAMPLE DATE (YYYY MM DD)

GREEN – CONCENTRATION LESS THAN OR EQUAL TO THE APPLICABLE STANDARD

CYAN – CONCENTRATION GREATER THAN THE APPLICABLE CSR/CCME AW STANDARDS

BLUE – CONCENTRATION GREATER THAN THE APPLICABLE CCME AW GUIDELINES

*CCME GUIDELINES NOT APPLIED ON PROVINCIAL LANDS

LEPHw	LIGHT EXTRACTABLE PETROLEUM HYDROCARBONS
EPHw10–19	EXTRACTABLE PETROLEUM HYDROCARBONS (C10–C19)
<	DENOTES CONCENTRATION LESS THAN INDICATED DETECTION LIMIT
–	NOT ANALYZED FOR
a	MDL EXCEEDS CCME GUIDELINES

CSR AW STANDARDS (µg/L)

EPHw10–19	LEPHw	PAH
5,000	500	SEE TABLES

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED ON SITE. NOT ALL UTILITIES MAY BE SHOWN.

REFERENCE DRAWINGS

No.	DATE	DESCRIPTION
–	–	–

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
0	2010–03–31	ISSUED TO CLIENT	AJK	PAC

SNC·LAVALIN

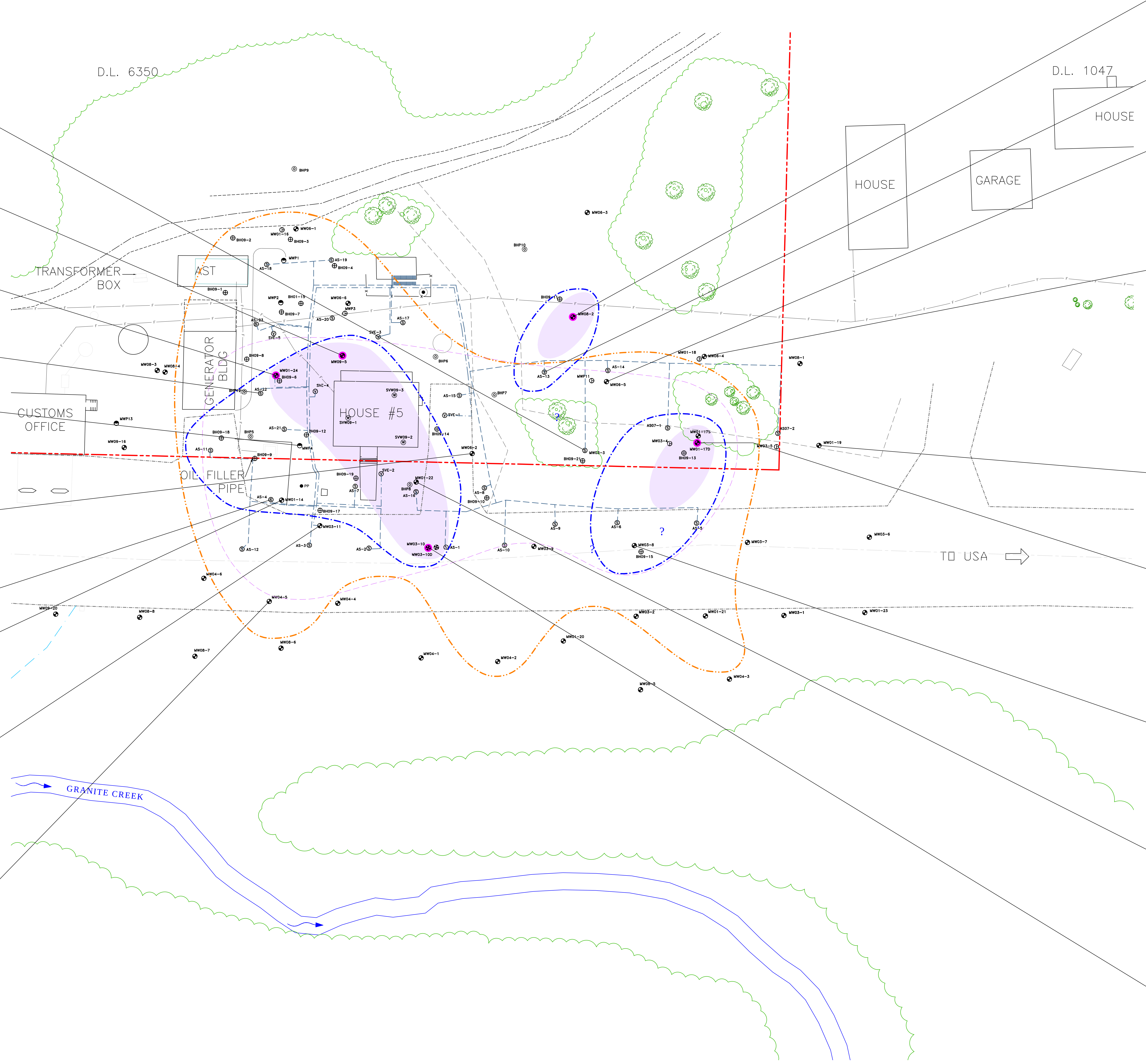
CLIENT NAME:
PUBLIC WORKS &
GOVERNMENT SERVICES CANADA

PROJECT LOCATION:
CANADA BORDER SERVICES AGENCY
PORT OF PLEASANT CAMP, BC

TITLE:
DETAILED GROUNDWATER
ANALYTICAL RESULTS - HYDROCARBONS

DWN BY: AJK
SCALE: 1:300
DATE: 2008–10–05
DWG No: 131416-911
REV.: 0
CHK'D: DWB
PLOT: 20150216.1004
CADFILE: 131416R22

PATH: P:\CURRENT PROJECTS\PUBLIC WORKS AND GOV'T SERVICES CANADA\131416\PRE 2014 QMS\GEOMATICS\EXPORTS\FINAL OF 20100331\131416R22.DWG



DATE	03-3
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2003 09 04	NM
2003 09 11	0
2003 10 23	NM
2004 10 01	0
2004 10 18	NM
2005 07 06	NM
2006 06 14	NM
2006 06 18	NM
2006 07 16	NM
2006 09 29	NM
2007 09 24	NM
2008 06 20	SHEEN*
2008 10 01	SHEEN*
2009 07 12	SHEEN*
2009 09 25	SHEEN*

DATE	09-5
2009 09 25	SHEEN

DATE	01-24
2001 09 28	1
2003 09 04	NM
2003 09 11	NM
2003 10 23	NM
2004 10 01	DRY
2004 10 18	NM
2005 07 06	DRY
2006 06 14	DRY
2006 06 18	NM
2006 07 16	14
2006 09 29	NM
2007 09 24	NM
2008 06 17	SHEEN
2008 10 02	SHEEN

DATE	AS-22
2009 07 13	SHEEN*

DATE	MWP4
2001 09 28	1
2003 09 04	NM
2003 09 11	NM
2003 10 23	NM
2004 10 01	2
2004 10 18	NM
2005 07 06	0
2006 06 14	NM
2006 06 18	NM
2006 07 16	0
2006 09 29	NM
2007 09 24	NM
2008 06 19	SHEEN*
2008 10 01	SHEEN*
2009 09 26	SHEEN*

DATE	06-2
2006 09 29	SHEEN*
2007 09 24	0
2008 06 19	SHEEN*
2008 10 01	SHEEN*
2009 09 25	SHEEN*

DATE	AS-4
2009 09 26	SHEEN*

DATE	01-14
2001 09 28	DRY
2003 09 04	NM
2003 09 11	3
2003 10 23	NM
2004 10 01	DRY
2004 10 18	NM
2005 07 06	0
2006 06 14	NM
2006 06 18	NM
2006 07 16	0
2006 09 29	0
2007 09 24	DRY
2008 06 16	DRY
2008 09 30	DRY

DATE	03-11
2001 09 28	–
2003 09 04	NM
2003 09 11	2
2003 10 23	0
2004 10 01	0
2004 10 18	0
2005 07 06	DRY
2006 06 14	NM
2006 06 18	NM
2006 07 16	0
2006 09 29	NM
2007 09 24	NM
2008 06 19	SHEEN*
2008 10 03	0
2009 09 24	SHEEN*

DATE	04-5
2006 07 16	SHEEN*
2006 09 29	SHEEN*
2007 09 24	0
2008 06 17	0
2008 10 02	0
2009 09 24	SHEEN*

DATE	08-2
2009 07 12	SHEEN*
2009 09 24	SHEEN

DATE	AS-13
2009 07 14	SHEEN*

DATE	06-5
2006 09 29	SHEEN
2007 09 24	SHEEN*
2008 06 18	SHEEN*
2008 10 03	SHEEN*

DATE	06-4
2007 09 24	SHEEN*
2008 06 18	SHEEN*
2008 10 01	SHEEN*

DATE	01-19
2001 09 28	0
2003 09 04	NM
2003 09 11	0
2003 10 23	NM
2004 10 01	0
2004 10 18	NM
2005 07 06	NM
2006 06 14	0
2006 06 18	0
2006 07 16	0
2006 09 29	SHEEN*
2007 09 24	0
2008 06 18	SHEEN*
2008 10 03	SHEEN*

DATE	01-17D
2001 09 28	0
2003 09 04	0
2003 09 11	0
2003 10 23	NM
2004 10 01	0
2004 10 18	NM
2005 07 06	NM
2006 06 14	0
2006 06 18	0
2006 07 16	SHEEN
2006 09 29	SHEEN
2007 09 24	1
2008 06 18	SHEEN
2008 10 03	SHEEN
2009 07 12	SHEEN
2009 09 25	SHEEN

DATE	03-8
2001 09 28	–
2003 09 04	NM
2003 09 11	0
2003 10 23	0
2004 10 01	0
2004 10 18	0
2005 07 06	0
2006 06 14	0
2006 06 18	0
2006 07 16	SHEEN*
2006 09 29	SHEEN
2007 09 24	SHEEN
2008 06 17	SHEEN*
2008 09 29	SHEEN*
2009 07 11	SHEEN*
2009 09 25	SHEEN*

DATE	01-22
2001 09 28	2
2003 09 04	NM
2003 09 11	DRY
2003 10 23	NM
2004 10 01	DRY
2004 10 18	NM
2005 07 06	DRY
2006 06 14	0
2006 06 18	0
2006 07 16	DRY
2006 09 29	DRY
2007 09 24	DRY
2008 06 16	DRY
2008 09 30	DRY

DATE	03-10
2001 09 28	–
2003 09 04	–
2003 09 11	0
2003 10 23	0
2004 10 01	0
2004 10 18	0
2005 07 06	NM
2006 06 14	0
2006 06 18	0
2006 07 16	0
2006 09 29	SHEEN
2007 09 24	SHEEN*
2008 06 17	SHEEN*
2008 09 29	SHEEN*
2009 07 11	SHEEN
2009 09 25	SHEEN*

LEGEND

0 5 10 15
METRES

LOT BOUNDARY
FORMER STRUCTURES
FUEL LINE
FOREST
AS/SVE SYSTEM PIPING
BOREHOLE (OTHER)
MONITORING WELL (OTHER)
MONITORING WELL (SLE)
BOREHOLE (SLE)
AIR SPARGE WELL (SLE)
SOIL VAPOUR EXTRACTION WELL (SLE)
SOIL VAPOUR WELL
DESTROYED MONITORING WELL

HISTORIC INFERRED DISSOLVED PHASE HYDROCARBON IMPACTED AREA GREATER THAN CSR AW STANDARDS (PRE 2006)
CURRENT INFERRED DISSOLVED PHASE HYDROCARBON IMPACTED AREA GREATER THAN CSR/CCME AW STANDARDS (2009)
CURRENT INFERRED LNAPL PLUME (2009)
HISTORIC INFERRED EXTENT OF LNAPL PLUME BASED ON EPH CONCENTRATIONS AND OBSERVATIONS (PRE 2006)

CONFIRMED LNAPL (2009)
* SHEEN NOT CONFIRMED BY ANALYTICAL

NOTES

ORIGINAL DRAWING IN COLOUR.

LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED ON SITE. NOT ALL UTILITIES MAY BE SHOWN.

REFERENCE DRAWINGS

No.	DATE	DESCRIPTION
–	–	–

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
0	2010–03–31	ISSUED TO CLIENT	AJK	DWB

SNC·LAVALIN

CLIENT NAME:
PUBLIC WORKS &
GOVERNMENT SERVICES CANADA

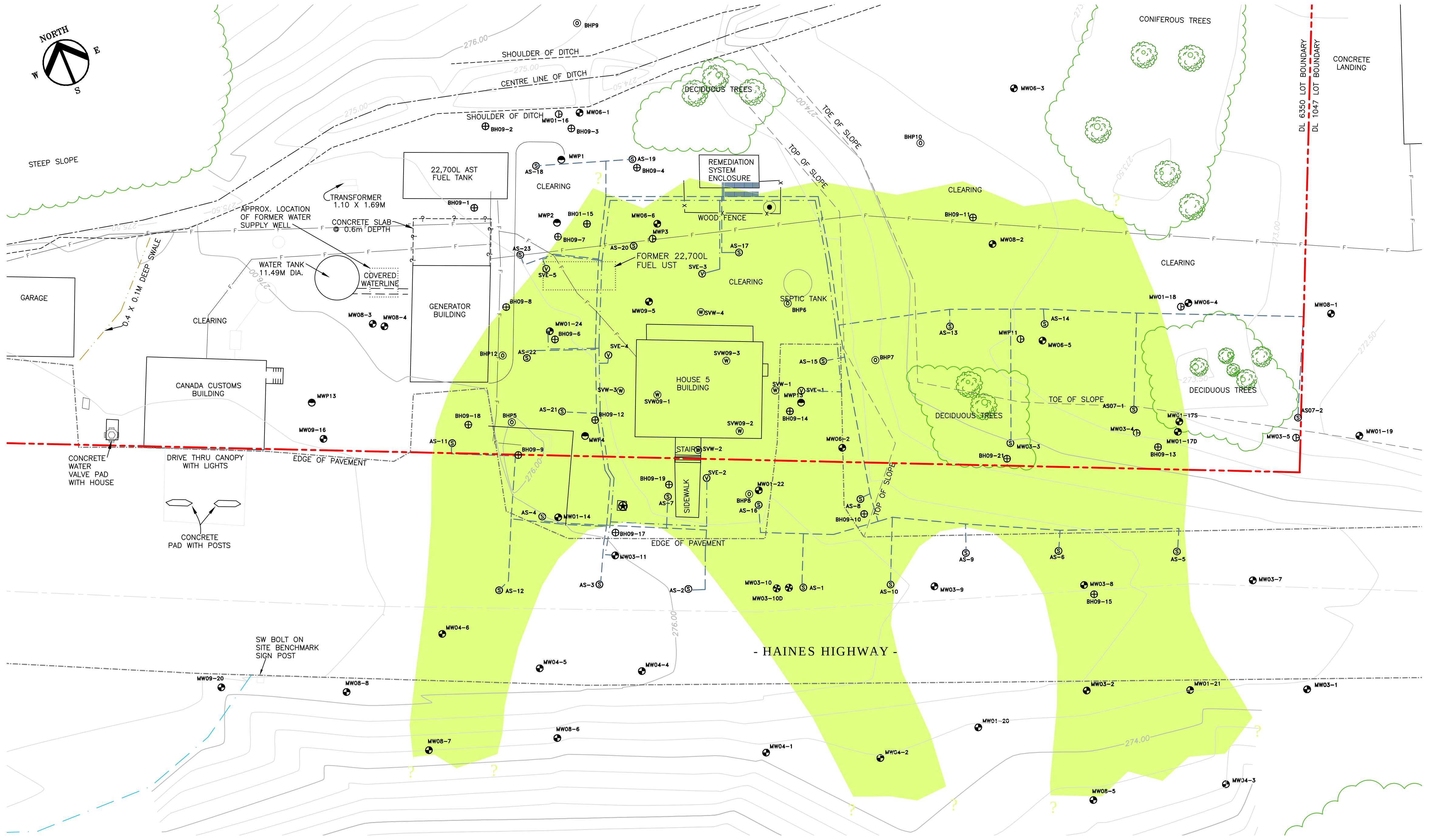
PROJECT LOCATION:
CANADA BORDER SERVICES AGENCY
PORT OF PLEASANT CAMP, BC

TITLE:

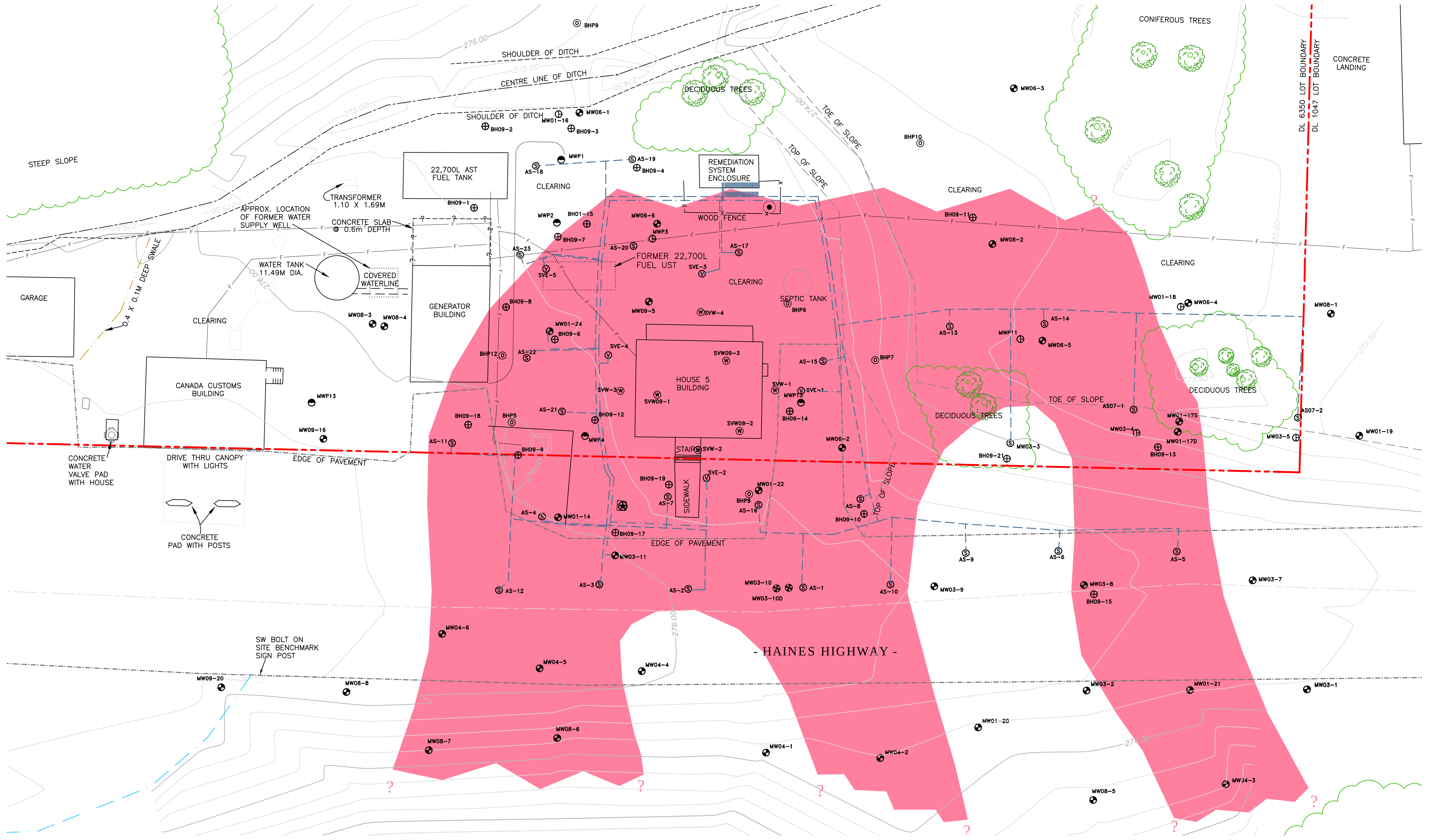
CURRENT AND HISTORIC INFERRED
LNAPL OCCURENCE

DWN BY: AJK
SCALE: 1:300
DATE: 2009–02–13
DWG No: 131416-912
REV.: 0
CHK'D: PAC
PLOT: 20150216.1004
CADFILE: 131416R22

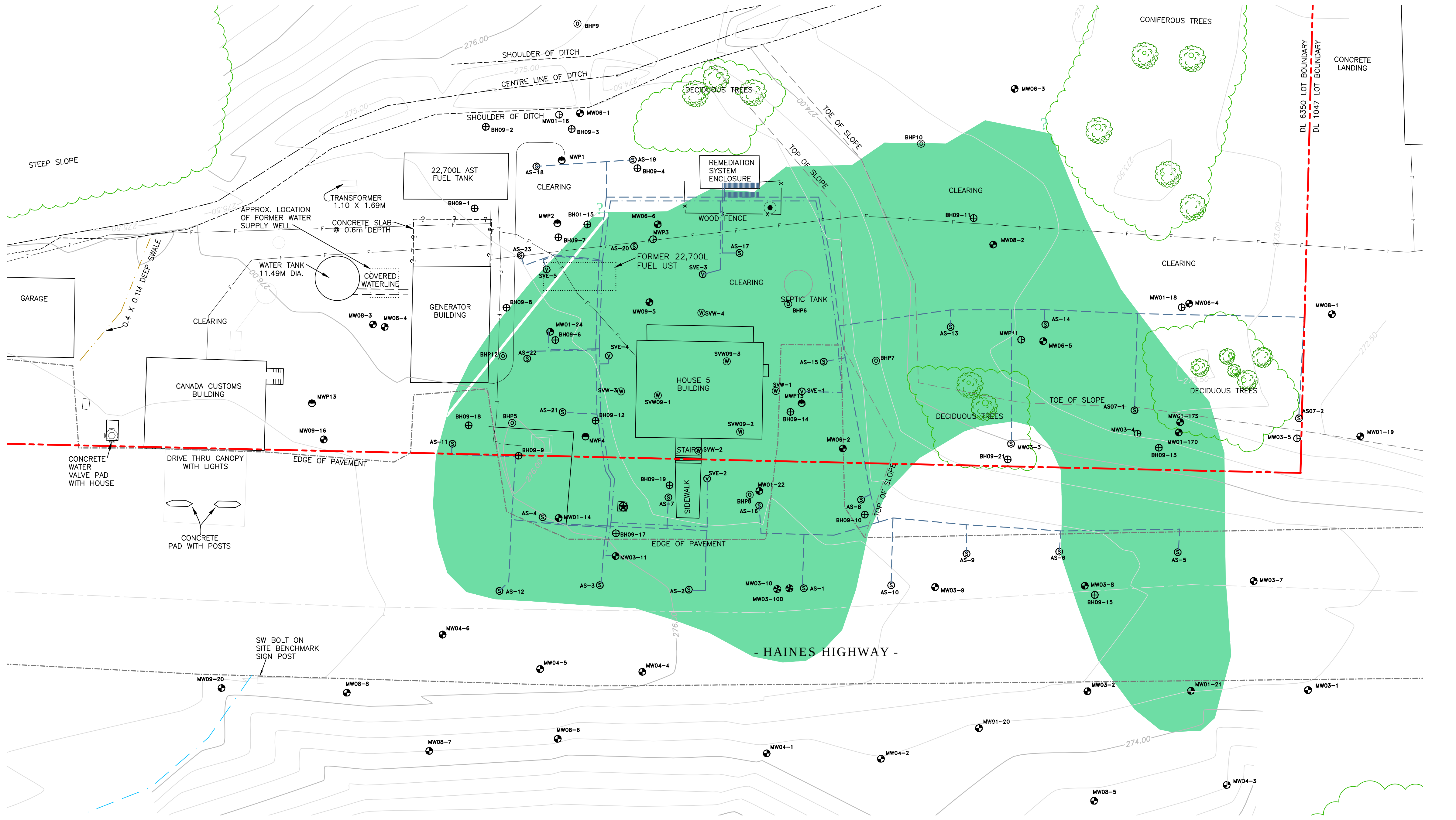
PATH: P:\CURRENT PROJECTS\PUBLIC WORKS AND GOV'T SERVICES CANADA\131416\PRE 2014 QMS\GEOMATICS\EXPORTS\FINAL OF 20100331\131416R22.DWG



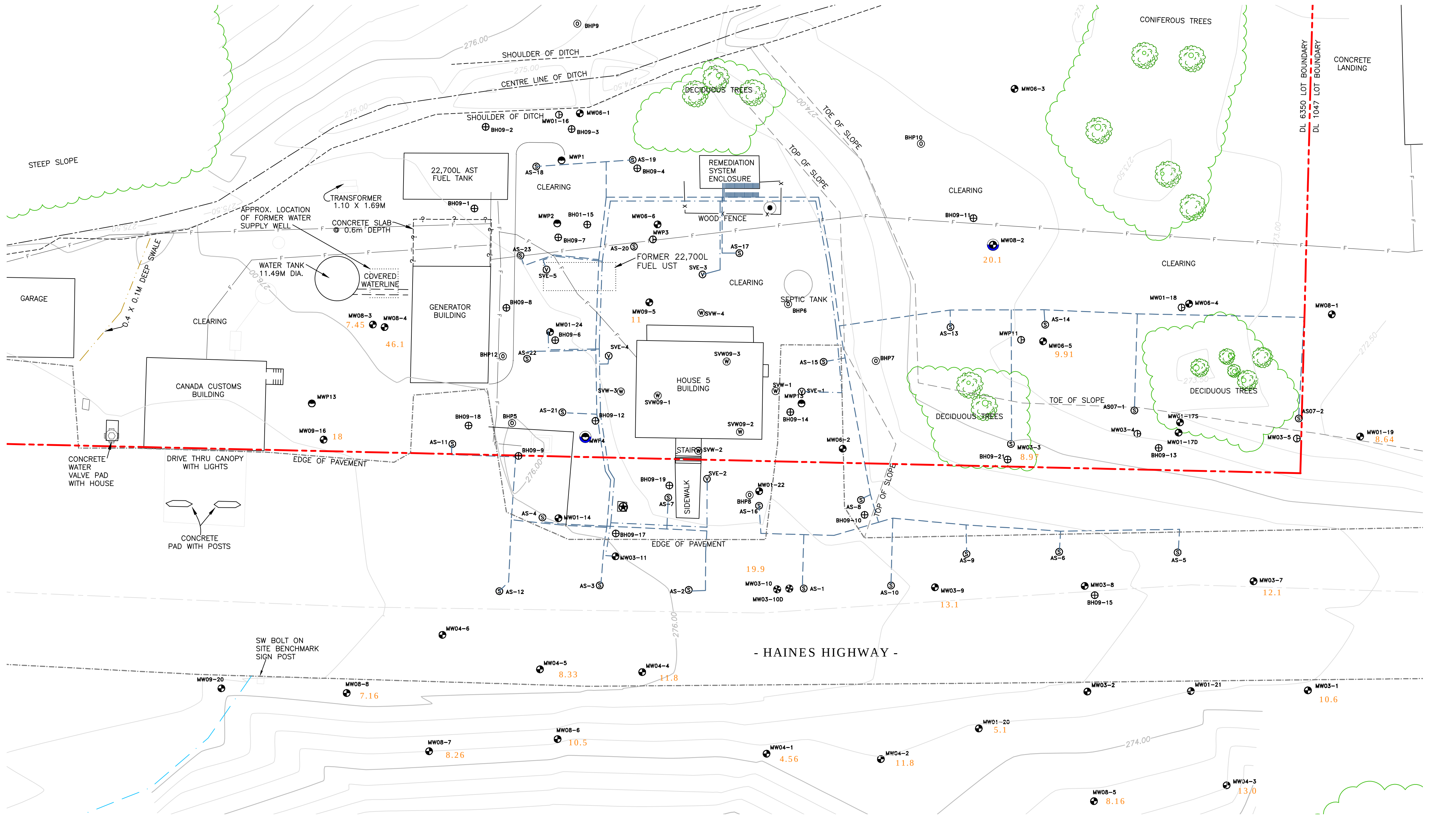
NO₃<50 μg/L (JULY TO SEPTEMBER 2009)



Fe>200 μg/L (JULY TO SEPTEMBER 2009)



Mn>500 μg/L (JULY TO SEPTEMBER 2009)



SO₄<40 mg/L (JULY TO SEPTEMBER 2009)

LEGEND

LOT BOUNDARY	FLAGPOLE (ARBITRARY DATUM)
FORMER STRUCTURES	SURFACE WATER SAMPLING LOCATION
TELEPHONE LINE (UG)	FIRE HYDRANT
WATER LINE	DESTROYED MONITORING WELL
ELECTRICAL LINE	BOREHOLE (OTHER)
FUEL LINE	MONITORING WELL (OTHER)
ELECTRICAL/TELEPHONE LINE	MONITORING WELL (SLE)
SEPTIC	BOREHOLE (SLE)
AS/SVE SYSTEM PIPING	AIR SPARGE WELL (SLE)
TOPOGRAPHIC MAJOR CONTOUR (2m)	SOIL VAPOUR EXTRACTION WELL (SLE)
TOPOGRAPHIC MINOR CONTOUR (0.5m)	SOIL VAPOUR WELL
FOREST	

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED ON SITE. NOT ALL UTILITIES MAY BE SHOWN.

REFERENCE DRAWINGS

No.	DATE	DESCRIPTION
08059/08073	2008-06-28	UNDERHILL GEOMATICS LTD.

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
0	2010-03-31	ISSUED TO CLIENT	AJK	DWB

SNC·LAVALIN

CLIENT NAME:
PUBLIC WORKS &
GOVERNMENT SERVICES CANADA

PROJECT LOCATION:
CANADA BORDER SERVICES AGENCY
PORT OF PLEASANT CAMP, BC

TITLE:
OCCURRENCE OF BIODEGRADATION PARAMETERS
SEPTEMBER 2009

DWN BY: AJK	SCALE: 1:300	DATE: 2010-03-31	DWG No: REV.: 0
CHK'D: PAC	PLOT: 20150216.1004	CADFILE: 131416R22	131416-913

PATH: P:\CURRENT PROJECTS\PUBLIC WORKS AND GOV'T SERVICES CANADA\131416\PRE 2014 QMS\GEOMATICS\EXPORTS\FINAL OF 20100331\131416R22.DWG

SNC•LAVALIN
Environment

Division of
SNC-LAVALIN INC.
8648 Commerce Court
Burnaby, British Columbia
Canada V5A 4N6

Tel.: 604-515-5151
Fax: 604-515-5150

FY 2009/2010
MONITORING AND REMEDIATION CLOSURE REPORT

Port of Pleasant Camp
Canada Border Services Agency
Pleasant Camp, BC

VOLUME II OF II

Prepared for:
Real Property Services, Public Works and Government Services Canada, Pacific Region

131416
March 31, 2010

APPENDIX I

Photographs

Photograph 1: View of the Pleasant Camp border crossing facility looking south.

Photograph 2: View looking west-northwest towards the border crossing facility along alignment of underground fuel line.

Photograph 3: View looking west towards the Generator Building and Main Storage Tank shed from ditch that traverses north of the facility.

Photograph 4: View looking northeast from the Generator Building towards the ditch.

Photograph 5: View looking north between the Generator Building and House #5. The fuel transfer area and fill pipe is visible in the foreground.

Photograph 6: View looking east at House #5. The fuel fill pipe and fuel transfer area is visible in the foreground.

Photograph 7: View looking southwest between House #5 and the Generator Building.

Photograph 8: View looking northwest along Haines Highway towards the border crossing facility.

Photograph 9: Granite Creek looking upstream at Station SW04-3.

Photograph 10: Hydrovacuum rig working at BH09-11 adjacent to the underground fuel line.

Photograph 11: Exposed remediation system piping in BH09-12.

Photograph 12: Boulders and cobbles removed by the hydrovacuum rig from BH09-11.

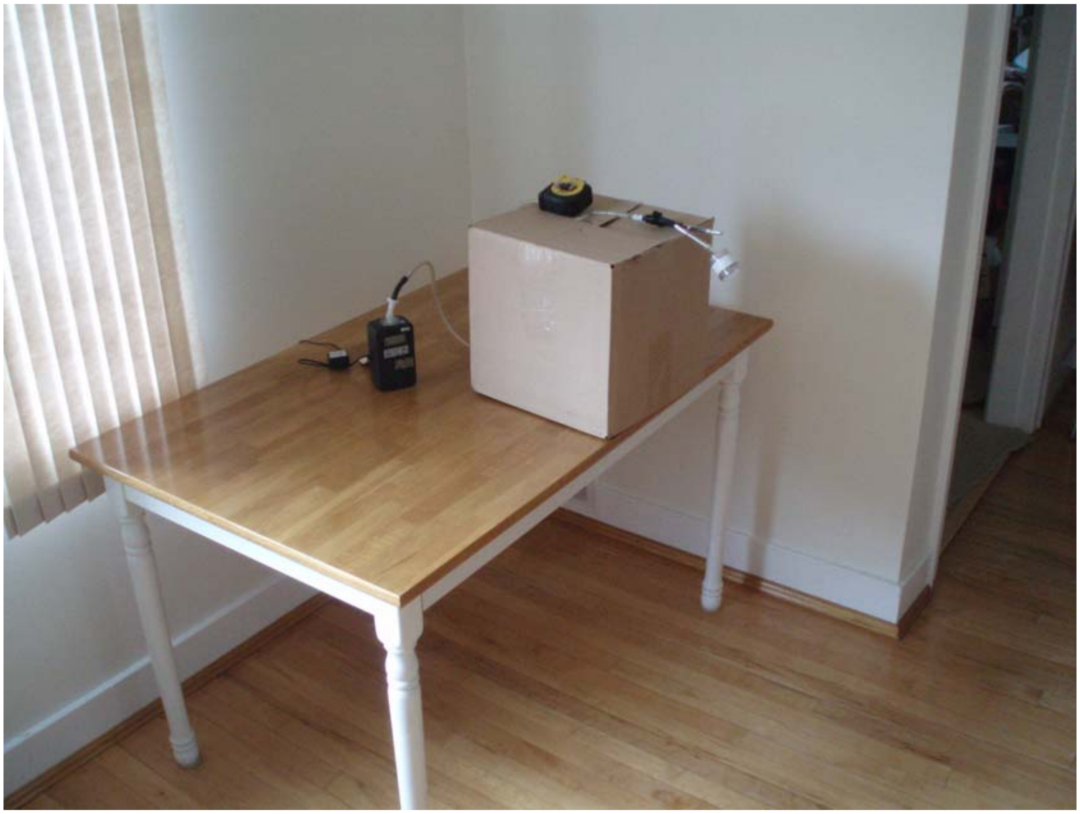
Photograph 13: Borehole locations 09-2 and 09-3 located adjacent to the ditch to the north of the main storage tank shed.

Photograph 14: Drilling at BH09-17 on Haines Hwy. August 2009.

Photograph 15: Borehole soils encountered in BH09-15 from 4.3 m to 4.9 m depth.

Photograph 16: Soils encountered in BH09-15 from 8.5 m to 9.1 m depth.

Photograph 17: Sub-slab soil vapour well SVW09-1 installed in the basement of House #5.

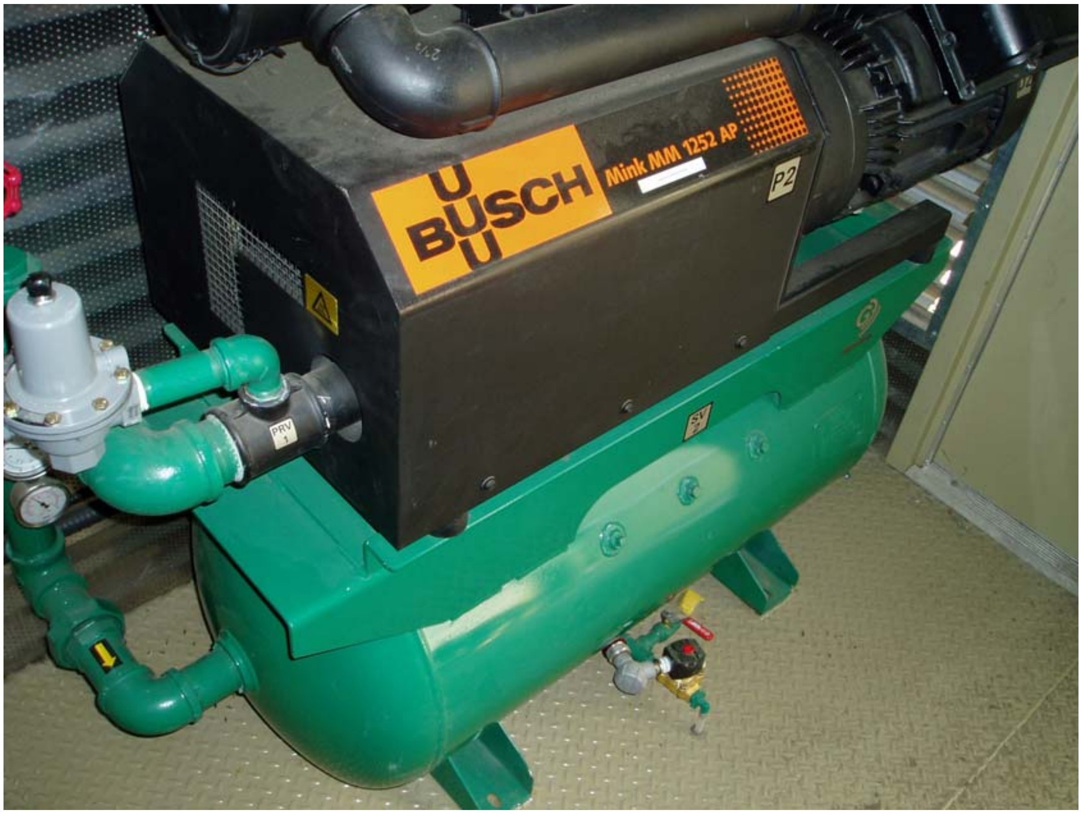


Photograph 18: Indoor air sampling set-up on the main floor of House #5.

Photograph 19: Remediation equipment enclosure.

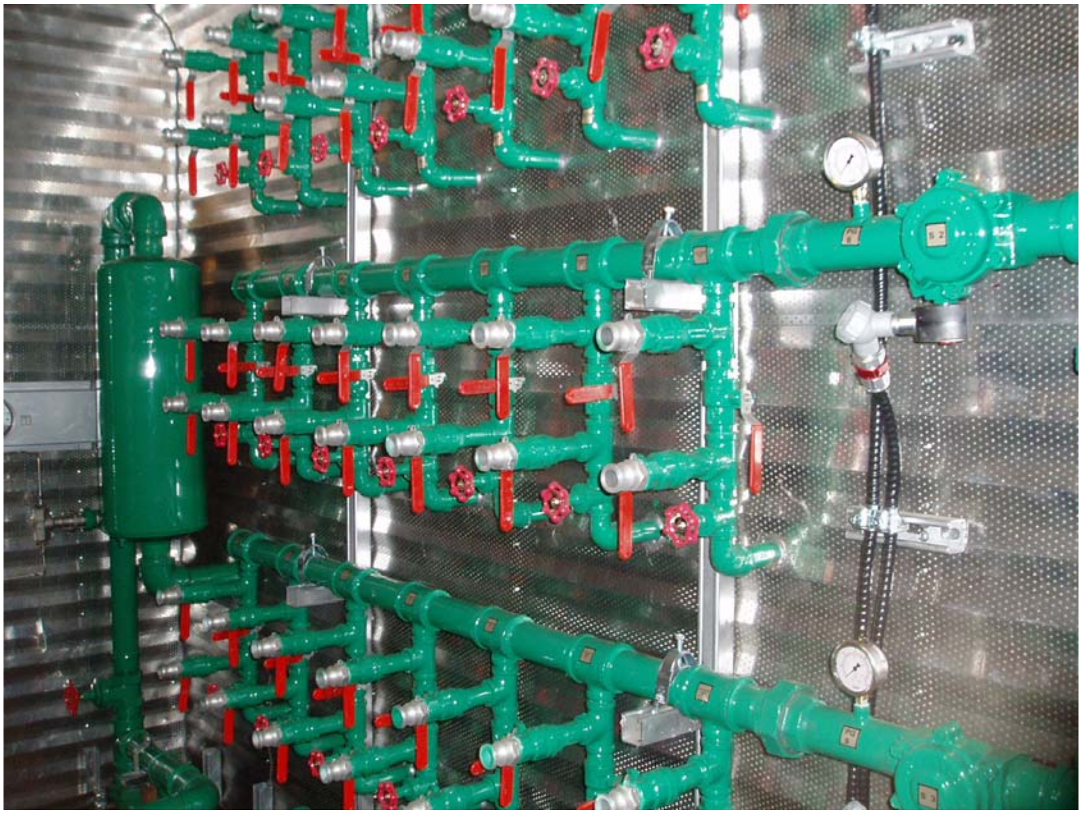
Photograph 20: Air sparge and SVE equipment inside enclosure.

Photograph 21: SVE blower and inlet knockout.



Photograph 22: Air sparge blower.

Photograph 23: Air sparge and SVE header connections.



Photograph 24: Air sparge header.

Photograph 25: Air phase carbon vessels.

Photograph 26: Equipment control panel.

Photograph 27: Typical air sparge well.

APPENDIX II

Correspondence and Permits

Yukon
Environment

Permit No: 4202-23-321

RELOCATION PERMIT

Issued for the Relocation of Contaminated Material Pursuant to the Environment Act
and Section 13(1) of the Contaminated Sites Regulation

Permittee: **SNC-Lavalin Environment Inc.**

Mailing Address: **8648 Commerce Court,, Burnaby, BC, V5A 4N6**

Phone/Fax: **604-515-5151 / 604-515-5150**

Email: **dave.bridger@snclavalin.com**

Removal Location: **CBSA Pleasant Camp Border Crossing Facility, Pleasant Camp, BC**
Cassiar District Lots 6350 & 1047, Haines Road

Receiving Location: **Arctic Backhoe Services' Land Treatment Facility at McLean Lake**
(permit #4202-24-002)

In accordance with your application, **SNC-Lavalin Environment Inc.**, represented by yourself, is hereby permitted to relocate soil and liquid contaminated with petroleum hydrocarbons, hereinafter referred to as contaminated material, from the removal location to the receiving location, both as specified above, subject to the following conditions:

PART 1. GENERAL

1. The permittee shall comply with applicable requirements in all federal, territorial and municipal legislation.

2. All personnel (employees, contractors or volunteers) involved in the relocation of the contaminated material shall be knowledgeable of the conditions and requirements specified in this permit. A copy of this permit shall be available to all personnel when relocating the contaminated material.

3. The permittee shall allow an environmental protection officer, at any reasonable time, to enter any place or premise under the permittee's ownership or occupation, other than a private dwelling, and inspect any activity which is subject to this permit.

4. The permittee shall provide notice in writing to the Environmental Programs Branch (the Branch) prior to any significant change of circumstances regarding the relocation of the contaminated material, including without limitation:
   a. a change in the receiving location; or
   b. the relocation of material contaminated with substances other than those authorized by this permit.

DEPARTMENT OF ENVIRONMENT
ENVIRONMENTAL PROGRAMS
Whitehorse, Yukon
Certified true copy of original
Date: Oct 8/09 Initials: MN

PART 2. RELOCATION OF CONTAMINATED MATERIAL

1. This permit is valid only for the one-time relocation of contaminated material from the removal location to the receiving location, as noted above.

2. The estimated volume of contaminated soil to be relocated is **0.25 m^3**. The estimated volume of contaminated water to be relocated is **0.4 m^3**.

3. The permittee shall confirm to the Branch the actual volume of contaminated material relocated, no later than 30 days following the date of issuance of this permit.

4. The permittee shall ensure that all contaminated material is transported and transferred in such a manner as to prevent its release into the environment.

5. The maximum volume of contaminated material that may be relocated under this permit without undertaking an environmental screening pursuant to the *Yukon Environmental and Socio-economic Assessment Act* is 2,999m^3.

6. The permittee shall ensure that all information submitted to satisfy the requirements of this permit is accompanied by a documentation tracking form provided by the Branch, and submitted as instructed on that form.

PART 4. INSPECTIONS & RECORD KEEPING

1. The permittee shall keep records of all analysis results (including raw analytical data), including those from in-situ, ex-situ, and confirmatory sampling, as applicable, for a minimum of 3 years and make them available upon request for inspection by an environmental protection officer.

THIS PERMIT SHALL EXPIRE ON DECEMBER 31, 2009.

Director, Environmental Programs Branch
Department of Environment

October 08, 2009
Date

I, DAVID BRIDGER [print name clearly], certify that I am an authorized representative of **SNC-Lavalin Environment Inc.**, and that I have read and understood the terms and conditions of this permit.

Authorized Representative
SNC-Lavalin Environment Inc.

October 8, 2009
Date

DEPARTMENT OF ENVIRONMENT
ENVIRONMENTAL PROGRAMS
Whitehorse, Yukon
Certified true copy of original
Date: Oct 8/09 Initials: MN

Yukon
Environment

Contaminated Sites Regulation
APPLICATION FOR A RELOCATION PERMIT

The original completed and signed application form should be mailed or delivered to your local government office, or:

Environment Programs Branch (V-8)
Department of Environment
Government of Yukon (located at 10 Burns Road, Whitehorse)
Box 2703
Whitehorse, Yukon Y1A 2C6

For additional information:

Phone: (867) 667-5683 or 1-800-661-0408 ext. 5683 Fax: (867) 393-6205
Web: http://environmentyukon.gov.yk.ca/monitoringenvironment/regulations.php Email: envprot@gov.yk.ca

Please read carefully and fill out all applicable sections. Attach additional pages if necessary.

1. Name and address of applicant:
The applicant is the person filling out this application, and whose name is to appear on the permit. This may be the owner of the contaminated material, the owner or operator of the receiving location, or a consultant working for either party. This person must sign this application form.

SNC-Lavalin Environment Inc. 604-515-5151
Business name or government agency/branch/department to appear on the permit Phone #
Dave Bridger, M.Sc., P.Geo. / Project Manager 604-515-5150
Contact name and position title Fax #
8648 Commerce Court, Burnaby, BC V5A 4N6
Mailing Address Postal Code
dave.bridger@snclavalin.com
Email Address
CBSA Pleasant Camp Border Crossing Facility, Pleasant Camp, BC, Highway 3 (Haines Road)
Site location and legal address

2. Who is directly responsible for relocating the contaminated material? ☐ **same as 1 above, or**

Public Works and Government Services Canada, Environmental Services 604-775-5116
Business name or government agency/branch/department Phone #
Arianne Ransom-Hodges, B.Sc., MRM 604-775-6645
Contact name and position title Fax #
641 800 - Burrard Street, Vancouver, BC V6Z 2V8
Mailing address Postal Code
arianne.ransom-hodges@pwgsc-tpsgc.gc.ca
Email Address Special waste permit # (if req'd)

3. Location and owner of the site from which contaminated material will be removed: ☐ **same as 1 above, or**

Public Works and Government Services Canada
Landowner
Highway 7 (Haines Road) N/A
Street address Postal Code
CBSA Pleasant Camp Border Crossing Facility, Pleasant Camp, BC, Highway 7 (Haines Road) - Cassiar District Lots 6350 & 1047.
Site location and legal address

4. Location and owner of the site receiving the contaminated material: ☐ **same as 1 above, or**

Yukon Territory Government - Leased to and operated by Arctic Backhoe Services Ltd.
Landowner or land treatment facility operator
Box 31459 Whitehorse, Yukon (mailing address) Y1A 6K8
Street address Postal Code
McLean Lake Quarry LTF (Permit 24-002)
Site location and legal address

5. Is the receiving site in #4 above a permitted land treatment facility under the *Contaminated Sites Regulation*?

☐ **No**: proceed to #6 ☑ **Yes**: proceed to #7

6. If the receiving site is **not** an approved Land Treatment Facility, please provide one of the following:
- A completed Land Treatment Facility Permit application for the receiving site; **or**
- Laboratory results demonstrating that the levels of contamination in the soil and/or water are less than the *Contaminated Sites Regulation* standards that apply at that location.

Applicant's initials _______

7. What is the volume of contaminated **soil** to be relocated? 0.25 cubic metres: ☐actual ☑estimated

8. What is the volume of contaminated **water** to be relocated? _____ litres: ☐actual ☐estimated

9. What is the volume of contaminated **snow or ice** to be relocated? _____ cubic metres: ☐actual ☐estimated

10. What was the cause of the contamination? Provide a **detailed** description.

Contaminant type(s) and quantity: Diesel Fuel contamination - Unknown amount

Event (including date and location): In 1980, a fuel spill occurred during the transfer of fuel from an underground storage tank to a day tank located within the generator building onsite.

11. List any special waste permits in place at the removal location.

N/A

12. Is any of the contaminated material known or suspected to be a special waste (for example, due to concentrations of petroleum hydrocarbons in excess of 30,000 parts per million in soil)?

☑ **No**; proceed to #14

☐ **Yes**; please demonstrate that the carrier identified in item 2 above is permitted to transport the special waste, or submit the following documentation with this application:

a) proof that each vehicle used to transport special wastes is owned by the carrier, or written permission from the vehicle owner if a leased vehicle is to be used to transport special wastes;

b) proof of minimum $2 million third-party liability insurance held by the carrier, covering personal injury and property damage without excluding impairment of the natural environment; and

c) a detailed spill response plan covering the special wastes to be relocated. A sample plan and a fact sheet describing spill response plans can be obtained from the Department of Environment.

Permittees transporting special wastes will be required to submit manifests at the time of transport.

13. Describe the method to be used to relocate the material, including precautions to be taken to ensure that no contaminants are dispersed to the environment en route.

Soil is stored and will be transported in one steel drum with bolt down sealable lids.
Drum to be loaded onto flat bed truck and secured with sinch down straps.

14. When will the contaminated material be relocated? October 2009

15. Attach the following information to your application (ALL APPLICANTS):

- **The written approval of the landowner of the *removal location*, approving the removal of contaminated material from the site (not necessary if the applicant is also the landowner);**
- **The written approval of the landowner of the *receiving location*, allowing contaminated material to be moved to the site (not necessary if the applicant is also the landowner)**; and
- Information regarding any samples collected to date, and the results of any analysis conducted on these samples. (Such sampling must be conducted in accordance with Protocol 3: Sampling Procedures, and Protocol 5: Petroleum Hydrocarbon Analytical Methods and Standards)

I, Dave Bridger, M.Sc., P.Geo. / Project Manager [print name clearly], am the authorized representative of SNC-Lavalin Environment Inc. [business/person to be named on the permit], and I certify that the information provided on this application form is correct and complete to the best of my knowledge.

Signature of applicant

Oct 2, 2009
Date

Number of attachments: 3

This information is being collected under the authority of section 13(1) of the *Contaminated Sites Regulation* and section 9 or 16 of the *Special Waste Regulations*. For further information contact the Environmental Programs Branch at (867) 667-5683 or toll free at 1-800-661-0408 extension 5683.

Canada Border Services Agency   Agence des services frontaliers du Canada

September 28, 2009

Stephan Bowman
Senior Environmental Analyst
Canada Border Services Agency
427 Laurier West Ave.
Ottawa, Ontario K1A 0L8
Stephan.bowman@cbsa-asfc.gc.ca

Matthew Nefstead
Environmental Protection Analyst
Standards and Approvals Section (V-8)
Yukon Department of Environment
Box 2703
Whitehorse, Yukon Y1A 2C6

REFERENCE: Removal of Contaminated Soil from CBSA Port of Pleasant Camp Border Crossing Facility, Pleasant Camp, BC

Dear Mr. Nefstead,

The Canada Border Services Agency (CBSA) hereby authorizes SNC-Lavalin Environment Inc. (SLEI) to act as agents of CBSA to proceed with the permitting process and the actual removal of hydrocarbon contaminated, but less than Hazardous Waste (HW) concentrations, soil from the Port of Pleasant Camp on Haines Road No.7 in Pleasant Camp, BC (legally described as Port of Pleasant Camp, Pleasant Camp, BC and Adjacent to District Lot 1047, Cassiar District). The work is to be conducted pursuant to a Yukon Contaminated Sites Regulation, soil relocation permit to be obtained by SLEI on behalf of CBSA.

The soil is currently stored in suitable containers for transport (205 L drums with bolt down lids for water) in preparation for the removal. The total quantities are estimated to be 0.25 cubic meter of soil (equivalent to 1 x 205 L drum). All materials will be transported by licensed contractors to the permitted facility (permit 24-002) operated by Arctic Backhoe Services Ltd., in Whitehorse, YT for treatment and disposal.

For any inquiries regarding this project, please contact the undersigned at 613-957-2252 or stephan.bowman@cbsa-asfc.gc.ca.

Sincerely,

Stephan Bowman

Stephan Bowman
Senior Environmental Analyst
Canada Border Services Agency

cc: Dave Bridger, SNC-Lavalin Environment Inc.

ARCTIC BACKHOE
SERVICES LTD.
633-5951
WHITEHORSE, YUKON

To: Yukon Environment
Environmental Programs
PO Box 2703
Whitehorse, Yukon
Y1A 2C6

Attention: Matt Nefstad
Contaminated Sites Analyst

Or: Heather Badry
Coordinator Contaminated Sites

Dated: September 25, 2009

Project: Relocation of hydrocarbon contaminated soils to Arctic Backhoe's land farm at the McLean Lake Quarry licensed under Land Treatment Facility Permit # 24-002.

This letter constitutes the required permission to relocate contaminated water/drill cuttings in the amount of 1-205 litre barrel of drilling cuttings and 3-205 litre barrels of water to our land farm at the McLean Lake Quarry.
Contaminated soil is being relocated by Arctic Backhoe for Morrow Environmental from their site at Pleasant Camp, BC.
In the event further information is required you can contact our office at 633-5951 or the numbers listed below.
A copy of the relocation permit is to be faxed to Arctic Backhoe for their files.

Yours truly,
Authorized by: ____________________
(signed)

Alex Ilchuk
(print name)

Wayne Dear (334-1911 cell)
Murray Stevenson (334-1912)
Alex Ilchuk (334-1913)

Arctic Backhoe Services Ltd
Box 31459
Whitehorse YT
Y1A 6K8

Analysis Report

CANTEST LTD.

Professional
Analytical
Services

4606 Canada Way
Burnaby, B.C.
V5G 1K5

FAX: 604 731 2386

TEL: 604 734 7276

1 800 665 8566

REPORT ON: Analysis of Soil Sample

REPORTED TO: Morrow Environmental Consultants Inc.
8648 Commerce Court
Burnaby, BC
V5A 4N6

Att'n: Dave Bridger

CHAIN OF CUSTODY: 2181268
PROJECT NAME: Pleasant Camp
PROJECT NUMBER: 131416 E009

NUMBER OF SAMPLES: 1

REPORT DATE: October 1, 2009

DATE SUBMITTED: September 30, 2009

GROUP NUMBER: 100930007

SAMPLE TYPE: Soil

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

TEST METHODS:

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

pH in Soil or Solid - analysis was performed based on procedures described in the "Manual on Soil Sampling and Methods of Analysis" (1993) published by the Canadian Society of Soil Science. The test was performed using a deionized water leach with measurement by pH meter.

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 C and C19 to C32 are quantified against eicosane (n-C20). LEPH & HEPH are calculated by subtraction of specified PAH's.

Mercury in Soil - analysis was performed using Cold Vapour Atomic Fluorescence.

Strong Acid Leachable Metals in Soil - analysis was performed using B.C. MOELP Method "Strong Acid Leachable Metals in Soil, Version 1.0". The method involves drying the sample at 60 C, sieving using a 2 mm (10 mesh) sieve and digestion using a mixture of hydrochloric and nitric acids. Analysis was performed using Inductively Coupled Argon Plasma Spectroscopy (ICAP) or by specific techniques as described.

TEST RESULTS:

(See following pages)

CANTEST LTD.

Anna Becalska, PhD
Coordinator, Trace Metals

Conventional Parameters in Soil

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	Moisture	pH
BH Cuttings - 090927	Sep 27/09	909300025	7.9	8.4
REPORTING LIMIT UNITS			0.1 %	0.1 pH units

% = percent

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: October 1, 2009

GROUP NUMBER: 100930007

CANTEST

Extractable Petroleum Hydrocarbons (EPH) in Soil

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	EPHs10-19	EPHs19-32
BH Cuttings - 090927	Sep 27/09	909300025	300	<
REPORTING LIMIT UNITS			250 μg/g	250 μg/g

μg/g = micrograms per gram, on a dry weight basis.
< = Less than reporting limit

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: October 1, 2009

GROUP NUMBER: 100930007

CANTEST

Strong Acid Soluble Metals in Soil

CLIENT SAMPLE IDENTIFICATION:		BH Cuttings - 090927	
DATE SAMPLED:		Sep 27/09	
CANTEST ID:		909300025	REPORTING LIMIT
Selenium	Se	<	2
Antimony	Sb	<	10
Arsenic	As	<	10
Barium	Ba	88	1
Beryllium	Be	<	1
Cadmium	Cd	<	0.5
Chromium	Cr	38	2
Cobalt	Co	15	1
Copper	Cu	39	1
Lead	Pb	10	5
Mercury	Hg	0.01	0.01
Molybdenum	Mo	<	4
Nickel	Ni	25	2
Silver	Ag	<	2
Tin	Sn	<	5
Vanadium	V	60	1
Zinc	Zn	78	1
Aluminum	Al	13400	10
Boron	B	47	1
Calcium	Ca	57400	1
Iron	Fe	26000	2
Magnesium	Mg	14300	0.1
Manganese	Mn	544	1
Phosphorus	P	868	20
Potassium	K	1170	10
Sodium	Na	241	5
Strontium	Sr	105	1
Titanium	Ti	576	1
Zirconium	Zr	2	1

Results expressed as micrograms per gram, on a dry weight basis. (μg/g)
< = Less than reporting limit

Yukon
Environment

Contaminated Sites Regulation
APPLICATION FOR A RELOCATION PERMIT

The original completed and signed application form should be mailed or delivered to your local government office, or:

Environment Programs Branch (V-8)
Department of Environment
Government of Yukon (located at 10 Burns Road, Whitehorse)
Box 2703
Whitehorse, Yukon Y1A 2C6

For additional information:

Phone: (867) 667-5683 or 1-800-661-0408 ext. 5683 Fax: (867) 393-6205
Web: http://environmentyukon.gov.yk.ca/monitoringenvironment/regulations.php Email: envprot@gov.yk.ca

Please read carefully and fill out all applicable sections. Attach additional pages if necessary.

1. Name and address of applicant:
The applicant is the person filling out this application, and whose name is to appear on the permit. This may be the owner of the contaminated material, the owner or operator of the receiving location, or a consultant working for either party. This person must sign this application form.

SNC-Lavalin Environment Inc. — 604-515-5151
Business name or government agency/branch/department to appear on the permit — Phone #

Dave Bridger, M.Sc., P.Geo. / Project Manager — 604-515-5150
Contact name and position title — Fax #

8648 Commerce Court, Burnaby, BC — V5A 4N6
Mailing Address — Postal Code

dave.bridger@snclavalin.com
Email Address

CBSA Pleasant Camp Border Crossing Facility, Pleasant Camp, BC, Highway 3 (Haines Road)
Site location and legal address

2. Who is directly responsible for relocating the contaminated material? ☐ **same as 1 above, or**

Public Works and Government Services Canada, Environmental Services — 604-775-5116
Business name or government agency/branch/department — Phone #

Arianne Ransom-Hodges, B.Sc., MRM — 604-775-6645
Contact name and position title — Fax #

641 800 - Burrard Street, Vancouver, BC — V6Z 2V8
Mailing address — Postal Code

arianne.ransom-hodges@pwgsc-tpsgc.gc.ca
Email Address — Special waste permit # (if req'd)

3. Location and owner of the site from which contaminated material will be removed: ☐ **same as 1 above, or**

Public Works and Government Services Canada
Landowner

Highway 7 (Haines Road) — N/A
Street address — Postal Code

CBSA Pleasant Camp Border Crossing Facility, Pleasant Camp, BC, Highway 7 (Haines Road) - Cassiar District Lots 6350 & 1047.
Site location and legal address

4. Location and owner of the site receiving the contaminated material: ☐ **same as 1 above, or**

Yukon Territory Government - Leased to and operated by Arctic Backhoe Services Ltd.
Landowner or land treatment facility operator

Box 31459 Whitehorse, Yukon (mailing address) — Y1A 6K8
Street address — Postal Code

McLean Lake Quarry LTF (Permit 24-002)
Site location and legal address

5. Is the receiving site in #4 above a permitted land treatment facility under the *Contaminated Sites Regulation*?

☐ **No**: proceed to #6 ☑ **Yes**: proceed to #7

6. If the receiving site is **not** an approved Land Treatment Facility, please provide one of the following:
- A completed Land Treatment Facility Permit application for the receiving site; **or**
- Laboratory results demonstrating that the levels of contamination in the soil and/or water are less than the *Contaminated Sites Regulation* standards that apply at that location.

Applicant's initials _______

7. What is the volume of contaminated **soil** to be relocated? ______ cubic metres: ☐actual ☐estimated

8. What is the volume of contaminated **water** to be relocated? 400 litres: ☐actual ☑estimated

9. What is the volume of contaminated **snow or ice** to be relocated? ______ cubic metres: ☐actual ☐estimated

10. What was the cause of the contamination? Provide a **detailed** description.

Contaminant type(s) and quantity: Diesel Fuel contamination - Unknown amount

Event (including date and location): In 1980, a fuel spill occurred during the transfer of fuel from an underground storage tank to a day tank located within the generator building onsite.

11. List any special waste permits in place at the removal location.

N/A

12. Is any of the contaminated material known or suspected to be a special waste (for example, due to concentrations of petroleum hydrocarbons in excess of 30,000 parts per million in soil)?

☑ **No**; proceed to #14

☐ **Yes**; please demonstrate that the carrier identified in item 2 above is permitted to transport the special waste, or submit the following documentation with this application:

a) proof that each vehicle used to transport special wastes is owned by the carrier, or written permission from the vehicle owner if a leased vehicle is to be used to transport special wastes;

b) proof of minimum $2 million third-party liability insurance held by the carrier, covering personal injury and property damage without excluding impairment of the natural environment; and

c) a detailed spill response plan covering the special wastes to be relocated. A sample plan and a fact sheet describing spill response plans can be obtained from the Department of Environment.

Permittees transporting special wastes will be required to submit manifests at the time of transport.

13. Describe the method to be used to relocate the material, including precautions to be taken to ensure that no contaminants are dispersed to the environment en route.

Water is stored and will be transported in steel drums with bolt down sealable lids. Drums to be loaded onto flat bed truck and secured with sinch down straps.

14. When will the contaminated material be relocated? October 2009

15. Attach the following information to your application (ALL APPLICANTS):

- **The written approval of the landowner of the *removal location*, approving the removal of contaminated material from the site (not necessary if the applicant is also the landowner);**
- **The written approval of the landowner of the *receiving location*, allowing contaminated material to be moved to the site (not necessary if the applicant is also the landowner)**; and
- Information regarding any samples collected to date, and the results of any analysis conducted on these samples. (Such sampling must be conducted in accordance with Protocol 3: Sampling Procedures, and Protocol 5: Petroleum Hydrocarbon Analytical Methods and Standards)

I, Dave Bridger, M.Sc., P.Geo. / Project Manager [print name clearly], am the authorized representative of SNC-Lavalin Environment Inc. [business/person to be named on the permit], and I certify that the information provided on this application form is correct and complete to the best of my knowledge.

Signature of applicant

Oct 2/2009
Date

Number of attachments: 3

This information is being collected under the authority of section 13(1) of the *Contaminated Sites Regulation* and section 9 or 16 of the *Special Waste Regulations*. For further information contact the Environmental Programs Branch at (867) 667-5683 or toll free at 1-800-661-0408 extension 5683.

Canada Border Services Agency
Agence des services frontaliers du Canada

September 28, 2009

Stephan Bowman
Senior Environmental Analyst
Canada Border Services Agency
427 Laurier West Ave.
Ottawa, Ontario K1A 0L8
Stephan.bowman@cbsa-asfc.gc.ca

Matthew Nefstead
Environmental Protection Analyst
Standards and Approvals Section (V-8)
Yukon Department of Environment
Box 2703
Whitehorse, Yukon Y1A 2C6

REFERENCE: **Removal of Contaminated Water from CBSA Port of Pleasant Camp Border Crossing Facility, Pleasant Camp, BC**

Dear Mr. Nefstead,

The Canada Border Services Agency (CBSA) hereby authorizes SNC-Lavalin Environment Inc. (SLEI) to act as agents of CBSA to proceed with the permitting process and the actual removal of contaminated water from the Port of Pleasant Camp on Haines Road No.7 in Pleasant Camp, BC (legally described as Port of Pleasant Camp, Pleasant Camp, BC and Adjacent to District Lot 1047, Cassiar District). The work is to be conducted pursuant to a Yukon Contaminated Sites Regulation, relocation permit to be obtained by SLEI on behalf of CBSA.

The water is currently stored in suitable containers suitable for transport (205 L drums with bolt down lids for water) in preparation for the removal. The total quantities are estimated to be 615 L of hydrocarbon contaminated groundwater (i.e., equivalent of 3 - 205 L drums). All materials will be transported by licensed contractors to the permitted facility (permit 24-002) operated by Arctic Backhoe Services Ltd., in Whitehorse, YT for treatment and disposal.

For any inquiries regarding this project, please contact the undersigned at 613-957-2252 or stephan.bowman@cbsa-asfc.gc.ca.

Sincerely,

Stephan Bowman

Stephan Bowman
Senior Environmental Analyst
Canada Border Services Agency

cc: Dave Bridger, SNC-Lavalin Environment Inc.

Canada

Arctic Backhoe
Services Ltd.
633-5951
Whitehorse, Yukon

To: Yukon Environment
Environmental Programs
PO Box 2703
Whitehorse, Yukon
Y1A 2C6

Attention: Matt Nefstad
Contaminated Sites Analyst

Or: Heather Badry
Coordinator Contaminated Sites

Dated: September 25, 2009

Project: Relocation of hydrocarbon contaminated soils to Arctic Backhoe's land farm at the McLean Lake Quarry licensed under Land Treatment Facility Permit # 24-002.

This letter constitutes the required permission to relocate contaminated water/drill cuttings in the amount of 1-205 litre barrel of drilling cuttings and 3-205 litre barrels of water to our land farm at the McLean Lake Quarry.
Contaminated soil is being relocated by Arctic Backhoe for Morrow Environmental from their site at Pleasant Camp, BC.
In the event further information is required you can contact our office at 633-5951 or the numbers listed below.
A copy of the relocation permit is to be faxed to Arctic Backhoe for their files.

Yours truly,
Authorized by: ____________________
(signed)

Alex Ilchuk
(print name)

Wayne Dear (334-1911 cell)
Murray Stevenson (334-1912)
Alex Ilchuk (334-1913)

Arctic Backhoe Services Ltd
Box 31459
Whitehorse YT
Y1A 6K8

Analysis Report

REPORT ON: Analysis of Water Samples

REPORTED TO:
Morrow Environmental Consultants Inc.
8648 Commerce Court
Burnaby, BC
V5A 4N6

Att'n: Dave Bridger

CHAIN OF CUSTODY: 2174566, 2174567, 2174568
PROJECT NAME: Pleasant Camp
PROJECT NUMBER: 131416E000

NUMBER OF SAMPLES: 27

REPORT DATE: July 28, 2009

DATE SUBMITTED: July 18, 2009

GROUP NUMBER: 100718016

SAMPLE TYPE: Water

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

TEST METHODS:

Anions in Water by Ion Chromatography - was determined based on Method 4110 in Standard Methods (21st Edition) and EPA Method 300.0 (Revision 2.1).

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

Nitrite in Water - was determined based on Method 4500-NO2 B in Standard Methods for the examination of Water and Wastewater (21st Edition) and from the BC Laboratory Methods Manual (2005).

Conventional Parameters - analyses were performed using procedures based on those described in the most current editions of "British Columbia Environmental Laboratory Manual for the Analysis of Water, Wastewater, Sediment and Biological Materials", (2005 edition) Province of British Columbia and "Standard Methods for the Examination of Water and Wastewater" (21st Edition), published by the American Public Health Association.

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.

(Continued)

CANTEST LTD.

Zhenyong Gao, M.Sc.
Coordinator, Trace Organics

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)

Extractable Petroleum Hydrocarbons (EPH) in Water

CLIENT SAMPLE IDENTIFICATION:	**PWD-1-090714**	**PWD-2-090714**	
DATE SAMPLED:	Jul 14/09	Jul 14/09	
CANTEST ID:	907180103	907180104	REPORTED DETECTION LIMIT
EPHw10-19	560	340	100
EPHw19-32	260	< 250	100
LEPHw (corrected for PAH's)	-	-	100
HEPHw (corrected for PAH's)	-	-	100

Results expressed as micrograms per liter (µg/L)
< = Less than reported detection limit

Bridger, Dave

From: Matthew.Nefstead@gov.yk.ca
Sent: October 8, 2009 1:36 PM
To: Bridger, Dave
Cc: Giles, Melissa
Subject: RE: CBSA Pleasant Camp Remediation - Contaminated Soil and Water Drum Disposal
Attachments: SCAN1918_000.pdf; Documentation Tracking Form Fillable.pdf

Enclosed, please find a certified copy of your Relocation Permit for the relocation of approximately 0.25 m^3 of soil and 0.4 m^3 of water contaminated with petroleum hydrocarbons from Pleasant Camp, BC to Arctic Backhoe Services' Land Treatment Facility at McLean Lake (permit #4202-24-002).

Please ensure that a copy of the attached permit is kept on hand during the relocation activities, and that all relevant staff are familiar with its conditions. Please read the attached permit carefully, as it contains many important legal requirements. In particular, note that you are required to submit to the Environmental Programs Branch the following information within 30 days of the date of issuance of the permit (i.e. November 7, 2009):

a) notification of the actual amount of soil relocated.

This information must be submitted with a Documentation Tracking Form, attached.

Should you have any questions regarding this permit, please contact me at (867) 667-5076.

Sincerely,

Matthew Nefstead
Contaminated Sites Analyst
Yukon Department of Environment (V-8)
(867) 667-5076

-----Original Message-----
From: Bridger, Dave [mailto:Dave.Bridger@snclavalin.com]
Sent: Thursday, October 08, 2009 10:40 AM
To: Matthew.Nefstead
Cc: Giles, Melissa
Subject: RE: CBSA Pleasant Camp Remediation - Contaminated Soil and Water Drum Disposal

Hi Matthew,
Please see signed copy of relocation permit.

Thank you.

Dave Bridger, M.Sc., P.Geo.
SNC-LAVALIN Environment Inc.
8648 Commerce Court
Burnaby, BC V5A 4N6
Phone: (604) 515-5151 ext. 102
Fax: (604) 515-5150
Cell: (604) 838-4628

From: Matthew.Nefstead@gov.yk.ca [mailto:Matthew.Nefstead@gov.yk.ca]
Sent: October 8, 2009 10:26 AM
To: Bridger, Dave
Cc: Giles, Melissa
Subject: RE: CBSA Pleasant Camp Remediation - Contaminated Soil and Water Drum Disposal

Thanks Dave. My apologies, I missed the fact that this site is in BC. In that case, as I'm sure you could guess, the Yukon CSR and protocols don't apply for the purpose of assessing the site. That said, we will require adherence to these standards for the characterization of contaminated material being brought into the Yukon for disposal.

For this particular load, however, we are willing to accept the borehole results you have provided. Please ensure that any future materials intended for disposal in the Yukon are sampled and analyzed in accordance with Protocol 5.

The relocation permit is attached for your signature. Please sign and return it to me by fax or email, and note that the permit is not valid until it is signed by our director.

Regards,

Matthew Nefstead
Contaminated Sites Analyst
Environmental Programs Branch
Department of Environment
Government of Yukon
P.O. Box 2703 (V-8)
Whitehorse, YT Y1A 2C6
Phone: (867) 667-5076 Fax: (867) 393-6205

-----Original Message-----
From: Bridger, Dave [mailto:Dave.Bridger@snclavalin.com]
Sent: Monday, October 05, 2009 12:40 PM
To: Matthew.Nefstead
Cc: Giles, Melissa
Subject: RE: CBSA Pleasant Camp Remediation - Contaminated Soil and Water Drum Disposal

Hi Matthew,
The soil drum contains suspect hydrocarbon-contaminated soil cuttings from a drilling program completed in August at the Pleasant Camp site. While the soil sample collected from the drum did not exceed CSR standards for EPH we suspect that it may contain pockets of contaminated material if we redeposit it on site and would therefore prefer to have this material removed off-site for treatment/disposal.

We understand we have not completed the necessary analysis on this sample (not analyzed VPH, BTEX, and PAH) required under Protocol 5; however, to avoid returning to the site to re-sample the drum (sample is past recommended hold time), would it be possible to consider soil results (where exceedances occur) from the drilling program to be representative of material in the drum? I have attached a file containing soil sampling results from the drilling program which include the required analyses (refer to worksheets SOIL-1 and SOIL-2). See specifically samples BH09-11-7 and BH09-13-5 in red which have the required analysis for BETX, VPH, PAH, LEPH, and HEPH. Note we have analyzed for both provincial and federal hydrocarbon parameters as the site is federal but contamination extends onto provincial lands (site is in BC). We can send you lab reports as back-up for data presented in tables if required.

Similarly, the water drums contain suspect hydrocarbon-contaminated purge water that was placed in drums during sampling events in October 2008, July 2009, and September 2009. We have sampled these wells for the required parameters VHw6-10 and EHw10-19 either currently or previously, and the material in the drums should be representative of the groundwater sampled from these wells. Please refer to the attached analytical data tables (see WATER-1 and WATER-2) which include the parameters you require. Would it be possible to consider this data (where exceedances occur) representative of water contained in the drums for purposes of obtaining the relocation permit? Again we can provide lab reports as back if required.

We have reviewed Protocol 5 and other CSR protocols and will ensure that future work complies with these requirements. A description of field procedures for soil and water sample collection is attached.

Please let me know if you have any further questions or need further info.

Regards,

Dave Bridger, M.Sc., P.Geo.
SNC-LAVALIN Environment Inc.
8648 Commerce Court
Burnaby, BC V5A 4N6
Phone: (604) 515-5151 ext. 102
Fax: (604) 515-5150
Cell: (604) 838-4628

From: Matthew.Nefstead@gov.yk.ca [mailto:Matthew.Nefstead@gov.yk.ca]
Sent: October 5, 2009 11:20 AM
To: Giles, Melissa
Cc: Bridger, Dave; Heather.Badry@gov.yk.ca
Subject: RE: CBSA Pleasant Camp Remediation - Contaminated Soil and Water Drum Disposal

Melissa,

Sorry for the double emails; I've just finished reviewing the applications, and I have some more questions.

1. According to the results provided, the soil is not contaminated in excess of any of the land use standards in the Contaminated Sites Regulation. Subject to my second point below, this material can be redeposited on site, and need not be transported to Arctic Backhoe.

2. Neither the soil nor the water were analyzed for the correct parameters. I have attached a copy of Protocol 5, which sets out the analyses required in the Yukon for contaminated soil and water. In particular, the soil should have been analyzed for VPH, LEPH, HEPH, BTEX, and PAHs, and the water should have been analyzed for VH_{W6-10} and EH_{W10-19}. We will require that these analyses be done on any material transported under a relocation permit. If you choose not to relocate the soil and do not conduct the additional required analyses on it, we will be unable to confirm to your client that the site has been remediated in accordance with the Contaminated Sites Regulation.

Please ensure that all future work at this site is conducted in accordance with the Contaminated Sites Regulation and the Protocols established under it. You can find the most up-to-date versions of our protocols at our website:
http://environmentyukon.gov.yk.ca/monitoringenvironment/EnvironmentActandRegulations/contaminated_sites_re

Please note that Protocol 5 is currently under revision, as we have determined that the Canada-Wide Standard for Petroleum Hydrocarbons cannot legally be used to satisfy the Contaminated Sites Regulation in the Yukon. However, the sampling and analysis requirements I referenced above will remain the same.

Regards,

Matthew Nefstead
Contaminated Sites Analyst
Yukon Department of Environment (V-8)
(867) 667-5076

-----Original Message-----
From: Giles, Melissa [mailto:Melissa.Giles@snclavalin.com]
Sent: Friday, October 02, 2009 3:23 PM
To: Matthew.Nefstead
Cc: Bridger, Dave
Subject: CBSA Pleasant Camp Remediation - Contaminated Soil and Water Drum Disposal

Matthew

Please find attached relocation permit applications for drums containing contaminated soil and groundwater that need to be removed from the CBSA Port of Pleasant Camp on Haines road No.7 in Pleasant Camp, BC. The material will be transported to McLean Lake Quarry LTF in Whitehorse YT.

If you require further information, please feel free to contact me.

Thanks

Melissa Giles, B.Sc.
SNC-Lavalin Environment Inc.
8648 Commerce Court
Burnaby, BC V5A 4N6
Phone: 604- 515-5151 ext. 287
Fax: 604 515-5150
E-mail: melissa.giles@snclavalin.com

$100.00 Fee Paid - Yes

Permit # 3098

Receipt No : 16131Z

Application Date: Jul 21, 2009

(If rejected or withdrawn, note it here)

Policy Number 3.3

Expiry Date: ***12 months from approval date or as specified in "Special Permit Conditions"***

Revised March, 2008

PERMIT FOR WORK WITHIN THE RIGHT-OF-WAY LONG TERM

1. *Name and Address of Applicant:*

SNC Lavalin Environment Inc.	Contact: Tim Drozda
8648 Commerce Court	Phone: (604) 515-5151
Burnaby, British Columbia, V5A 4N6	Fax: (604) 515-5150
	Email: tim.drozda@snclavalin.com

2. *Description of Work Requested:*

Drilling 7 boreholes & installing one environmental monitoring well. Max. depth 9 metres, to be on or next to the roadway. Finishing work will be completed at grade.

Proposed Schedule: Aug 12, 2009 to Aug 19, 2009

3. *Location of Work Requested:*

Hwy #003,Haines Road, km 71.9 Pleasant Camp Border Crossing

This permit is granted subject to the list of attached conditions & attached standard drawing.

Area Superintendent A/ ______ Signature Aug 10/09 Date

Director, Transportation Engineering ______ Signature 09 | 08 | 12 Date

Director, Transportation Maintenance ______ Signature 09/08/15 Approval Date

Distribution List:
1 copy - Applicant: / 1 copy - Road Foreman / 1 copy – Area Superintendent
Original to File - No. 3520/70/03 Short Term (By Year) or 3520/75/01 Long Term or 3520/20/04 Unmaintained

List of Conditions for Right-Of-Way Permit #3098

SNC Lavalin Environment Inc.

1.0 GENERAL CONDITIONS

1.1 The applicant's signature is required at the end of these conditions, and any included special conditions, before this permit is valid.

1.2 The applicant shall conform to all Territorial and Federal regulations, and obtain all permits required, including, but not limited to: Land Use Permits, Timber Permits, Water Use Licenses and Fisheries approvals.

1.3 The applicant is responsible for ensuring any requirements resulting from a Yukon Environmental and Socio-Economic Assessment screening are addressed when carrying out their project.

1.4 The applicant shall notify the Road Foreman in Blanchard at (604) 628-8907 at least 48 hours prior to the start of this project.

1.5 Any changes in the proposed schedule or work shall be requested in writing at least 48 hours in advance. Where proposed schedule is approved, the applicant will be advised in writing. Requests for Changes may be faxed to (867) 667-3608.

1.6 No signs or structures may be removed from the Highway right-of-way without written permission from the Road Foreman.

1.7 Traffic on the roadway shall not be restricted unless specifically authorized in this permit.

2.0 LIABILITY

2.1 The applicant is fully responsible for any accidents or damages related to their work and would indemnify the Government of Yukon for any loss in regards to accidents, legal suits, legal costs, etc. associated with this work.

2.2 Proof of Liability insurance in the amount of $2 million must be provided to the Transportation Maintenance Branch prior to the work. ***The applicant shall name the Government of Yukon as "Additional Insured" on their insurance policy.***

2.3 The applicant shall be responsible for the repair of damage caused directly or indirectly by his operations to highway surfacing, shoulders, side slopes, fill slopes, ditch bottoms, back slopes, drainage structures, signs and signposts, and to any public utility infrastructure located within the Highway Right-Of-Way. Such repair shall include all work required to leave the work site in an acceptable condition.

2.4 The applicant shall be aware that buried utility lines exist in the right of way. It is the applicants responsibility to have these lines located and marked. The Yukon Government will not be held responsible for any damage done to any utility line caused by work done under this permit.

3.0 INSTALLATION OF UTILITIES/INFRASTRUCTURE IN THE HIGHWAY RIGHT-OF-WAY

3.1 The site(s) shall conform to the location(s) and dimensions shown on the attached plans submitted by the applicant.

3.2 No additional development or improvements of any kind shall be permitted in the highway right-of-way without the written permission of Government of Yukon.

3.3 Where requested by YG applicant must submit a letter demonstrating community approval of the proposed installation(s).

3.4 The permission granted via this permit is a privilege and not a right and the Government of Yukon, upon written notification with accompanying reasons, reserves the right to withhold or remove the permission at any time without any compensation to the applicant.

3.5 The permission to work within the designated highway right-of-way does not in any way give the applicant any right, interest, estate, or easement over the land on which the work will be done.

3.6 Government of Yukon will not be responsible for damage to infrastructure placed within the right-of-way, whether caused by highway maintenance operations or highway improvements, unless such damage is the result of negligence on the part of Government of Yukon.

3.7 The applicant shall be responsible for maintenance of all infrastructure, including litter control, site cleanup, general upkeep, snow removal and ensuring positive drainage through or around the site and away from the roadway.

3.8 During snow clearing operations, no snow shall be placed on any portion of the adjacent roadway.

3.9 The applicant shall ensure positive drainage is maintained through or around the site(s). If ponding of water occurs and/or culverts are too small for the site, the applicant shall regrade the site or replace the culvert as necessary.

3.10 The applicant shall provide Transportation Maintenance with the name, address and contact numbers for any contractor responsible for maintenance of the sites. If the Contractor changes, the applicant is responsible for providing updated information.

3.11 The applicant will bear the cost of any removal, adjustment, or relocation of the infrastructure that may be required in the future due to reconstruction, maintenance or operation of the highway.

3.12 When the applicant decides to no longer require a site then they shall contact Transportation Maintenance to identify what reclamation work will be required to restore the site. All restoration work required will be at the applicant's expense.

4.0 EARTHWORKS

4.1 During construction any mud, soil, debris, or other foreign material tracked onto the highway from the work shall be removed by the applicant at his expense at least daily, or at any time the material unduly inconveniences traffic.

4.2 The work site(s) shall be trimmed and landscaped to blend in with the surrounding area. Remove all boulders, windrows and debris from the site.

4.3 The site(s) must be constructed as to provide positive drainage away from the roadway unless specifically exempted.

4.4 The applicant shall be aware that drainage problems may not become apparent until spring run-off of the year following construction. A review of the drainage will be undertaken at that time. Transportation Maintenance will identify problem areas which must be rectified by the applicant.

5.0 ROAD MAINTENANCE\EQUIPMENT ON ROADWAY

5.1 Applicant shall co-ordinate the work with the Blanchard Grader Station Foreman. The co-ordination shall include at a minimum, the type of equipment to be used and the schedule of the work.

5.2 Tracked vehicles operating on Yukon roads and highways must have all the necessary permits from Carrier Compliance. In addition, loads in excess of legal gross vehicle weights and/or dimensions will require additional authorization from Carrier Compliance.

5.3 If a permit to operate a tracked vehicle on a bridge is given, the bridge deck(s) shall be protected from the lugs on the tracked equipment by the use of tires or planks or other material.

6.0 TRAFFIC CONTROL

6.1 Level I

6.1.1 Emergency Vehicles shall have right of passage and will not be held or detoured.

6.1.2 Proper signing in accordance with RTAC's Manual of Uniform Control Devices of Canada is required to alert the traveling public to the work being performed on or adjacent to the roadway.

7.0 INSPECTION OF THE WORK

7.1 The work must pass a final inspection by the Road Foreman to ensure the standard conditions and design standards have been met. The applicant must inform the Foreman when the work has been completed and is ready for inspection.

7.2 If the completed work does not meet with the satisfaction of the Road Foreman, the applicant will then be informed in writing of the work necessary to correct the deficiencies. The applicant will have 60 calendar days to correct the deficiencies.

7.3 If the applicant does not comply with Clause 2, Transportation Maintenance will correct the deficiencies and the applicant shall pay all associated costs incurred.

8.0 SPECIAL CONDITIONS:

8.1

I have read and understood the above conditions for this permit and will perform the work according to the conditions. (Please sign and return this page by fax or mail to the address below.)

Applicant's Name: TIM DROZDA

Applicant's Signature:

Date: August 14, 2009

Transportation Maintenance Branch (W-12)
9029 Quartz Road, Building 275, Whitehorse, Yukon, Y1A 4P9
Phone: (867) 667-8214 Fax: (867) 667-3608

SNC·LAVALIN Environment

SNC-Lavalin
Environment Inc.

8648 Commerce Court
Burnaby, British Columbia
Canada V5A 4N6

Telephone: (604) 515-5151
FAX: (604) 515-5150

FACSIMILE

TO:	Wendy Holway	**Date:**	July 21, 2009
C.C.:			
Fax:	1-867-667-3608	**Ref.:**	131577 / 131416 (D000)
Company:	Yukon Highways and Public Works - Transportation Maintenance Branch	**Location:**	Beaver Creek / Pleasant Camp Border Crossings
FROM:	Tim Drozda	**E-mail:**	tim.drozda@snclavalin.com

If you have any problems, please call: 604-515-5151

Subject: Performance of Work Within a Highway Right-Of-Way Permit **Number of pages** *(including this one)*:

MESSAGE

Hi Wendy,

As requested, here are the two permit applications (one for Beaver Creek and one for Pleasant Camp) for work within the Highway right of way. Included are drawings showing the locations of the work to be completed and a copy of our Liability Insurance naming the Government of Yukon as “Additional Insured”.

As mentioned during our telephone conversation, we are planning on commencing the work in Pleasant Camp on August 12th and in Beaver Creek on August 18th. If there is any way possible that this process can be fast-tracked so we can get the permits approved by this time, it would be extremely appreciated.

I will give you a call shortly to confirm that the faxes have made it to you and to pay the application fees.

If there is anything else you need, please let me know.

Sincerely,

Tim Drozda

APPLICATION FOR
PERFORMANCE OF WORK WITHIN THE RIGHT-OF-WAY *(please Print)*

I understand that this is an application only and approval to perform said work has not been given at this time. Receipt of the signed permit from the Transportation Maintenance Branch will constitute permission to hold said event, subject to the conditions attached to the permit.

Name of Applicant / Company:	TIM DROZDA / SNC-LAVALIN ENVIRONMENT INC.
Complete Mailing Address:	8648 - COMMERCE COURT, BURNABY, BC V5A 4N6
Phone Number & Fax Number:	604-515-5151 Fax: 604-515-5150
E-mail address:	tim.drozda@snclavalin.com

Location of Work: Pleasant Camp Border Crossing Facility

(If applicable, note side of road – right or left side is determined when looking in direction of increasing Kms)

Highway Name:	**Kilometre Location** (from\to)	**Right** (NE)	**Left** (SW)	**Road Surface**
Highway 7 (Haines Road)		Road + shoulder	shoulder	asphalt
Map Coordinates \ datum (if no km available): Lat: N59°27'14" Long: W136°22'03"				

Description of Work and or equipment to be utilized:

Drilling 7 boreholes and installing 1 environmental monitoring well using a Drill rig operated by Geotech Drilling of Prince George. Max depth ~ 9 m. work to be completed on and next to the roadway. Traffic control will be provided by Arctic Backhoe of Whitehorse, YT. BHs will be backfilled with sand + bentonite and concreted at grade. monitoring well will be completed at grade with a steel roadbox concreted in place. work being completed for PWGSC + CBSA

Type of Work: ***(check all that apply)***

Installation of Utilities\Infrastructure	☐	Road Maintenance (winter)	☐
Brushing\Clearing\Tree removal	☐	Road Maintenance (summer)	☐
Earthworks (road surface)	☐	Work on Roadway	☒
Earthworks (not road surface)	☐	Work off Roadway	☒

Traffic Details: ***(check if applicable)***

Temporary Road Closure	☐	Temporary Lane Closure	☒

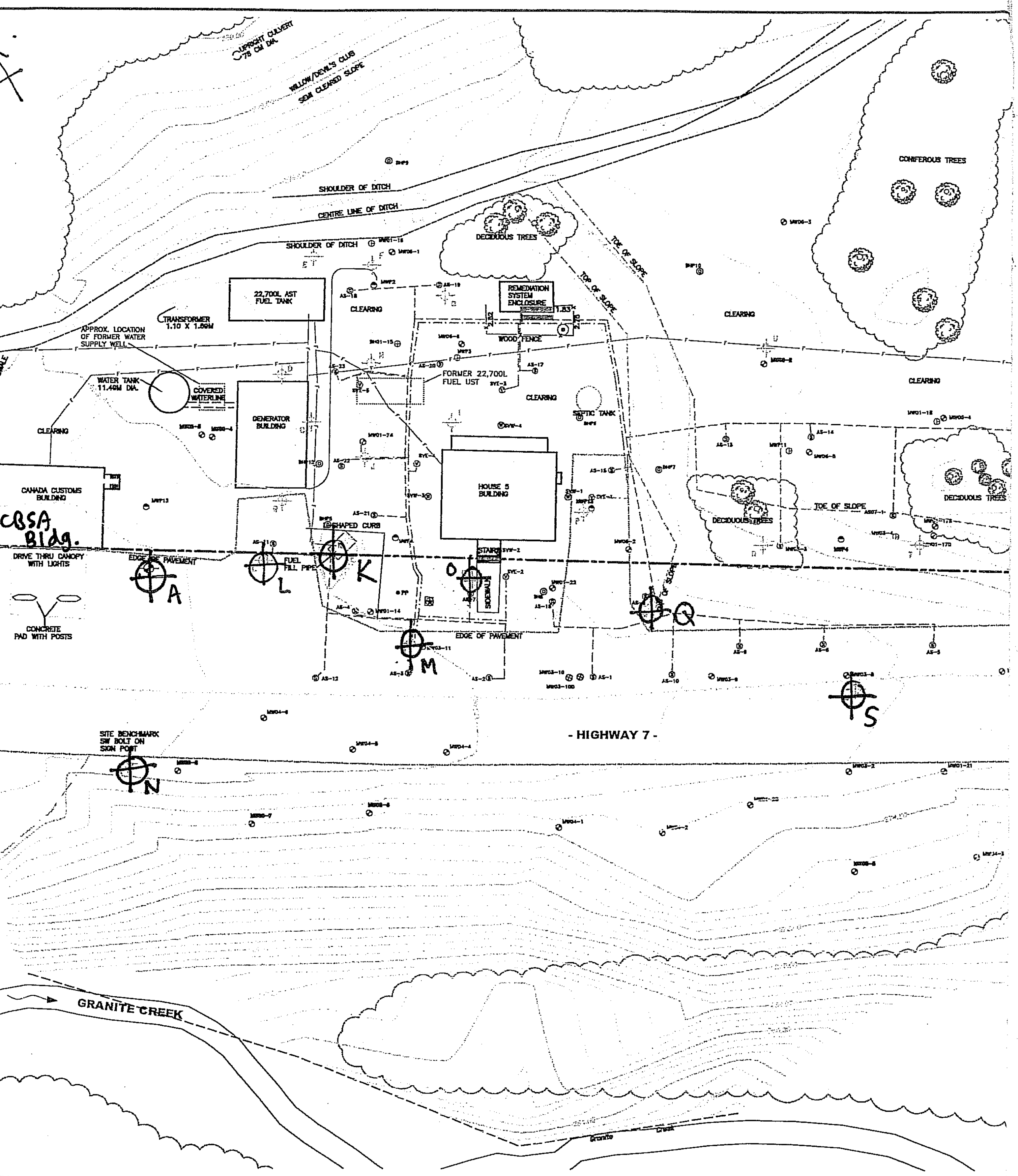
Associated Permits and Screening: ***(check if applicable)***

YESAA	#:	Other:	Type:

Proposed Schedule: (approximate)

Start Date:	August 12, 2009	Duration:	7 days.

Applicant's Name:	TIM DROZDA
Applicant's Signature:	
Date:	July 21, 2009



- ⊕ DESTROYED MONITORING WELL
- MONITORING WELL (MORROW)
- ⊕ BOREHOLE (MORROW)
- ◎ BOREHOLE (BY OTHERS)
- MONITORING WELL (BY OTHERS)
- PROPOSED MONITORING WELL
- PROPOSED SHALLOW BOREHOLE <5m
- PROPOSED DEEP BOREHOLE <9m
- CURRENT INFERRED GROUNDWATER IMPACTED AREA GREATER THAN CSR AW STANDARDS (2008)
- ▨ CURRENT INFERRED 2008 LNAPL PLUME
- INFERRED LNAPL PLUME (LNAPL SHEEN OBSERVED ON MORE THAN ONE OCCASION)
- INFERRED EXTENT OF HYDROCARBON-IMPACTED SOILS

ES

PING

(MORROW)

ACTION WELL (MORROW)

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED ON SITE. NOT ALL UTILITIES MAY BE SHOWN.

Certificate of Insurance N°: 2009-288
Issue Date: 2009-07-20

Project N° : (1) 131416 & 131577

This certificate is issued at the request of: (2)	*Insured:* (3)
Government of Yukon Highways and Public Works - Transportation Maintenance Branch Box 2703 (W-12) Whitehorse, Yukon Y1A 2C6	SNC-Lavalin Environment Inc 8648 Commerce Court Burnaby, BC V5A 4N6

Location and operations to which this certificate applies: (4)

Monitoring Environmental Drilling done by others at Pleasant Camp Canadian Border Crossing Facility and Environmental . Environmental Test Pits at Beaver Creek Canadian Canadian Border Crossing Facility.

Insurer	Type of insurance	Policy N°	Expiry date DD-MM-YY	Minimum limits of liability (5)	Currency (6)
AIG & LLOYD'S	Professional Liability				
AIG, LLOYD'S & various Insurers	General Liability	1729109 WD0900084, Et. Al.	31-03-10	$2,000,000	CAD
AIG, LLOYD'S & various Insurers	Excess Liability - Automobile (owned & non owned)				

Notes: (7)

The Certificate Holder is added as an additional insured on the General Liability policy but only with respect to the Insured's activities.

1. *This certificate is issued as a matter of information only and confers no rights upon the certificate holder.*
2. *This certificate does not amend, extend or alter the coverage afforded above by the policies.*
3. *This certificate is valid only if it bears two authorized signatures.*

This is to certify that the insurance policies listed above have been issued to the insured named above for the policy period indicated. Notwithstanding any requirement, term or condition of any contract or other document with respect to which this certificate may be issued or may pertain, the insurance afforded by the policies described herein is subject to all the terms, exclusions and conditions of such policies. Limits of liability shown may have been reduced by paid claims.

By :

By :

Aon Reed Stenhouse Inc.
20 Bay Street, Toronto, Ontario, Canada M5J 2N9
Tel.: (416) 868-5500, Fax: (416) 868-5580

A03A0/11

APPENDIX III

Borehole and Well Logs

TABLE III-1: Borehole and Well Survey Information

ID	Type	Date Drilled / Installed	Coordinates		Ground Elevation (m geod)[a]	Top of Casing Elevation (m geod)[a]	Borehole Depth (m bgs)	Screen Length (m)	Screen Depth		Screen Elevation		
			Easting	Northing					Top (m bgs)	Bottom (m bgs)	Top (m geod)	Bottom (m geod)	Mid Point (m geod)
Boreholes and Monitoring Wells													
BHP1	Borehole	2000-08-23			275.35								
MWP2	Monit. Well	2000-08-23	155.9	126.4	275.21	275.17	3.70	1.6	2.00	3.60	273.2	271.6	272.4
MWP3	Monit. Well	2000-08-23	163.4	119.9	275.26	275.22	5.80	1.5	4.10	5.60	271.1	269.6	270.4
MWP4	Monit. Well	2000-08-24	157.8	103.6	275.52	275.47	5.50	3.0	2.50	5.50	273.0	270.0	271.5
BHP5	Borehole	2000-08-23	151.8	104.7	275.94								
BHP6	Borehole	2000-08-24	174.6	114.6	275.15		4.00						
BHP7	Borehole	2000-08-23	181.8	109.9	274.55								
BHP8	Borehole	2000-08-23	171.4	98.8	275.20								
BHP9	Borehole	2000-08-23	157.2	137.7	275.55								
BHP10	Borehole	2000-08-23	185.5	127.8	273.61								
MWP11	Monit. Well	2000-08-25	193.8	111.6	273.22	273.19	6.70	3.1	3.00	6.10	270.2	267.1	268.6
BHP12	Borehole	2001-08-24	151.0	110.2	275.90		7.00						
MWP13	Monit. Well	2000-08-25	135.3	106.4	276.13	276.10	4.90	1.5	3.30	4.80	272.8	271.3	272.1
MW01-14	Monit. Well	2001-09-22	155.6	96.9	275.91	275.77	5.95	1.5	4.34	5.86	271.4	269.9	270.7
BH01-15	Borehole	2001-09-22	158.0	121.1	275.30		2.50						
MW01-16	Monit. Well	2001-09-22	155.7	130.2	275.02	274.96	3.50	1.5	1.90	3.42	273.1	271.5	272.3
MW01-17D	Monit. Well	2001-09-23	206.8	103.9	273.04	272.99	6.71	0.8	5.94	6.70	267.1	266.3	266.7
MW01-17S	Monit. Well	2001-09-23	206.9	104.8	272.96	272.89	5.20	0.6	4.46	5.07	268.4	267.8	268.1
MW01-18	Monit. Well	2001-09-23	207.0	114.3	272.96	272.93	5.20	1.5	3.50	5.03	269.4	267.9	268.7
MW01-19	Monit. Well	2001-09-26	221.8	103.6	272.20	272.13	6.10	1.8	3.96	5.79	268.2	266.3	267.3
MW01-20	Monit. Well	2001-09-25	190.3	79.5	274.45	274.35	6.10	1.5	4.52	6.05	269.8	268.3	269.1
MW01-21	Monit. Well	2001-09-25	207.8	82.6	274.39	274.25	10.40	1.5	8.84	10.36	265.4	263.9	264.6
MW01-22	Monit. Well	2001-09-26	172.2	99.1	275.20	275.11	7.60	1.5	4.42	5.94	270.7	269.2	269.9
MW01-23	Monit. Well	2001-09-25	227.4	83.0	274.21	273.79	9.75	1.5	8.23	9.75	265.6	264.0	264.8
MW01-24	Monit. Well	2001-09-27	154.9	112.3	275.52	275.39	5.90	1.5	3.50	5.03	271.9	270.4	271.1
MW03-01	Monit. Well	2003-09-04	217.4	82.7	274.13	273.99	9.75	3.0	6.71	9.75	267.3	264.2	265.8
MW03-02	Monit. Well	2003-09-04	199.3	82.6	274.68	274.58	7.62	3.0	4.57	7.62	270.0	267.0	268.5
MW03-06	Monit. Well	2003-09-04	228.0	92.3	274.18	273.99	8.84	3.0	5.79	8.84	268.2	265.2	266.7
MW03-07	Monit. Well	2003-09-04	213.0	91.7	274.61	274.48	7.01	3.0	3.96	7.01	270.5	267.5	269.0
MW03-08	Monit. Well	2003-09-04	199.0	91.3	274.98	274.82	8.84	3.0	5.79	8.84	269.0	266.0	267.5
MW03-09	Monit. Well	2003-09-04	186.7	91.2	275.28	275.09	8.23	3.0	5.18	8.23	269.9	266.9	268.4
MW03-10	Monit. Well	2003-09-04	173.7	91.0	275.61	275.46	8.53	3.0	5.49	8.53	270.0	266.9	268.4
MW03-10D	Monit. Well	2003-09-05	174.7	91.1	275.60	275.46							
MW03-11	Monit. Well	2003-09-04	160.3	93.7	275.85	275.72	7.62	3.0	4.57	7.62	271.1	268.1	269.6
MW04-1	Monit. Well	2004-10-14	172.8	77.5	274.17	274.06	6.86	3.0	3.76	6.81	270.3	267.3	268.8
MW04-2	Monit. Well	2004-10-14	182.2	77.0	274.33	274.25	7.37	3.0	4.00	7.00	270.2	267.2	268.7
MW04-3	Monit. Well	2004-10-15	210.7	74.9	272.12	272.76	8.38	3.0	5.33	8.38	267.4	264.4	265.9
MW04-4	Monit. Well	2004-10-15	162.5	84.2	275.86	275.69	7.62	3.0	4.57	7.62	271.1	268.1	269.6
MW04-5	Monit. Well	2004-10-15	154.1	84.4	276.04	275.94	8.38	3.0	5.33	8.38	270.6	267.6	269.1
MW04-6	Monit. Well	2004-10-16	146.0	87.3	276.21	276.09	8.23	3.0	5.03	8.08	271.1	268.0	269.5
MW06-1	Monit. Well	2006-09-22	157.4	130.3	275.08	274.99	3.35	1.5	1.83	3.35	273.2	271.6	272.4
MW06-2	Monit. Well	2006-09-22	179.1	102.6	275.16	275.05	7.32	3.1	4.23	7.32	270.8	267.7	269.3
MW06-3	Monit. Well	2006-09-22	193.2	132.3	273.13	273.08	2.90	1.5	1.37	2.89	271.7	270.2	271.0
MW06-4	Monit. Well	2006-09-22	207.6	114.6	273.12	273.04	6.71	3.1	3.50	6.55	269.5	266.5	268.0
MW06-5	Monit. Well	2006-09-23	195.6	111.5	273.34	273.29	6.71	3.0	3.66	6.70	269.6	266.6	268.1
MW06-6	Monit. Well	2006-09-23	163.8	121.1	275.22	275.10	4.72	3.0	1.68	4.72	273.4	270.4	271.9
MW08-1	Monit. Well	2008-08-20	219.4	113.7	272.74	272.67	6.10	3.0	3.05	6.10	269.6	266.6	268.1
MW08-2	Monit. Well	2008-08-20	191.5	119.5	273.65	273.59	6.37	3.2	3.20	6.37	270.4	267.2	268.8
MW08-3	Monit. Well	2008-08-21	140.3	112.9	276.00	275.97	6.10	3.0	3.05	6.10	272.9	269.9	271.4
MW08-4	Monit. Well	2008-08-21	141.3	112.7	275.95	275.93	42.21	3.0	39.17	42.21	236.8	233.7	235.2
MW08-5	Monit. Well	2008-09-27	199.8	73.5	273.26	274.04	9.14	4.6	4.57	9.14	269.5	264.9	267.2
MW08-6	Monit. Well	2008-09-27	155.5	78.7	273.97	274.71	7.32	3.0	4.27	7.32	270.4	267.4	268.9
MW08-7	Monit. Well	2008-09-28	144.9	77.7	274.81	275.39	8.53	4.0	4.57	8.53	270.8	266.9	268.8
MW08-8	Monit. Well	2008-09-28	138.1	82.5	276.43	276.36	8.38	3.7	4.72	8.38	271.6	268.0	269.8
BH09-1	Borehole	2009-08-21	148.7	122.4	275.448		5.18						
BH09-2	Borehole	2009-08-21	149.6	129.2	275.191		3.96						
BH09-3	Borehole	2009-08-21	156.7	129.0	275.130		5.03						
BH09-4	Borehole	2009-08-21	162.1	125.8	275.113		5.33						
BH09-5	Monit. Well	2009-08-21	163.1	114.7	275.28	275.14	6.10	3.0	3.05	6.10	272.1	269.0	270.6
BH09-6	Borehole	2009-08-22	155.3	111.6	275.534		5.79						
BH09-7	Borehole	2009-08-22	155.6	120.1	275.359		6.10						
BH09-8	Borehole	2009-08-22	151.3	114.2	275.610		5.64						
BH09-9	Borehole	2009-08-22	100.0	100.0	275.911		5.79						
BH09-10	Borehole	2009-08-22	180.9	97.2	275.187		8.84						
BH09-11	Borehole	2009-08-22	189.9	121.6	273.581		8.23						
BH09-12	Borehole	2009-08-24	158.7	104.9	275.470		7.16						
BH09-13	Borehole	2009-08-25	205.1	102.7	273.432		18.29						
BH09-14	Borehole	2009-08-27	174.7	105.6	275.316		9.14						
BH09-15	Borehole	2009-08-28	199.9	90.5	275.131		9.14						
BH09-16	Monit. Well	2009-08-28	100.0	100.0	276.46	276.34	5.94	2.1	3.66	5.79	272.7	270.6	271.6
BH09-17	Borehole	2009-08-28	160.3	95.6	275.914		8.23						
BH09-18	Borehole	2009-08-29	152.3	102.0	276.075		5.49						
BH09-19	Borehole	2009-08-29	164.8	99.6	275.367		8.23						
BH09-20	Monit. Well	2009-08-31	127.8	82.9	276.46	276.41	7.47	3.1	4.11	7.16	272.3	269.3	270.8
BH09-21	Borehole	2009-08-31	192.7	101.7	274.519		9.75						
Air Sparge Wells													
AS-1	Air Sparge Well	2004-10-16	175.9	91.1	275.58	275.45	10.52	0.6	9.75	10.36	265.7	265.1	265.4
AS-2	Air Sparge Well	2004-10-16	166.4	91.0	275.79	275.68	9.14	0.6	8.53	9.14	267.1	266.5	266.8
AS-3	Air Sparge Well	2004-10-17	159.0	91.3	275.96	275.83	8.23	0.8	7.32	8.08	268.5	267.7	268.1
AS-4	Air Sparge Well	2004-10-17	154.3	97.0	275.82	275.67	7.62	0.6	7.01	7.62	268.7	268.0	268.3
AS-5	Air Sparge Well	2004-10-17	206.7	94.1	276.04	275.94	11.90	0.6	8.38	8.99	267.6	266.9	267.3
AS-6	Air Sparge Well	2004-10-17	196.9	94.1	274.97	274.87	9.91	0.6	7.92	8.53	266.9	266.3	266.6
AS-7	Air Sparge Well	2004-10-18	164.7	98.6	275.38	275.27	8.23	0.6	7.72	8.33	267.5	266.9	267.2
AS-8	Air Sparge Well	2004-10-18	180.6	98.4	274.92	274.80	7.92	0.6	6.86	7.47	267.9	267.3	267.6
AS-9	Air Sparge Well	2005-09-08	189.3	93.9	275.28	275.18	10.06	0.6	8.84	9.45	266.3	265.7	266.0
AS-10	Air Sparge Well	2005-09-08	183.1	91.3	275.50	275.42	8.84	0.6	8.23	8.84	267.2	266.6	266.9
AS-11	Air Sparge Well	2005-09-09	146.9	103.0	275.68	275.58	5.79	0.6	5.18	5.79	270.4	269.8	270.1
AS-12	Air Sparge Well	2005-09-09	150.7	90.9	276.29	276.17	8.08	0.6	7.47	8.08	268.7	268.1	268.4
AS-13	Air Sparge Well	2005-09-09	188.0	112.7	273.55	273.48	7.01	0.6	6.25	6.86	267.2	266.6	266.9
AS-14	Air Sparge Well	2005-09-09	195.8	112.9	273.33	273.26	7.01	0.6	6.10	6.71	267.2	266.6	266.9
AS-15	Air Sparge Well	2005-09-10	177.5	109.8	275.30		7.16	0.6	5.94	6.55	-5.9	-6.6	-6.2
AS-16	Air Sparge Well	2005-09-10	172.2	97.9	275.40	275.32	7.21	0.6	6.60	7.21	268.7	268.1	268.4
AS-17	Air Sparge Well	2005-09-11	170.5	118.8	275.25	275.20	5.94	0.6	4.62	5.23	270.6	270.0	270.3
AS-18	Air Sparge Well	2005-09-11	153.8	125.9	275.25	275.17	4.27	0.6	3.61	4.22	271.6	270.9	271.3
AS-19	Air Sparge Well	2005-09-11	161.7	126.5	275.29	275.21	4.57	0.6	3.81	4.42	271.4	270.8	271.1
AS-20	Air Sparge Well	2005-09-11	161.8	119.3	275.39	275.29	5.38	0.6	4.62	5.23	270.7	270.1	270.4
AS-21	Air Sparge Well	2005-09-12	155.9	105.6	275.71	275.61	5.49	0.6	4.72	5.33	270.9	270.3	270.6
AS-22	Air Sparge Well	2005-09-12	153.0	110.0	275.74	275.63	6.10	0.6	5.23	5.84	270.4	269.8	270.1
AS-23	Air Sparge Well	2005-09-12	152.5	118.6	275.53	275.42	6.05	0.6	4.98	5.59	270.4	269.8	270.1
AS07-1	Air Sparge Well	2007-09-15	203.1	105.8	273.13		10.30		8.23	10.30			
AS07-2	Air Sparge Well	2007-09-15	216.7	105.1	272.53		9.40		8.20	9.45			
AS03-03	Air Sparge Well	2003-09-04	192.9	103.0	273.93	273.85	6.71	1.5	5.18	6.71	268.7	267.1	267.9
AS03-04	Air Sparge Well (Decommissioned)	2003-09-04	203.4	103.9	273.18	273.13	10.21	1.5	8.69	10.21	264.4	262.9	263.7
AS03-05	Air Sparge Well (Decommissioned)	2003-09-04	216.5	103.5	272.46	272.40	10.21	1.5	8.69	10.21	263.7	262.2	262.9
Soil Vapour Extraction Wells													
SVE-1	SVE Well	2005-09-10	175.7	107.3	275.33	275.23	6.10	3.0	2.90	5.94	272.3	269.3	270.8
SVE-2	SVE Well	2005-09-10	167.9	100.1	275.27	275.16	6.10	3.0	2.90	5.94	272.3	269.2	270.7
SVE-3	SVE Well	2005-09-11	167.5	117.0	275.28	275.23	5.18	3.0	2.13	5.18	273.1	270.0	271.6
SVE-4	SVE Well	2005-09-11	159.8	110.3	275.53	275.44	3.66	2.1	1.52	3.66	273.9	271.8	272.8
SVE-5	SVE Well	2005-09-12	154.6	117.4	275.49	275.43	4.88	3.0	1.83	4.88	273.6	270.6	272.1
Soil Vapour Monitoring Wells													
SVW-1	Soil Vapour Well	2005-09-10	173.5	107.4	275.33	275.23	1.50	0.5	1.00	1.50	274.2	273.7	274.0
SVW-2	Soil Vapour Well	2005-09-10	167.2	102.5	275.27	275.16	1.50	0.5	1.00	1.50	274.2	273.7	273.9
SVW-3	Soil Vapour Well	2005-09-10	160.8	107.3	275.45	275.35	1.50	0.5	1.00	1.50	274.3	273.8	274.1
SVW-4	Soil Vapour Well	2005-09-10	167.4	113.8	275.23	275.13	1.50	0.5	1.00	1.50	274.1	273.6	273.9
SVW09-1	Soil Vapour Well	2009-07-09	148.7	122.4			0.60	0.1	0.50	0.60			
SVW09-2	Soil Vapour Well	2009-07-09	149.6	129.2			0.59	0.1	0.49	0.59			
SVW09-3	Soil Vapour Well	2009-07-09	156.7	129.0			0.59	0.1	0.48	0.59			

Notes:

a Elevations corrected to geodetic elevation based on benchmark of 275.80 m at base of flagpole surveyed by Underhill Geomatics in June 2008.

Boreholes and Monitoring Wells

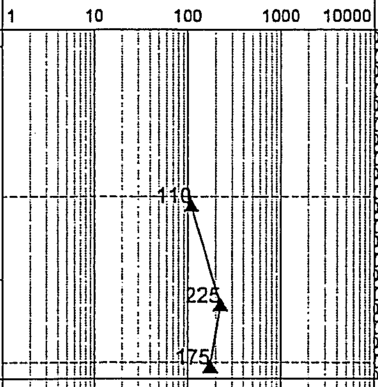
SEACOR
ENVIRONMENTAL ENGINEERING INC.
SEACOR JOB NO: 201.00861.001

CLIENT: PWGSC
PROJECT: Yukon/BC Border Crossings
Pleasant Camp

BOREHOLE LOG

BOREHOLE NO: BH-P1
ELEVATION: 99.629 m

DEPTH (m)	SAMPLE TYPE	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: HYDROCARBON VAPOUR LEVEL (ppmv)	WELL COMPLETION	WATER LEVEL	FIELD NOTES
			TOPSOIL & GRASSES				backfilled with drill cuttings
			SAND & GRAVEL silty, fine to coarse grained sand, fine and coarse sub-angular gravel, occasional cobble, brown-grey, moist				
1.0				110			
			SILT trace fine to coarse grained sand, occasional cobble, peaty, some fibrous organics (wood), dark brown, moist	225			
2.0				175			



End of borehole at 2.1 m below grade.
Not completed as a monitoring well.

Split spoon refusal at 1.2 m below grade.
Refusal at 2.1 m below grade.

DRILLING METHOD: Solid/Hollow Stem Auger; log by d.t.

DATE DRILLED: 23-08-00

Notes: ◪ AUGER SAMPLE

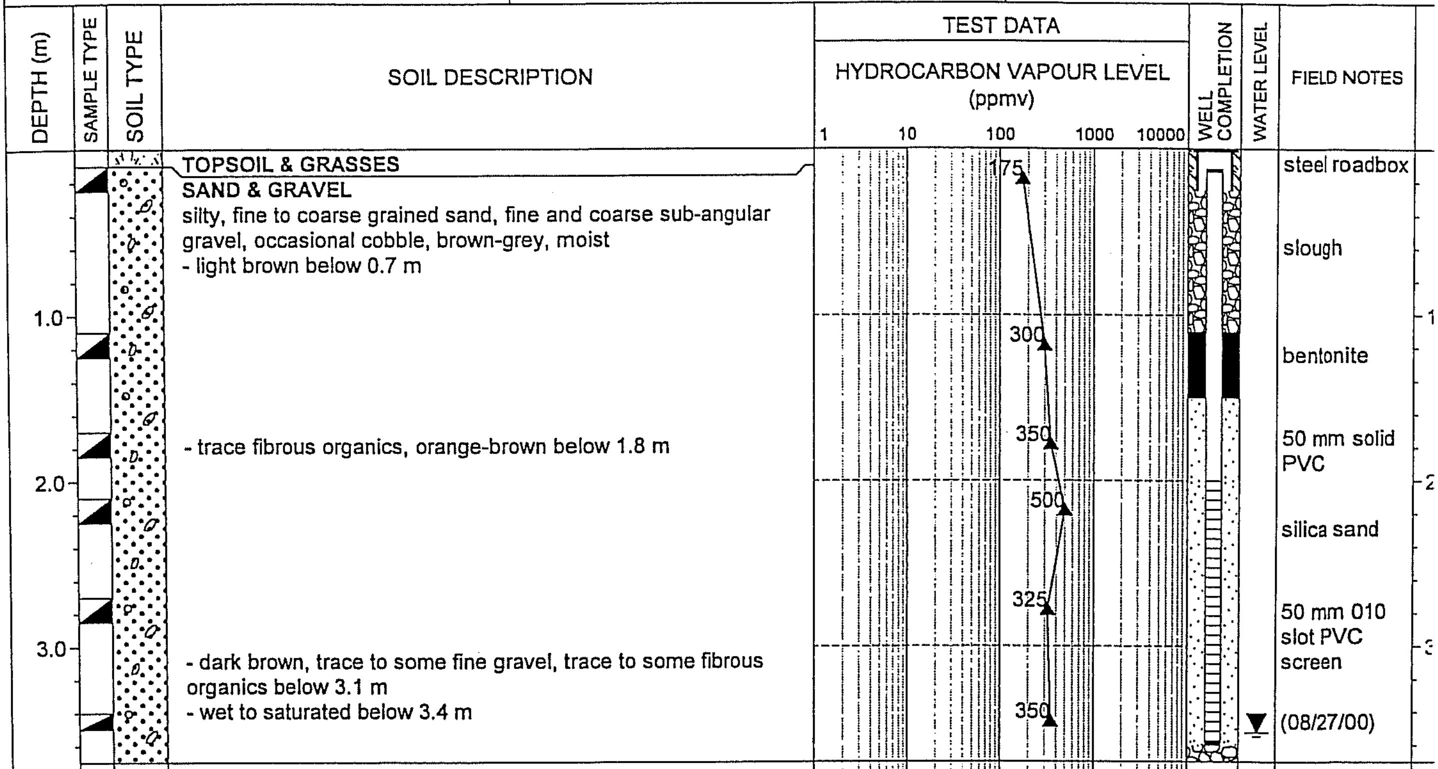
Sheet 1 of 1

SEACOR
ENVIRONMENTAL ENGINEERING INC.
SEACOR JOB NO: 201.00861.001

CLIENT: PWGSC
PROJECT: Yukon/BC Border Crossings
Pleasant Camp

BOREHOLE LOG

BOREHOLE NO: BH-P2
ELEVATION: 99.456 m



TOPSOIL & GRASSES

SAND & GRAVEL
silty, fine to coarse grained sand, fine and coarse sub-angular gravel, occasional cobble, brown-grey, moist
- light brown below 0.7 m

- trace fibrous organics, orange-brown below 1.8 m

- dark brown, trace to some fine gravel, trace to some fibrous organics below 3.1 m
- wet to saturated below 3.4 m

steel roadbox
slough
bentonite
50 mm solid PVC
silica sand
50 mm 010 slot PVC screen
(08/27/00)

End of borehole at 3.7 m below grade.
Monitoring well installed.

Screened interval from 2.0 m to 3.6 m
Top of Piezometer (TOP) Elevation = 99.389 m
Depth to groundwater from TOP = 3.456 (08/27/00)

1st refusal at 1.8 m below grade.
2nd refusal at 1.8 m below grade.
3rd refusal at 3.7 m below grade.

DRILLING METHOD: Solid Stem Auger; log by d.t.
DATE DRILLED: 23-08-00

Notes: ◪ AUGER SAMPLE

Sheet 1 of 1

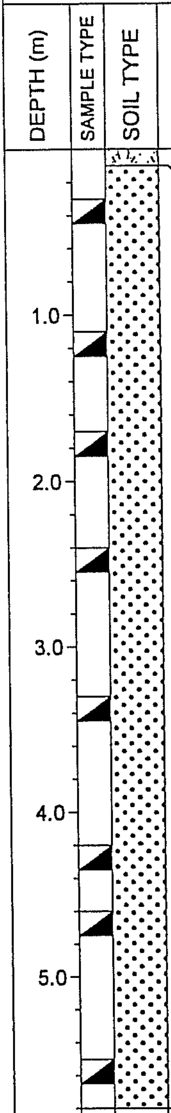
SEACOR
ENVIRONMENTAL ENGINEERING INC.

SEACOR JOB NO: 201.00861.001

CLIENT: PWGSC
PROJECT: Yukon/BC Border Crossings
Pleasant Camp

BOREHOLE LOG

BOREHOLE NO: BH-P3
ELEVATION: 99.460 m



SOIL DESCRIPTION

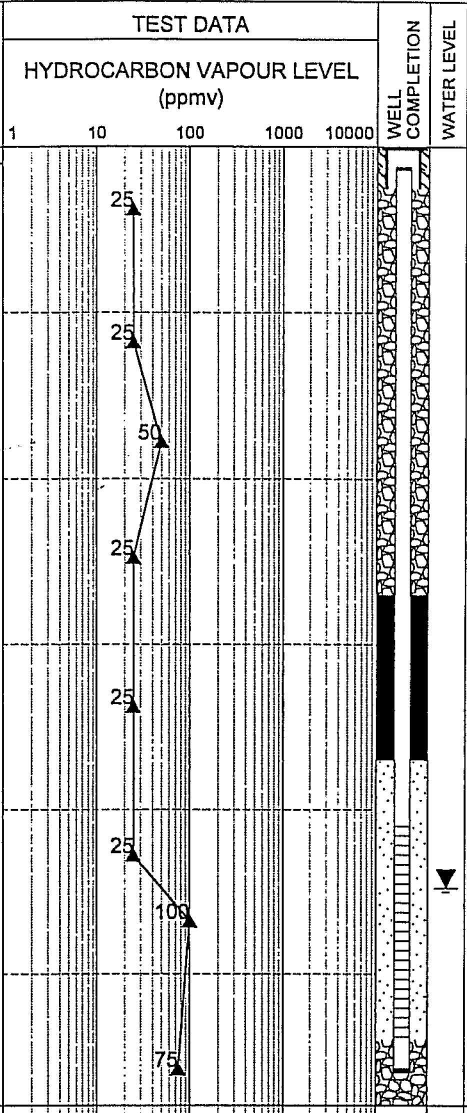
TOPSOIL & GRASSES

SAND
fine to coarse grained, trace to some silt, trace to some fine and coarse subangular & subrounded gravel, trace to some fibrous organics, dark brown, moist

- occasional cobble below 1.8 m

- occasional peat below 2.4 m

- wet to saturated below 4.6 m



FIELD NOTES
steel roadbox
slough
bentonite
50 mm solid PVC
(08/27/00)
silica sand
50 mm 010 slot PVC screen
slough

End of borehole at 5.8 m below grade.
Monitoring well installed.

Screened interval from 4.1 m to 5.6 m
Top of Piezometer (TOP) Elevation = 99.386 m
Depth to groundwater from TOP = 4.402 (08/27/00)

DRILLING METHOD: Solid Stem Auger; log by d.t.

DATE DRILLED: 23-08-00

Notes: ◢ AUGER SAMPLE

Sheet 1 of 1

SEACOR_CANADA 201_861.GPJ SEAC_CAN.GDT 28-11-00

SEACOR
ENVIRONMENTAL ENGINEERING INC.
SEACOR JOB NO: 201.00861.001

CLIENT: PWGSC
PROJECT: Yukon/BC Border Crossings
Pleasant Camp

BOREHOLE LOG

BOREHOLE NO: BH-P4
ELEVATION: 99.766 m

DEPTH (m) | SAMPLE TYPE | SOIL TYPE | SOIL DESCRIPTION | TEST DATA | WELL COMPLETION | WATER LEVEL | FIELD NOTES

TOPSOIL & GRASSES

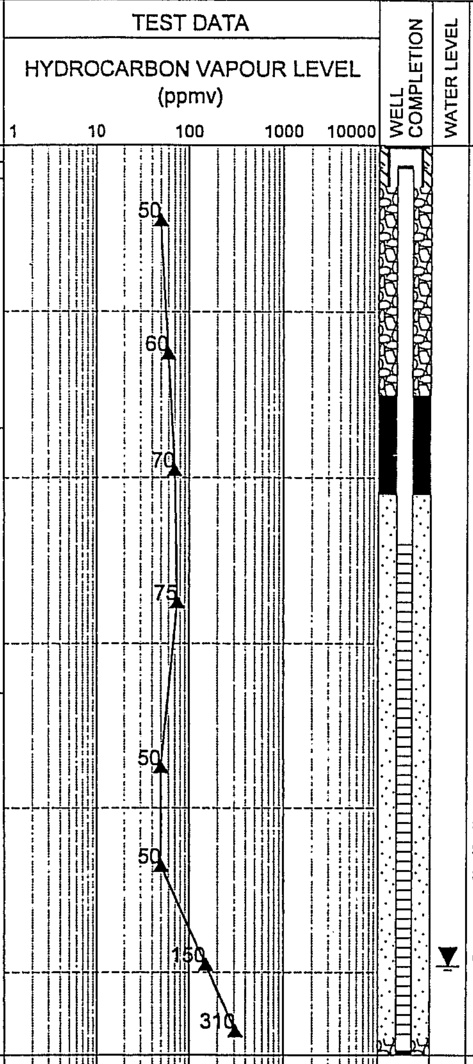
SAND
fine grained, trace silt, grey, moist

SILTY SAND
fine to coarse grained, silty, trace to some fine and coarse subangular to subrounded gravel, trace fibrous organics, brown, moist

fine to coarse grained, silty, some fine and coarse subangular to subrounded gravel, trace to some fibrous organics, occasional peat, brown with orange-mottling, moist

GRAVELLY SAND
fine to coarse grained sand, fine and coarse subangular to subrounded gravel, silty, occasional cobble, trace to some fibrous organics, occasional peat, brown with orange-mottling, moist
- wet below 4.1 m

- saturated below 4.7 m



FIELD NOTES:
steel roadbox
slough
bentonite
50 mm solid PVC
silica sand
50 mm 010 slot PVC screen
(08/27/00)

End of borehole at 5.5 m below grade.
Monitoring well installed.

Screened interval from 2.5 m to 5.5 m
Top of Piezometer (TOP) Elevation = 99.756 m
Depth to groundwater from TOP = 4.951 (08/27/00)

1st refusal at 3.2 m below grade.
2nd refusal at 5.5 m below grade.

DRILLING METHOD: Solid Stem Auger; log by d.t.

DATE DRILLED: 24-08-00

Notes: ◪ AUGER SAMPLE

Sheet 1 of 1

SEACOR
ENVIRONMENTAL ENGINEERING INC.

SEACOR JOB NO: 201.00861.001

CLIENT: **PWGSC**
PROJECT: **Yukon/BC Border Crossings**
Pleasant Camp

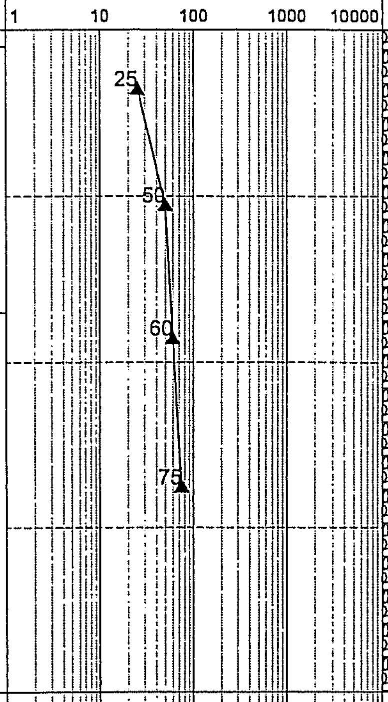
BOREHOLE LOG

BOREHOLE NO: BH-P5
ELEVATION: 99.967 m

DEPTH (m)	SAMPLE TYPE	SOIL TYPE	SOIL DESCRIPTION	WELL COMPLETION	WATER LEVEL	FIELD NOTES
0.0			**TOPSOIL & GRASSES**			backfilled with drill cuttings
	◣		**SAND** fine to coarse grained sand, trace to some silt, trace to some fine and coarse subrounded gravel, brown, moist			
1.0	◣					
2.0	◣		fine to coarse grained sand, trace to some silt, some fine and coarse subrounded gravel, occasional cobble, orange-brown, moist			
3.0	◣					
4.0			End of borehole at 4.0 m below grade. Not completed as a monitoring well. 1st refusal at 3.1 m below grade. 2nd refusal at 4.0 m below grade. 3rd refusal at 4.0 m below grade.			

TEST DATA

HYDROCARBON VAPOUR LEVEL
(ppmv)



DRILLING METHOD: Solid Stem Auger; log by d.t.

DATE DRILLED: 24-08-00

Notes: ◣ AUGER SAMPLE

Sheet 1 of 1

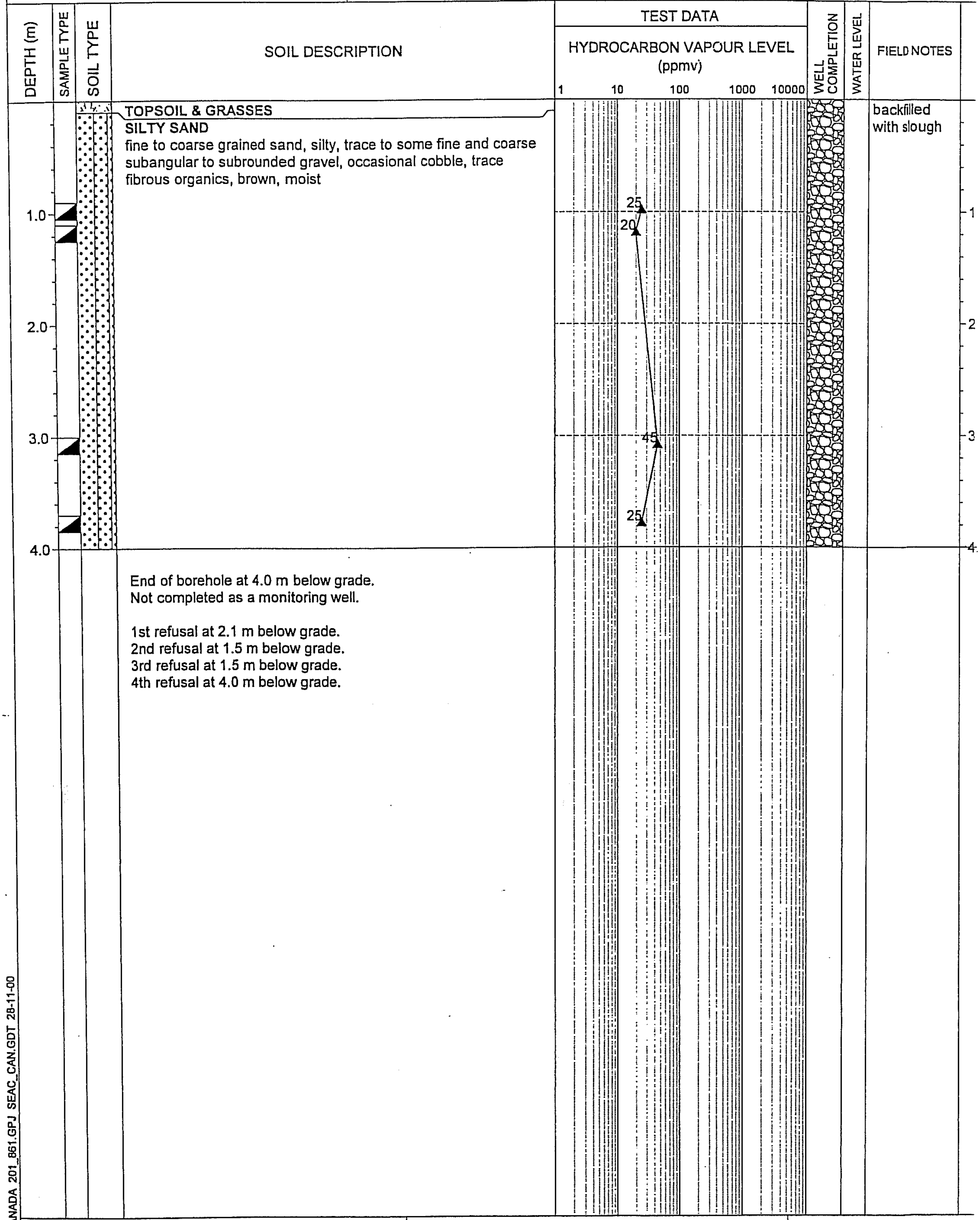
SEACOR
ENVIRONMENTAL ENGINEERING INC.

SEACOR JOB NO: 201.00861.001

CLIENT: PWGSC
PROJECT: Yukon/BC Border Crossings
Pleasant Camp

BOREHOLE LOG

BOREHOLE NO: BH-P6
ELEVATION: 99.474 m



TOPSOIL & GRASSES

SILTY SAND
fine to coarse grained sand, silty, trace to some fine and coarse subangular to subrounded gravel, occasional cobble, trace fibrous organics, brown, moist

backfilled with slough

End of borehole at 4.0 m below grade.
Not completed as a monitoring well.

1st refusal at 2.1 m below grade.
2nd refusal at 1.5 m below grade.
3rd refusal at 1.5 m below grade.
4th refusal at 4.0 m below grade.

DRILLING METHOD: Solid Stem Auger; log by d.t.

DATE DRILLED: 24-08-00

Notes: ◢ AUGER SAMPLE

Sheet 1 of 1

SEACOR
ENVIRONMENTAL ENGINEERING INC.
SEACOR JOB NO: 201.00861.001

CLIENT: PWGSC
PROJECT: Yukon/BC Border Crossings
Pleasant Camp

BOREHOLE LOG

BOREHOLE NO: BH-P7
ELEVATION: 99.185 m

DEPTH (m) | SAMPLE TYPE | SOIL TYPE | SOIL DESCRIPTION | TEST DATA | WELL COMPLETION | WATER LEVEL | FIELD NOTES

TOPSOIL & GRASSES

SAND & GRAVEL
silty, fine to coarse grained sand, fine and coarse sub-angular gravel, dark-brown, moist

- occasional peat, occasional cobble and orange-mottling below 1.5 m.

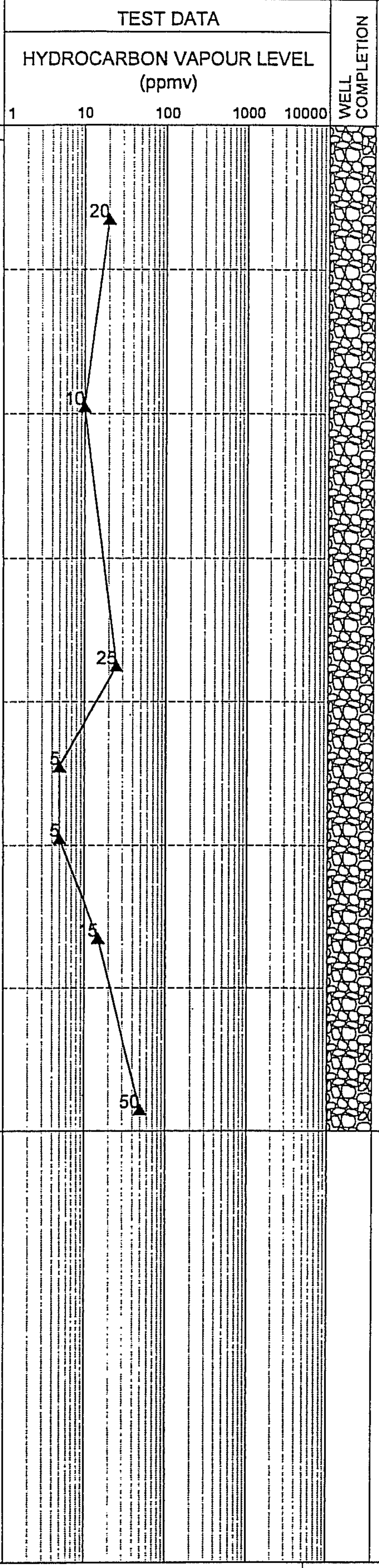
- trace to some fibrous organics below 3.6 m

- trace to some gravel, grey below 6.4 m

End of borehole at 7.0 m below grade.
Not completed as a monitoring well.

Refusal at 7.0 m below grade.

Depth (m): 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0



FIELD NOTES: backfilled with drill cuttings

DRILLING METHOD: Solid Stem Auger; log by d.t.

DATE DRILLED: 24-08-00

Notes: ◢ AUGER SAMPLE

Sheet 1 of 1

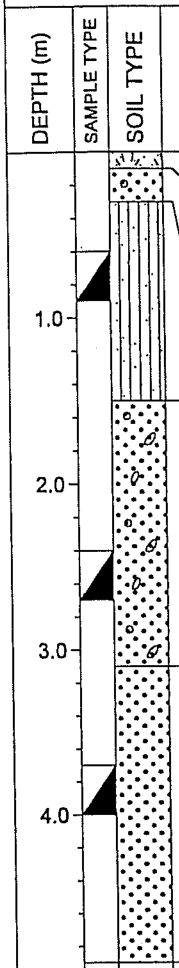
SEACOR
ENVIRONMENTAL ENGINEERING INC.

SEACOR JOB NO: 201.00861.001

CLIENT: PWGSC
PROJECT: Yukon/BC Border Crossings
Pleasant Camp

BOREHOLE LOG

BOREHOLE NO: BH-P8
ELEVATION: 99.594 m



SOIL DESCRIPTION

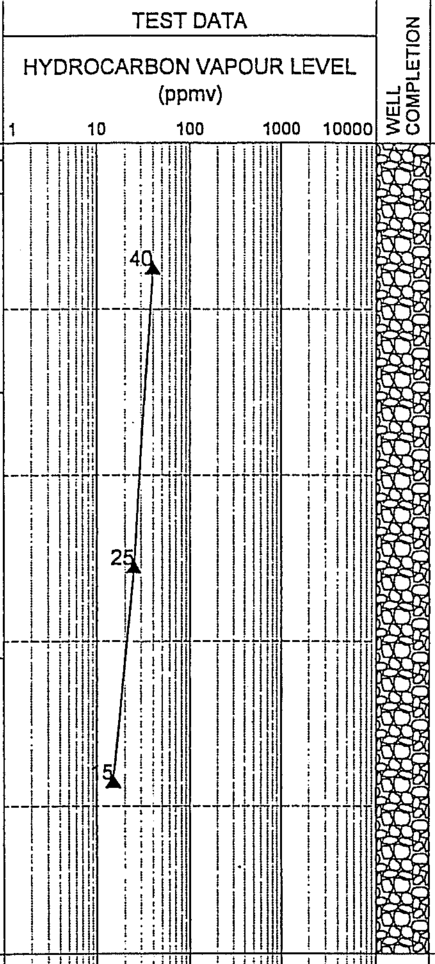
TOPSOIL & GRASSES

SAND & GRAVEL
silty, fine to coarse grained sand, fine and coarse sub-angular gravel, dark-brown, moist

SANDY SILT
fine to coarse grained sand, trace to some fine and coarse subangular to subrounded gravel, occasional cobble, trace to some fibrous organics, red-brown, moist

SAND & GRAVEL
silty, fine to coarse grained sand, fine and coarse sub-angular gravel, dark-brown, moist

SAND
fine to coarse grained sand, some silt, some fine to coarse subangular to subrounded gravel, occasional cobble, trace fibrous organics, brown, moist



WATER LEVEL

FIELD NOTES

End of borehole at 4.9 m below grade.
Not completed as a monitoring well.

1st refusal at 3.7 m below grade.
2nd refusal at 3.7 m below grade.
3rd refusal at 4.9 m below grade.
4th refusal at 4.9 m below grade.

DRILLING METHOD: Solid Stem Auger; log by d.t.

DATE DRILLED: 24-08-00

Notes: ◢ AUGER SAMPLE

Sheet 1 of 1

SEACOR
ENVIRONMENTAL ENGINEERING INC.

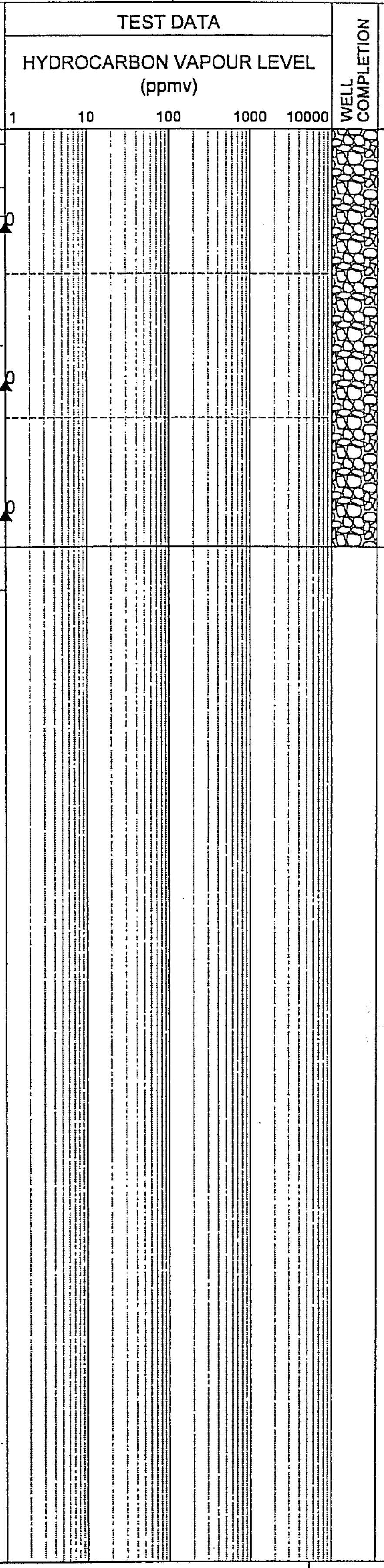
SEACOR JOB NO: 201.00861.001

CLIENT: PWGSC
PROJECT: Yukon/BC Border Crossings
Pleasant Camp

BOREHOLE LOG

BOREHOLE NO: BH-P9
ELEVATION: 99.936 m

DEPTH (m)	SAMPLE TYPE	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: HYDROCARBON VAPOUR LEVEL (ppmv)	WELL COMPLETION	WATER LEVEL	FIELD NOTES
			TOPSOIL & GRASSES				backfilled with drill cuttings
			SAND & GRAVEL silty, fine to coarse grained sand, fine and coarse sub-angular gravel, brown, moist				
	◢		**PEAT** fibrous and amorphous organics, trace to some fine to coarse grained sand, trace to some fine and coarse grained gravel, black, moist to wet	0			
1.0			**SILT** some fine grained sand, some fine gravel, occasional fibrous organics, light brown, moist to wet				
	◢		**SILTY SAND** fine grained sand, silty, occasional coarse grained sand, some fine gravel, occasional cobble, occasional fibrous organics, light brown, moist to wet	0			
2.0							
	◢		- wet to saturated below 2.8 m	0			
			BEDROCK				



End of borehole at 2.9 m below grade.
Not completed as a monitoring well.

DRILLING METHOD: Solid Stem Auger; log by d.t.

DATE DRILLED: 24-08-00

Notes: ◢ AUGER SAMPLE

Sheet 1 of 1

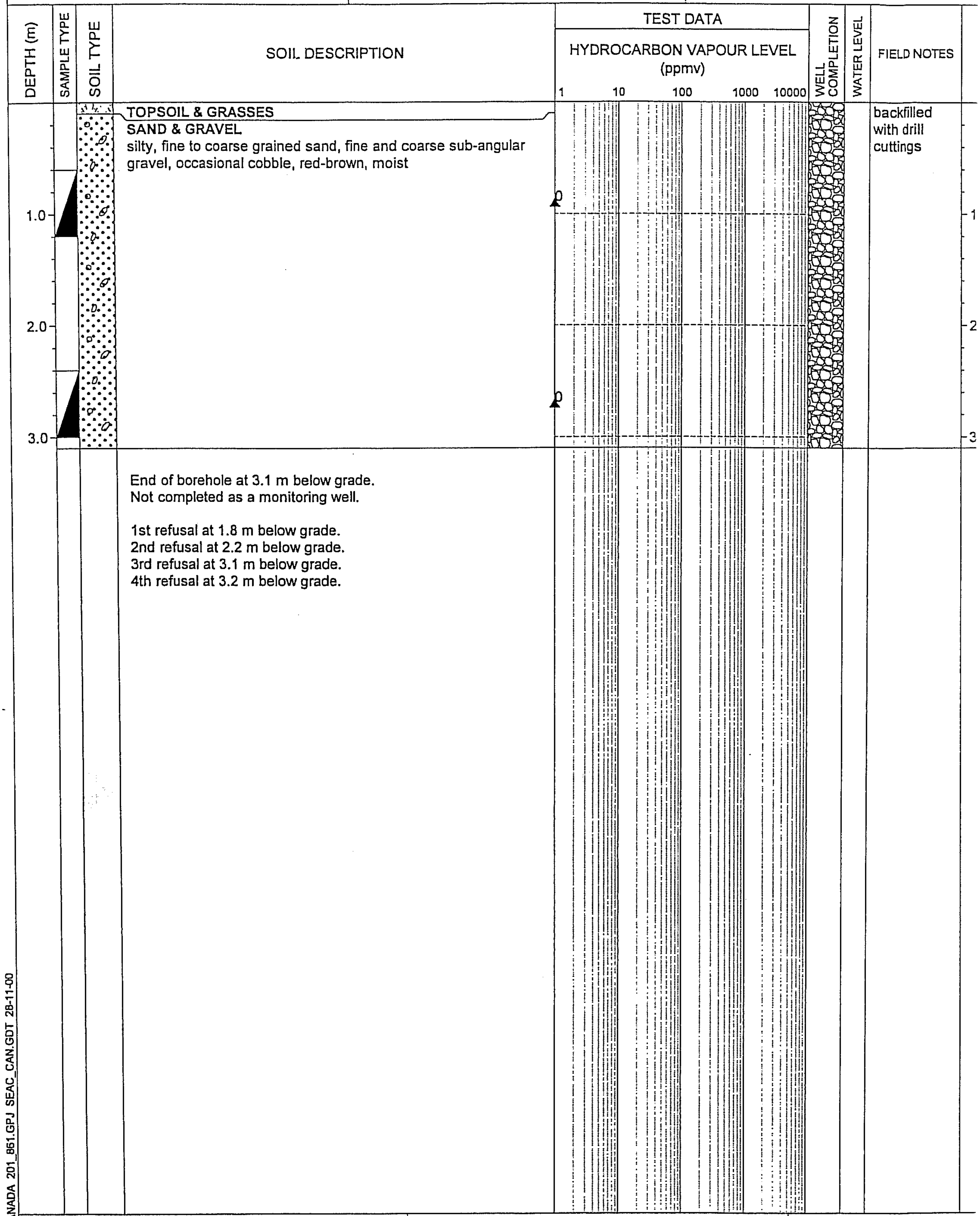
EACOR_CANADA 201_861.GPJ SEAC_CAN.GDT 28-11-00

SEACOR
ENVIRONMENTAL ENGINEERING INC.
SEACOR JOB NO: 201.00861.001

CLIENT: **PWGSC**
PROJECT: **Yukon/BC Border Crossings**
Pleasant Camp

BOREHOLE LOG

BOREHOLE NO: BH-P10
ELEVATION: 97.908 m



TOPSOIL & GRASSES
SAND & GRAVEL
silty, fine to coarse grained sand, fine and coarse sub-angular gravel, occasional cobble, red-brown, moist

backfilled with drill cuttings

End of borehole at 3.1 m below grade.
Not completed as a monitoring well.

1st refusal at 1.8 m below grade.
2nd refusal at 2.2 m below grade.
3rd refusal at 3.1 m below grade.
4th refusal at 3.2 m below grade.

DRILLING METHOD: Solid Stem Auger; log by d.t.

DATE DRILLED: 25-08-00

Notes: ◪ AUGER SAMPLE

Sheet 1 of 1

SEACOR_CANADA 201_861.GPJ SEAC_CAN.GDT 28-11-00

SEACOR
ENVIRONMENTAL ENGINEERING INC.

SEACOR JOB NO: 201.00861.001

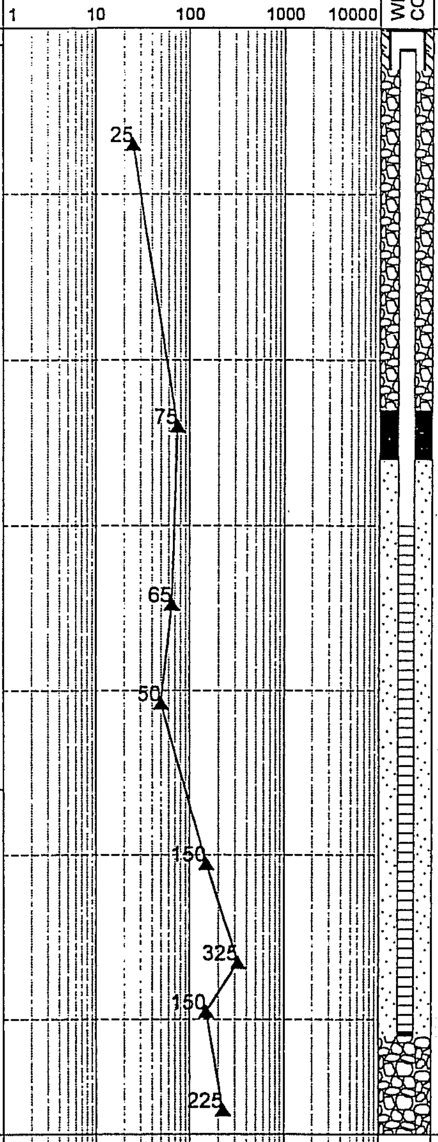
CLIENT: PWGSC
PROJECT: Yukon/BC Border Crossings
Pleasant Camp

BOREHOLE LOG

BOREHOLE NO: BH-P11
ELEVATION: 97.419 m

DEPTH (m)	SOIL DESCRIPTION	FIELD NOTES
0.0	**TOPSOIL & GRASSES**	steel roadbox
	SAND & GRAVEL silty, fine to coarse grained sand, fine and coarse sub-angular gravel, occasional cobble, trace fibrous organics, brown, dry to moist	
1.0		slough
2.0	- moist below 2.1 m	bentonite
		50 mm solid PVC
3.0		
4.0	- grey below 4.0 m	(08/27/00)
	SANDY SILT fine to coarse grained sand, some fine and coarse sub-angular gravel, occasional cobble, trace fibrous organics, grey, moist	
5.0		silica sand
		50 mm 010 slot PVC screen
6.0		slough

TEST DATA
HYDROCARBON VAPOUR LEVEL (ppmv)



End of borehole at 6.7 m below grade.
Monitoring well installed.

Screened interval from 3.0 m to 6.1 m
Top of Piezometer (TOP) Elevation = 97.389 m
Depth to groundwater from TOP = 4.327 m (08/27/00)

DRILLING METHOD: Solid Stem Auger; log by d.t.

Notes: ◢ AUGER SAMPLE

SEACOR
ENVIRONMENTAL ENGINEERING INC.

SEACOR JOB NO: 201.00861.001

CLIENT: **PWGSC**
PROJECT: **Yukon/BC Border Crossings**
Pleasant Camp

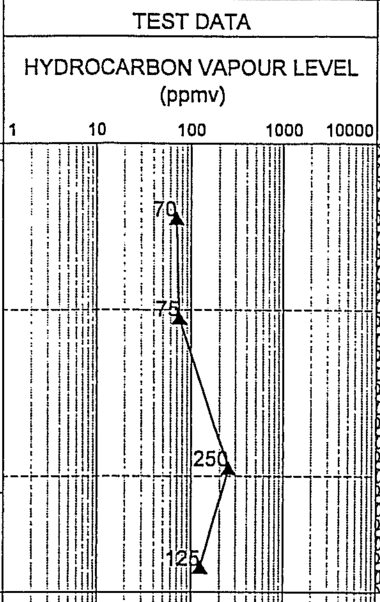
BOREHOLE LOG

BOREHOLE NO: BH-P12
ELEVATION: 99.951 m

DEPTH (m)	SOIL DESCRIPTION	WELL COMPLETION	FIELD NOTES
	TOPSOIL & GRASSES		backfilled with drill cuttings
	SAND & GRAVEL silty, fine to coarse grained sand, fine and coarse sub-angular gravel, occasional cobble, occasional fibrous organics, brown, dry to moist		
1.0			
	- wet below 1.8 m		
2.0			
	- no organics, light brown below 2.1 m		

End of borehole at 2.7 m below grade.
Not completed as a monitoring well.

Refusal at 2.7 m below grade.



DRILLING METHOD: Solid Stem Auger; log by d.t.

Notes: ◢ AUGER SAMPLE

DATE DRILLED: 25-08-00

Sheet 1 of 1

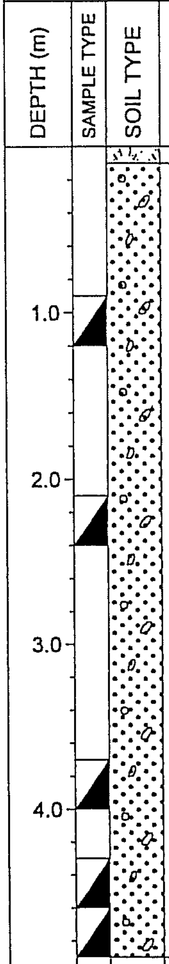
ACOR_CANADA 201_861.GPJ SEAC_CAN.GDT 28-11-00

SEACOR
ENVIRONMENTAL ENGINEERING INC.
SEACOR JOB NO: 201.00861.001

CLIENT: **PWGSC**
PROJECT: **Yukon/BC Border Crossings**
Pleasant Camp

BOREHOLE LOG

BOREHOLE NO: BH-P13
ELEVATION: 100.326 m

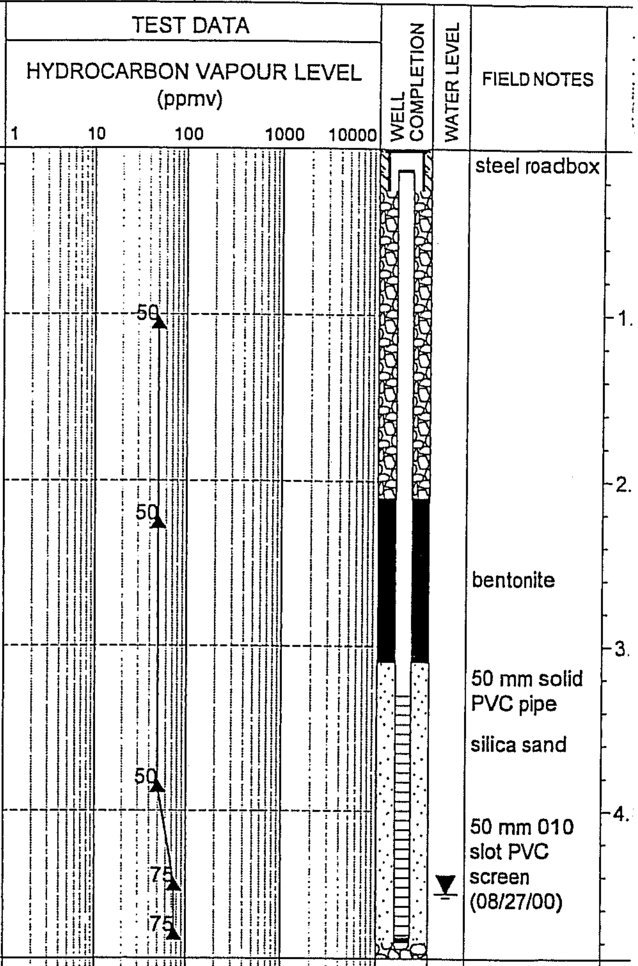


SOIL DESCRIPTION

TOPSOIL & GRASSES

SAND & GRAVEL
silty, fine to coarse grained sand, fine and coarse sub-angular gravel, occasional cobble, occasional fibrous organics, dark brown, dry to moist

- wet to saturated below 4.3 m



End of borehole at 4.9 m below grade.
Monitoring well installed.

Screened interval from 3.3 m to 4.8 m
Top of Piezometer (TOP) Elevation = 100.250 m
Depth to groundwater from TOP = 4.430 m (08/27/00)

Refusal at 4.9 m below grade.

DRILLING METHOD: Solid Stem Auger; log by d.t.
DATE DRILLED: 25.08.00

Notes: ◩ AUGER SAMPLE

Sheet 1 of 1

SNC·LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : BH01-14

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex

Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 300.11
Top of Casing Elev. (m) : 299.965

Project Number : 130846
Borehole Logged By : ARL
Date Drilled : 2001 09 22
Log Typed By : ARL

Drilling Legend
▨ Sample Interval

Water/LPH Levels
Water Level 1
Water Level 2
LPH
LPH

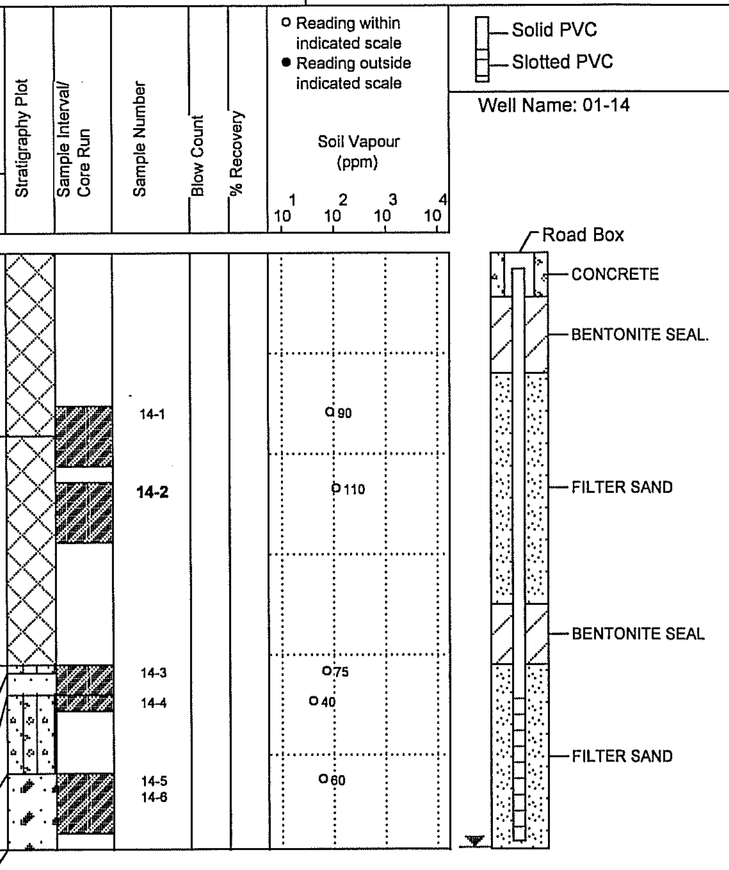
○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: 01-14

Depth in Metres	Soil Description	Sample Number	Soil Vapour (ppm)
0	SAND, (FILL), fine sand, gravelly, trace silt, orange brown.	14-1	90
2	SAND and GRAVEL, (FILL), medium sand, angular gravel, medium brown.	**14-2**	110
4	GRAVEL and SILT, gravel composed of black shale with orange oxidized fractures. Possibly local material used as fill.	14-3	75
	SAND, coarse quartzite sand, medium grey to black and white. Slight hydrocarbon-like odour detected.	14-4	40
5	GRAVEL and SILT, gravel composed of sericite schist. Possibly local material used as fill.		
	SILT and clay, some gravel, grey, firm, moist, no hydrocarbon-like odour detected.	14-5 14-6	60
6	BEDROCK at end of hole.		

End of borehole at 6.0 m.



Depth in Metres: 0 1 2 3 4 5 6 7 8 9 10 11 12

Notes:
Bolded sample denotes sample analyzed.
Converted to SVE well - November 2005.

Print Date: 2008 07 21, Date Approved: 2004 04 22

SNC•LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : BH01-15

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 299.72

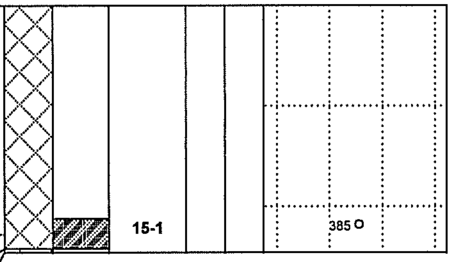
Project Number : 130846
Borehole Logged By : ARL
Date Drilled : 2001 09 22
Log Typed By : ARL

Drilling Legend
▨ Sample Interval

Water/LPH Levels
Water Level 1
Water Level 2
LPH
LPH

○ Reading within indicated scale
● Reading outside indicated scale

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval/ Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
0	SAND, (FILL), fine sand, gravelly, dark grey, damp.						
2.3	Wet, dark grey/black, strong hydrocarbon-like odour.		▨	**15-1**			385 ○
2.5	CONCRETE PAD.						
	End of borehole at 2.5 m.						



Notes:
Bold Sample Number indicates sample analyzed.
Borehole advanced at location of former UST.

Print Date: 2008 07 21, Date Approved: 2004 04 22

SNC·LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : BH01-16

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex

Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 299.22
Top of Casing Elev. (m) : 299.16

Project Number : 130846
Borehole Logged By : ARL
Date Drilled : 2001 09 22
Log Typed By : ARL

Drilling Legend
▨ Sample Interval

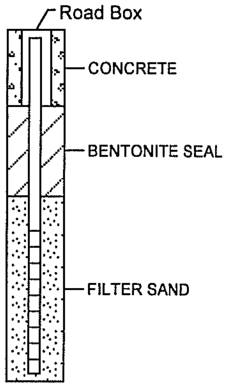
Water/LPH Levels
Water Level 1
Water Level 2
LPH
LPH

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: 01-16

Depth in Metres	Soil Description	Sample Interval/ Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) (10^1 10^2 10^3 10^4)
0	BOULDERS, GRAVEL and SAND, dark grey, hydrocarbon like odour detected at 1.2 m.					
1.5	SILT, gravelly, some sand, trace clay, rounded to subrounded coarse gravel, dry.	▨	**16-1**			600 ○
		▨	16-2			○ 325
2.75	GRAVEL and SAND, trace silt, trace clay, wet.	▨	**16-3**			
3.3	BEDROCK, fractured.					
3.5	End of borehole at 3.5 m.					



Notes:
Bold Sample Number indicates sample analyzed.
Borehole advanced downgradient of AST in area of historical surface fuel spill.

SNC•LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : BH01-17S

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex

Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 297.155
Top of Casing Elev. (m) : 297.09

Project Number : 130846
Borehole Logged By : ARL
Date Drilled : 2001 09 23
Log Typed By : ARL

Depth in Metres

Drilling Legend

Water/LPH Levels
- ▼ Water Level 1
- ▽ Water Level 2
- ◆ LPH
- ◇ LPH

Soil Description

Stratigraphy Plot | Sample Interval/Core Run | Sample Number | Blow Count | % Recovery

○ Reading within indicated scale
● Reading outside indicated scale

Soil Vapour (ppm)

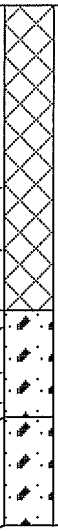
10^1 10^2 10^3 10^4

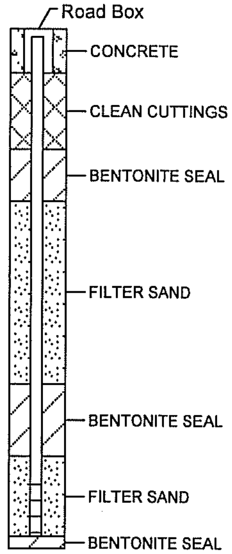
Solid PVC
Slotted PVC

Well Name: 01-17S

Depth (m)	Soil Description
0	SAND, (FILL) gravelly, silty, reddish to medium brown.
1.8	COBBLES (FILL), from 1.8 m to 2.44 m.
3.0	GRAVEL and COBBLES, CLAY, silty, medium grey brown.
3.2	SAND and GRAVEL, from 3.2 m to 3.7 m.
4.0	COBBLES, from 4.0 m to 4.1 m.
4.1	SILT, gravelly, some sand, some cobbles, trace clay, rounded to subrounded coarse gravel, fine sand, grey brown, dense, oxidized rims on cobbles, damp. Hydrocarbon-like odour detected at 5 m.

End of borehole at 5.2 m.





Notes:
Bold sample number indicates sample analyzed.
Well dry at the time of monitoring - October 1, 2004.

Print Date: 2008 07 21, Date Approved: 2004 04 22

SNC·LAVALIN Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : BH01-17D

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex

Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 297.24
Top of Casing Elev. (m) : 297.19

Project Number : 130846
Borehole Logged By : ARL
Date Drilled : 2001 09 23
Log Typed By : ARL

Drilling Legend
▨ Sample Interval

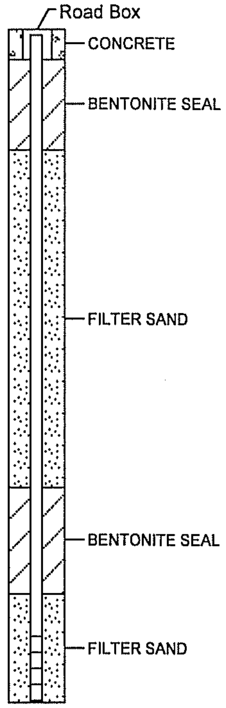
Water/LPH Levels
Water Level 1
Water Level 2
LPH
LPH

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: 01-17D

Soil Description	Sample Number	Soil Vapour (ppm)
SAND, (FILL) gravelly, silty, reddish to medium brown.		
COBBLES, (FILL) from 1.8 m to 2.4 m.		
GRAVEL and COBBLES, CLAY, silty, medium grey brown.		
SAND and GRAVEL from 3.2 m to 3.66 m.	17-1	○ 150
COBBLES from 3.96 m to 4.11 m.		
SILT, gravelly, some sand, some cobbles, trace clay, rounded to subrounded coarse gravel, fine sand, grey brown, dense, oxidized rims on cobbles, damp.	**17-2**	○ 150
	17-3	○ 110
COBBLES, strong hydrocarbon-like odour.	17-4	○ 175
SAND and GRAVEL.	**17-5**	
End of borehole at 6.7 m.		



Notes:
Bold Sample Number indicates sample analyzed.

Print Date: 2008 07 21, Date Approved: 2004 04 22

SNC·LAVALIN Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : BH01-18

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 297.16
Top of Casing Elev. (m) : 297.125

Project Number : 130846
Borehole Logged By : ARL
Date Drilled : 2001 09 23
Log Typed By : ARL

Drilling Legend
▨ Sample Interval

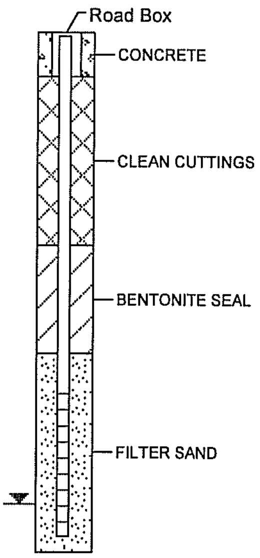
Water/LPH Levels
▼ Water Level 1
▽ Water Level 2
◆ LPH
◇ LPH

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: 01-18

Depth in Metres	Soil Description	Sample Number	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
0	(TOPSOIL), SAND and COBBLES, (FILL), gravelly, silty, red brown.		
	BOULDERS, (FILL),		
1	SAND, (FILL), gravelly, medium brown.		
2	BOULDERS, (FILL)		
3			
	GRAVEL and COBBLES, fine angular gravel, sandy, silty, some clay, grey brown, very dense.		
4		18-1	○30
	Wet below 4.3 m	**18-2**	○180
5			
	End of borehole at 5.2 m.		
6			
7			
8			
9			
10			
11			
12			



Notes:
Bold Sample Number indicates sample analyzed.
Well dry at the time of monitoring - October 1, 2004.

Print Date: 2008 07 21, Date Approved: 2004 04 22

SNC•LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : BH01-19

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex

Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 296.4
Top of Casing Elev. (m) : 296.33

Project Number : 130846
Borehole Logged By : ARL
Date Drilled : 2001 09 26
Log Typed By : ARL

Drilling Legend
▨ Sample Interval

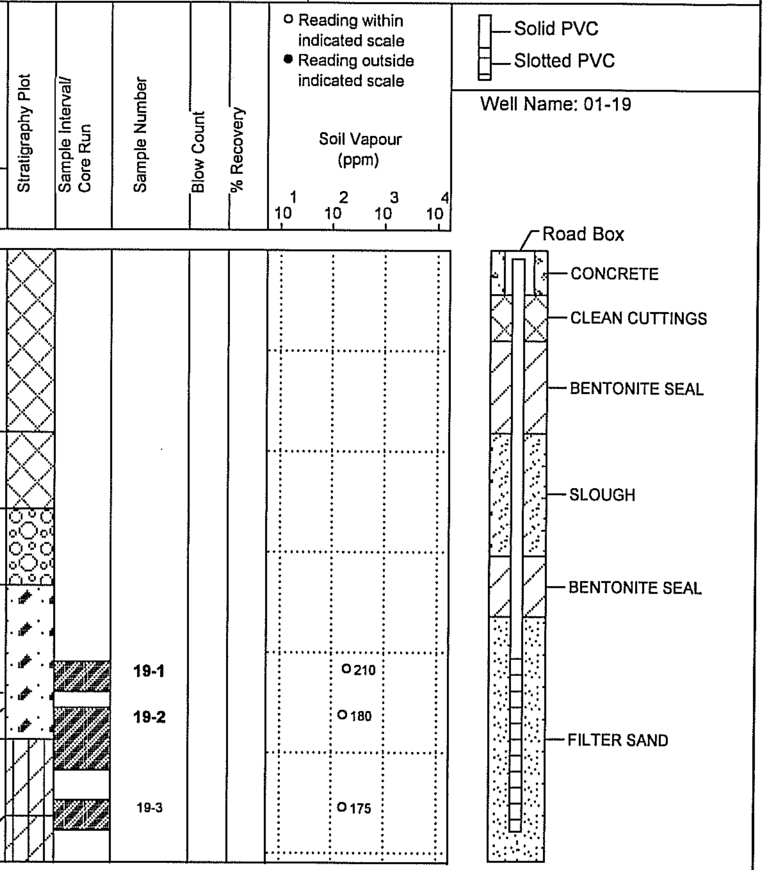
Water/LPH Levels
Water Level 1
Water Level 2
LPH
LPH

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: 01-19

Depth in Metres	Soil Description	Sample Number	Soil Vapour (ppm)
0	SAND, (FILL), gravelly, some silt, dark brown.		
1.8	BOULDERS and SILT, (FILL), some fine sand, medium brown, moist.		
2.6	SAND and GRAVEL and BOULDERS, silty, medium brown, dry.		
3.3	SAND, GRAVEL, and SILT, medium brown, dry.		
	Damp below 4.1 m.	**19-1**	210
	COBBLES from 4.42 m to 4.57 m.	**19-2**	180
4.8	CLAY, silty, with sand and gravel lenses. SAND and GRAVEL lens from 4.95 m to 5.11 m.		
	GRAVEL, lens from 5.56 to 5.64 m.	19-3	175
	CLAY, trace silt, blue below 5.7 m, very stiff.		
6.1	End of borehole at 6.1 m.		



Depth scale: 0 1 2 3 4 5 6 7 8 9 10 11 12

Notes:
Bold Sample Number indicates sample analyzed.

Print Date: 2008 07 21, Date Approved: 2004 04 22

SNC•LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : BH01-20

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 298.645
Top of Casing Elev. (m) : 298.545

Project Number : 130846
Borehole Logged By : ARL
Date Drilled : 2001 09 25
Log Typed By : ARL

Drilling Legend
▨ Sample Interval

Water/LPH Levels
Water Level 1
Water Level 2
LPH
LPH

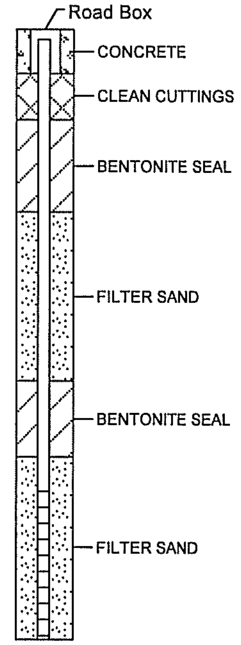
○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: 01-20

Soil Description	Stratigraphy Plot	Sample Interval/ Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
COBBLES, GRAVEL, and SAND, (FILL), some silt, trace clay, medium brown, reddish brown below 2.1 m, medium dense, damp to moist.						
COBBLES, gravelly, sandy, trace clay subunit from 1.52 m to 2.13 m.						
SAND, (FILL), light brown, medium grained sand, dry.						
SAND, silty, gravelly, medium brown, damp to 5.2 m, wet below 5.2 m, gravel at base of unit.		▨	**20-1**			
CLAY, silty, trace subangular gravel, light brown.						
COBBLES, marble. BEDROCK at end of hole.						

End of borehole at 6.1 m.



Notes:
Bold Sample Number indicates sample analyzed.

Print Date: 2008 07 21, Date Approved: 2004 04 22

SNC·LAVALIN Morrow Environmental

Client : **Public Works and Gov't Services Canada**

Location : **Pleasant Camp, BC**

Borehole No. : BH01-21

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex

Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 298.59
Top of Casing Elev. (m) : 298.445

Project Number : 130846
Borehole Logged By : ARL
Date Drilled : 2001 09 25
Log Typed By : ARL

Drilling Legend

Water/LPH Levels
- ▼ Water Level 1
- ▽ Water Level 2
- ◆ LPH
- ◇ LPH

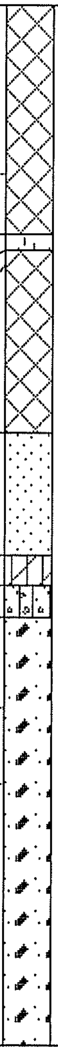
○ Reading within indicated scale
● Reading outside indicated scale

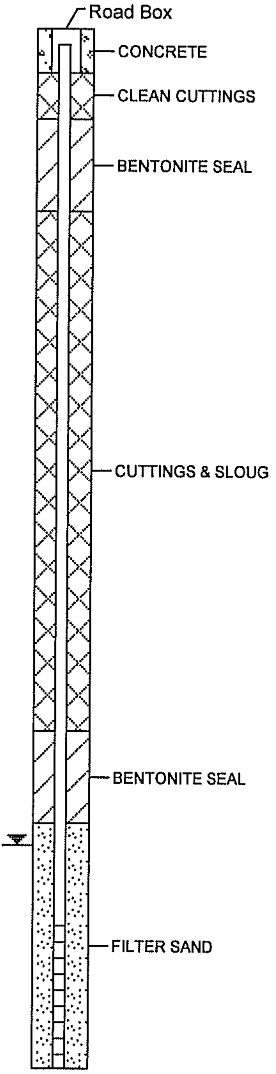
Soil Vapour (ppm): 10^1 10^2 10^3 10^4

Solid PVC
Slotted PVC

Well Name: 01-21

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval/ Core Run	Sample Number	Blow Count	% Recovery
0	COBBLES, SAND and GRAVEL, (FILL), medium brown, medium dense, moist.					
	SAND and COBBLES and BOULDERS medium sand, grey, dry.					
	SILT and ORGANICS, black.					
	SAND and GRAVEL, (FILL), medium red/brown.					
3	COBBLES and SAND, trace to some silt increasing with depth, reddish brown, dry.					
	SAND, gravelly, some silt, medium brown.					
	SILT, some clay, some gravel, medium grey/brown, soft, moist.					
6	SAND and GRAVEL, silty.					
	SILT and GRAVEL and COBBLES, clayey to trace clay, grey, moist below 8.6 m. No detectable hydrocarbon-like odour.					
7	SAND and GRAVEL, from 7.0 m to 7.77 m.					
9	wet below 8.7 m.					
	End of borehole at 10.4 m.					





Notes:
Bold Sample Number indicates sample analyzed.

Print Date: 2008 07 21, Date Approved: 2004 04 22

SNC•LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : BH01-22

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex

Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 299.4
Top of Casing Elev. (m) : 299.305

Project Number : 130846
Borehole Logged By : ARL
Date Drilled : 2001 09 26
Log Typed By : ARL

Drilling Legend
▨ Sample Interval

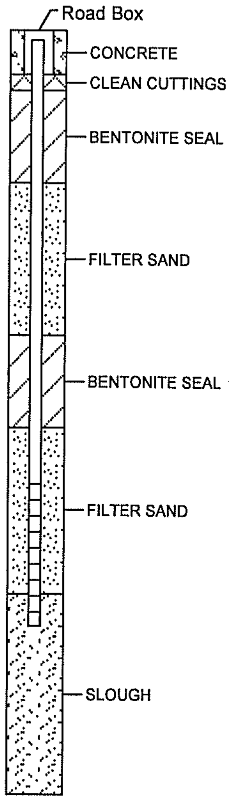
Water/LPH Levels
Water Level 1
Water Level 2
LPH
LPH

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: 01-22

Soil Description	Stratigraphy Plot	Sample Interval/ Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
SAND, (TOPSOIL), trace gravel, reddish brown.						
SAND and GRAVEL, (FILL), angular gravel, trace clay, grey brown, loose, dry.						
SAND, medium grained, trace gravel, brown, dry.		▨	**22-1**			○ 170
SILT and SAND some gravel, trace clay, brown grey, soft, dry, black and white sand/rocks from 2.97 m to 3.05 m. Silt content decreasing with depth to Silty SAND below 3.65 m.						
GRAVEL and COBBLES, sandy, silty, some clay, fine angular gravel, grey brown, wet.						
COBBLES		▨	22-2			○ 255
SILT and SAND some gravel, trace clay, brown grey, soft.						
COBBLES						
SILT and SAND some gravel, some cobbles, trace to some clay, brown grey, soft, wet to 5.5 m.						
Slight hydrocarbon-like odour at 5.8 m. Grey soils below this depth.						
End of borehole at 7.6 m.						



Notes:
Bold Sample Number indicates sample analyzed.
Well dry at the time of monitoring - October 1, 2004.

Print Date: 2008 07 21, Date Approved: 2004 04 22

SNC·LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : BH01-23

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex

Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 298.41
Top of Casing Elev. (m) : 297.99

Project Number : 130846
Borehole Logged By : ARL
Date Drilled : 2001 09 25
Log Typed By : ARL

Drilling Legend

Water/LPH Levels
- Water Level 1
- Water Level 2
- LPH
- LPH

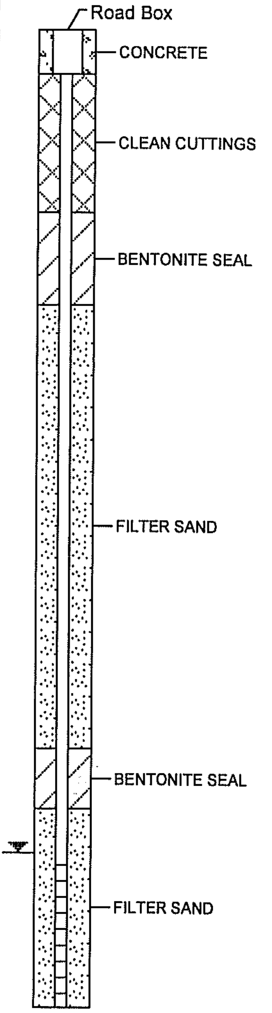
○ Reading within indicated scale
● Reading outside indicated scale

Soil Vapour (ppm): 10^1 10^2 10^3 10^4

Solid PVC
Slotted PVC

Well Name: 01-23

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval/ Core Run	Sample Number	Blow Count	% Recovery
0	SAND and GRAVEL, (FILL), some silt, dark brown.					
1	BOULDERS, COBBLES, GRAVEL and SAND, (FILL), trace silt, very loose, voids between boulders, grey brown to medium brown at depth.					
2	BOULDERS with voids from 1.83 m to 2.44 m.					
3	BOULDERS from 3.66 m to 3.81 m.					
4	SAND and GRAVEL, (FILL), cobbley, bouldery, fine sand, brown, loose, wet at 5.6 m, dry at 5.9 m, damp below 6.4 m.					
5						
6	COBBLES and BOULDERS. Dark grey gravelly sand below.					
7	SAND and GRAVEL, silty, trace clay, fine sand, light grey brown, moist.					
	GRAVEL and COBBLES, silty, light grey brown, dry.					
8	GRAVEL, clayey, blue grey, damp, from 8.31 m.					
	BOULDERS, COBBLES and GRAVEL, wet below 8.8 m.					
9	BEDROCK? or BOULDERS? at end of hole.					
10	End of borehole at 9.8 m.					
11						
12						



Notes:
Bold Sample Number indicates sample analyzed.

Print Date: 2008 07 21, Date Approved: 2004 04 22

SNC•LAVALIN Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : BH01-24

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex

Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 299.715
Top of Casing Elev. (m) : 299.585

Project Number : 130846
Borehole Logged By : ARL
Date Drilled : 2001 09 27
Log Typed By : ARL

Drilling Legend
▨ Sample Interval

Water/LPH Levels
Water Level 1
Water Level 2
LPH
LPH

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: 01-24

Depth in Metres

Soil Description

SAND and GRAVEL, (TOPSOIL).

SAND, (FILL), trace gravel, brown, damp to moist, no odour detected.

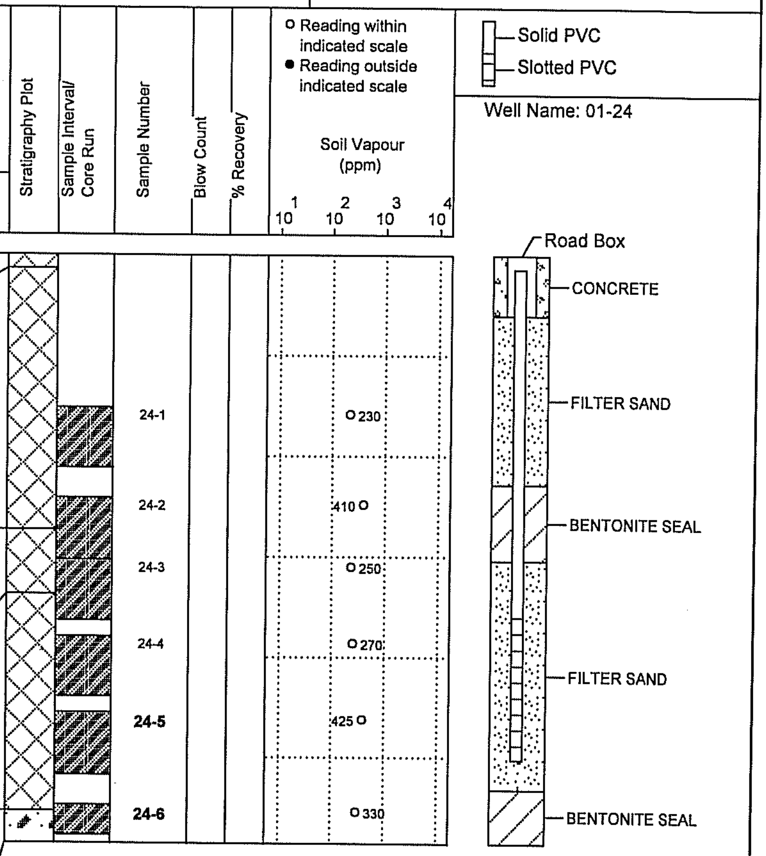
SAND, (FILL) some gravel, trace to some clay, brown and black sand, soapy odour at base of unit. Some silt at base of unit.

Plastic sheet suspected at 3.4 m.

GRAVEL, (FILL), fine rounded to subrounded gravel, silty, trace sand, trace to some clay, black to grey, wet, noticable hydrocarbon-like odour encountered from 4.1 m to 5.5 m.

SILT, gravelly, some cobbles, some clay, rounded to subrounded coarse gravel, fine sand, some to trace sand lenses and thin bands of silty clay, grey brown, firm, oxidized rims on cobbles, no odour detected. BEDROCK at end of hole.

End of borehole at 5.9 m.



Sample Number	Soil Vapour (ppm)
24-1	230
24-2	410
24-3	250
24-4	270
24-5	425
24-6	330

Notes:
Bold sample number indicates sample analyzed.
Converted to SVE well - November 2005.

Print Date: 2008 07 21, Date Approved: 2004 04 22

SNC•LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 03-01

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex/Solid Stem Auger
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 298.326
Top of Casing Elev. (m) : 298.191

Project Number : 130846
Borehole Logged By : RNS
Date Drilled : 2003 09 04
Log Typed By : PKR

Drilling Legend
- ▨ Sample Interval
- ☒ Odex

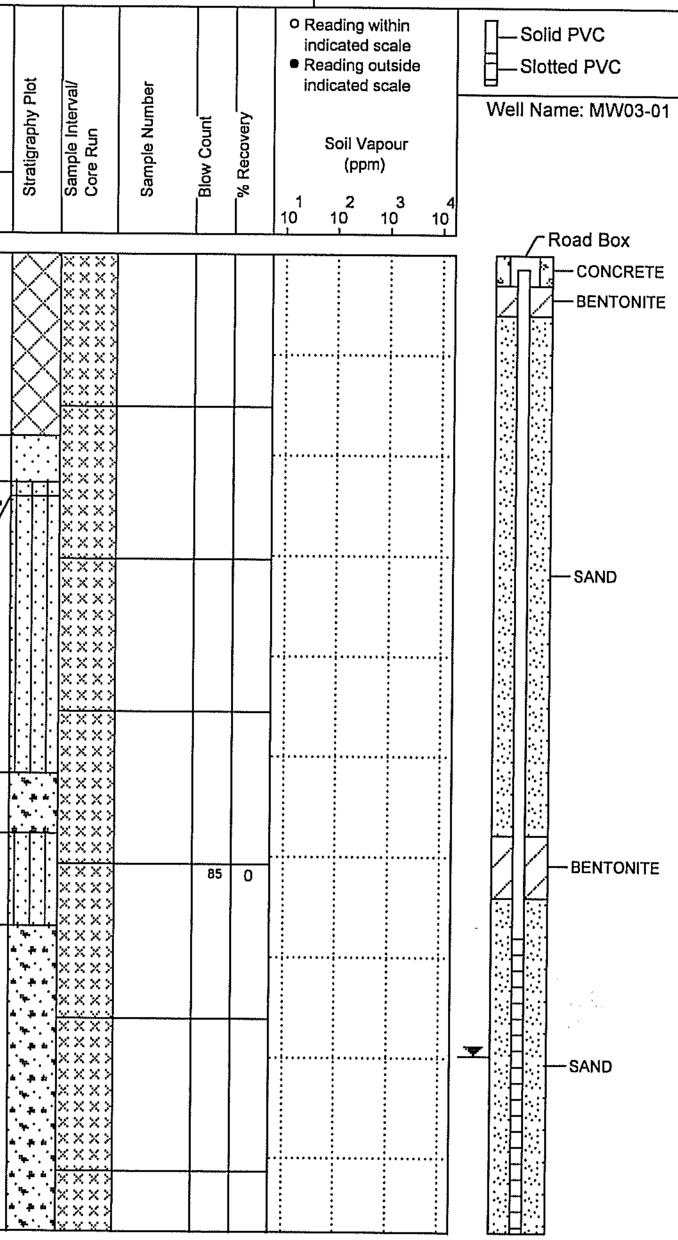
Water/LPH Levels
- ▼ Water Level 1
- ▽ Water Level 2
- ◆ LPH
- ◇ LPH

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: MW03-01

Depth in Metres	Soil Description
0	SAND and GRAVEL (FILL), some silt, dark brown, moist.
1	Between 0.8 to 0.9 m - cobbles. At 0.9 m - dry to moist.
2	SAND, medium grained, some cobbles, medium grey, loose, dry.
	SAND and SILT, medum to fine grained, some gravel, dark brown, loose, moist.
3	SAND and SILT, medium to fine grained, some gravel, medium brown, medium dense to loose, moist.
4	At 3.7 m - medium to coarse grained. At 4.3 m - some cobbles to boulders.
5	SAND and GRAVEL, medium to coarse grained, some silt, medium dense to loose, moist.
6	SAND and SILT, medium to fine grained, gravelly, brown, loose, moist.
7	SAND and GRAVEL, medium to fine grained, silty, medium dense, dark grey, moist. At 7.2 m - cobbley and boulders.
8	Between 7.9 to 8.2 m - wet.
9	At 8.7 m - silty sand and gravel, medium to coarse grained, medium grey to medium brown, dense, moist to wet.
10	End of borehole at 9.8 m.
11	
12	



Notes:
Bolded sample denotes sample analyzed.

Print Date: 2008 07 21, Date Approved: 2005 03 04

SNC•LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 03-02

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex/Solid Stem Auger
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 298.878
Top of Casing Elev. (m) : 298.781

Project Number : 130846
Borehole Logged By : RNS
Date Drilled : 2003 09 04
Log Typed By : PKR

Drilling Legend
- ▨ Sample Interval
- ☒ Odex

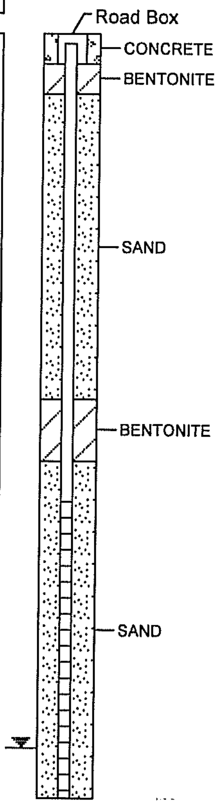
Water/LPH Levels
- ▼ Water Level 1
- ▽ Water Level 2
- ◆ LPH
- ◇ LPH

- ○ Reading within indicated scale
- ● Reading outside indicated scale

- Solid PVC
- Slotted PVC

Well Name: MW03-02

Depth in Metres	Soil Description	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
0	SAND and GRAVEL (FILL), medium to coarse grained, some silt, dark brown, moist. At 2.7 m - cobbley with boulders.				
3	SAND and GRAVEL, medium to fine grained, some silt, medium dense, dark brown, moist.		9 17 35 69	20	
4	SAND, medium grained, trace gravel, dark brown, loose, moist. Between 4.4 to 4.6 m - cobbley, boulders with voids. At 4.9 m - fine grained.	02-1			○ 50
6	SAND, fine grained, trace gravel, medium grey, loose, moist to wet. At 7.2 m - boulder (or bedrock), very slow.	**02-2**	18 70 106	23	○ 45
8	End of borehole at 7.6 m.				



Notes:
Bolded sample denotes sample analyzed.

Print Date: 2008 07 21, Date Approved: 2005 03 04

SNC•LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 03-03

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex/Solid Stem Auger
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 298.124
Top of Casing Elev. (m) : 298.045

Project Number : 130846
Borehole Logged By : RNS
Date Drilled : 2003 09 04
Log Typed By : PKR

Drilling Legend
▨ Sample Interval
☒ Odex

Water/LPH Levels
Water Level 1
Water Level 2
LPH
◇ LPH

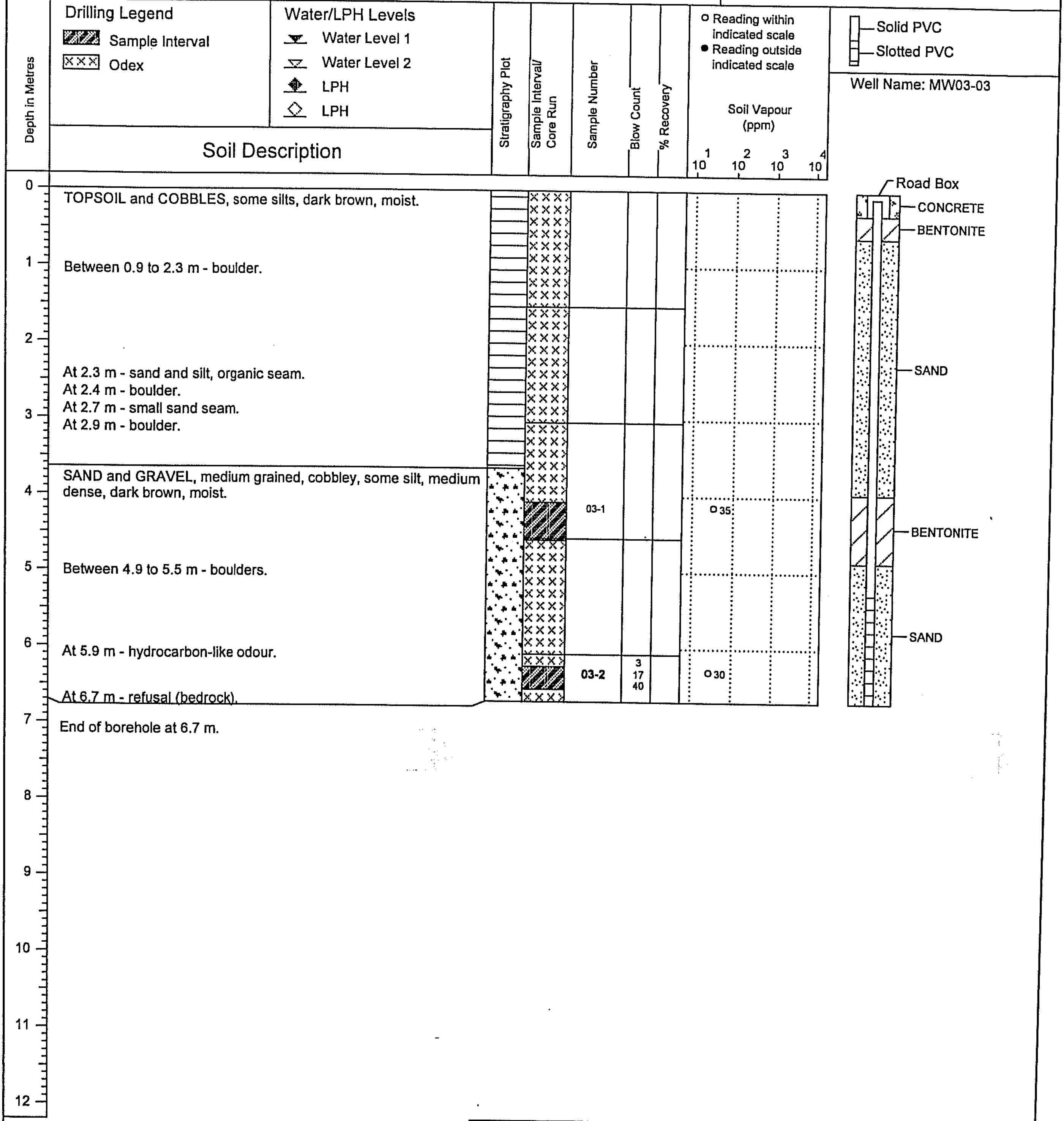
○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: MW03-03

Soil Description

Depth in Metres	Soil Description	Sample Number	Blow Count	Soil Vapour (ppm)
0	TOPSOIL and COBBLES, some silts, dark brown, moist.			
1	Between 0.9 to 2.3 m - boulder.			
2	At 2.3 m - sand and silt, organic seam. At 2.4 m - boulder. At 2.7 m - small sand seam. At 2.9 m - boulder.			
4	SAND and GRAVEL, medium grained, cobbley, some silt, medium dense, dark brown, moist.	03-1		35
5	Between 4.9 to 5.5 m - boulders.			
6	At 5.9 m - hydrocarbon-like odour.	03-2	3 17 40	30
6.7	At 6.7 m - refusal (bedrock).			
7	End of borehole at 6.7 m.			



Notes:
Bolded sample denotes sample analyzed.
Converted to AS well - November 2005.

Print Date: 2008 07 21, Date Approved: 2005 03 04

SNC•LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 03-04

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex/Solid Stem Auger
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 297.378
Top of Casing Elev. (m) : 297.328

Project Number : 130846
Borehole Logged By : RNS
Date Drilled : 2003 09 04
Log Typed By : PKR

Drilling Legend
▨ Sample Interval
☒ Odex

Water/LPH Levels
Water Level 1
Water Level 2
LPH
LPH

○ Reading within indicated scale
● Reading outside indicated scale

Soil Vapour (ppm)

Well Name: MW03-04

Depth in Metres

Soil Description

SAND and GRAVEL, medium grained, some silt, dark brown, medium dense to loose, damp.
At 1.1 m - cobbley.

SAND, fine grained, some silt, some cobbles, trace gravel, dark brown to black, loose, moist.

SAND and GRAVEL, medium grained, some cobbles, trace silt, dark brown, medium dense, moist.
Between 2.9 to 3.2 m - boulders.

SAND, medium to fine grained, some gravel, trace cobbles, dark brown, loose, moist.
Between 5.0 to 5.5 m - cobbley.

SAND and GRAVEL, medium to fine grained, some silt, some cobbles, medium dense, moist.
At 5.9 m - hydrocarbon-like odour.
At 6.3 m - wet.

SAND, coarse grained, some cobbles, medium dense, trace boulders, dark grey, wet, hydrocarbon-like odour.
At 7.2 m - sand and silt, medium to fine grained, hydrocarbon-like odour.

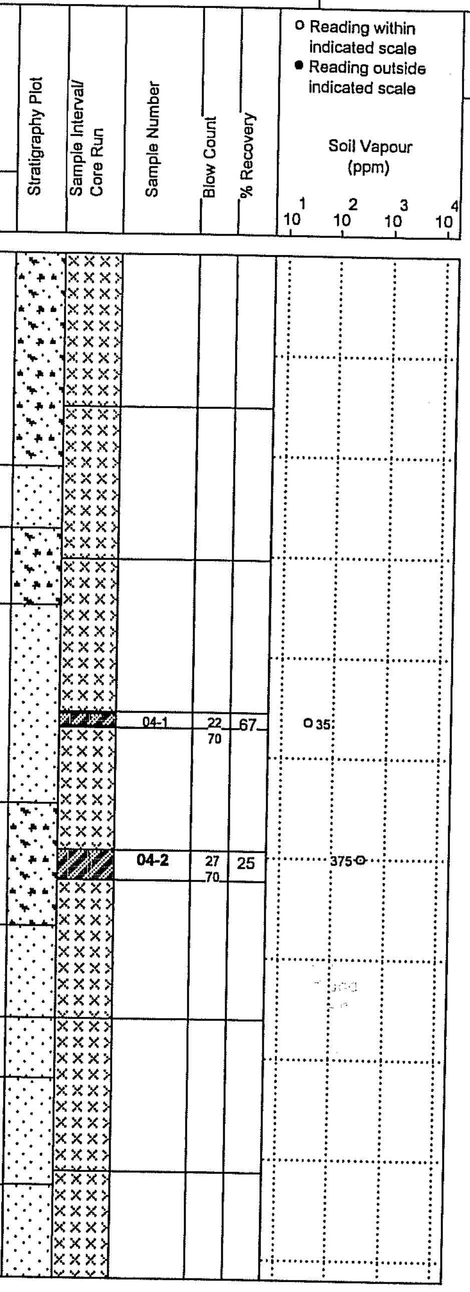
SAND and COBBLES, medium to coarse grained, dark grey, dense, moist.

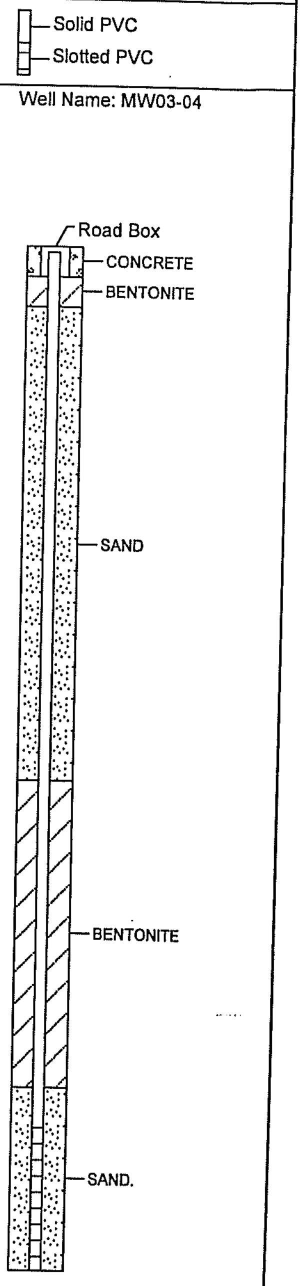
SAND, fine grained, some gravel and cobbles, medium to dark grey, medium dense, moist.
At 8.4 m - medium grained - fine grained, brown, - medium to dark grey.
At 8.7 m - cobbley.

SAND, coarse grained, some gravel, medium brown, loose, wet.
At 9.9 m - gravel, angular, dense.

End of borehole at 10.2 m.

Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
04-1	22 70	67	35
04-2	27 70	25	375





Notes:
Bolded sample denotes sample analyzed.
Converted to AS well - November 2005.

Print Date: 2008 07 21, Date Approved: 2005 03 04

SNC·LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 03-05

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex/Solid Stem Auger
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 296.659
Top of Casing Elev. (m) : 296.597

Project Number : 130846
Borehole Logged By : RNS
Date Drilled : 2003 09 04
Log Typed By : PKR

Drilling Legend
☒ Odex

Water/LPH Levels
▼ Water Level 1
▽ Water Level 2
◆ LPH
◇ LPH

Stratigraphy Plot | Sample Interval/ Core Run | Sample Number | Blow Count | % Recovery

○ Reading within indicated scale
● Reading outside indicated scale

Soil Vapour (ppm)

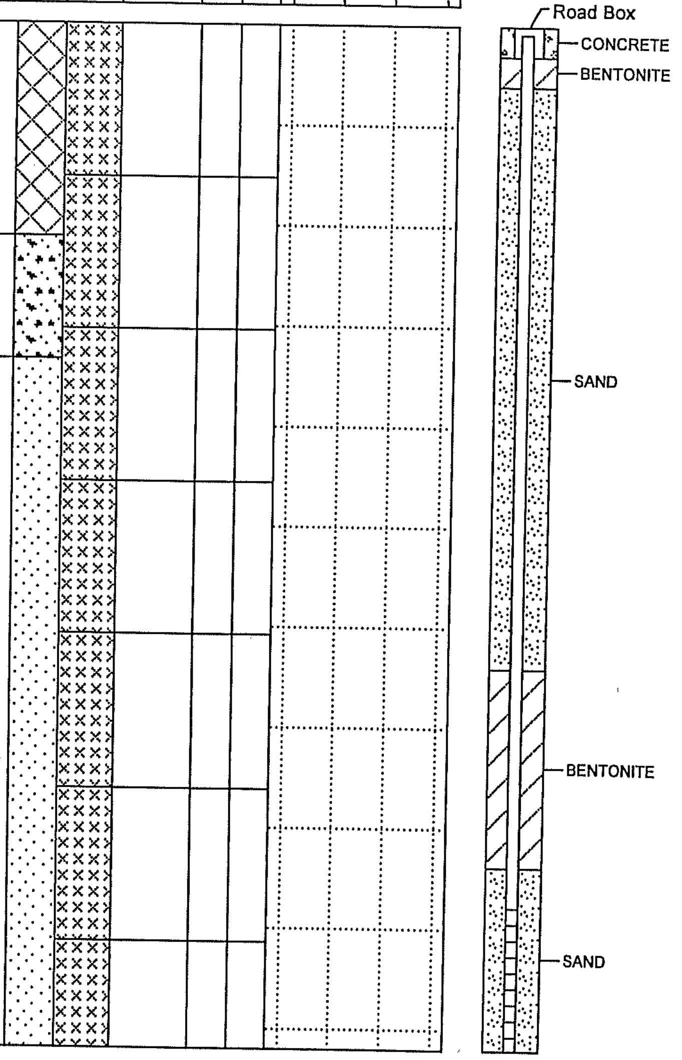
Solid PVC
Slotted PVC

Well Name: MW03-05

Depth in Metres

Soil Description

Depth in Metres	Soil Description
0	SAND and GRAVEL (FILL), medium to fine grained, some silt, dark brown, loose, damp.
2	SAND and GRAVEL, medium to fine grained, some silt, subangular gravel, brown to dark grey, medium dense to loose, moist. Between 2.7 to 3.4 m - boulders.
3	SAND, fine grained, some gravel, light brown, medium dense, damp. At 3.7 m - cobbley. At 4.7 m - dense. At 5.2 m - boulders with voids. At 5.5 m - medium grey to light brown. At 5.8 m - medium grey and light to medium brown, moist to wet, (sample attempt 0 recovery). AT 6.4 m - wet. At 7.0 m - boulders. At 7.9 m - sample attempt. At 9.3 m - light grey.
10	End of borehole at 10.2 m.



0 1 2 3 4 5 6 7 8 9 10 11 12

Notes:
Bolded sample denotes sample analyzed.
Converted to AS well - November 2005.

Print Date: 2008 07 21, Date Approved: 2005 03 04

SNC·LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 03-06

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex/Solid Stem Auger
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 298.381
Top of Casing Elev. (m) : 298.191

Project Number : 130846
Borehole Logged By : RNS
Date Drilled : 2003 09 04
Log Typed By : PKR

Drilling Legend
- ▨ Sample Interval
- ☒ Odex

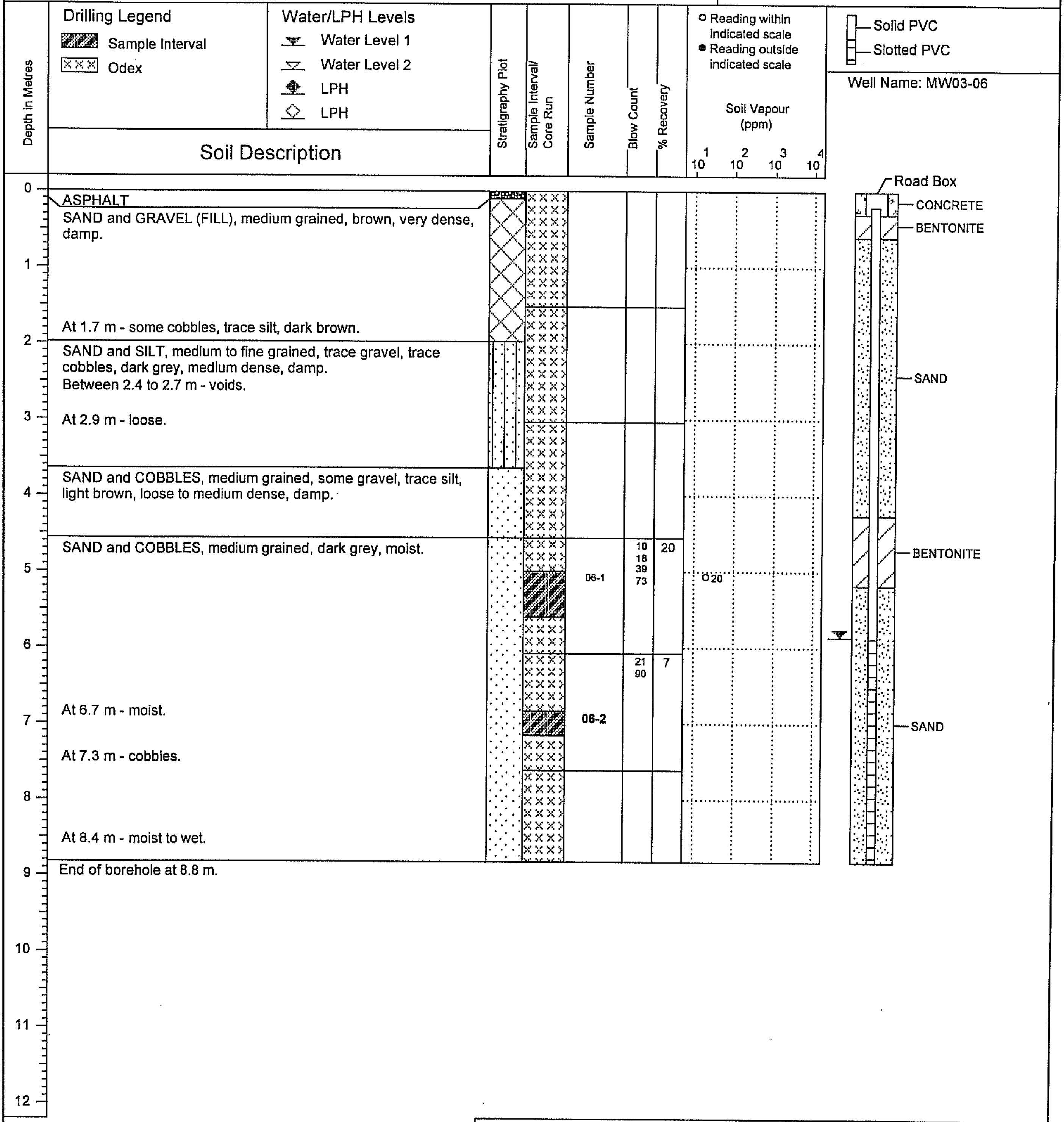
Water/LPH Levels
- Water Level 1
- Water Level 2
- ◆ LPH
- ◇ LPH

- ○ Reading within indicated scale
- ● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: MW03-06

Soil Description	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
ASPHALT				
SAND and GRAVEL (FILL), medium grained, brown, very dense, damp.				
At 1.7 m - some cobbles, trace silt, dark brown.				
SAND and SILT, medium to fine grained, trace gravel, trace cobbles, dark grey, medium dense, damp. Between 2.4 to 2.7 m - voids.				
At 2.9 m - loose.				
SAND and COBBLES, medium grained, some gravel, trace silt, light brown, loose to medium dense, damp.				
SAND and COBBLES, medium grained, dark grey, moist.	06-1	10 18 39 73	20	20
At 6.7 m - moist.	**06-2**	21 90	7	
At 7.3 m - cobbles.				
At 8.4 m - moist to wet.				
End of borehole at 8.8 m.				



Notes:
Bolded sample denotes sample analyzed.

Print Date: 2008 07 21, Date Approved: 2005 03 04

SNC·LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 03-07

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex/Solid Stem Auger
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 298.805
Top of Casing Elev. (m) : 298.676

Project Number : 130846
Borehole Logged By : RNS
Date Drilled : 2003 09 04
Log Typed By : PKR

Drilling Legend
▨ Sample Interval
☒ Odex

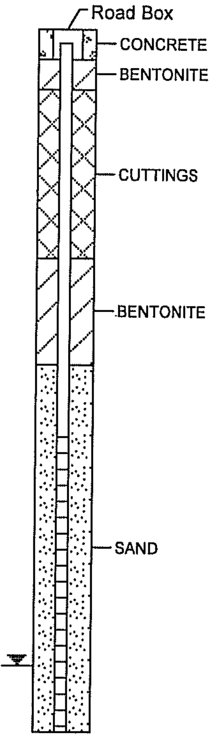
Water/LPH Levels
▼ Water Level 1
▽ Water Level 2
◆ LPH
◇ LPH

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: MW03-07

Soil Description	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
ASPHALT				
SAND and GRAVEL (FILL), medium grained, some silts, light brown, dry.				
SAND and GRAVEL, medium grained, cobbley, medium brown, medium dense, damp.				
At 1.8 m - some silt.				
At 2.1 m - dark brown.				
SAND and SILT, medium to fine grained, organics (roots), dark brown, medium dense to loose, moist.				
At 3.4 m - loose.				
ORGANIC LAYER, silt, fine grained, black, loose to soft, wet.				
SAND, coarse grained, some gravel, medium brown, loose, moist.				
ORGANIC LAYER, sand, coarse to medium grained, dark brown to black, loose to soft, wet.	07-1	7 15 28 52	58	○ 35
SAND and GRAVEL, medium to coarse grained, dark brown, loose, moist.				
At 5.5 m - coarse grained.	**07-2**	36 80 130		○ 20
SILTY SAND, medium to fine grained, medium dense to loose.				
End of borehole at 7.0 m.				



Notes:
Bolded sample denotes sample analyzed.

Print Date: 2008 07 21, Date Approved: 2005 03 04

SNC·LAVALIN Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 03-08

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex/Solid Stem Auger
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 299.176
Top of Casing Elev. (m) : 299.018

Project Number : 130846
Borehole Logged By : RNS
Date Drilled : 2003 09 04
Log Typed By : PKR

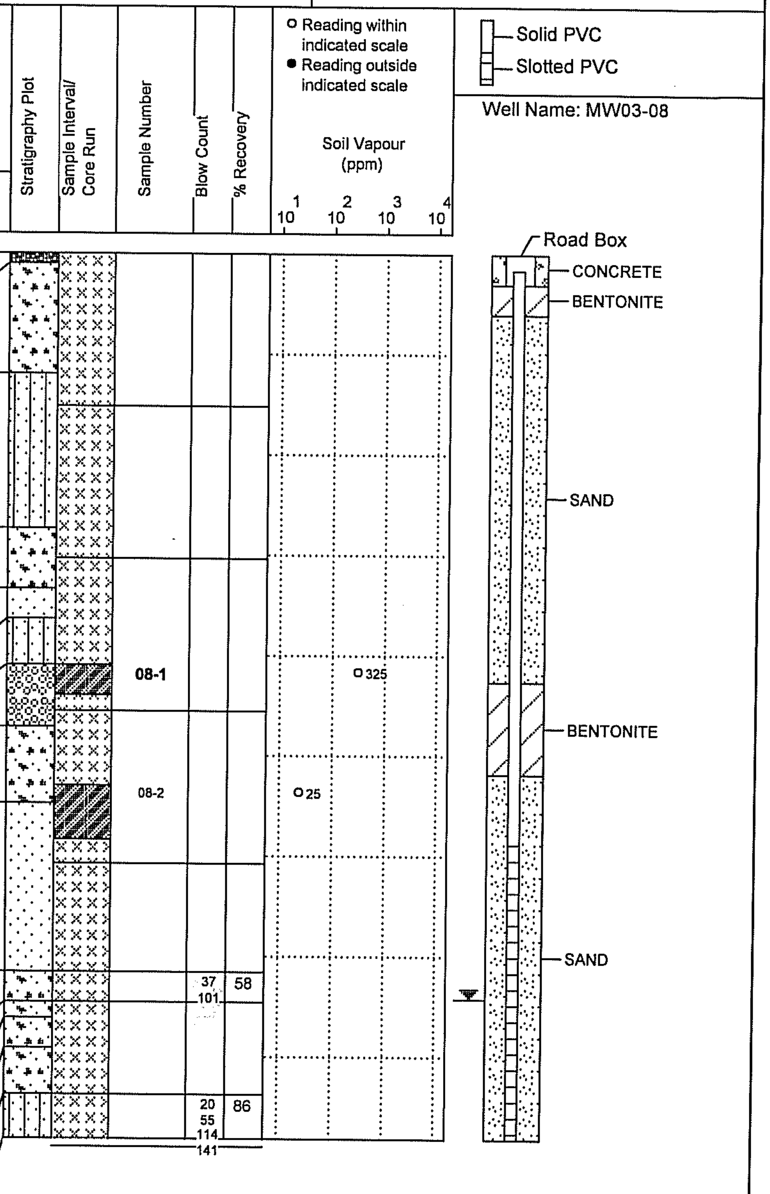
Drilling Legend
▨ Sample Interval
☒ Odex

Water/LPH Levels
▼ Water Level 1
▽ Water Level 2
◆ LPH
◇ LPH

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: MW03-08



Soil Description	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
ASPHALT				
SAND and GRAVEL, medium to coarse grained, medium brown, medium dense to dense, dry. Between 0.8 to 1.2 m - boulders.				
SAND and SILT, medium to fine grained, cobbley, some gravel, medium brown, dense, dry. Between 2.3 to 2.7 m - cobbles.				
SAND and GRAVEL, medium to coarse grained, trace silt, dark brown, medium dense, moist.				
SAND, medium to coarse grained, some gravel, trace silt, dark brown, medium dense to loose, moist.				
SAND and SILT, medium to fine grained, organics (roots), dark brown to black, loose to soft, moist.				
COBBLES and SAND, medium grained, grey, medium dense, damp.	**08-1**			○ 325
SAND and GRAVEL, medium grained, dark brown, medium dense to loose, damp to moist.	08-2			○ 25
SAND, medium to coarse grained, some gravel, medium brown, medium dense, damp. At 6.4 m - some cobbles and boulders.				
SAND and GRAVEL, medium grained, trace cobbles, grey, medium dense, damp, slight hydrocarbon-like odour.		37 101	58	
SAND and GRAVEL, medium grained, some silt, trace cobbles, medium brown, medium dense, damp. (BOULDER).				
SAND and GRAVEL, medium grained, trace cobbles, grey, medium dense, damp, slight hydrocarbon-like odour.				
SAND and GRAVEL, medium grained, some silt, trace cobbles, medium brown, medium dense, damp. (BOULDER).		20 55 114 141	86	
SAND, fine grained, some silt, brown, dense to very dense, wet to saturated.				

End of borehole at 8.8 m.

Notes:
Bolded sample denotes sample analyzed.

SNC·LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 03-09

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex/Solid Stem Auger
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 299.481
Top of Casing Elev. (m) : 299.284

Project Number : 130846
Borehole Logged By : RNS
Date Drilled : 2003 09 04
Log Typed By : PKR

Drilling Legend
- ▨ Sample Interval
- ☒ Odex

Water/LPH Levels
- ▼ Water Level 1
- ▽ Water Level 2
- ◆ LPH
- ◇ LPH

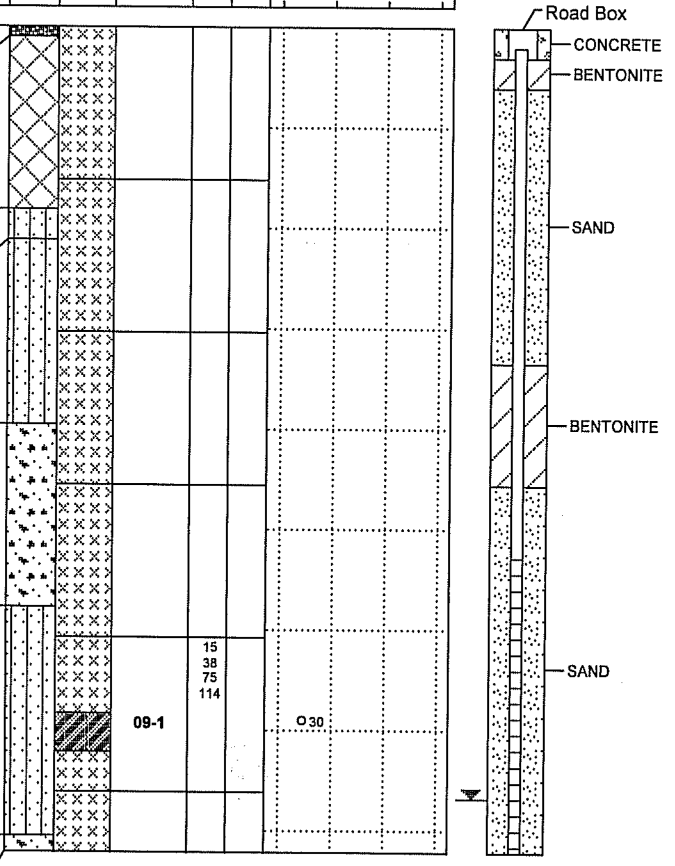
○ Reading within indicated scale
● Reading outside indicated scale

Soil Vapour (ppm): 10^1 10^2 10^3 10^4

Solid PVC
Slotted PVC

Well Name: MW03-09

Depth in Metres	Soil Description	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
0	ASPHALT				
	SAND and GRAVEL (FILL), medium grained, light brown, medium dense to dense, dry. At 0.8 m - cobbley.				
2	SAND and SILT, medium grained (organic layer: roots), dark brown, loose to soft, moist.				
	SAND and SILT, medium to fine grained, some gravel, light brown, medium dense to loose, dry to damp.				
4	SAND and GRAVEL, coarse grained, some cobbles, medium brown, medium dense, damp. At 4.9 m - cobbley.				
6	SAND and SILT, medium to fine grained, cobbley, some gravel, light brown, medium dense, damp.		15 38 75 114		
7		09-1			○30
8	SAND and GRAVEL, medium to coarse grained, dark grey, medium dense to dense, moist to wet.				
	End of borehole at 8.2 m.				



Notes:
Bolded sample denotes sample analyzed.

Print Date: 2008 07 21, Date Approved: 2005 03 04

SNC·LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 03-10

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex/Solid Stem Auger
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 299.804
Top of Casing Elev. (m) : 299.658

Project Number : 130846
Borehole Logged By : RNS
Date Drilled : 2003 09 04
Log Typed By : PKR

Drilling Legend
▨ Sample Interval
☒ Odex

Water/LPH Levels
Water Level 1
Water Level 2
◆ LPH
◇ LPH

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: MW03-10

Depth in Metres

Soil Description

ASPHALT

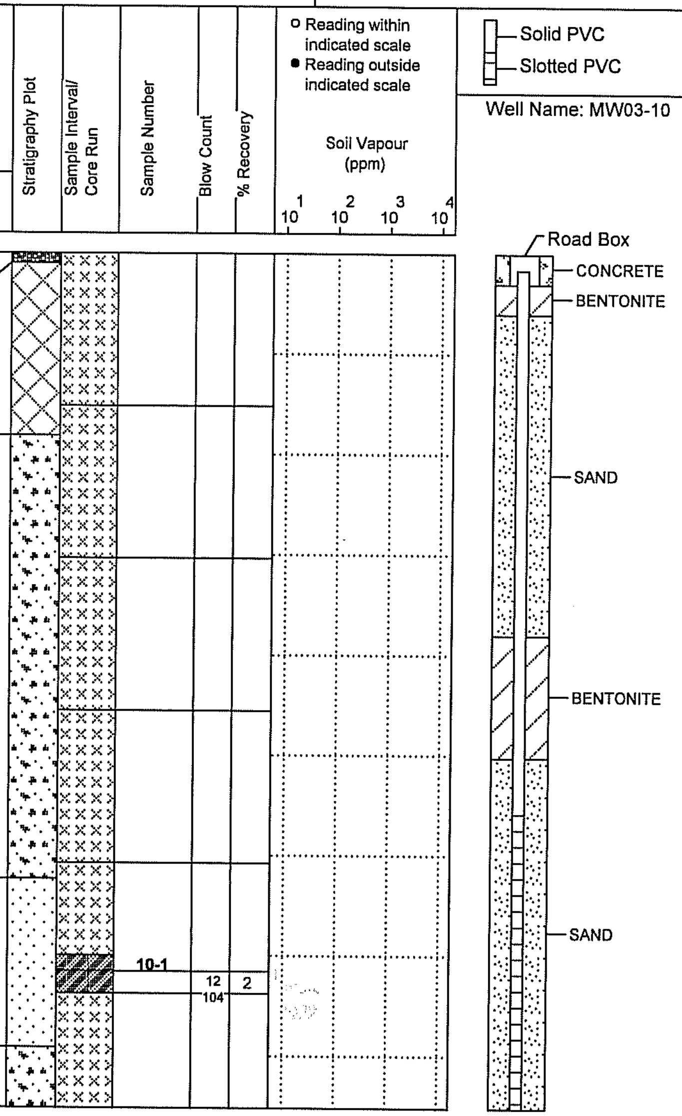
SAND and GRAVEL (FILL), medium grained, some silt, some cobbles, brown, medium dense to dense, dry.

SAND and GRAVEL, medium to fine grained, some cobbles, medium brown, some cobbles, damp.
At 2.3 m - cobbley.
At 3.7 m - cobbley.
At 4.7 m - boulders with voids.

SAND, coarse grained, some gravel, trace cobbles, medium brown, medium dense, moist.
At 6.9 m - boulders and silt.
At 7.2 m - hydrocarbon-like odour.
At 7.3 m - no hydrocarbon-like odour.

SAND and GRAVEL, medium to coarse grained, cobbley, medium grey, dense, moist to wet.

End of borehole at 8.5 m.



Notes:
Bolded sample denotes sample analyzed.

Print Date: 2008 07 21, Date Approved: 2005 03 04

SNC·LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 03-11

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex/Solid Stem Auger
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 300.048
Top of Casing Elev. (m) : 299.914

Project Number : 130846
Borehole Logged By : RNS
Date Drilled : 2003 09 04
Log Typed By : PKR

Drilling Legend
- ▨ Sample Interval
- ☒ Odex

Water/LPH Levels
- ▼ Water Level 1
- ▽ Water Level 2
- ◆ LPH
- ◇ LPH

- ○ Reading within indicated scale
- ● Reading outside indicated scale

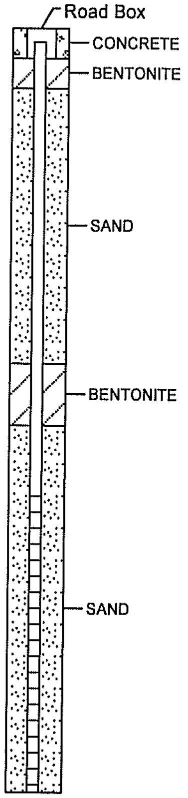
Soil Vapour (ppm): 10^1 10^2 10^3 10^4

- Solid PVC
- Slotted PVC

Well Name: MW03-11

Depth in Metres	Soil Description	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
0	ASPHALT				
0.1–2.0	SAND and GRAVEL (FILL), medium grained, some silt, medium to light brown, dense to very dense, dry. At 1.4 m - medium brown,				
2.0–4.7	SAND and GRAVEL, medium to fine grained, some silt, trace cobbles, dark brown, medium dense, damp. Between 2.6 to 3.5 m - boulders. Between 3.7 to 4.3 m - boulder.				
4.7–6.4	SAND and GRAVEL, medium to fine grained, some silt, trace cobbles, dark grey to medium brown, dense to medium dense, damp. Between 4.9 to 5.2 m - cobbley. At 5.5 m - hydrocarbon-like odour.	**11-1**	10 40 70 116	58	500 ○
6.4–7.6	SAND, medium to fine grained, silty, trace cobbles and gravel, dark brown to dark grey, dense to very dense, moist to wet. At 7.0 m - saturated.	11-2	59 121	67	○ 25

End of borehole at 7.6 m.



Notes:
Bolded sample denotes sample analyzed.
Converted to SVE well - November 2005.

Print Date: 2008 07 21, Date Approved: 2005 03 04

SNC•LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 04-1

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 298.364
Top of Casing Elev. (m) : 298.259

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2004 10 14
Log Typed By : JS

Drilling Legend
- ▨ Sample Interval
- ▧ Split Spoon
- ▪▪▪ No Recovery
- ☒ Odex

Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

Depth in Metres

Soil Description

0 – SAND and GRAVEL (FILL), silty, trace cobbles, medium to light brown, loose to compact, damp.

SAND and GRAVEL, fine to coarse, trace to some silt, trace cobbles, medium brown/grey, compact, damp.

From 2.3 m to 3.1 m - trace silt, boulders.

At 3.5 m - boulder.

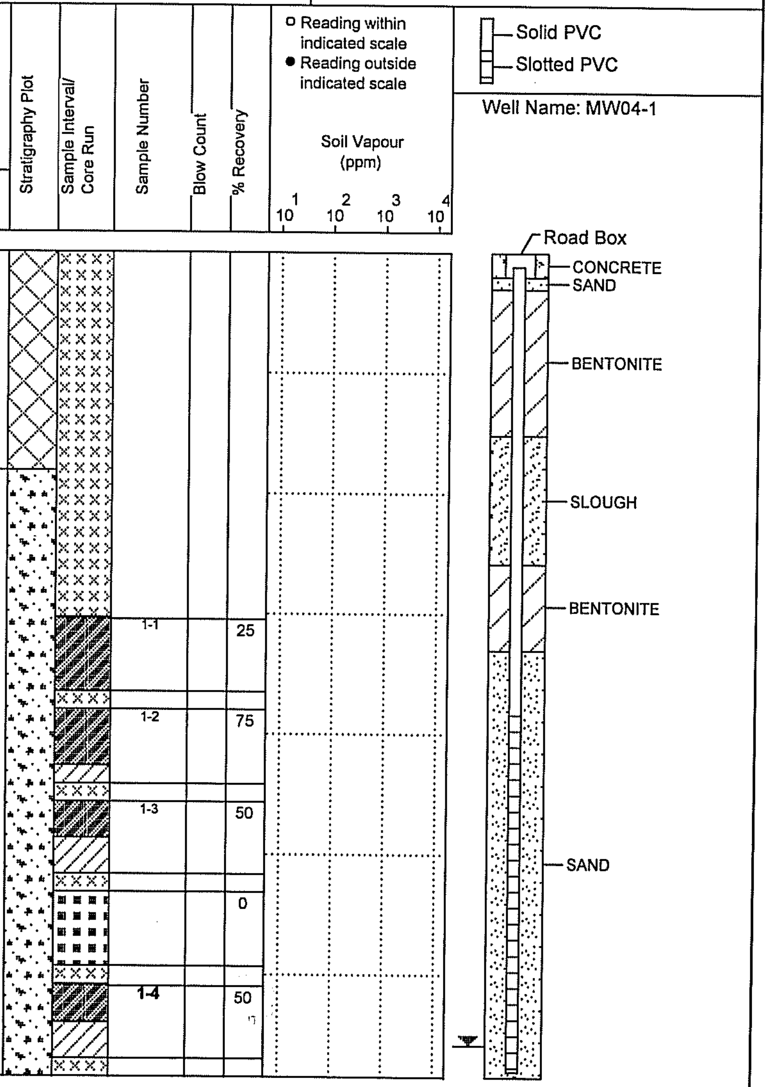
Below 3.8 m - moist.

Below 4.7 m - some silt, wet to saturated.

At 5.3 m - boulder.
Below 5.5 m - silty, saturated.

At 6.3 m - boulder.

End of borehole at 6.9 m.



0 1 2 3 4 5 6 7 8 9 10

Notes:
Bolded sample denotes sample analyzed.

Print Date: 2008 07 21, Date Approved: 2005 07 06

SNC•LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 04-2

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 298.524
Top of Casing Elev. (m) : 298.444

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2004 10 14
Log Typed By : JS

Drilling Legend
- ▨ Sample Interval
- ▨ Split Spoon
- ▪ No Recovery
- ☒ Odex

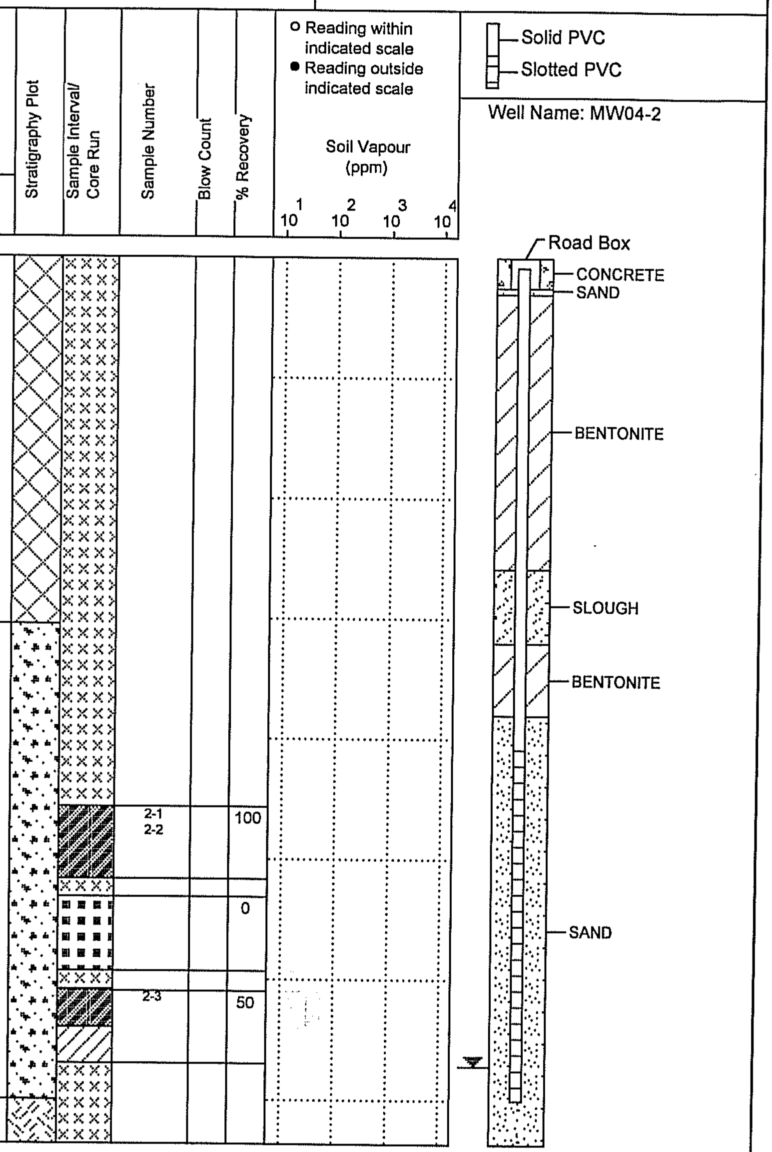
Water/NAPL Levels
- ▼ Water Level 1
- ▽ Water Level 2
- ◆ NAPL
- ◇ NAPL

- ○ Reading within indicated scale
- ● Reading outside indicated scale

- Solid PVC
- Slotted PVC

Well Name: MW04-2

Depth in Metres	Soil Description	Sample Number	Blow Count	% Recovery
0	SAND and GRAVEL (FILL), fine to coarse, some silt, trace cobbles, medium brown, loose, damp to moist.			
3	SAND and GRAVEL, fine to coarse, trace to some silt, some cobbles, medium brown/grey, compact, damp to moist. At 3.2 m - boulder. Below 3.8 m - some silt to silty.			
	Below 4.6 m - wet.	2-1 2-2		100
	Below 5.3 m - some silt, trace to some cobbles, saturated.			0
		2-3		50
	At 6.4 m - boulder.			
7	BEDROCK (GRANITE).			
	End of borehole at 7.4 m.			



Notes:
Bolded sample denotes sample analyzed.
Sample 2-2 is a blind field duplicate of sample 2-1.

Print Date: 2008 07 21, Date Approved: 2005 07 06

SNC·LAVALIN Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 04-3

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 296.319
Top of Casing Elev. (m) : 296.959

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2004 10 15
Log Typed By : JS

Drilling Legend
- ▨ Sample Interval
- ▧ Split Spoon
- ▪▪▪ No Recovery
- ☒ Odex

Water/NAPL Levels
- ▼ Water Level 1
- ▽ Water Level 2
- ◆ NAPL
- ◇ NAPL

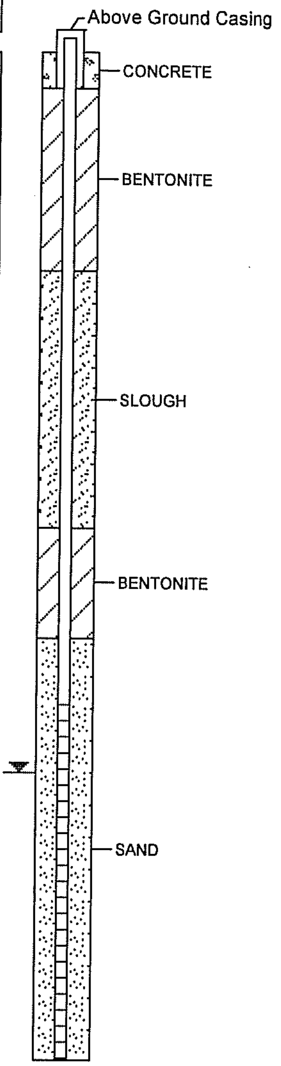
○ Reading within indicated scale
● Reading outside indicated scale

Soil Vapour (ppm): 10^1 10^2 10^3 10^4

Solid PVC
Slotted PVC

Well Name: MW04-3

Depth in Metres	Soil Description	Sample Number	Blow Count	% Recovery
0	SAND and GRAVEL (FILL), fine to coarse, trace to some cobbles, medium brown/grey, loose to compact.			
1.6	SAND and GRAVEL, fine to coarse, some silt to silty, medium brown/grey, compact, damp. From 3.1 m to 4.3 m - boulders.			0
4.6	SAND, fine grained, silty, medium brown, compact to dense, wet.	3-1 3-2		100
5.2	SAND and GRAVEL, fine to coarse, some silt, medium brown/grey, compact to dense, moist. At 5.6 m - boulder. Below 6.1 m - silty, moist to wet. Below 6.7 m - wet to saturated. Below 7.3 m - some silt to silty.	3-3		75
8.4	End of borehole at 8.4 m.			



Notes:
Bolded sample denotes sample analyzed.
Sample 3-2 is a blind field duplicate of sample 3-1.

Print Date: 2008 07 21, Date Approved: 2005 07 06

SNC·LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 04-4

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 300.054
Top of Casing Elev. (m) : 299.886

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2004 10 15
Log Typed By : JS

Drilling Legend
- ▨ Sample Interval
- ▧ Split Spoon
- ☒ Odex

Water/NAPL Levels
- ▼ Water Level 1
- ▽ Water Level 2
- ◆ NAPL
- ◇ NAPL

- ○ Reading within indicated scale
- ● Reading outside indicated scale

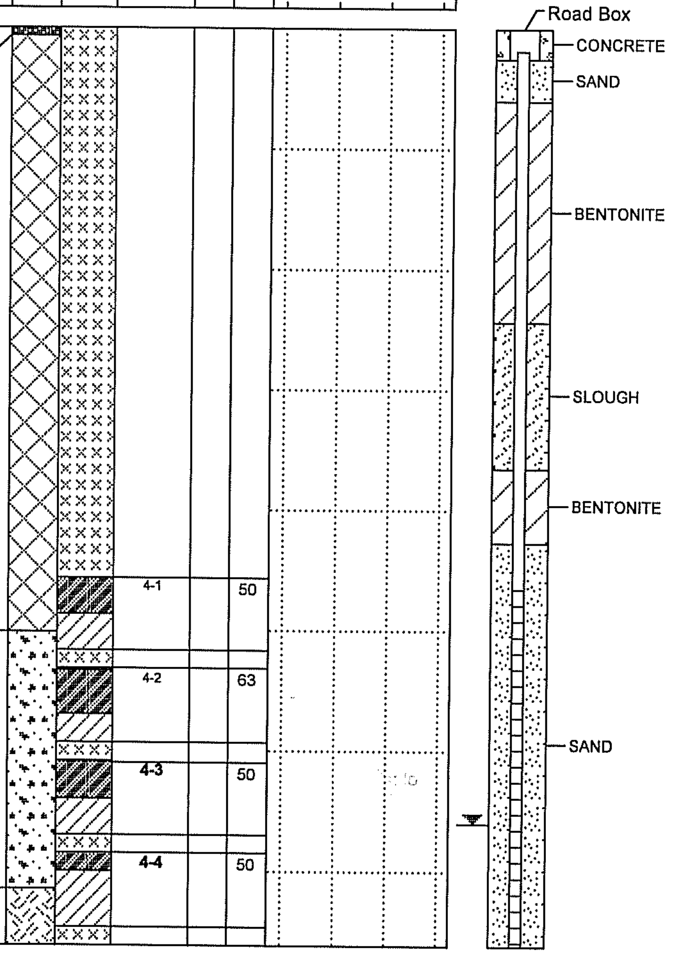
Soil Vapour (ppm)

- Solid PVC
- Slotted PVC

Well Name: MW04-4

Depth in Metres

Soil Description



Depth (m)	Soil Description
0	ASPHALT.
	SAND and GRAVEL (FILL), fine to medium, some silt, light brown/grey, dense, dry.
	Below 1.4 m - silty, medium brown, damp.
	At 1.7 m - trace cobbles, boulder.
	Between 2.0 m and 2.4 m - boulders.
	Below 2.7 m - damp to moist.
5	SAND and GRAVEL, fine to coarse, trace to some silt, trace cobbles, medium brown/grey, compact to dense, moist. At 5.3 m - boulder.
	Below 6.1 m - silty, moist to wet.
	Below 6.9 m - saturated.
	BEDROCK (GRANITE).
	End of borehole at 7.6 m.

Sample Number	Blow Count	% Recovery
4-1		50
4-2		63
4-3		50
4-4		50

Notes:
Bolded sample denotes sample analyzed.

Print Date: 2008 07 21, Date Approved: 2005 07 06

SNC·LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 04-5

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 300.242
Top of Casing Elev. (m) : 300.139

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2004 10 15
Log Typed By : JS

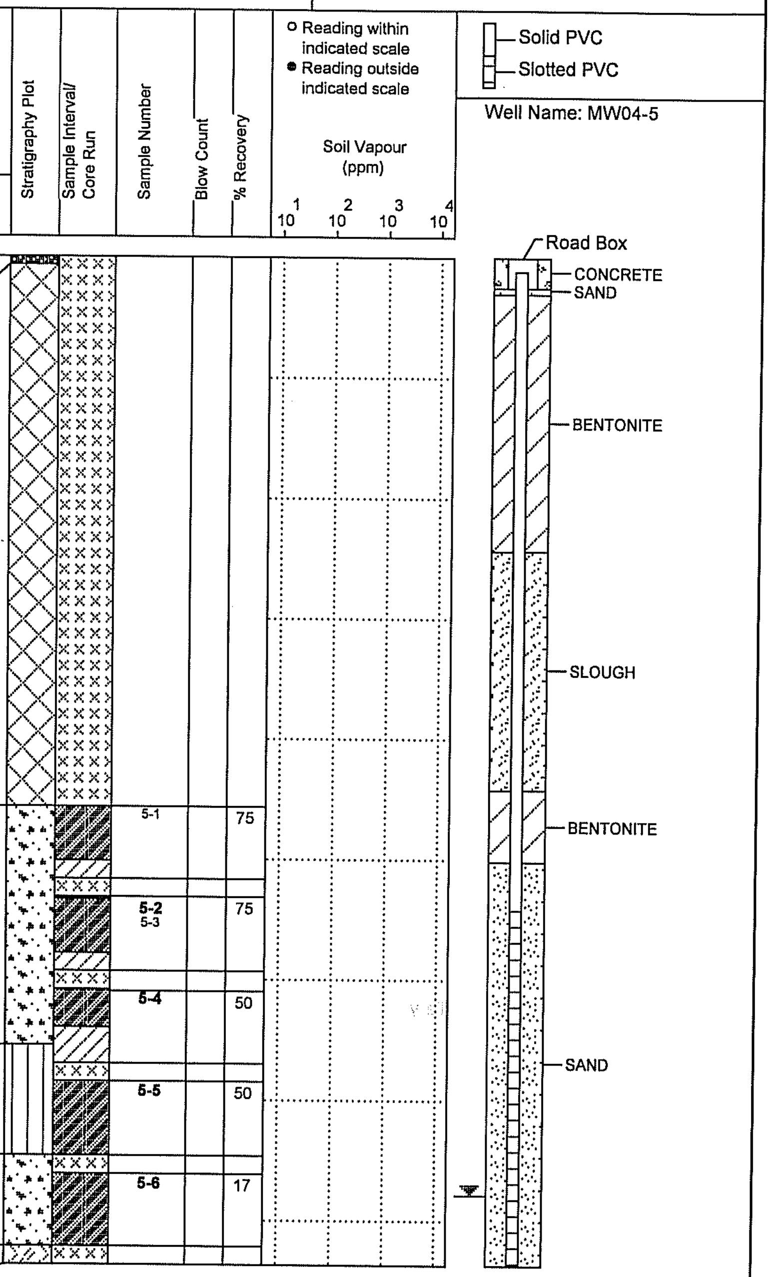
Drilling Legend
- ▨ Sample Interval
- ▧ Split Spoon
- ☒ Odex

Water/NAPL Levels
- ▼ Water Level 1
- ▽ Water Level 2
- ◆ NAPL
- ◇ NAPL

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: MW04-5



Depth in Metres — Soil Description

Depth in Metres	Soil Description	Sample Number	Blow Count	% Recovery
0	ASPHALT.			
	SAND and GRAVEL (FILL), fine to medium, some silt, light brown, dense, dry. At 1.5 m - boulder. Below 1.7 m - fine to coarse sand and gravel, trace cobbles, medium brown, compact, damp to moist. Below 3.1 m - trace to some silt.			
	SAND and GRAVEL, fine to coarse, trace silt, trace cobbles, medium brown/grey, compact to dense, damp.	5-1		75
		5-2 5-3		75
	Below 6.1 m - trace to some silt.	**5-4**		50
	SILT, some sand, some gravel, dark grey, dense, moist.	**5-5**		50
	SAND and GRAVEL, fine to coarse, silty, dark grey, compact, saturated, very faint hydrocarbon-like odour.	**5-6**		17
	BEDROCK (GRANITE).			
	End of borehole at 8.4 m.			

Notes:
Bolded sample denotes sample analyzed.
Sample 5-3 is a blind field duplicate of sample 5-2.

Print Date: 2008 07 21, Date Approved: 2005 07 06

SNC·LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 04-6

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 300.406
Top of Casing Elev. (m) : 300.291

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2004 10 16
Log Typed By : JS

Drilling Legend
- ▨ Sample Interval
- ▨ Split Spoon
- ☒ Odex

Water/NAPL Levels
- ▼ Water Level 1
- ▽ Water Level 2
- ◆ NAPL
- ◇ NAPL

Depth in Metres | Soil Description | Stratigraphy Plot | Sample Interval/ Core Run | Sample Number | Blow Count | % Recovery

○ Reading within indicated scale
● Reading outside indicated scale

Soil Vapour (ppm): 10^1 10^2 10^3 10^4

Solid PVC
Slotted PVC

Well Name: MW04-6

Soil Description

ASPHALT.

SAND and GRAVEL (FILL), fine to medium, some silt, trace cobbles, medium brown, loose to compact, moist.

Between 1.5 m and 2.1 m - boulders.

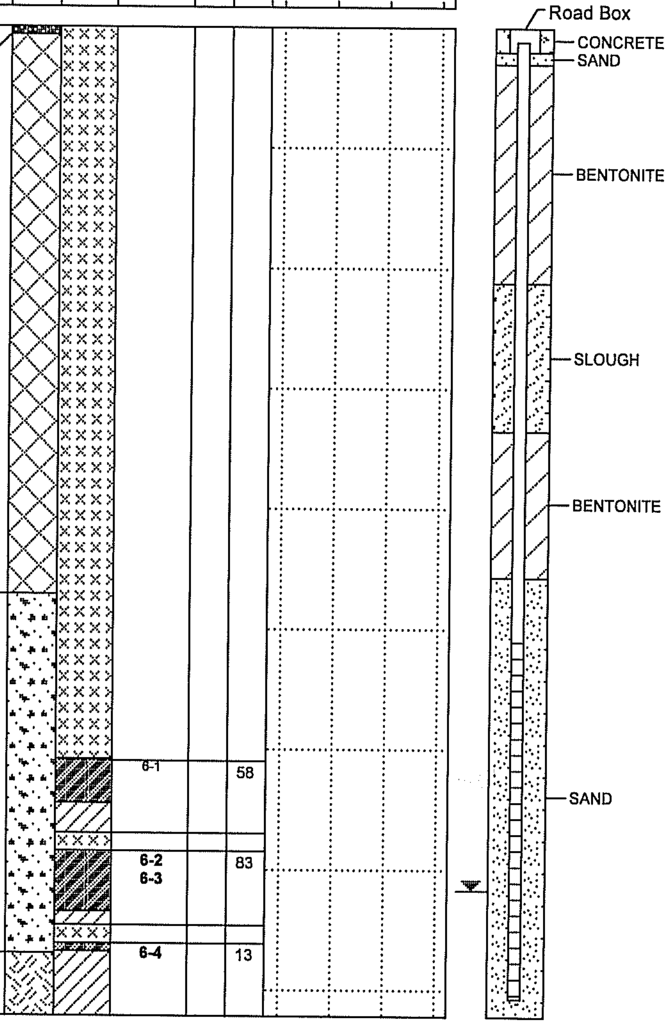
Below 2.3 m - fine to coarse sand and gravel, trace to some cobbles.

SAND and GRAVEL, fine to coarse, silty, trace cobbles, grey, dense, damp to moist.

Below 7.5 m - moist.

BEDROCK (GRANITE).

End of borehole at 8.2 m.



Sample Number	Blow Count	% Recovery
6-1		58
6-2 **6-3**		83
6-4		13

Notes:
Bolded sample denotes sample analyzed.
Sample 6-3 is a blind field duplicate of sample 6-2.

Print Date: 2008 07 21, Date Approved: 2005 07 06

SNC•LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 06-1

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Top of Casing Elev. (m) : 299.19

Project Number : 131416
Borehole Logged By : BSW
Date Drilled : 2006 09 22
Log Typed By : SW

Drilling Legend

Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

○ Reading within indicated scale
● Reading outside indicated scale

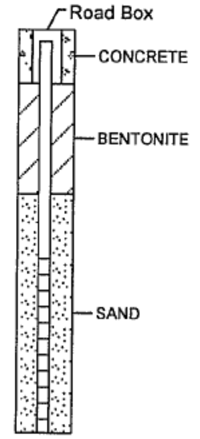
Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Solid PVC
Slotted PVC

Well Name: 06-1

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval/ Core Run	Sample Number	Blow Count	% Recovery
0	GRAVELLY SAND/SANDY GRAVEL, dark brown.					
1.2	SILT and GRAVELLY, some sand, medium brown.					
2.2	GRAVELLY SAND. At 2.4 m - moist to wet.					
3.2	FRACTURED BEDROCK.					

End of borehole at 3.4 m.



Notes:

Print Date: 2008 07 21

SNC·LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 06-2

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Top of Casing Elev. (m) : 299.25

Project Number : 131416
Borehole Logged By : BSW
Date Drilled : 2006 09 22
Log Typed By : SW

Drilling Legend

Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

○ Reading within indicated scale
● Reading outside indicated scale

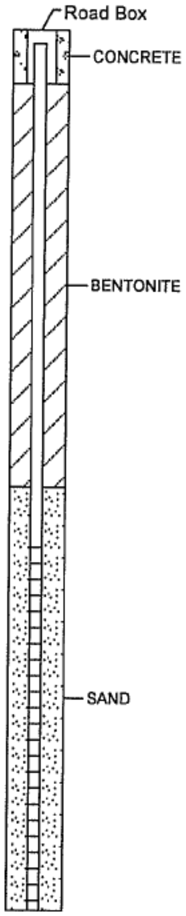
Soil Vapour (ppm): 10^1 10^2 10^3 10^4

Solid PVC
Slotted PVC

Well Name: 06-2

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval/ Core Run	Sample Number	Blow Count	% Recovery
0	SAND and GRAVEL (FILL).					
2.1	GRAVELLY SILT, some cobbles.					
	SANDY GRAVEL.					
3	SILT and GRAVEL.					
4.3	SAND and GRAVEL.					
6.7	SILT (TILL), slight hydrocarbon-like odour.					

End of borehole at 7.3 m.



Notes:

Print Date: 2008 07 21

SNC·LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 06-3

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex/Hydrovac
Borehole Dia. (m) : 0.20
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Top of Casing Elev. (m) : 297.28

Project Number : 131416
Borehole Logged By : BSW
Date Drilled : 2006 09 22
Log Typed By : SW

Drilling Legend

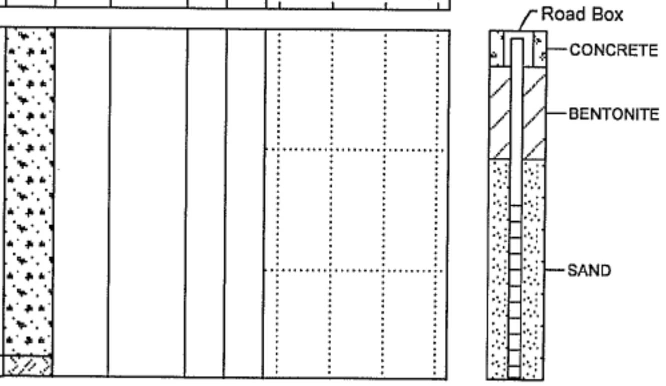
Water/NAPL Levels
- ▼ Water Level 1
- ▽ Water Level 2
- ◆ NAPL
- ◇ NAPL

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: 06-3

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval/ Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
0	SANDY GRAVEL and BOULDERS.						
2.7	BEDROCK.						
2.9	End of borehole at 2.9 m.						



Notes:

Print Date: 2008 07 21

SNC·LAVALIN Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 06-4

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Top of Casing Elev. (m) : 297.24

Project Number : 131416
Borehole Logged By : BSW
Date Drilled : 2006 09 22
Log Typed By : SW

Drilling Legend

Water/NAPL Levels
- ▼ Water Level 1
- ▽ Water Level 2
- ◆ NAPL
- ◇ NAPL

○ Reading within indicated scale
● Reading outside indicated scale

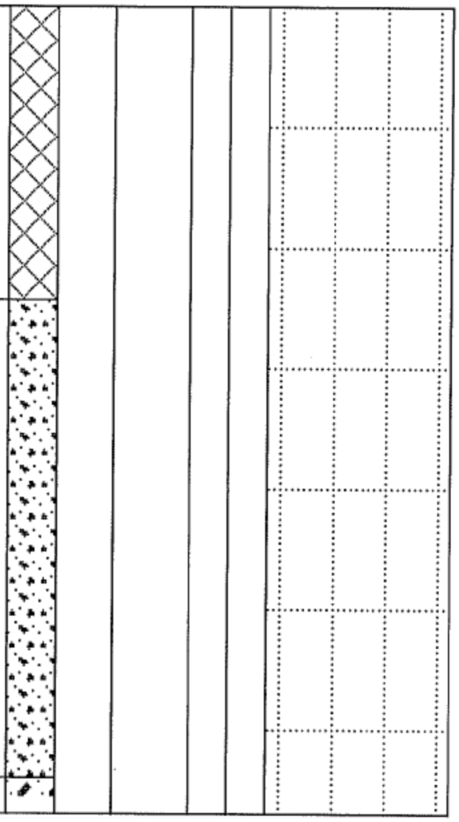
Soil Vapour (ppm)

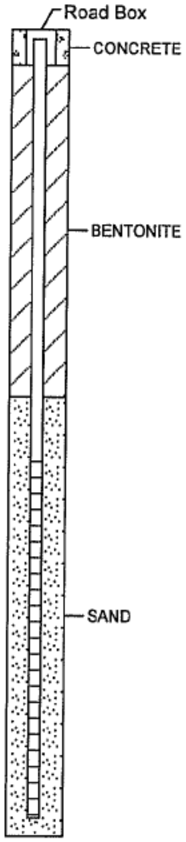
10^1 10^2 10^3 10^4

Solid PVC
Slotted PVC

Well Name: 06-4

Depth in Metres	Soil Description
0	GRAVEL, BOULDERS and SAND.
2.5	SAND and GRAVEL. At 2.7 m - some boulders. Below 5.5 m - wet.
6.4	GRAVEL and SILT (TILL).
6.7	End of borehole at 6.7 m.





Notes:

Print Date: 2008 07 21

SNC•LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 06-5

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Top of Casing Elev. (m) : 297.485

Project Number : 131416
Borehole Logged By : BSW
Date Drilled : 2006 09 23
Log Typed By : SW

Depth in Metres

Drilling Legend

Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

Stratigraphy Plot | Sample Interval/ Core Run | Sample Number | Blow Count | % Recovery

○ Reading within indicated scale
● Reading outside indicated scale

Soil Vapour (ppm)

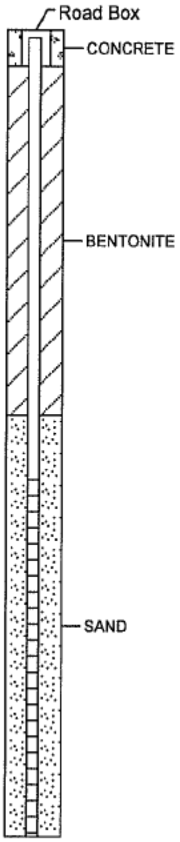
10^1 10^2 10^3 10^4

Solid PVC
Slotted PVC

Well Name: 06-5

Soil Description

Depth (m)	Soil Description
0	SAND and GRAVEL, angular gravel, some larger cobbles, medium grey.
1.5	Below 1.5 m - some silt.
3.7	At 3.7 m - grades to silt, orangish-brown.
4.85	SILTY SAND, SANDY SILT and GRAVEL, grey.
6.4	SILT (TILL), dense.
6.7	End of borehole at 6.7 m.



Notes:

Print Date: 2008 07 21

SNC·LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 06-6

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex/Hydrovac
Borehole Dia. (m) : 0.20
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Top of Casing Elev. (m) : 299.3

Project Number : 131416
Borehole Logged By : BSW
Date Drilled : 2006 09 23
Log Typed By : SW

Drilling Legend

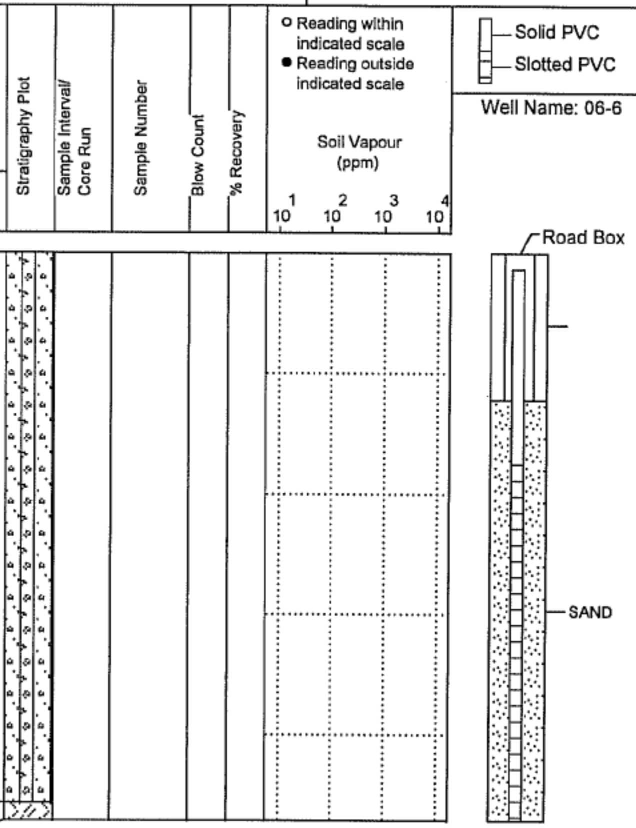
Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: 06-6

Depth in Metres	Soil Description
0	GRAVELLY SILT, large boulders, light to medium brown.
1	
2	
3	
4	
	BEDROCK.
5	End of borehole at 4.7 m.
6	
7	
8	
9	
10	



Notes:

Print Date: 2008 07 21

SNC•LAVALIN Environment

	Client : **Public Works and Gov't Services Canada**	**Borehole No. : 08-1**
	Location : **Pleasant Camp, BC**	(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd.
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2008 09 30
Ground Surf Elev. (m) : 296.941
Top of Casing Elev. (m) : 296.867

Project Number : 131416
Borehole Logged By : TDD
Date Drilled : 2008 08 20
Log Typed By : SGP

Drilling Legend
▨ Sample Interval
▧ Split Spoon
☒ Odex

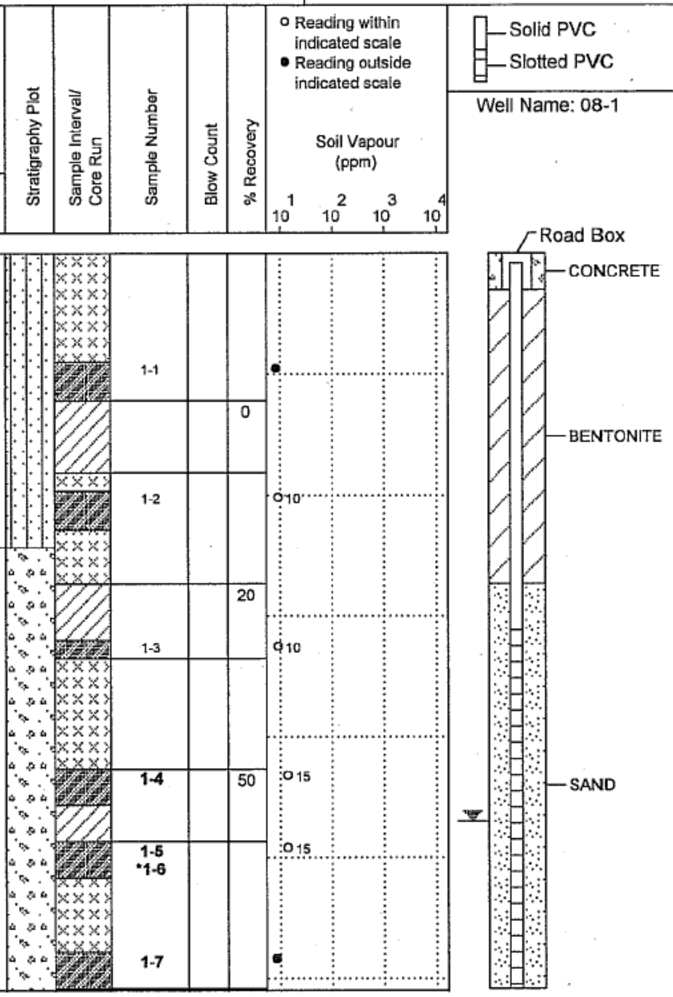
Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: 08-1

Depth in Metres	Soil Description
0	SAND, fine to medium grained, some gravel, some silt, light brown, medium dense to loose, damp.
	Between 1.5 m - 1.7 m - cobbles.
	Below 1.8 m - brown.
	SAND and GRAVEL, medium to coarse grained sand, angular to subangular gravel, some silt, some cobbles, brown, medium dense.
	Between 3.6 m - 5.5 m - trace to some gravel
	Below 3.6 m - grey.
	At 4.3 m - moist.
	Below 4.6 m - wet.
	End of borehole at 6.1 m.



Notes:
Bolded sample denotes sample analyzed.
* 1-6 denotes blind field duplicate of 1-5.

Print Date: 2010 02 12 QA1: MAG 2009 04 06

SNC•LAVALIN Environment

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 08-2

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd.
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2008 09 30
Ground Surf Elev. (m) : 297.85
Top of Casing Elev. (m) : 297.787

Project Number : 131416
Borehole Logged By : TDD
Date Drilled : 2008 08 20
Log Typed By : SGP

Drilling Legend
▨ Sample Interval
▧ Split Spoon
☒ Odex

Water/NAPL Levels
▽ Water Level 1
▽ Water Level 2
◆ NAPL
◇ NAPL

Depth in Metres

Soil Description

SAND and GRAVEL, medium to coarse grained, angular to subangular gravel, some silt, some cobbles, brown, medium dense, damp.

Below 4.6 m - moist.

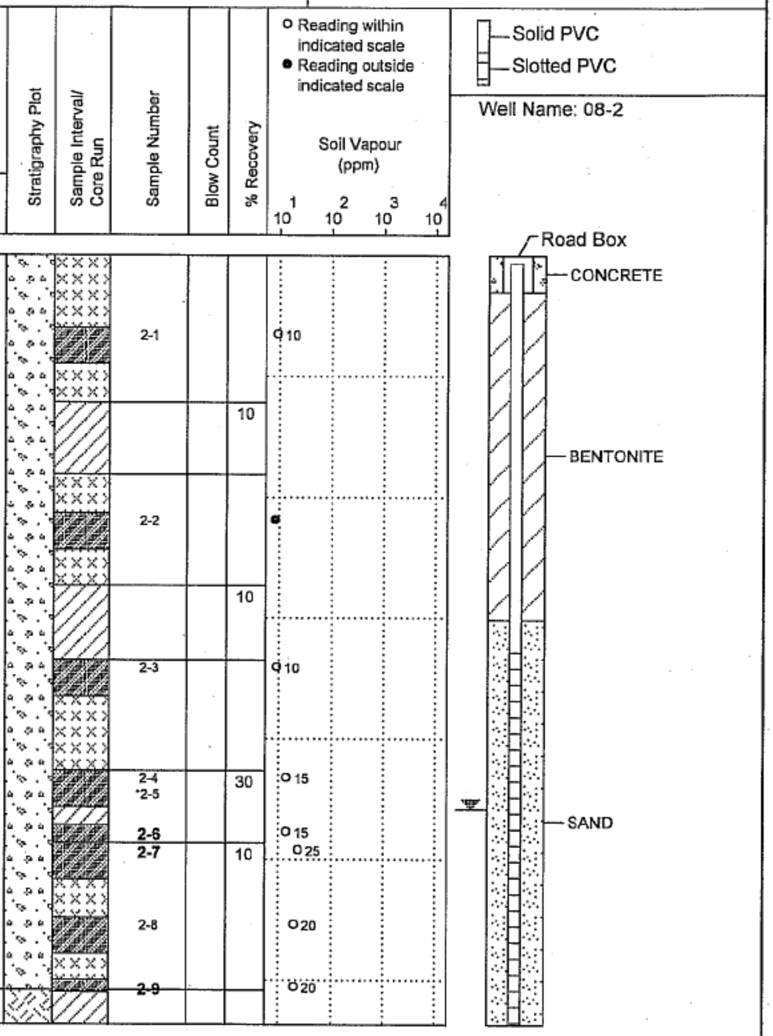
Below 4.9 m - hydrocarbon-like odour.

Below 5.5 m - grey.

Below 5.8 m - wet.

BEDROCK

End of borehole at 6.4 m.



Notes:
Bolded sample denotes sample analyzed.
* 2-5 denotes blind field duplicate of 2-4.

SNC·LAVALIN Environment

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 08-3

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd.
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2008 09 30
Ground Surf Elev. (m) : 300.199
Top of Casing Elev. (m) : 300.17

Project Number : 131416
Borehole Logged By : TDD
Date Drilled : 2008 08 21
Log Typed By : SGP

Drilling Legend
- ▨ Sample Interval
- ▧ Split Spoon
- ☒ Odex

Water/NAPL Levels
- ▽ Water Level 1
- ▽ Water Level 2
- ◈ NAPL
- ◇ NAPL

Depth in Metres

Soil Description

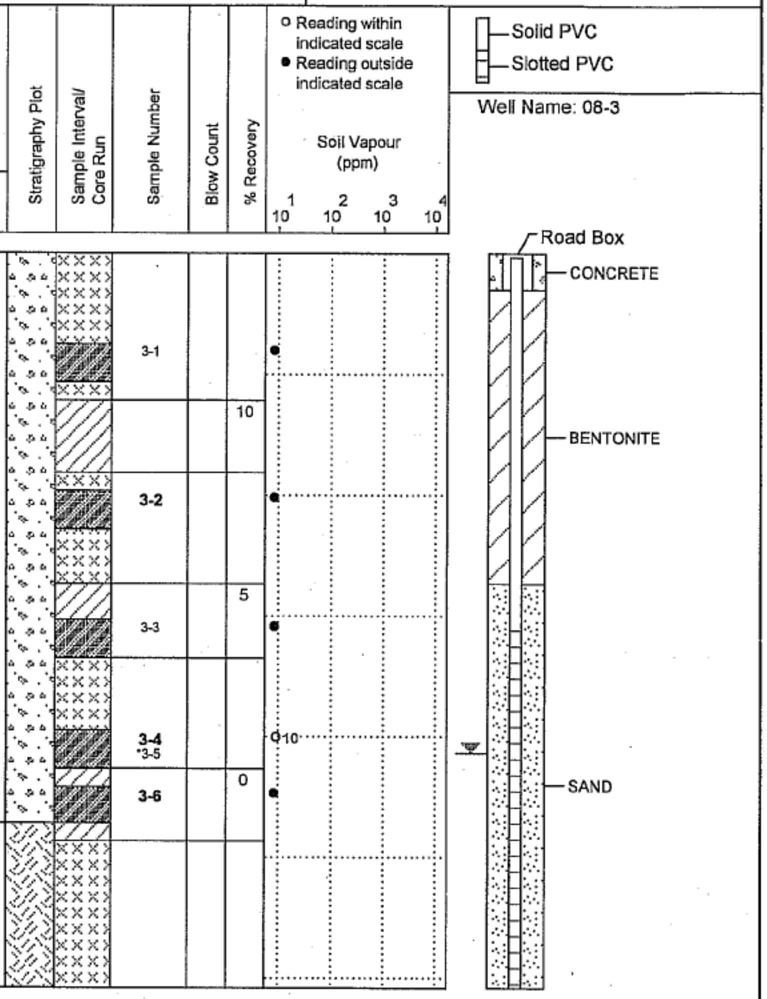
0 – SAND and GRAVEL, medium to coarse grained sand, subangular, some silt, trace to some cobbles, brown, medium dense, damp.

Below 1.2 m - silty.

Below 4.3 m - moist to wet.

BEDROCK, light grey, angular rock chips (granite), dry.

End of borehole at 6.1 m.



Depth scale: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Notes:
Bolded sample denotes sample analyzed.
* 3-5 denotes blind field duplicate of 3-4.

Print Date: 2010 02 12 QA1: MAG 2009 04 06

SNC•LAVALIN Environment

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 08-4

(Page 1 of 5)

Drilling Contractor: Geotech Drilling Services Ltd.
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2008 09 30
Ground Surf Elev. (m) : 300.15
Top of Casing Elev. (m) : 300.131

Project Number : 131416
Borehole Logged By : TDD
Date Drilled : 2008 08 21
Log Typed By : SGP

Drilling Legend
☒ Odex

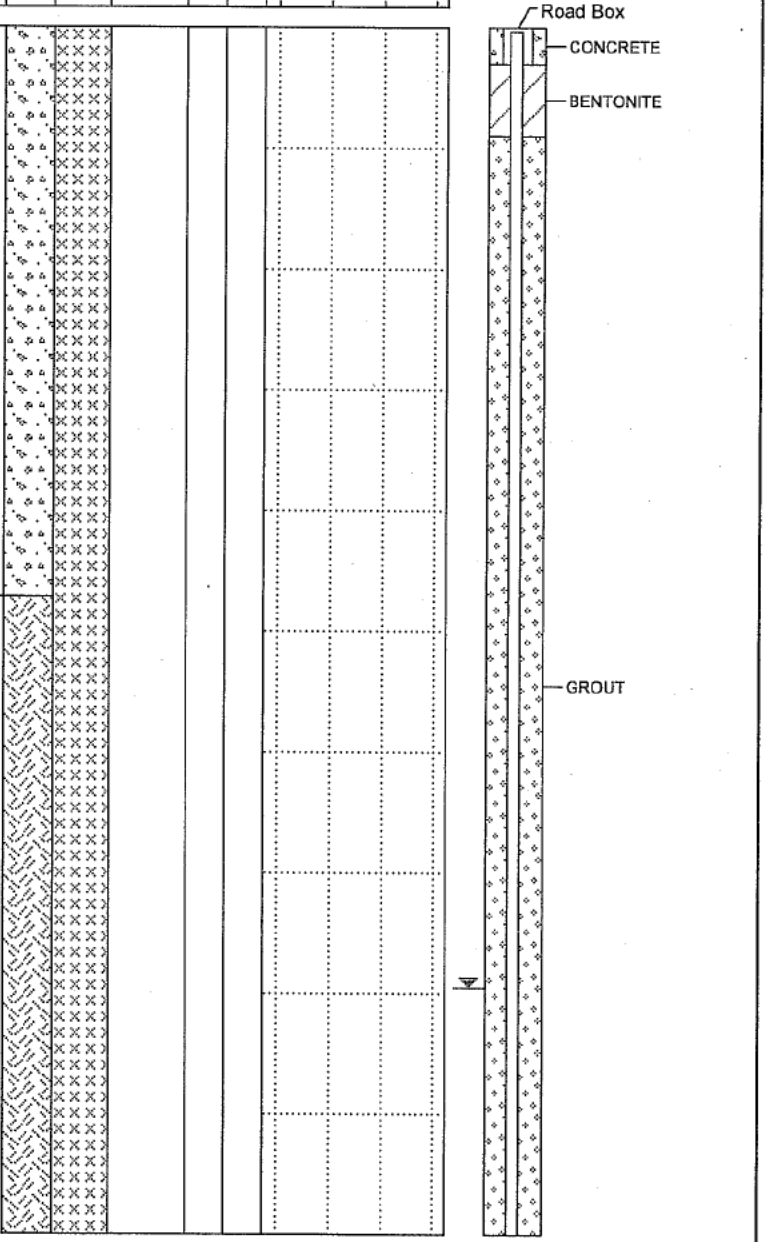
Water/NAPL Levels
▼ Water Level 1
▽ Water Level 2
◆ NAPL
◇ NAPL

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: 08-4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval/ Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
0	SAND and GRAVEL, medium to coarse grained sand, subangular, some silt, trace to some cobbles, brown, medium dense, damp.						
1.2	Below 1.2 m - silty.						
4.3	Below 4.3 m - moist to wet.						
4.7	BEDROCK, light grey, angular rock chips (granite), dry.						
9.1	Between 9.1 m - 9.7 m - softer area, light brown, dry.						
10							



...Continued

Notes:
No samples collected. No field screen completed.

Print Date: 2010 02 12 QA1: MAG 2009 04 06

SNC•LAVALIN Environment

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 08-4

(Page 2 of 5)

Drilling Contractor: Geotech Drilling Services Ltd.
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2008 09 30
Ground Surf Elev. (m) : 300.15
Top of Casing Elev. (m) : 300.131

Project Number : 131416
Borehole Logged By : TDD
Date Drilled : 2008 08 21
Log Typed By : SGP

Drilling Legend
▨ Odex

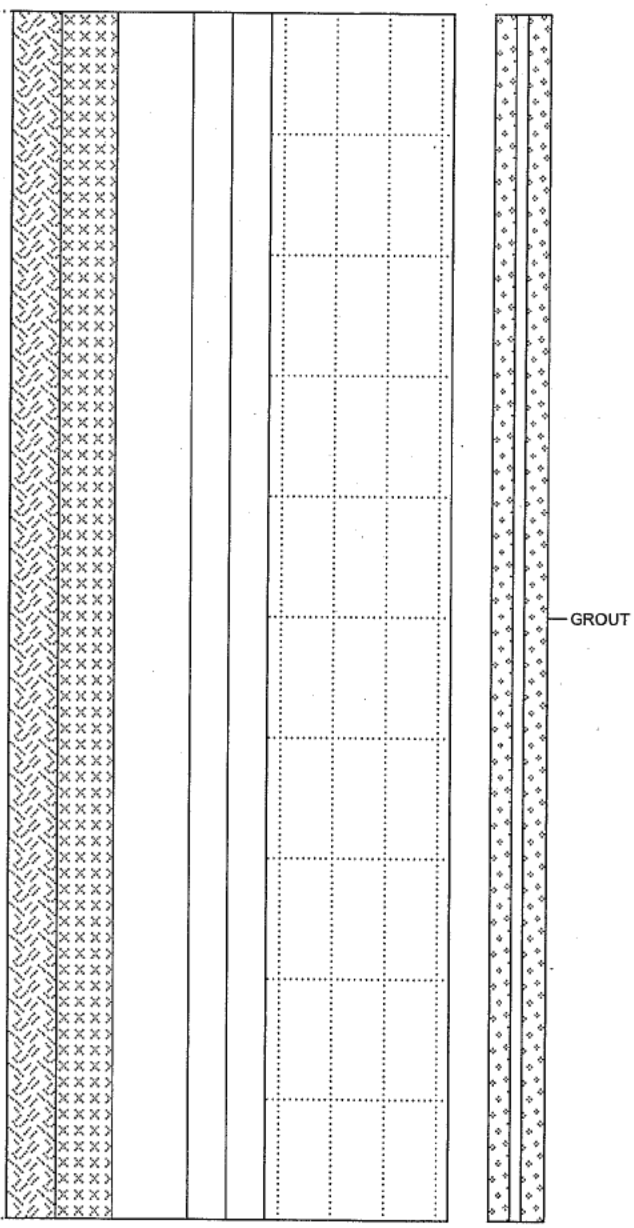
Water/NAPL Levels
Water Level 1
Water Level 2
◆ NAPL
◇ NAPL

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: 08-4

Depth in Metres | **Soil Description** | Stratigraphy Plot | Sample Interval/ Core Run | Sample Number | Blow Count | % Recovery | Soil Vapour (ppm) 10^1 10^2 10^3 10^4



10
11
Between 11.3 m - 11.4 m - softer area, brown, dry.
12
Between 11.9 m - 12.0 m - softer area, brown, dry.
Between 12.8 - 13.0 m - softer area, brown, dry.
13
14
15
16
17
At 17.1 - wet.
18
19
20

...Continued

Notes:
No samples collected. No field screen completed.

SNC•LAVALIN Environment	Client : Public Works and Gov't Services Canada	**Borehole No. : 08-4**
	Location : **Pleasant Camp, BC**	(Page 3 of 5)

Drilling Contractor: Geotech Drilling Services Ltd.
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2008 09 30
Ground Surf Elev. (m) : 300.15
Top of Casing Elev. (m) : 300.131

Project Number : 131416
Borehole Logged By : TDD
Date Drilled : 2008 08 21
Log Typed By : SGP

Drilling Legend
☒ Odex

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

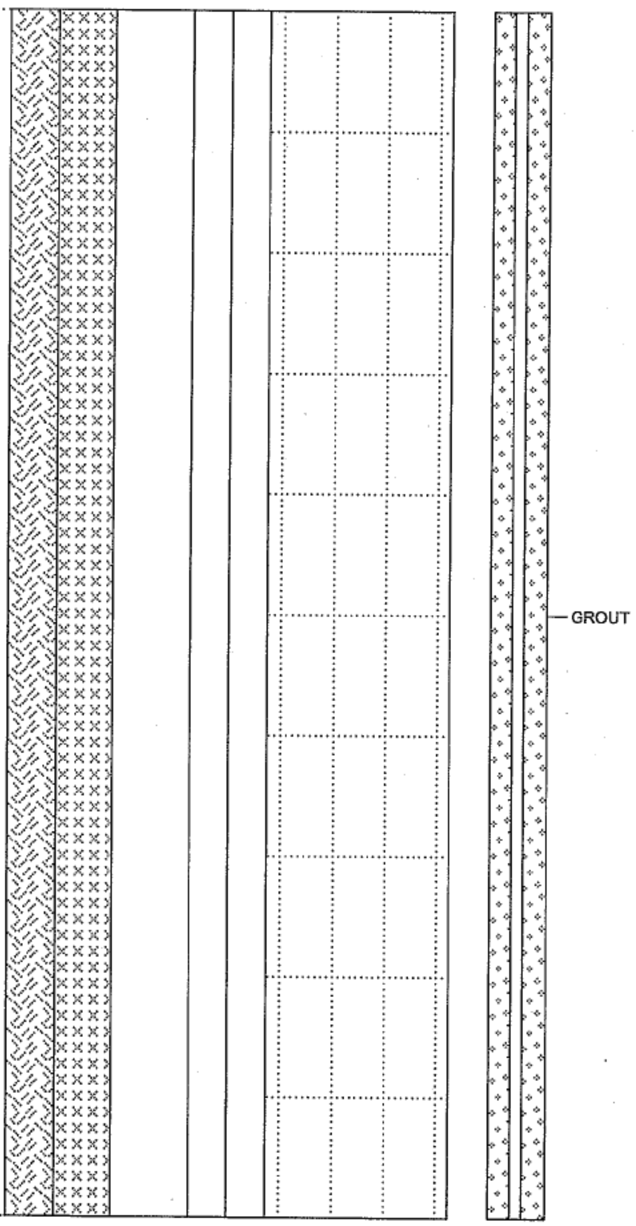
○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: 08-4

Depth in Metres

Soil Description



Between 29.3 m - 30.0 m - softer area, grey, wet.

...Continued

Notes:
No samples collected. No field screen completed.

SNC•LAVALIN Environment

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 08-4

(Page 4 of 5)

Drilling Contractor: Geotech Drilling Services Ltd.
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2008 09 30
Ground Surf Elev. (m) : 300.15
Top of Casing Elev. (m) : 300.131

Project Number : 131416
Borehole Logged By : TDD
Date Drilled : 2008 08 21
Log Typed By : SGP

Drilling Legend
☒ Odex

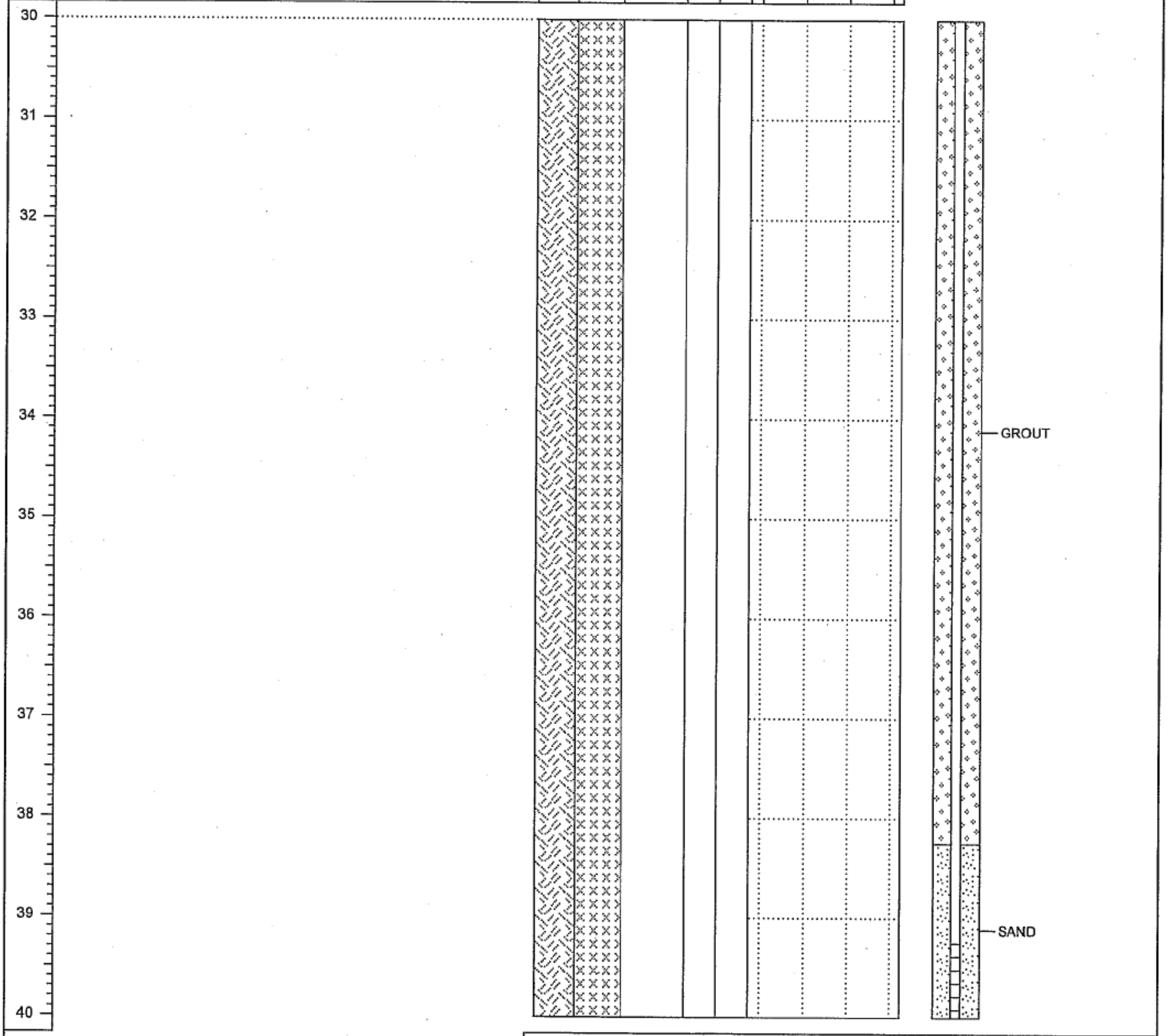
Water/NAPL Levels
▽ Water Level 1
▽ Water Level 2
◆ NAPL
◇ NAPL

○ Reading within indicated scale
● Reading outside indicated scale

▯ Solid PVC
▯ Slotted PVC

Well Name: 08-4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval/ Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4



Notes:
No samples collected. No field screen completed.

Print Date: 2010 02 12 QA1: MAG 2009 04 06

SNC•LAVALIN Environment

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 08-4

(Page 5 of 5)

Drilling Contractor: Geotech Drilling Services Ltd.
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2008 09 30
Ground Surf Elev. (m) : 300.15
Top of Casing Elev. (m) : 300.131

Project Number : 131416
Borehole Logged By : TDD
Date Drilled : 2008 08 21
Log Typed By : SGP

Drilling Legend
▨ Odex

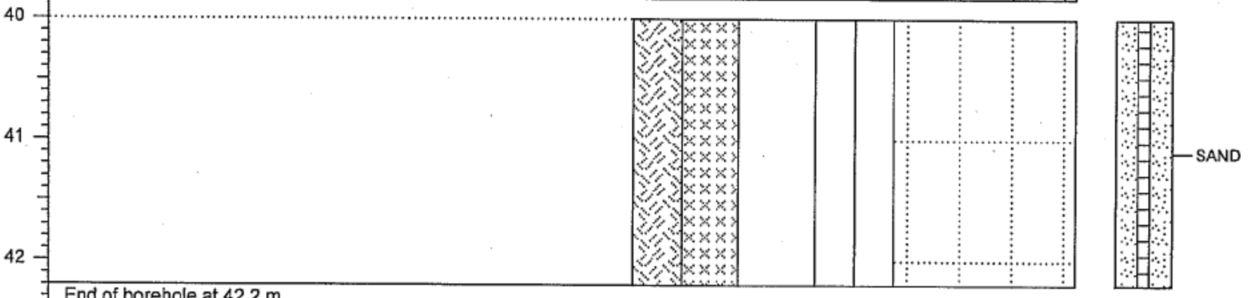
Water/NAPL Levels
▼ Water Level 1
▽ Water Level 2
◆ NAPL
◇ NAPL

○ Reading within indicated scale
● Reading outside indicated scale

▯ Solid PVC
▤ Slotted PVC

Well Name: 08-4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval/ Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4



End of borehole at 42.2 m.

43
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Notes:
No samples collected. No field screen completed.

Print Date: 2010 02 12 QA1: MAG 2009 04 06

SNC•LAVALIN Environment

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 08-5

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd.
Drilling Method : Air Rotary
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2008 09 30
Ground Surf Elev. (m) : 297.457
Top of Casing Elev. (m) : 298.235

Project Number : 131416
Borehole Logged By : TDD
Date Drilled : 2008 09 27
Log Typed By : SGP

Drilling Legend
▨ Sample Interval
▨ Air Rotary

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Depth in Metres

Soil Description

SAND (FILL), fine to medium grained, gravelly, trace to some cobbles, trace silt, brown, loose to medium dense, damp.

SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, some silt, brown, medium dense, damp.

Between 4.2 m - 4.6 m - trace cobbles.

SAND, fine to medium grained, silty, some gravel, brown-grey, dense, damp.

SAND, fine grained, silty, grey, dense, damp.

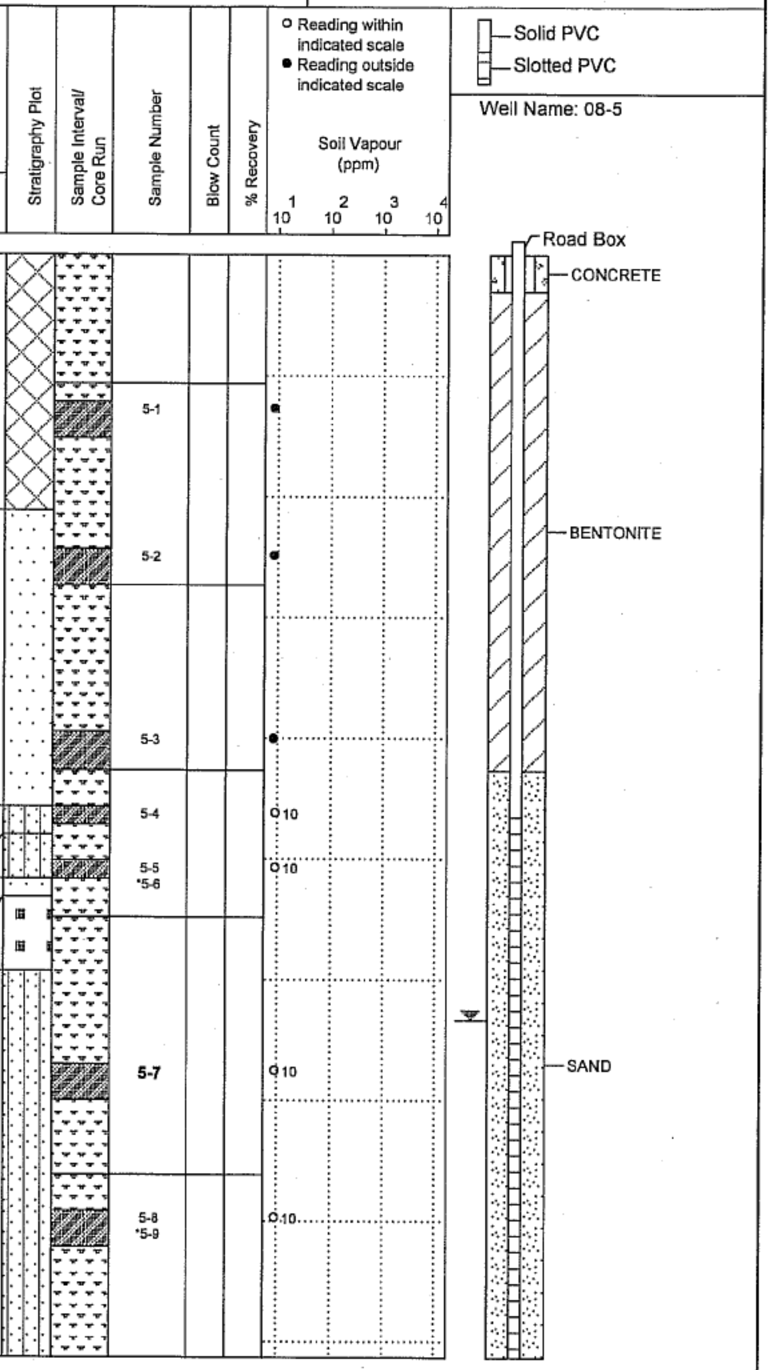
SAND and GRAVEL, fine to coarse grained sand, some silt, brown, dense, damp.

BOULDER.

SAND (TILL-LIKE), fine to medium grained, some silt to silty, trace gravel, grey, dense, damp.

Below 8.5 - some gravel to gravelly, very dense.

End of borehole at 9.1 m.



Notes:
Bolded sample denotes sample analyzed.
*5-6 denotes blind field duplicate of 5-5.
*5-9 denotes blind field duplicate of 5-8.

Print Date: 2010 02 12 QA1: MAG 2009 04 06

SNC·LAVALIN Environment

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 08-6

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd.
Drilling Method : Air Rotary
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2008 09 30
Ground Surf Elev. (m) : 298.17
Top of Casing Elev. (m) : 298.91

Project Number : 131416
Borehole Logged By : TDD
Date Drilled : 2008 09 27
Log Typed By : SGP

Drilling Legend
- ▨ Sample Interval
- ▧ Split Spoon
- ▤ Air Rotary

Water/NAPL Levels
- ▼ Water Level 1
- ▽ Water Level 2
- ◆ NAPL
- ◇ NAPL

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: 08-6

Depth in Metres

Soil Description

0 – SAND (FILL), fine to coarse grained, gravelly, trace to some cobbles, trace silt, brown, loose, damp.

Between 1.7 m - 2.1 m - some gravel, cobbley.

SAND and GRAVEL, fine to coarse grained sand, some silt to trace silt, trace cobbles, brown, medium dense, damp.

At 3.3 m - boulder.

At 4.0 m - boulder.

Below 4.9 m - silty.

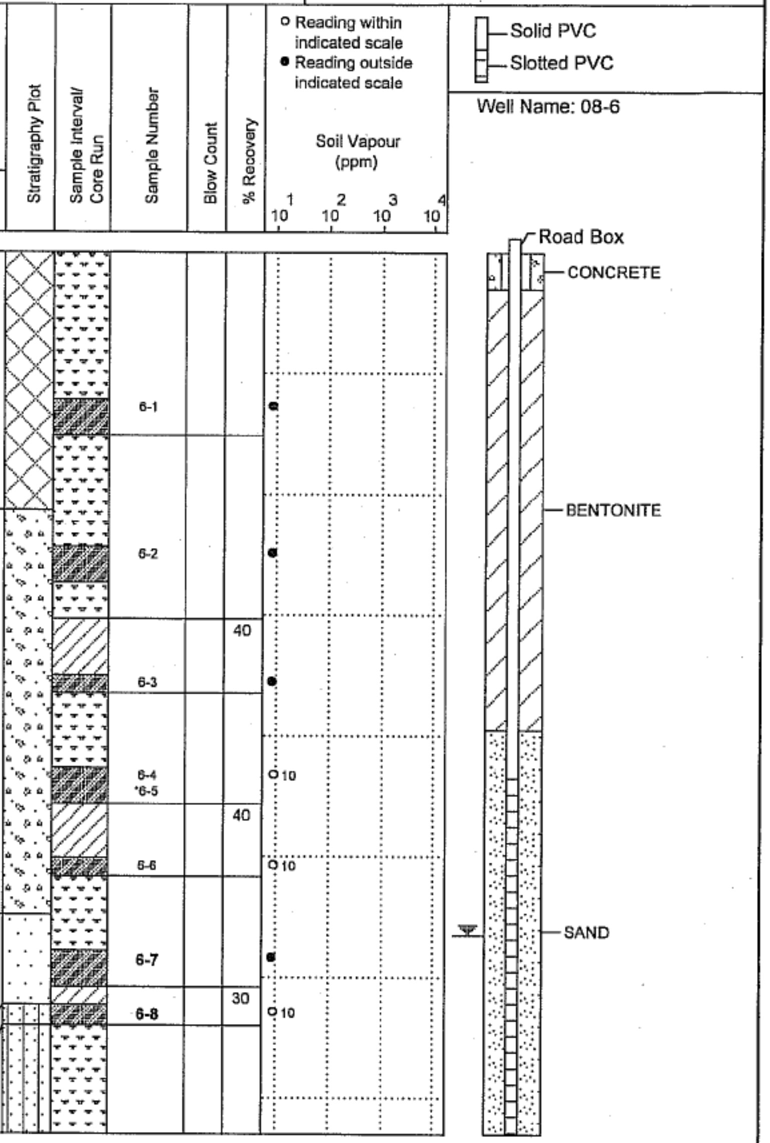
SAND, fine grained, some silt to silty, trace gravel, grey, medium dense, moist.

Below 6.3 m - wet.

SAND and GRAVEL, fine to coarse grained, silty, trace cobbles, dense, wet.

SAND (TILL-LIKE), fine to medium grained, some gravel to gravelly, some silt, grey, very dense, damp.

End of borehole at 7.3 m.



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Notes:
Bolded sample denotes sample analyzed.
*6-5 denotes blind field duplicate of 6-4.

Print Date: 2010 02 12 QA1: MAG 2009 04 06

SNC•LAVALIN Environment

Client : **Public Works and Gov't Services Canada**	**Borehole No. : 08-7**
Location : **Pleasant Camp, BC**	(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd.
Drilling Method : Air Rotary
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2008 09 30
Ground Surf Elev. (m) : 299.012
Top of Casing Elev. (m) : 299.592

Project Number : 131416
Borehole Logged By : TDD
Date Drilled : 2008 09 28
Log Typed By : SGP

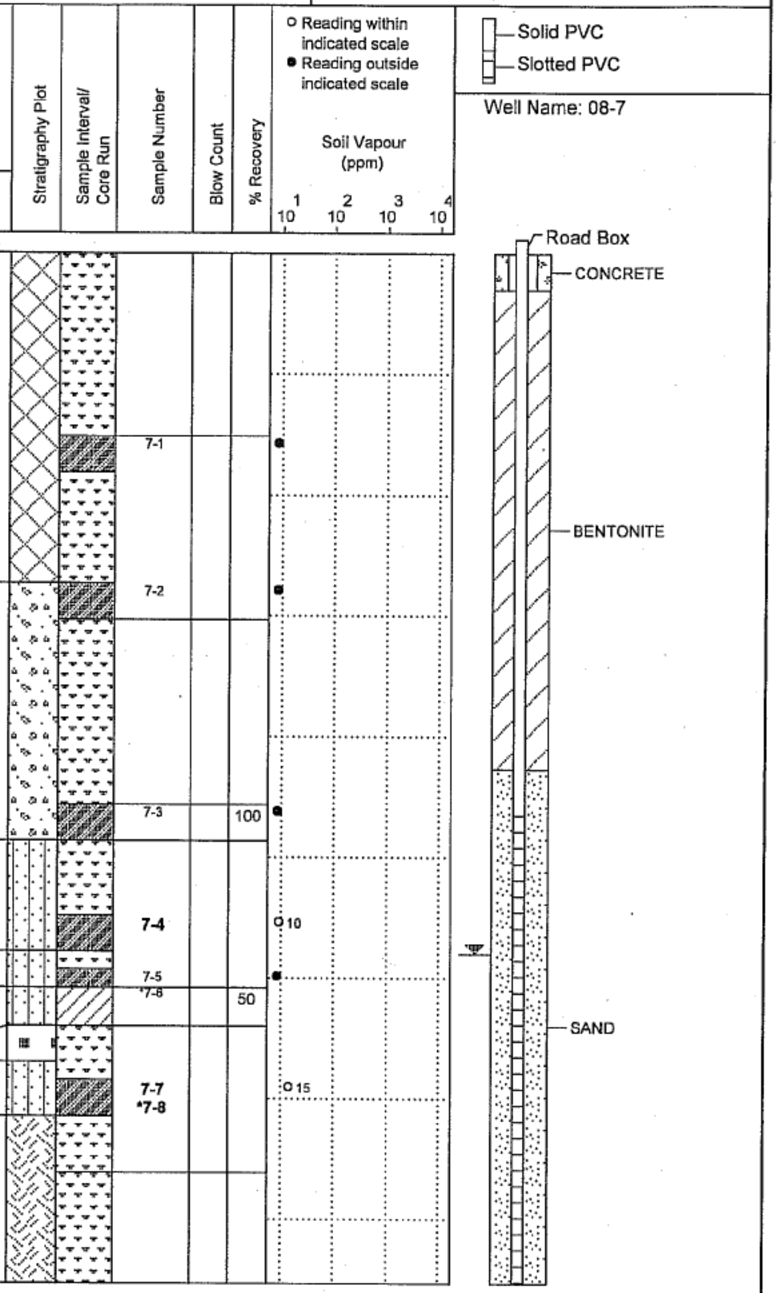
Drilling Legend
- ▨ Sample Interval
- ▨ Split Spoon
- ▨ Air Rotary

Water/NAPL Levels
- ▽ Water Level 1
- ▽ Water Level 2
- ◆ NAPL
- ◇ NAPL

- ○ Reading within indicated scale
- ● Reading outside indicated scale

- Solid PVC
- Slotted PVC

Well Name: 08-7



Soil Description	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
SAND, fine to coarse grained, gravelly, trace to some silt, some cobbles, brown, loose, damp. Between 0.9 m - 1.5 m - some gravel, cobbley.	7-1			●
SAND and GRAVEL, fine to coarse grained, some to trace silt, trace cobbles, brown, medium dense, damp. At 2.9 m - boulder. At 3.5 m - boulder. Below 3.7 m - some silt.	7-2 7-3		 100	● ●
SAND, medium to fine grained, some silt, trace gravel, brown, medium dense, damp.	**7-4**			○ 10
SAND, fine grained, silty, medium dense to dense, damp.	7-5 *7-6			●
SAND, fine to coarse grained, some silt to silty, grace gravel, brown-grey, medium dense to dense, damp.			50	
BOULDER.				
SAND (TILL-LIKE), fine to medium grained, gravelly, some silt, grey, dense to very dense, damp.	**7-7** ***7-8**			○ 15
BEDROCK.				

End of borehole at 8.5 m.

Notes:
Bolded sample denotes sample analyzed.
* 7-6 denotes blind field duplicate of 7-5.
* 7-8 denotes blind field duplicate of 7-7.

SNC•LAVALIN Environment	Client : **Public Works and Gov't Services Canada**	**Borehole No. : 08-8**
	Location : **Pleasant Camp, BC**	(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd.
Drilling Method : Air Rotary
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2008 09 30
Ground Surf Elev. (m) : 300.631
Top of Casing Elev. (m) : 300.557

Project Number : 131416
Borehole Logged By : TDD
Date Drilled : 2008 09 28
Log Typed By : SGP

Drilling Legend
- ▨ Sample Interval
- ▨ Split Spoon
- ▨ Air Rotary

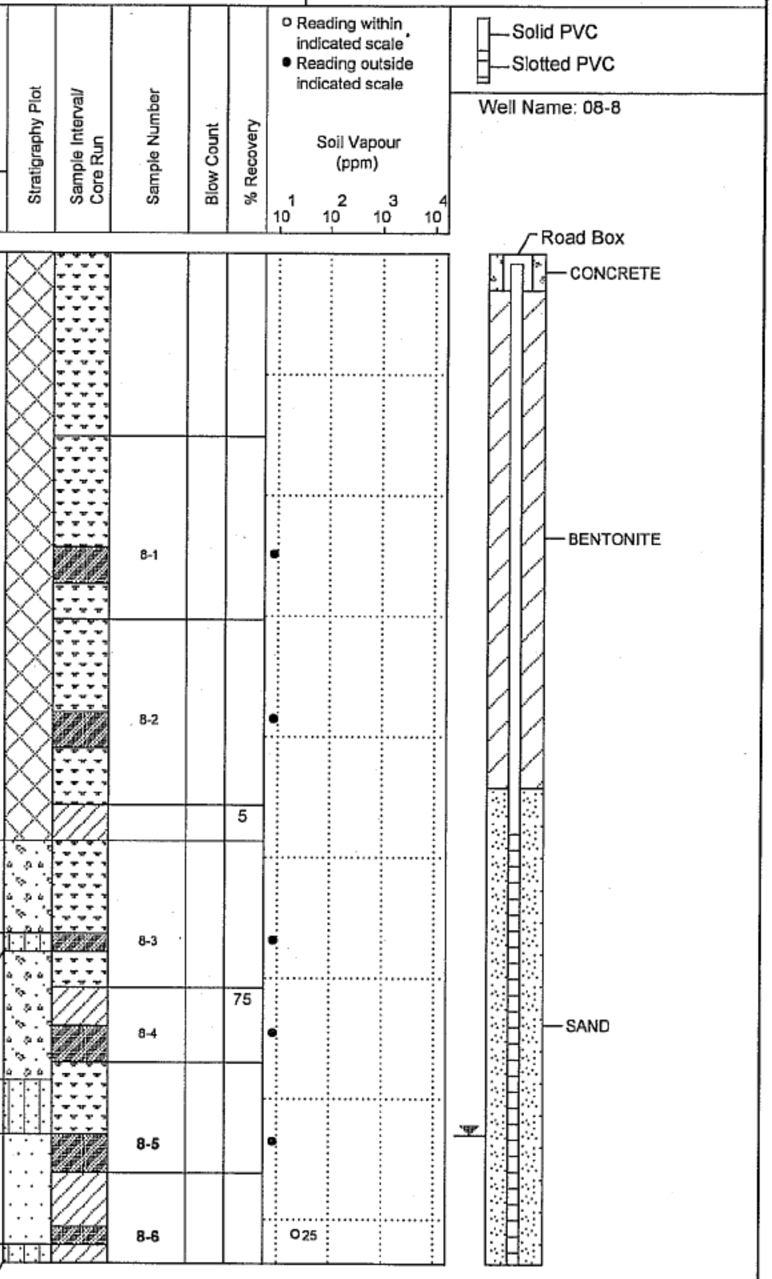
Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

- ○ Reading within indicated scale
- ● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: 08-8

Depth in Metres	Soil Description
0	SAND and GRAVEL (FILL), fine to coarse grained sand, fine to coarse gravel, some silt, trace to some cobbles, brown, loose to medium dense, damp.
	At 1.2 m - boulder.
	At 2.3 m - boulder.
	Below 3.4 m - medium dense.
5	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, some silt to silty, trace cobbles, brown, medium dense to dense, damp.
	SAND, medium to fine grained, some silt, trace gravel, brown, medium dense, damp.
	SAND and GRAVEL, fine to coarse grained sand, fine to coare gravel, silty, trace cobbles, grey, dense, damp to moist.
7	SAND, fine to medium grained, some gravel, some silt to silty, grey, medium dense, damp to moist.
	SAND and GRAVEL, medium to coarse grained, some to trace silt, trace cobbles, medium dense, moist to wet. Below 7.6 m - hydrocarbon-like odour.
	SAND (TILL-LIKE), fine to medium grained, some silt, grey, very dense, damp.
	End of borehole at 8.4 m.



Notes:
Bolded sample denotes sample analyzed.

SNC•LAVALIN Environment

Client : **Public Works and Gov't Services Canada**

Location : **Pleasant Camp, BC**

Borehole No. : 09-1

(Page 1 of 1)

Drilling Contractor: Badger Daylighting/Geotech Drilling
Drilling Method : Vacuum Truck/Odex
Borehole Dia. (m) : 0.20

Ground Surf Elev. (m) : 299.698

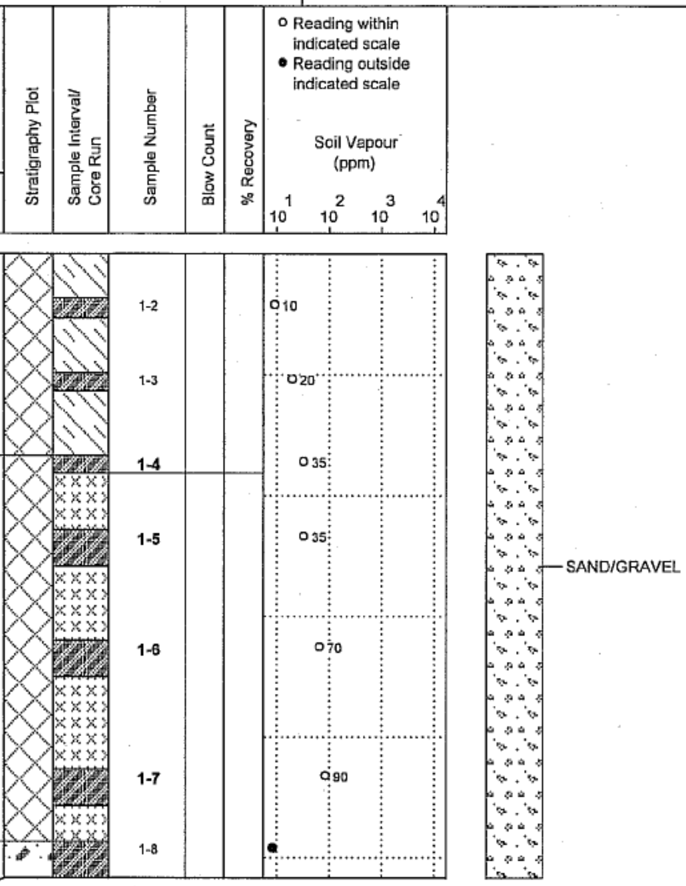
Project Number : 131416
Borehole Logged By : TD
Date Drilled : 2009 08 21
Log Typed By : TLW

Drilling Legend
▨ Sample Interval
☒ Odex
▧ Vac. Extraction

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Depth in Metres

Soil Description



SAND (FILL), coarse grained, some silt to silty, some gravel, trace cobbles, medium dense, damp to moist, trace organics (rootlets above 0.1 m/wood debris below 0.1 m).

SAND and GRAVEL (FILL), medium to coarse grained, some cobbles, trace silt, brown, dense to medium dense, moist. Below 1.8 m - grey, hydrocarbon-like odour.

Below 3.4 m - wet.

SAND (TILL-LIKE), fine grained, silty, trace gravel, grey, dense, dry to damp, no hydrocarbon-like odour.

End of borehole at 5.2 m.

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Notes:
Bolded sample denotes sample analyzed.

Print Date: 2010 02 12 QA1: PS 2009 10 29 QA2: TD 2010 02 10

SNC•LAVALIN Environment

Client : **Public Works and Gov't Services Canada**

Location : **Pleasant Camp, BC**

Borehole No. : 09-2

(Page 1 of 1)

Drilling Contractor: Badger Daylighting/Geotech Drilling
Drilling Method : Vacuum Truck/Odex
Borehole Dia. (m) : 0.20

Ground Surf Elev. (m) : 299.441

Project Number : 131416
Borehole Logged By : TD
Date Drilled : 2009 08 21
Log Typed By : TLW

Drilling Legend
- ▨ Sample Interval
- ☒ Odex
- ⧄ Vac. Extraction

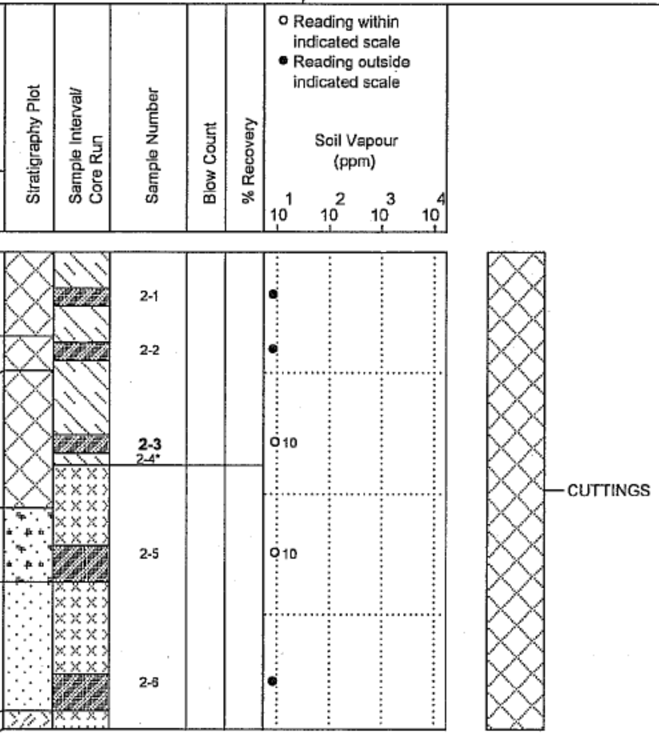
Water/NAPL Levels
- ▽ Water Level 1
- ▽ Water Level 2
- ◆ NAPL
- ◇ NAPL

Depth in Metres

Soil Description

Depth in Metres	Soil Description
0	SAND (FILL), coarse to medium grained, silty, some gravel, trace cobbles, medium dense, damp, trace organics (roots/wood debris).
	SILT (FILL), sandy, trace gravel, stiff, moist, trace organics (wood debris).
1	SAND (FILL), medium to coarse grained, silty to some silt, some gravel, some cobbles, medium dense, moist, trace wood debris (branches).
2	SAND and GRAVEL, medium grained, trace silt, brown, medium dense, damp.
3	SAND, medium to fine grained, trace silt, trace gravel, brown, dense to medium dense, damp to dry. Below 3.1 m - some gravel. Below 3.4 m - grey. Below 3.7 m - orange/brown.
4	BEDROCK.

End of borehole at 4.0 m.



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Notes:
Bolded sample denotes sample analyzed.
*Sample 2-4 is a blind field duplicate of sample 2-3.

Print Date: 2010 02 12 QA1: PS 2009 10 29 QA2: TD 2010 02 10

SNC•LAVALIN Environment

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 09-3

(Page 1 of 1)

Drilling Contractor: Badger Daylighting/Geotech Drilling
Drilling Method : Vacuum Truck/Odex
Borehole Dia. (m) : 0.20

Ground Surf Elev. (m) : 299.38

Project Number : 131416
Borehole Logged By : TD
Date Drilled : 2009 08 21
Log Typed By : TLW

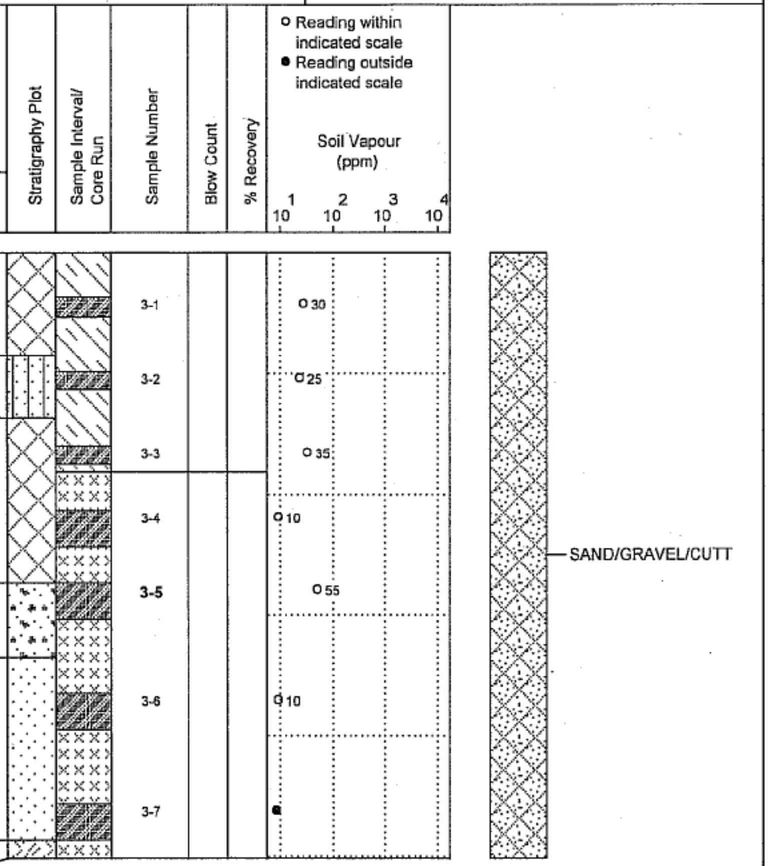
Drilling Legend
- ▨ Sample Interval
- ☒ Odex
- ⧅ Vac. Extraction

Water/NAPL Levels
- ▽ Water Level 1
- ▽ Water Level 2
- ◈ NAPL
- ◇ NAPL

○ Reading within indicated scale
● Reading outside indicated scale

Depth in Metres	Soil Description
0	SAND (FILL), coarse grained, gravelly, some silt to silty, trace cobbles, brown, medium dense to dense, trace organics (roots). Between 0.3 and 0.6 m - some cobbles.
1	SILT, sandy, some gravel, dark brown, medium stiff, moist, some organics (rootlets, wood debris).
	SAND (FILL), some gravel, some silt, trace cobbles, loose to medium dense, damp to moist.
2	Below 2.0 m - gravelly, trace silt. Between 2.4 and 2.6 m - cobble.
	SAND and GRAVEL, medium to coarse grained, trace silt, grey, medium dense, moist, hydrocarbon-like odour.
3	SAND, medium to fine grained, some gravel, trace silt, brown, dense to medium dense, damp.
5	BEDROCK.

End of borehole at 5.0 m.



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Notes:
Bolded sample denotes sample analyzed.

Print Date: 2010 02 12 QA1: PS 2009 10 29 QA2: TD 2010 02 10

SNC•LAVALIN Environment

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 09-4

(Page 1 of 1)

Drilling Contractor: Badger Daylighting/Geotech Drilling
Drilling Method : Vacuum Truck/Odex
Borehole Dia. (m) : 0.20

Ground Surf Elev. (m) : 299.363

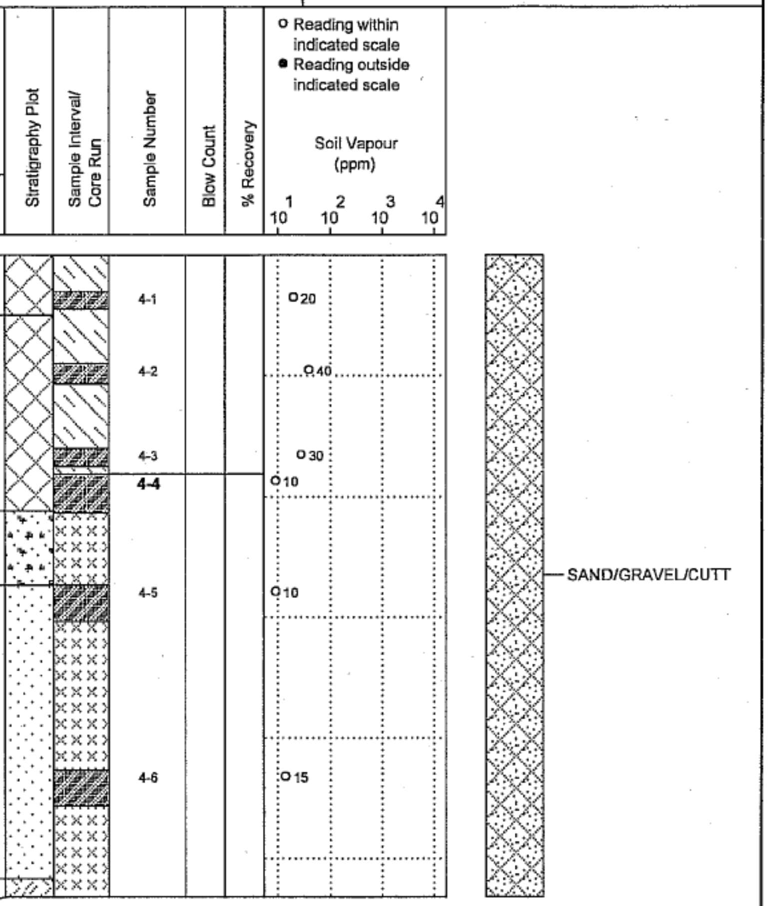
Project Number : 131416
Borehole Logged By : TD
Date Drilled : 2009 08 21
Log Typed By : TLW

Drilling Legend
▨ Sample Interval
☒ Odex
▧ Vac. Extraction

Water/NAPL Levels
▼ Water Level 1
▽ Water Level 2
◆ NAPL
◇ NAPL

Depth in Metres

Soil Description



0

SAND and GRAVEL (FILL), coarse grained, some silt, trace cobbles, brown, medium dense, moist, trace organics (rootlets).

SAND (FILL), medium grained, silty, some gravel, trace cobbles, brown, medium dense, moist, trace organics (roolets/wood debris).

1

2

SAND and GRAVEL, medium grained sand, some silt, trace cobbles, brown, medium dense, moist.
Between 2.4 and 2.7 m - cobble.

SAND, medium to fine grained, some gravel to gravelly, trace silt, brown, medium dense, damp.

3

4

Below 4.0 m - dark brown.
Below 4.1 m - grey, wet.

5

BEDROCK.

End of borehole at 5.3 m.

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Notes:
Bolded sample denotes sample analyzed.

Print Date: 2010 02 12 QA1: PS 2009 10 29 QA2: TD 2010 02 10

SNC•LAVALIN Environment

Client : **Public Works and Gov't Services Canada**

Location : **Pleasant Camp, BC**

Borehole No. : 09-5

(Page 1 of 1)

Drilling Contractor: Badger Daylighting/Geotech Drilling
Drilling Method : Vacuum Truck/Odex
Borehole Dia. (m) : 0.20
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2009 09 23
Ground Surf Elev. (m) : 299.525
Top of Casing Elev. (m) : 299.386

Project Number : 131416
Borehole Logged By : TD
Date Drilled : 2009 08 21
Log Typed By : TLW

Drilling Legend
▨ Sample Interval
☒ Odex
Vac. Extraction

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: 09-5

Depth in Metres

Soil Description

SAND (FILL), medium grained, silty, trace gravel, brown, medium dense, damp to moist, trace organics (rootlets).

SAND (FILL), some gravel, trace silt, trace cobbles, light brown, dense to medium dense, damp.

SAND and GRAVEL (FILL), cobbly, trace silt, brown, medium dense, damp to moist.

Below 2.3 m - trace cobbles.

Below 4.7 m - moist, hydrocarbon-like odour.

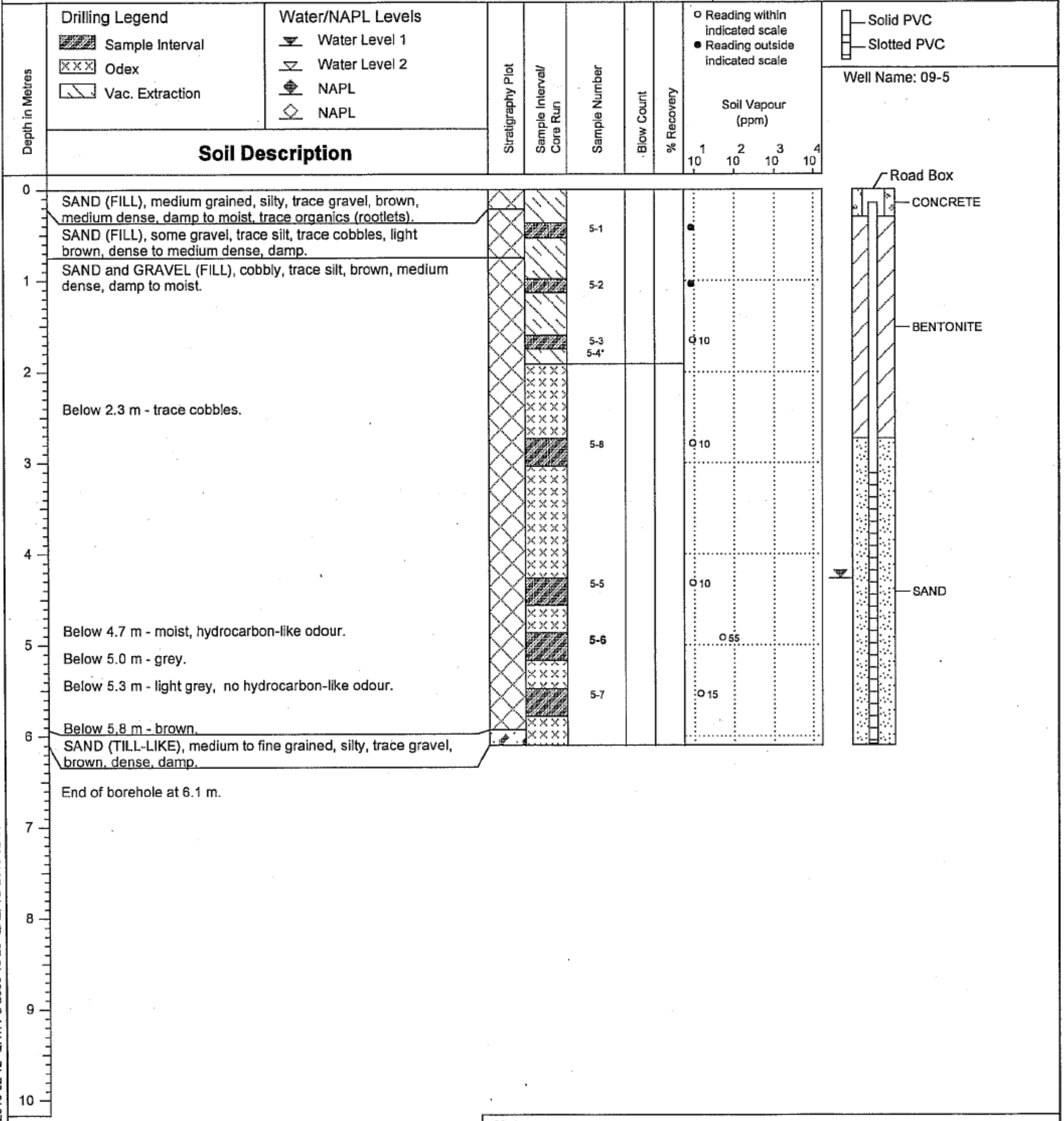
Below 5.0 m - grey.

Below 5.3 m - light grey, no hydrocarbon-like odour.

Below 5.8 m - brown.

SAND (TILL-LIKE), medium to fine grained, silty, trace gravel, brown, dense, damp.

End of borehole at 6.1 m.



Notes:
Bolded sample denotes sample analyzed.
*Sample 5-4 is a blind field duplicate of sample 5-3.

Print Date: 2010 02 12 QA1: PS 2009 10 29 QA2: TD 2010 02 10

SNC•LAVALIN Environment

Client : **Public Works and Gov't Services Canada**

Location : **Pleasant Camp, BC**

Borehole No. : 09-6

(Page 1 of 1)

Drilling Contractor: Badger Daylighting/Geotech Drilling
Drilling Method : Vacuum Truck/Odex
Borehole Dia. (m) : 0.20

Ground Surf Elev. (m) : 299.784

Project Number : 131416
Borehole Logged By : TD
Date Drilled : 2009 08 22
Log Typed By : TLW

Drilling Legend
- ▨ Sample Interval
- ☒ Odex
- ⧅ Vac. Extraction

Water/NAPL Levels
- ▼ Water Level 1
- ▽ Water Level 2
- ◆ NAPL
- ◇ NAPL

Depth in Metres

Soil Description

SAND (FILL), medium to coarse grained, gravelly, some silt, trace cobbles, brown, medium dense, moist, trace organics (rootlets).

SAND (FILL), coarse grained, trace gravel, trace silt, grey, loose, moist.

SAND (FILL), some gravel, trace silt, trace cobbles, brown, medium dense, moist.

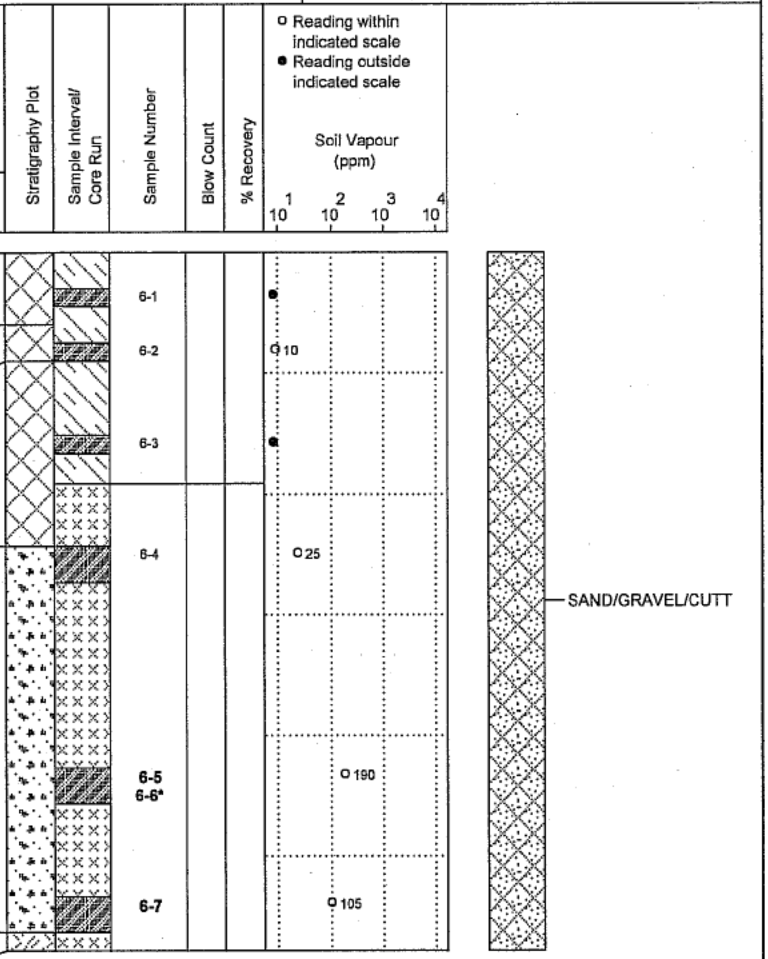
SAND and GRAVEL, medium to coarse grained, trace silt, trace cobbles, brown, medium dense, moist.

Between 3.8 and 4.1 m - boulder.

Below 4.1 m - grey, hydrocarbon-like odour.

BEDROCK.

End of borehole at 5.8 m.



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Notes:
Bolded sample denotes sample analyzed.
*Sample 6-6 is a blind field duplicate of sample 6-5.

SNC•LAVALIN Environment

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 09-7

(Page 1 of 1)

Drilling Contractor: Badger Daylighting/Geotech Drilling
Drilling Method : Vacuum Truck/Odex
Borehole Dia. (m) : 0.20

Ground Surf Elev. (m) : 299.609

Project Number : 131416
Borehole Logged By : TD
Date Drilled : 2009 08 22
Log Typed By : TLW

Drilling Legend
- ▨ Sample Interval
- ☒ Odex
- ⧅ Vac. Extraction

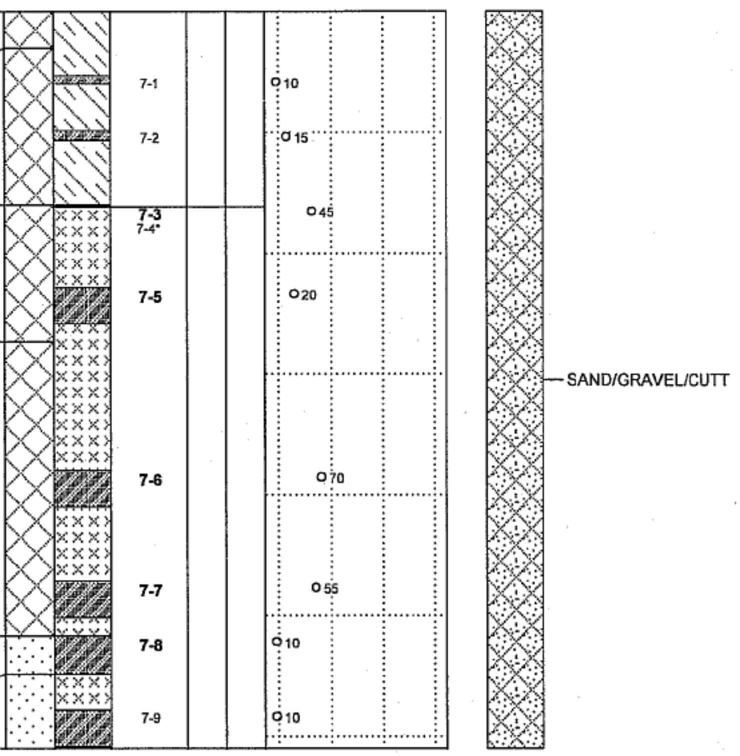
Water/NAPL Levels
- ▼ Water Level 1
- ▽ Water Level 2
- ◆ NAPL
- ◇ NAPL

Depth in Metres	Soil Description
0	SAND (FILL), medium grained, silty, trace gravel, brown, loose, damp, trace organics (rootlets).
	SAND (FILL), medium to coarse grained, gravelly, trace silt, trace cobbles, brown, medium dense, damp to moist. Between 1.0 and 1.4 m - trace wood debris.
	SAND (FILL), coarse grained, some gravel, trace silt, brown, medium dense to loose, moist. Between 1.6 and 1.8 m - hydrocarbon-like odour. Below 1.8 m - silty.
	SAND and GRAVEL (FILL), medium to coarse grained, trace silt, trace cobbles, grey, medium dense, moist. Below 3.5 m - hydrocarbon-like odour.
	SAND, medium to fine grained, some silt, some gravel, grey, dense, moist, no hydrocarbon-like odour.
	SAND, coarse grained, trace silt, trace gravel, brown, loose to medium dense, moist to wet, no hydrocarbon-like odour.
6.1	End of borehole at 6.1 m.

Stratigraphy Plot | Sample Interval/ Core Run | Sample Number | Blow Count | % Recovery

○ Reading within indicated scale
● Reading outside indicated scale

Soil Vapour (ppm)



0 1 2 3 4 5 6 7 8 9 10

Notes:
Bolded sample denotes sample analyzed.
*Sample 7-4 is a blind field duplicate of sample 7-3.

Print Date: 2010 02 12 QA1: PS 2009 10 29 QA2: TD 2010 02 10

SNC•LAVALIN Environment

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 09-8

(Page 1 of 1)

Drilling Contractor: Badger Daylighting/Geotech Drilling
Drilling Method : Vacuum Truck/Odex
Borehole Dia. (m) : 0.20

Ground Surf Elev. (m) : 299.86

Project Number : 131416
Borehole Logged By : TD
Date Drilled : 2009 08 22
Log Typed By : TLW

Drilling Legend
- ▨ Sample Interval
- ☒ Odex
- ⧄ Vac. Extraction

Water/NAPL Levels
- ▽ Water Level 1
- ▽ Water Level 2
- ◆ NAPL
- ◇ NAPL

Soil Description

SAND (FILL), medium to coarse grained, some gravel to gravelly, some silt, trace cobbles, brown, medium dense, moist, trace organics (rootlets).

SAND (FILL), medium grained, silty, trace to some gravel, trace cobbles, dark brown, medium dense, moist.
Below 1.4 m - hydrocarbon-like odour.

SAND and GRAVEL, medium to coarse grained, trace silt, trace cobbles, brown, medium dense, damp, no hydrocarbon-like odour.
Between 2.4 and 2.7 m - cobble.

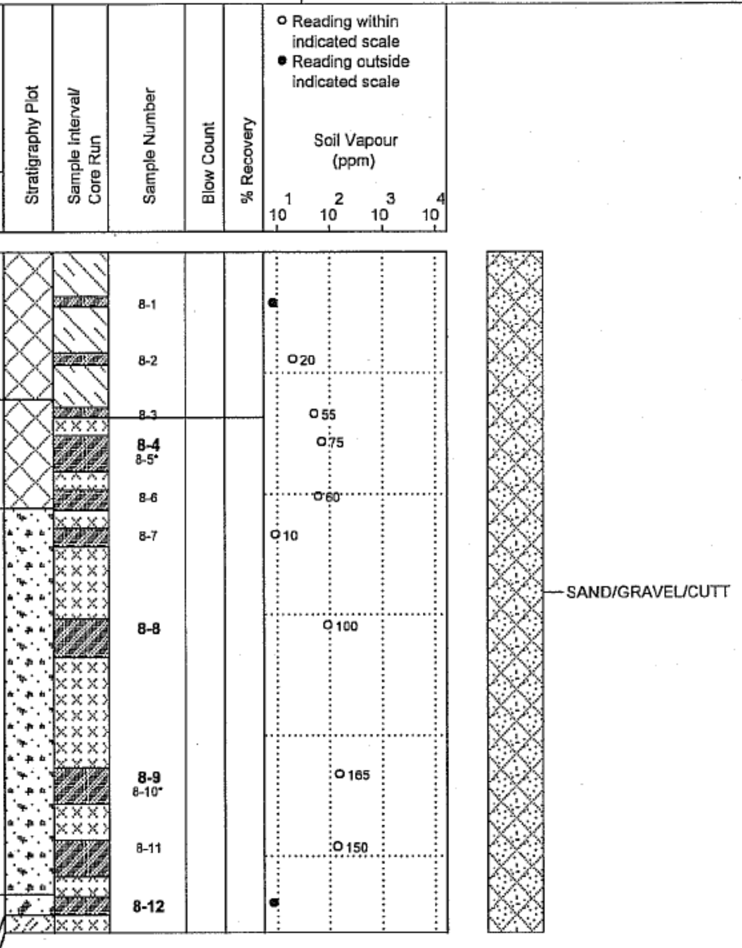
Below 3.1 m - moist, hydrocarbon-like odour.

Below 4.3 m - grey, wet.

Below 4.9 m - dense.

SAND (TILL-LIKE), fine to medium grained, silty, trace to some gravel, grey, dense to very dense, damp, no hydrocarbon-like odour.

BEDROCK.



Depth in Metres: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

End of borehole at 5.6 m.

Notes:
Bolded sample denotes sample analyzed.
*Sample 8-5 is a blind field duplicate of sample 8-4.
*Sample 8-10 is a blind field duplicate of sample 8-9.

Print Date: 2010 02 12 QA1: PS 2009 10 29 QA2: TD 2010 02 10

SNC•LAVALIN Environment

Client : **Public Works and Gov't Services Canada**

Location : **Pleasant Camp, BC**

Borehole No. : 09-9

(Page 1 of 1)

Drilling Contractor: Badger Daylighting/Geotech Drilling
Drilling Method : Vacuum Truck/Odex
Borehole Dia. (m) : 0.20

Ground Surf Elev. (m) : 300.162

Project Number : 131416
Borehole Logged By : TD
Date Drilled : 2009 08 22
Log Typed By : TLW

Drilling Legend
▨ Sample Interval
☒ Odex
⧅ Vac. Extraction

Water/NAPL Levels
▼ Water Level 1
▽ Water Level 2
◆ NAPL
◇ NAPL

○ Reading within indicated scale
● Reading outside indicated scale

Depth in Metres | **Soil Description** | Stratigraphy Plot | Sample Interval/ Core Run | Sample Number | Blow Count | % Recovery | Soil Vapour (ppm)

TOPSOIL/GRASS.

ASPHALT.

SAND (FILL), medium to coarse grained, gravelly, trace to some silt, trace cobbles, brown, medium dense, damp to moist.

Below 0.9 m - some cobbles, trace boulders.

SAND and GRAVEL, medium to coarse grained, some cobbles, trace silt, brown, medium dense, moist.

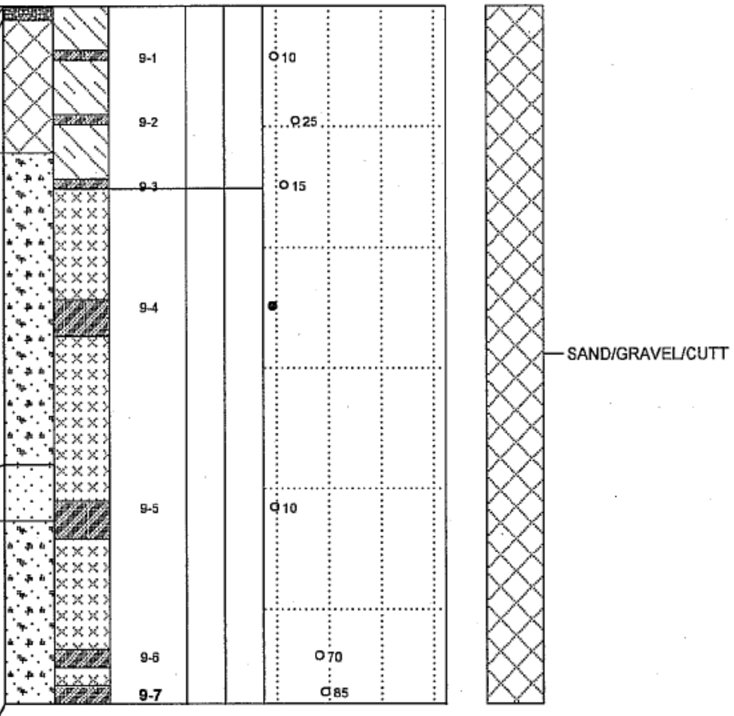
Between 3.7 and 3.8 m - cobble.

SAND, medium grained, some silt, some gravel, brown, medium dense, moist.

SAND and GRAVEL, medium grained, trace silt, trace cobbles, medium dense, wet.
Between 4.4 and 4.6 m - cobble.

Below 5.3 m - medium to coarse grained sand and gravel, hydrocarbon-like odour.
Below 5.5 m - grey.
Below 5.8 m - bedrock.

End of borehole at 5.8 m.



Sample Number	Soil Vapour (ppm)
9-1	10
9-2	25
9-3	15
9-4	●
9-5	10
9-6	70
9-7	85

Notes:
Bolded sample denotes sample analyzed.

Print Date: 2010 02 12 QA1: PS 2009 10 29 QA2: TD 2010 02 10

SNC•LAVALIN Environment

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 09-10

(Page 1 of 1)

Drilling Contractor: Badger Daylighting/Geotech Drilling
Drilling Method : Vacuum Truck/Odex
Borehole Dia. (m) : 0.20

Ground Surf Elev. (m) : 299.437

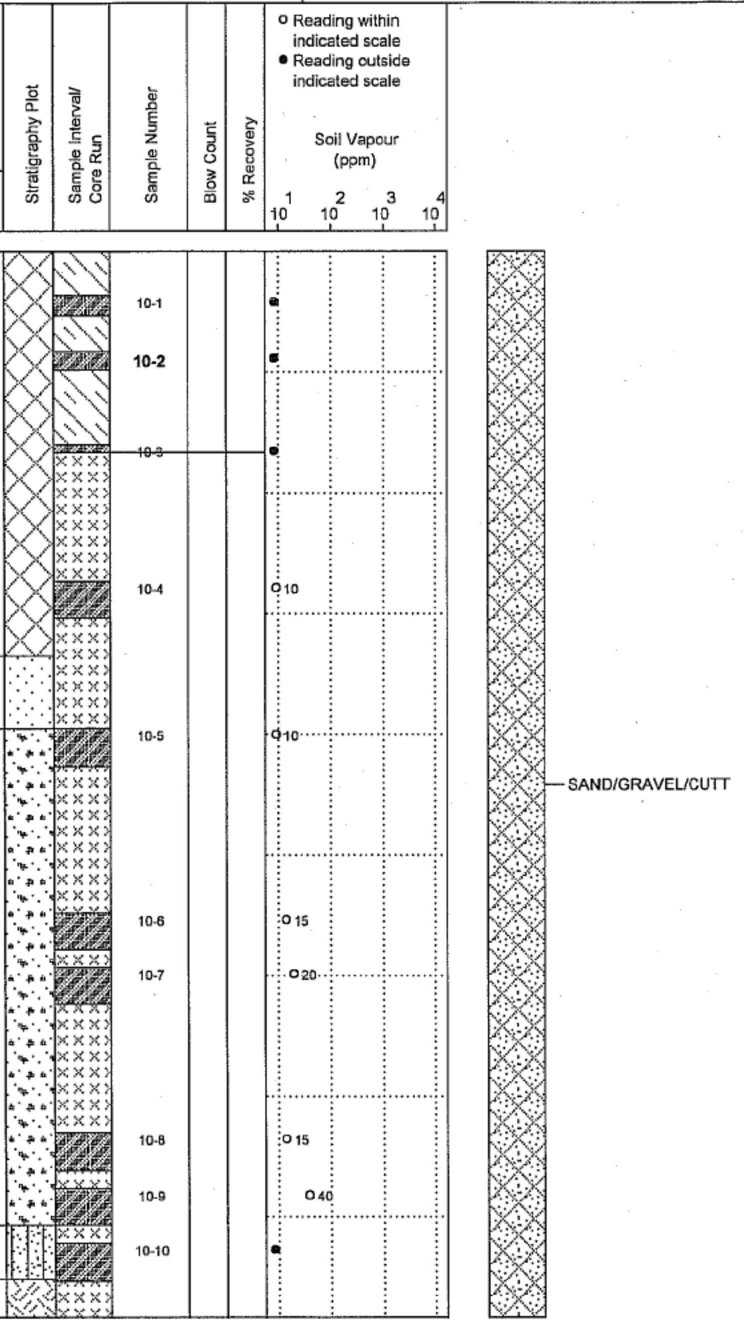
Project Number : 131416
Borehole Logged By : TD
Date Drilled : 2009 08 22
Log Typed By : TLW

Drilling Legend
▨ Sample Interval
☒ Odex
⧄ Vac. Extraction

Water/NAPL Levels
▽ Water Level 1
▽ Water Level 2
◈ NAPL
◇ NAPL

○ Reading within indicated scale
● Reading outside indicated scale

Depth in Metres | **Soil Description** | Stratigraphy Plot | Sample Interval/Core Run | Sample Number | Blow Count | % Recovery | Soil Vapour (ppm)



0 SAND and GRAVEL (FILL), coarse grained, trace silt, trace cobbles, brown, medium dense, damp, trace organics (rootlets).

Below 1.5 m - no organics.

Between 1.8 and 2.1 m - some silt.

Between 2.1 and 2.3 m - cobble.

SAND, medium to coarse grained, some silt, some gravel, brown, loose, moist.

4 SAND and GRAVEL, medium to coarse grained, trace silt, trace cobbles, brown, medium dense, moist to wet.

Below 5.9 m - some silt.

7 Below 6.9 m - silty.

Between 7.6 m and 8.1 m - grey, moist, hydrocarbon-like odour.

SAND, fine grained, silty, trace gravel, grey, dense, damp.

BEDROCK.

End of borehole at 8.8 m.

Notes:
Bolded sample denotes sample analyzed.

SNC•LAVALIN Environment

Client : **Public Works and Gov't Services Canada**

Location : **Pleasant Camp, BC**

Borehole No. : 09-11

(Page 1 of 1)

Drilling Contractor: Badger Daylighting/Geotech Drilling
Drilling Method : Vacuum Truck/Odex
Borehole Dia. (m) : 0.20

Ground Surf Elev. (m) : 297.831

Project Number : 131416
Borehole Logged By : TD
Date Drilled : 2009 08 22
Log Typed By : TLW

Drilling Legend
- ▨ Sample Interval
- ☒ Odex
- ▧ Vac. Extraction

Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

○ Reading within indicated scale
● Reading outside indicated scale

Soil Description

SAND (FILL), medium to coarse grained, silty, some gravel, trace cobbles, brown, medium dense, damp to moist, trace organics (rootlets).

SAND and GRAVEL (FILL), coarse grained, cobbly, some boulders, brown, dense, moist.

Between 3.8 m and 4.0 m - cobble.

SAND and GRAVEL, medium to coarse grained, some silt, trace cobbles, grey, medium dense, moist.

SAND, fine to medium grained, silty, trace gravel, grey, dense, damp.

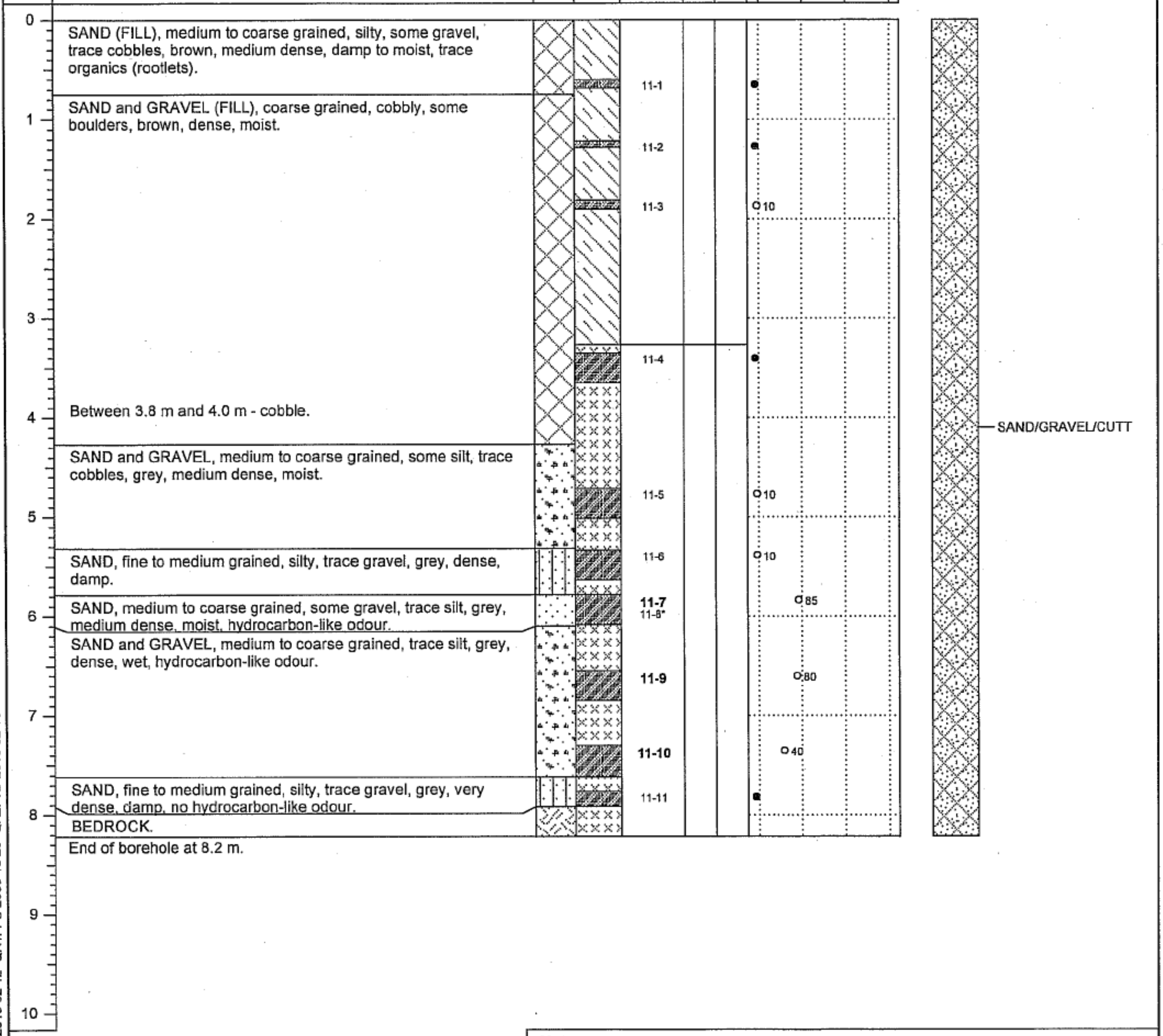
SAND, medium to coarse grained, some gravel, trace silt, grey, medium dense, moist, hydrocarbon-like odour.

SAND and GRAVEL, medium to coarse grained, trace silt, grey, dense, wet, hydrocarbon-like odour.

SAND, fine to medium grained, silty, trace gravel, grey, very dense, damp, no hydrocarbon-like odour.

BEDROCK.

End of borehole at 8.2 m.



Sample Number	Soil Vapour (ppm)
11-1	●
11-2	●
11-3	○ 10
11-4	●
11-5	○ 10
11-6	○ 10
11-7 11-8*	○ 85
11-9	○ 80
11-10	○ 40
11-11	●

Notes:
Bolded sample denotes sample analyzed.
*Sample 11-8 is a blind field duplicate of sample 11-7.

Print Date: 2010 02 12 QA1: PS 2009 10 29 QA2: TD 2010 02 10

SNC•LAVALIN Environment

Client : **Public Works and Gov't Services Canada**

Location : **Pleasant Camp, BC**

Borehole No. : 09-12

(Page 1 of 1)

Drilling Contractor: Badger Daylighting/Geotech Drilling
Drilling Method : Vacuum Truck/Odex
Borehole Dia. (m) : 0.20

Ground Surf Elev. (m) : 299.72

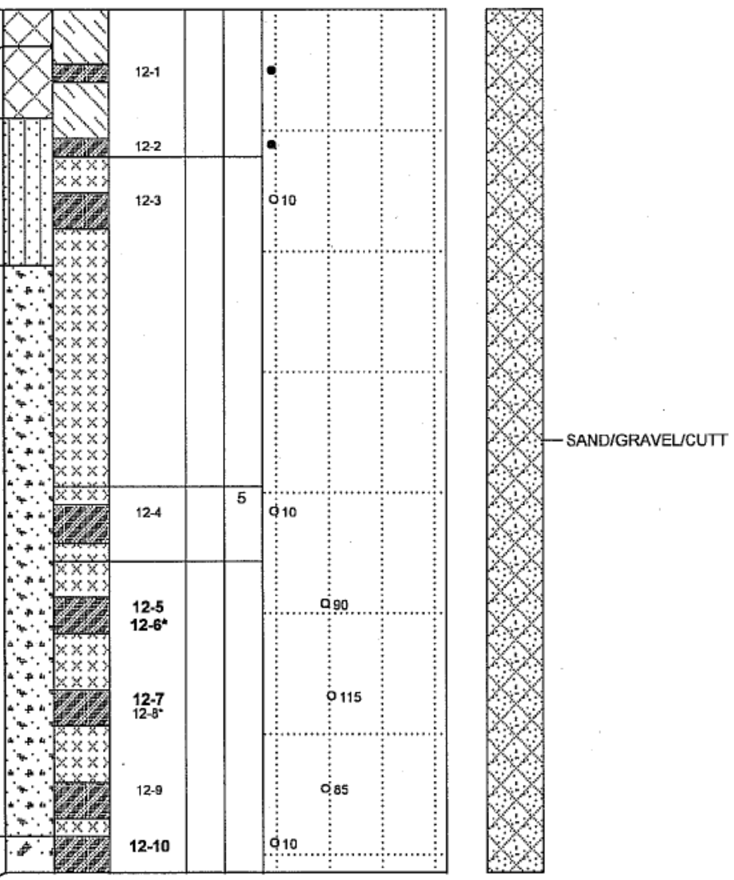
Project Number : 131416
Borehole Logged By : TD
Date Drilled : 2009 08 24
Log Typed By : TLW

Drilling Legend
- ▨ Sample Interval
- ☒ Odex
- ▧ Vac. Extraction

Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- ◇ NAPL

○ Reading within indicated scale
● Reading outside indicated scale

Soil Vapour (ppm)



Depth in Metres	Soil Description
0	SAND (FILL), medium grained, some silt to silty, trace gravel, brown, loose, damp, trace organics (rootlets).
	SAND and GRAVEL (FILL), medium to coarse grained, trace silt, brown, medium dense, damp to moist.
1	SAND, medium to fine grained, silty, trace gravel, brown, medium dense, damp.
2	SAND and GRAVEL, medium to coarse grained, trace silt, trace cobbles, light brown/orange, medium dense, damp.
3	Below 2.9 m - brown.
5	Below 4.9 m - brown/grey, hydrocarbon-like odour.
	Below 5.5 m - dark grey, wet.
7	SAND (TILL-LIKE). fine grained, silty, trace gravel, grey, dense to very dense, damp.
	End of borehole at 7.2 m.

Sample Number	% Recovery	Soil Vapour (ppm)
12-1		●
12-2		●
12-3		10
12-4	5	10
12-5 **12-6***		90
12-7 12-8*		115
12-9		85
12-10		10

Notes:
Bolded sample denotes sample analyzed.
*Sample 12-6 is a blind field duplicate of sample 12-5.
*Sample 12-8 is a blind field duplicate of sample 12-7.

Print Date: 2010 02 12 QA1: PS 2009 10 29 QA2: TD 2010 02 10

SNC•LAVALIN Environment

Client : **Public Works and Gov't Services Canada**

Location : **Pleasant Camp, BC**

Borehole No. : 09-13

(Page 1 of 2)

Drilling Contractor: Geotech Drilling Services Ltd.
Drilling Method : Odex
Borehole Dia. (m) : 0.10

Ground Surf Elev. (m) : 297.682

Project Number : 131416
Borehole Logged By : TD
Date Drilled : 2009 08 25
Log Typed By : TLW

Drilling Legend
▨ Sample Interval
☒ Odex

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

○ Reading within indicated scale
● Reading outside indicated scale

Soil Description

SAND (FILL), medium grained, silty, some gravel, trace cobbles, brown, medium dense to loose, damp, trace organics (rootlets).

SAND and GRAVEL (FILL), medium to coarse grained, trace silt, trace cobbles, brown, medium dense, damp.

SAND, medium to fine grained, some silt, trace gravel, trace cobbles, brown, medium dense, damp.
Between 2.4 and 2.9 m - boulder.

Below 3.8 m - some to trace silt.

SAND, medium to coarse grained, gravelly, some silt, trace cobbles, brown, medium dense to dense, damp.
Between 5.0 and 5.3 m - boulder.

SAND and GRAVEL, medium to coarse grained, some to trace silt, brown, medium dense, damp to moist, hydrocarbon-like odour.
Below 6.1 m - grey, moist to wet.

Between 6.9 and 7.3 m - boulder.

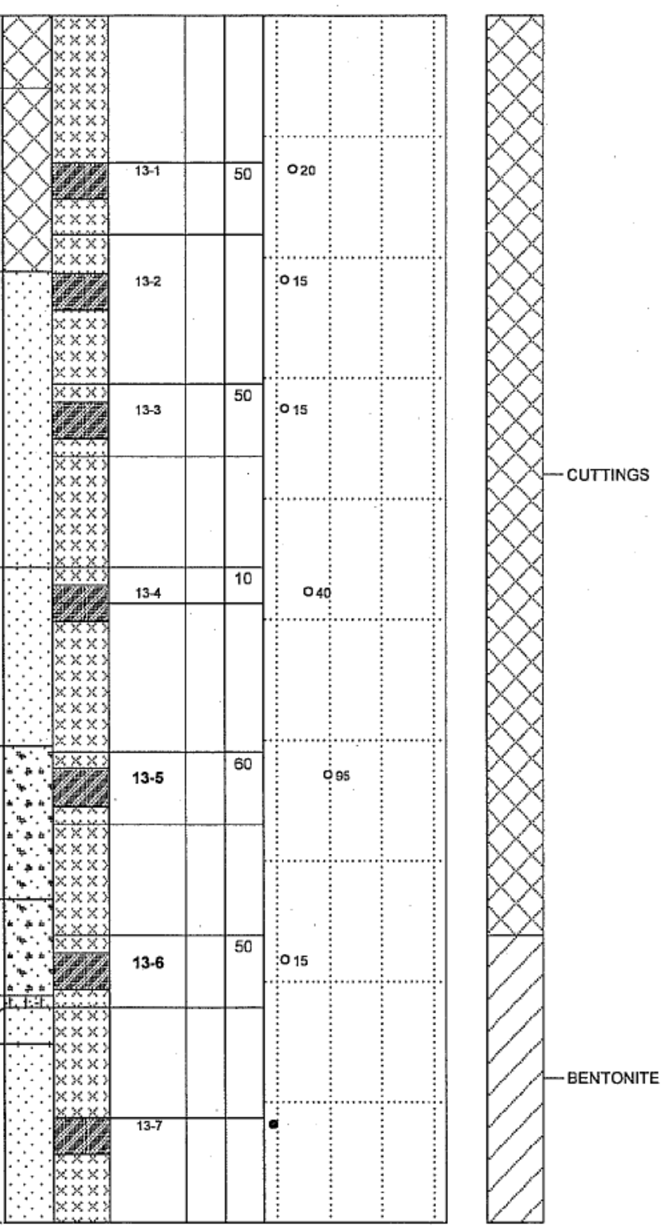
SAND and GRAVEL, trace silt, trace cobbles, dark brown, medium dense, wet, no hydrocarbon-like odour.

SAND, fine grained, silty, brown, dense, wet.

SAND, coarse grained, trace silt, brown, loose, wet.

SAND, medium to fine grained, some silt to silty, trace to some gravel, grey, medium dense, moist.
Between 8.8 and 9.1 m - trace silt.
Below 9.1 m - fine grained sand, some silt.

Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
13-1		50	○ 20
13-2			○ 15
13-3		50	○ 15
13-4		10	○ 40
13-5		60	○ 95
13-6		50	○ 15
13-7			●



...Continued

Notes:
Bolded sample denotes sample analyzed.

Print Date: 2010 02 12 QA1: PS 2009 10 29 QA2: TD 2010 02 10

SNC•LAVALIN Environment

Client : **Public Works and Gov't Services Canada**

Location : **Pleasant Camp, BC**

Borehole No. : 09-13

(Page 2 of 2)

Drilling Contractor: Geotech Drilling Services Ltd.
Drilling Method : Odex
Borehole Dia. (m) : 0.10

Ground Surf Elev. (m) : 297.682

Project Number : 131416
Borehole Logged By : TD
Date Drilled : 2009 08 25
Log Typed By : TLW

Drilling Legend
▨ Sample Interval
☒ Odex

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

○ Reading within indicated scale
● Reading outside indicated scale

Depth in Metres | **Soil Description** | Stratigraphy Plot | Sample Interval/ Core Run | Sample Number | Blow Count | % Recovery | Soil Vapour (ppm) 10^1 10^2 10^3 10^4

SAND and GRAVEL, coarse grained, trace silt, grey, loose, wet.

SAND, medium to fine grained, some silt, trace gravel, grey/brown, medium dense, damp.

SAND and GRAVEL, medium to coarse grained, trace silt, brown, medium dense, wet.

SAND (TILL-LIKE), fine grained, trace to some silt, trace gravel, brown, very dense, damp.

GRAVEL, sandy, coarse grained sand, trace silt, brown, medium dense, moist to wet.

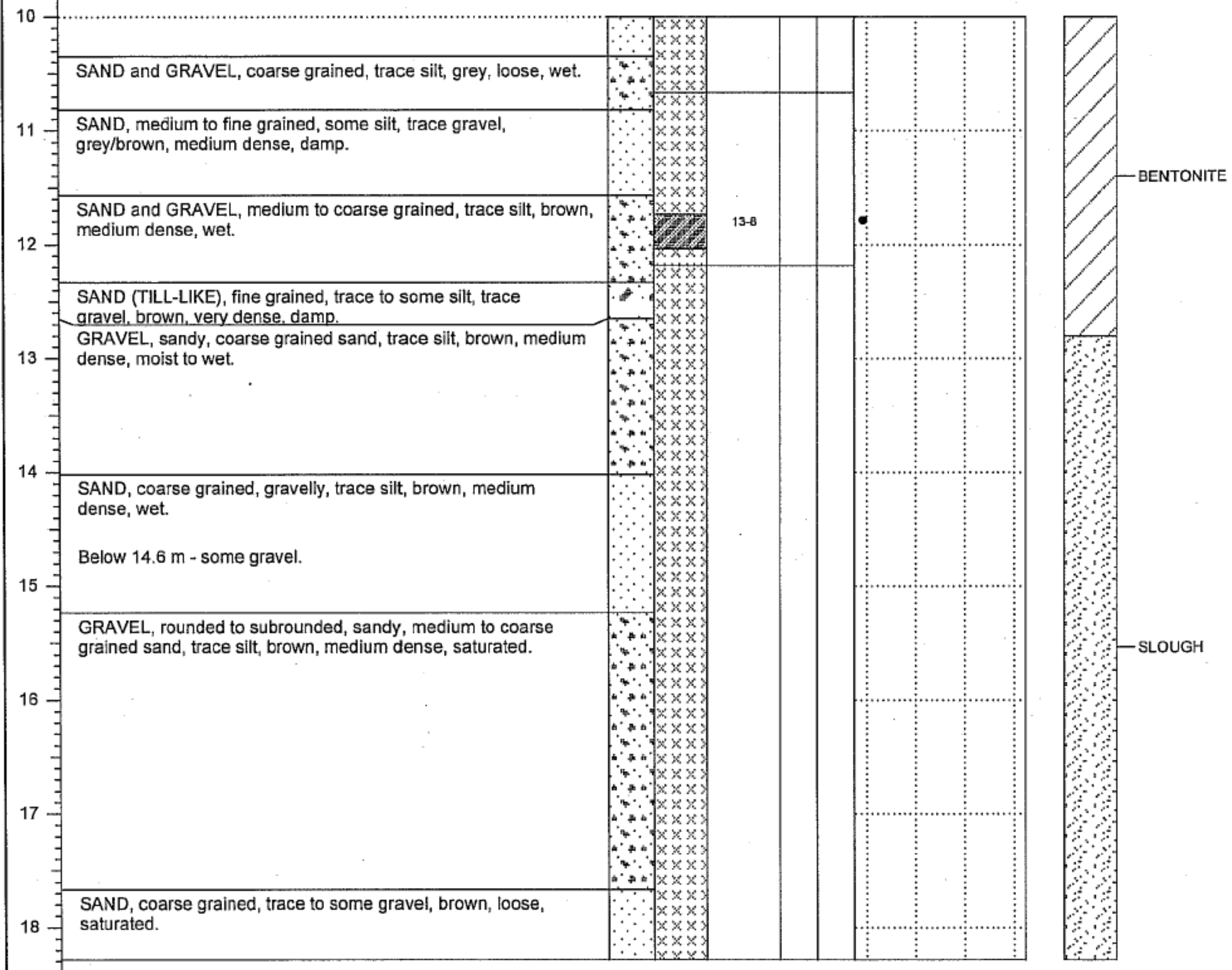
SAND, coarse grained, gravelly, trace silt, brown, medium dense, wet.

Below 14.6 m - some gravel.

GRAVEL, rounded to subrounded, sandy, medium to coarse grained sand, trace silt, brown, medium dense, saturated.

SAND, coarse grained, trace to some gravel, brown, loose, saturated.

End of borehole at 18.3 m.



Notes:
Bolded sample denotes sample analyzed.

SNC•LAVALIN Environment	Client : **Public Works and Gov't Services Canada**	**Borehole No. : 09-14**
	Location : **Pleasant Camp, BC**	(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd.
Drilling Method : Odex
Borehole Dia. (m) : 0.10

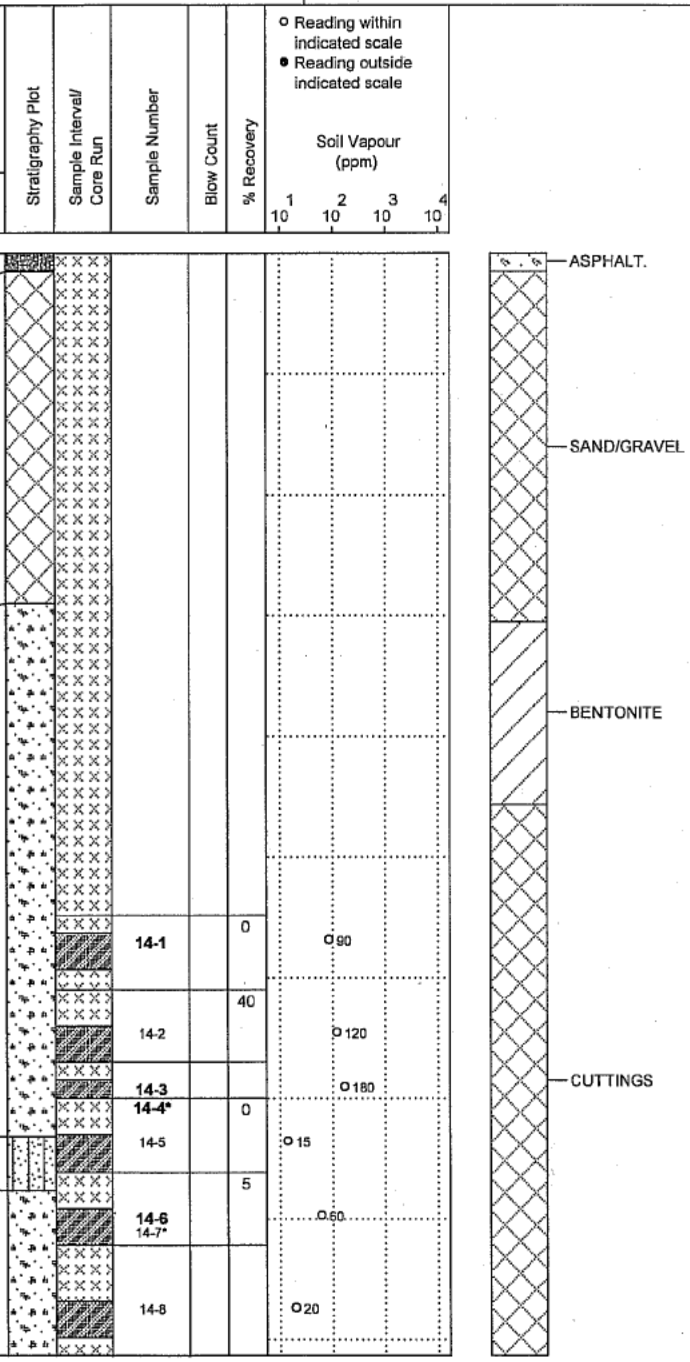
Ground Surf Elev. (m) : 299.566

Project Number : 131416
Borehole Logged By : TD
Date Drilled : 2009 08 27
Log Typed By : TLW

Drilling Legend
▨ Sample Interval
☒ Odex

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Depth in Metres	Soil Description
0	ASPHALT. SAND (FILL), medium to fine grained, silty to some silt, trace gravel, brown, medium dense, damp.
1	
2	
3	Below 2.7 m - some silt, moist. SAND and GRAVEL, medium to coarse grained, trace silt, trace cobbles, brown, medium dense, damp.
4	Between 3.8 and 4.0 m - cobble. Below 4.4 m - dense, moist.
5	
6	Below 5.6 m - grey, hydrocarbon-like odour. Below 5.8 m - wet.
7	SAND, fine grained, silty, trace gravel, brown, dense, damp, no hydrocarbon-like odour.
8	SAND and GRAVEL, medium to coarse grained, some silt to silty, trace cobbles, brown, medium dense, moist. Between 7.9 and 8.4 m - grey, hydrocarbon-like odour.
9	End of borehole at 9.1 m.
10	



Notes:
Bolded sample denotes sample analyzed.
*Sample 14-4 is a blind field duplicate of sample 14-3.
*Sample 14-7 is a blind field duplicate of sample 14-6.

Print Date: 2010 02 12 QA1: PS 2009 10 29 QA2: TD 2010 02 10

SNC•LAVALIN Environment

Client : **Public Works and Gov't Services Canada**

Location : **Pleasant Camp, BC**

Borehole No. : 09-15

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd.
Drilling Method : Odex
Borehole Dia. (m) : 0.10

Ground Surf Elev. (m) : 299.381

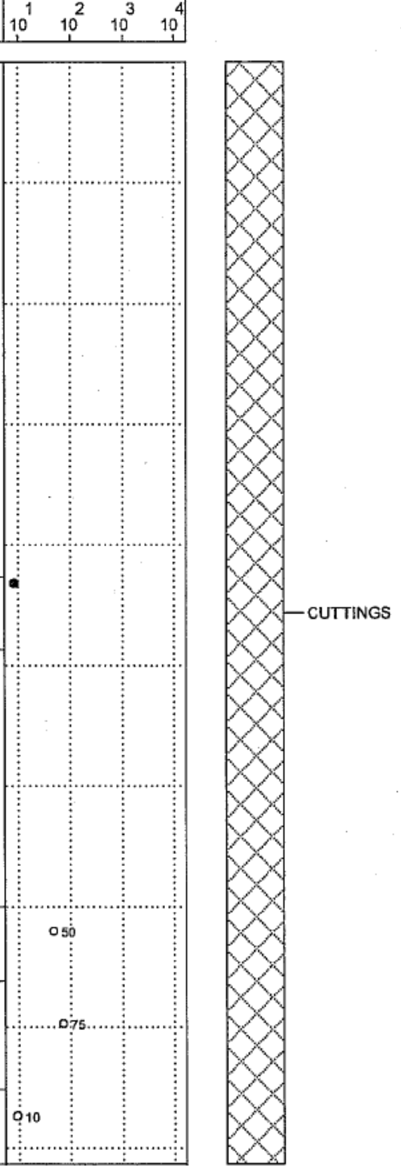
Project Number : 131416
Borehole Logged By : TD
Date Drilled : 2009 08 28
Log Typed By : TLW

Drilling Legend
▨ Sample Interval
☒ Odex

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

○ Reading within indicated scale
● Reading outside indicated scale

Depth in Metres	Soil Description	Sample Number	Blow Count	% Recovery
0	ASPHALT.			
0.1	SAND and GRAVEL (FILL), medium to coarse grained, trace silt, brown, medium dense, damp.			
1.4	SAND, medium to coarse grained, some gravel, trace silt, light brown, loose to medium dense, damp. Below 2.7 m - medium to fine grained sand, some silt, brown, damp.			
4.3	SAND, medium to coarse grained, gravelly, some silt, trace cobbles, dark brown, medium dense, damp.	15-1		100
5.3	SAND, medium to coarse grained, some gravel, light brown, medium dense, damp. Between 6.9 and 7.0 m - cobble.			
7.0	SAND and GRAVEL, medium grained, trace silt, trace cobbles, medium dense, damp.	15-2		0
	Between 7.9 and 8.4 m - grey, hydrocarbon-like odour.	15-3 15-4*		
8.4	SAND, fine grained, silty, trace gravel, brown, medium dense, moist, no hydrocarbon-like odour. Below 8.5 m - some silt, dense, wet.	15-5		100
9.1	End of borehole at 9.1 m.			



Notes:
Bolded sample denotes sample analyzed.
*Sample 15-4 is a blind field duplicate of sample 15-3.

Print Date: 2010 02 12 QA1: PS 2009 10 29 QA2: TD 2010 02 10

SNC•LAVALIN Environment

Client : **Public Works and Gov't Services Canada**

Location : **Pleasant Camp, BC**

Borehole No. : 09-16

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd.
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2009 09 23
Ground Surf Elev. (m) : 300.706
Top of Casing Elev. (m) : 300.593

Project Number : 131416
Borehole Logged By : TD
Date Drilled : 2009 08 28
Log Typed By : TLW

Drilling Legend
▨ Sample Interval
☒ Odex

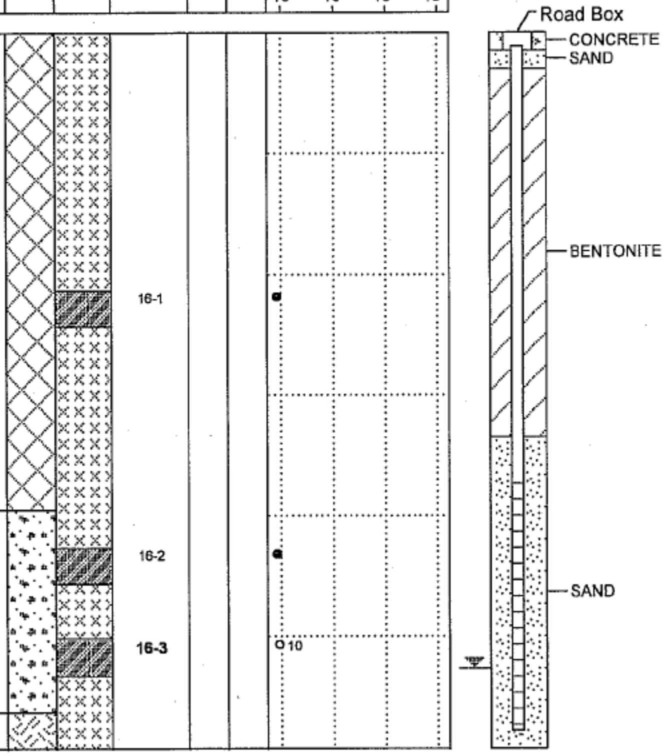
Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: 09-16

Depth in Metres	Soil Description	Sample Number
0	SAND (FILL), medium grained, some gravel, trace silt, brown, loose, damp.	
2	Between 1.8 and 2.1 m - gravelly.	
	Below 2.1 m - medium to coarse grained sand.	16-1
	Below 3.7 and 3.8 m - cobble.	
4	SAND and GRAVEL, coarse grained, trace silt, light brown, medium dense, damp.	16-2
5	Below 4.9 m - medium to coarse grained sand, some silt, trace cobbles, brown.	**16-3**
	Below 5.3 m - trace silt, moist to wet.	
	BEDROCK, angular, light grey, dry, rock chips (granite).	
6	End of borehole at 5.9 m.	



Notes:
Bolded sample denotes sample analyzed.

Print Date: 2010 02 12 QA1: PS 2009 10 29 QA2: TD 2010 02 10

SNC•LAVALIN Environment

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 09-17

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd.
Drilling Method : Odex
Borehole Dia. (m) : 0.10

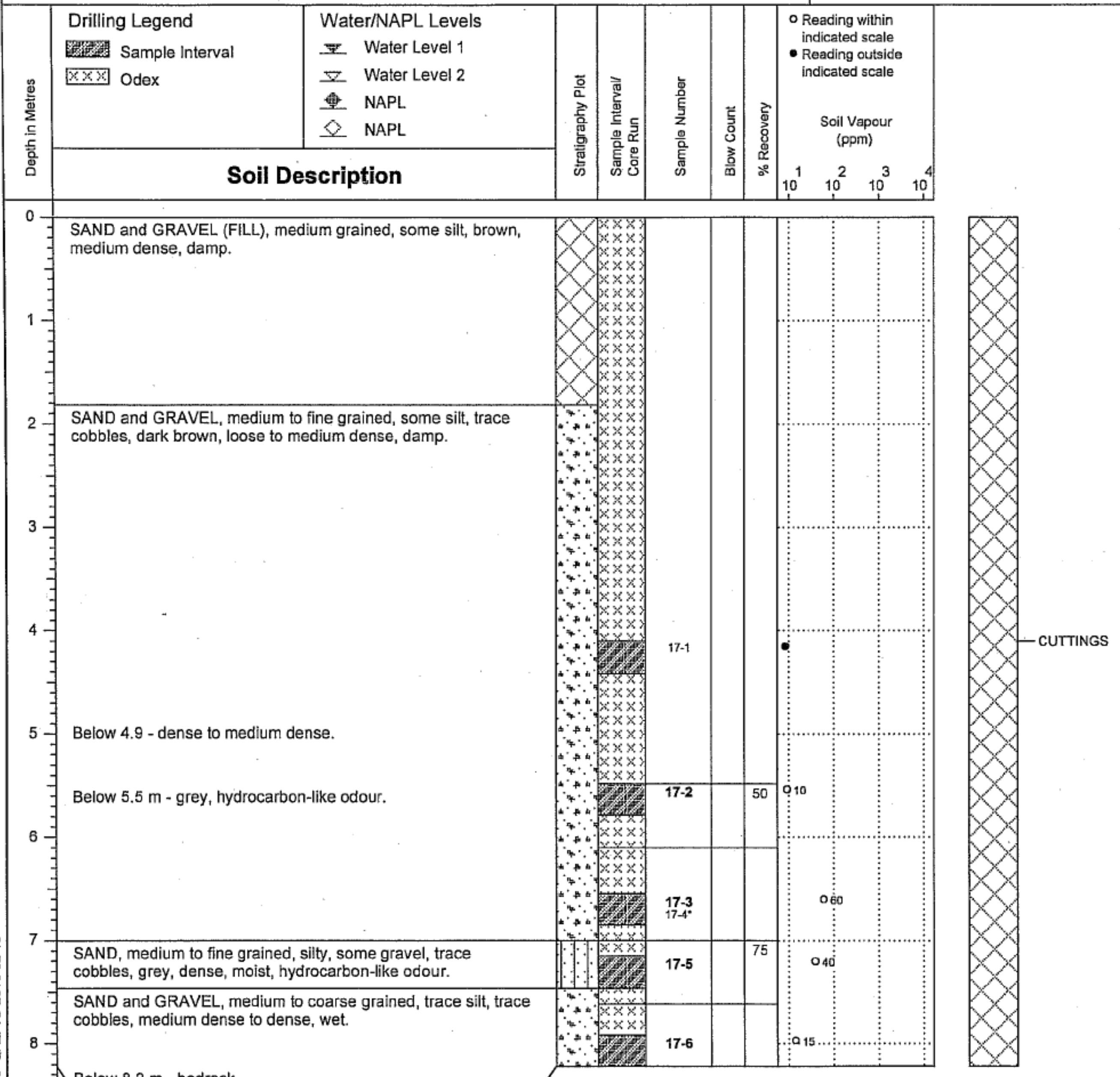
Ground Surf Elev. (m) : 300.164

Project Number : 131416
Borehole Logged By : TD
Date Drilled : 2009 08 28
Log Typed By : TLW

Drilling Legend
▨ Sample Interval
☒ Odex

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

○ Reading within indicated scale
● Reading outside indicated scale



Soil Description

SAND and GRAVEL (FILL), medium grained, some silt, brown, medium dense, damp.

SAND and GRAVEL, medium to fine grained, some silt, trace cobbles, dark brown, loose to medium dense, damp.

Below 4.9 - dense to medium dense.

Below 5.5 m - grey, hydrocarbon-like odour.

SAND, medium to fine grained, silty, some gravel, trace cobbles, grey, dense, moist, hydrocarbon-like odour.

SAND and GRAVEL, medium to coarse grained, trace silt, trace cobbles, medium dense to dense, wet.

Below 8.2 m - bedrock.

End of borehole at 8.2 m.

Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
17-1			●
17-2		50	10
17-3 17-4*			60
17-5		75	40
17-6			15

Notes:
Bolded sample denotes sample analyzed.
*Sample 17-4 is a blind field duplicate of sample 17-3.

Print Date: 2010 02 12 QA1: PS 2009 10 29 QA2: TD 2010 02 10

SNC•LAVALIN Environment

Client : **Public Works and Gov't Services Canada**	**Borehole No. : 09-18**
Location : **Pleasant Camp, BC**	(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd.
Drilling Method : Odex
Borehole Dia. (m) : 0.10

Ground Surf Elev. (m) : 300.325

Project Number : 131416
Borehole Logged By : TD
Date Drilled : 2009 08 29
Log Typed By : TLW

Drilling Legend
▨ Sample Interval
☒ Odex

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Depth in Metres

Soil Description

ASPHALT.

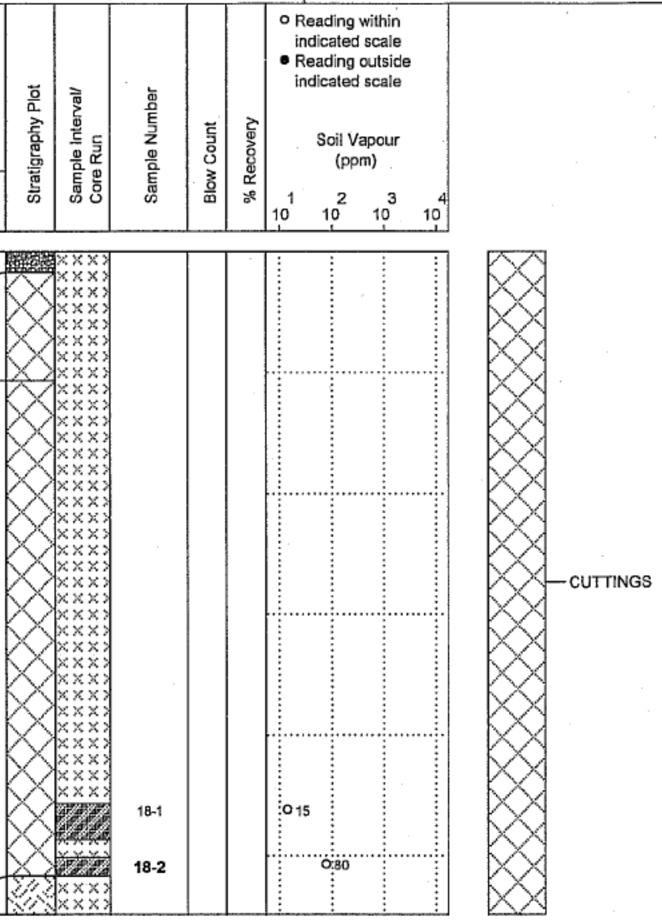
SAND (FILL), medium to fine grained, some gravel, trace silt, brown, medium dense, damp.

SAND and GRAVEL (FILL), medium grained, trace silt, trace cobbles, brown, medium dense, damp.

Below 5.0 m - wet to moist, hydrocarbon-like odour.

BEDROCK.

End of borehole at 5.5 m.



Notes:
Bolded sample denotes sample analyzed.

Print Date: 2010 02 12 QA1: PS 2009 10 29 QA2: TD 2010 02 10

SNC•LAVALIN Environment

Client : **Public Works and Gov't Services Canada**

Location : **Pleasant Camp, BC**

Borehole No. : 09-19

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd.
Drilling Method : Odex
Borehole Dia. (m) : 0.10

Ground Surf Elev. (m) : 299.617

Project Number : 131416
Borehole Logged By : TD
Date Drilled : 2009 08 29
Log Typed By : TLW

Drilling Legend
- ▨ Sample Interval
- ☒ Odex

Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

Depth in Metres

Soil Description

SAND (FILL), fine to medium grained, some silt to silty, some gravel, brown, loose to medium dense, damp.

SAND, medium to coarse grained, some gravel, trace silt, brown, loose, damp.

SAND and GRAVEL, medium to coarse grained, trace silt, trace cobbles, brown, medium dense, damp.

Below 5.2 m - hydrocarbon-like odour.

Below 5.6 m - grey.

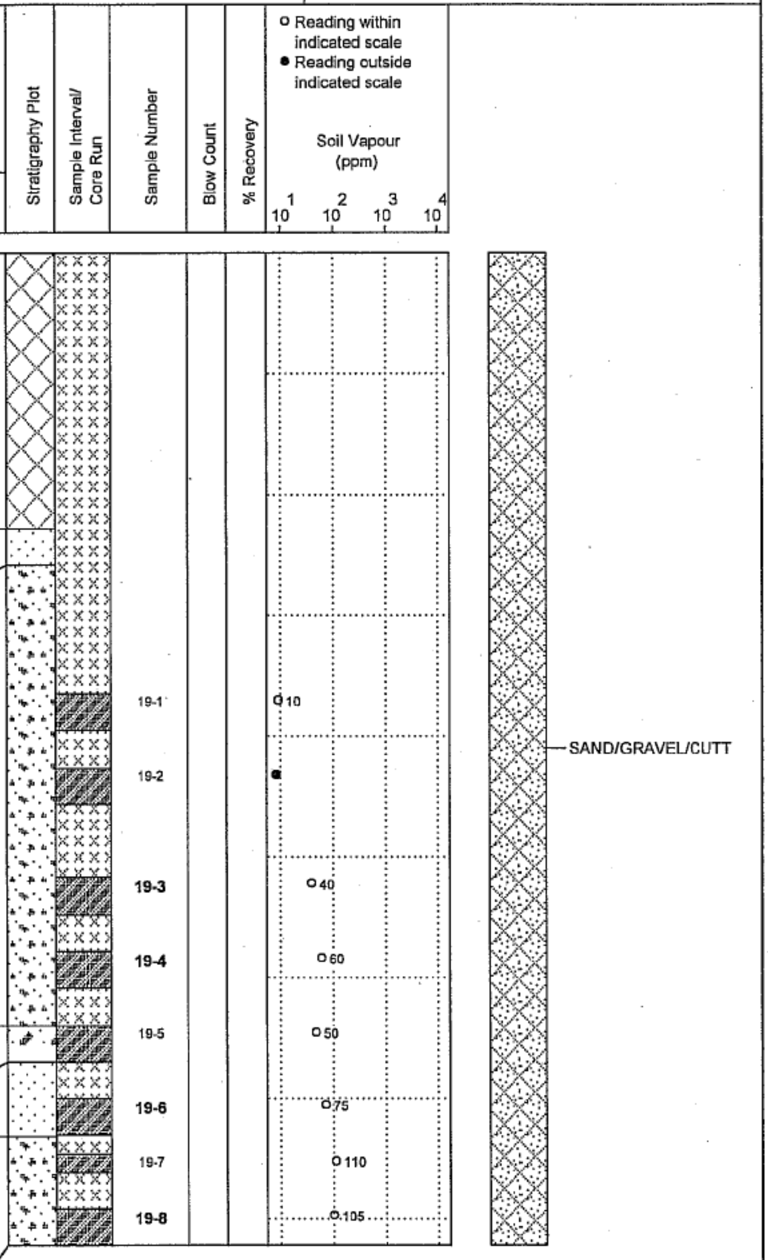
SAND (TILL-LIKE), fine grained, silty, trace gravel, brown, dense to very dense, damp, no hydrocarbon-like odour.

SAND, medium to fine grained, some gravel to gravelly, trace silt, grey, dense, damp, hydrocarbon-like odour.

SAND and GRAVEL, medium to coarse grained, trace silt, trace cobbles, grey, medium dense to dense, moist to wet.

Below 8.2 m - bedrock.

End of borehole at 8.2 m.



Sample Number	Soil Vapour (ppm)
19-1	10
19-2	●
19-3	40
19-4	60
19-5	50
19-6	75
19-7	110
19-8	105

Depth scale: 0 1 2 3 4 5 6 7 8 9 10

Notes:
Bolded sample denotes sample analyzed.

Print Date: 2010 02 12 QA1: PS 2009 10 29 QA2: TD 2010 02 10

SNC•LAVALIN Environment

Client : **Public Works and Gov't Services Canada**

Location : **Pleasant Camp, BC**

Borehole No. : 09-20

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd.
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2009 09 23
Ground Surf Elev. (m) : 300.713
Top of Casing Elev. (m) : 300.664

Project Number : 131416
Borehole Logged By : TD
Date Drilled : 2009 08 31
Log Typed By : TLW

Drilling Legend
- ▨ Sample Interval
- ☒ Odex

Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: 09-20

Soil Description

SAND and GRAVEL (FILL), fine to coarse grained, some silt, trace cobbles, brown, loose to medium dense, damp.

Below 2.1 m - trace silt.
Between 2.1 and 2.4 m - grey.

Below 3.7 m - grey, medium dense.
Below 4.0 m - brown.

Below 4.6 m - moist.
Below 4.7 m - dense.
Between 5.0 and 5.4 m - boulder.

SAND, fine to coarse grained, silty to some silt, some gravel, brown, medium dense, wet to moist.

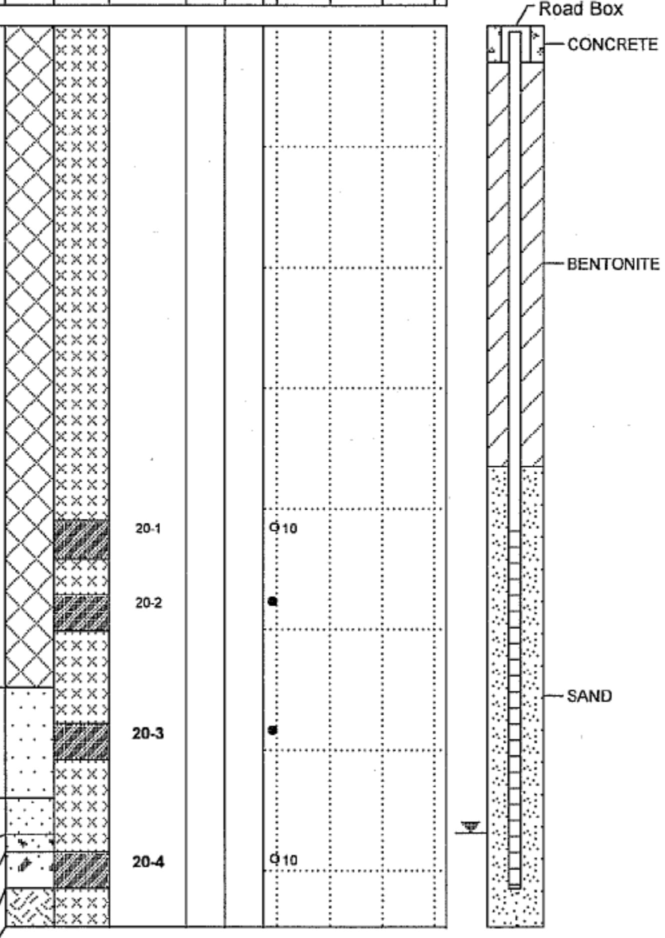
SAND, medium to coarse grained, gravelly, trace silt, loose to medium dense, moist.

SAND and GRAVEL, medium to coarse grained, trace silt, medium dense, damp to moist.

SAND (TILL-LIKE), fine grained, silty, trace gravel, dense to very dense, damp.

BEDROCK.

End of borehole at 7.5 m.



Notes:
Bolded sample denotes sample analyzed.

Print Date: 2010 02 12 QA1: PS 2009 10 29 QA2: TD 2010 02 10

SNC•LAVALIN Environment

Client : **Public Works and Gov't Services Canada**

Location : **Pleasant Camp, BC**

Borehole No. : 09-21

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd.
Drilling Method : Odex
Borehole Dia. (m) : 0.10

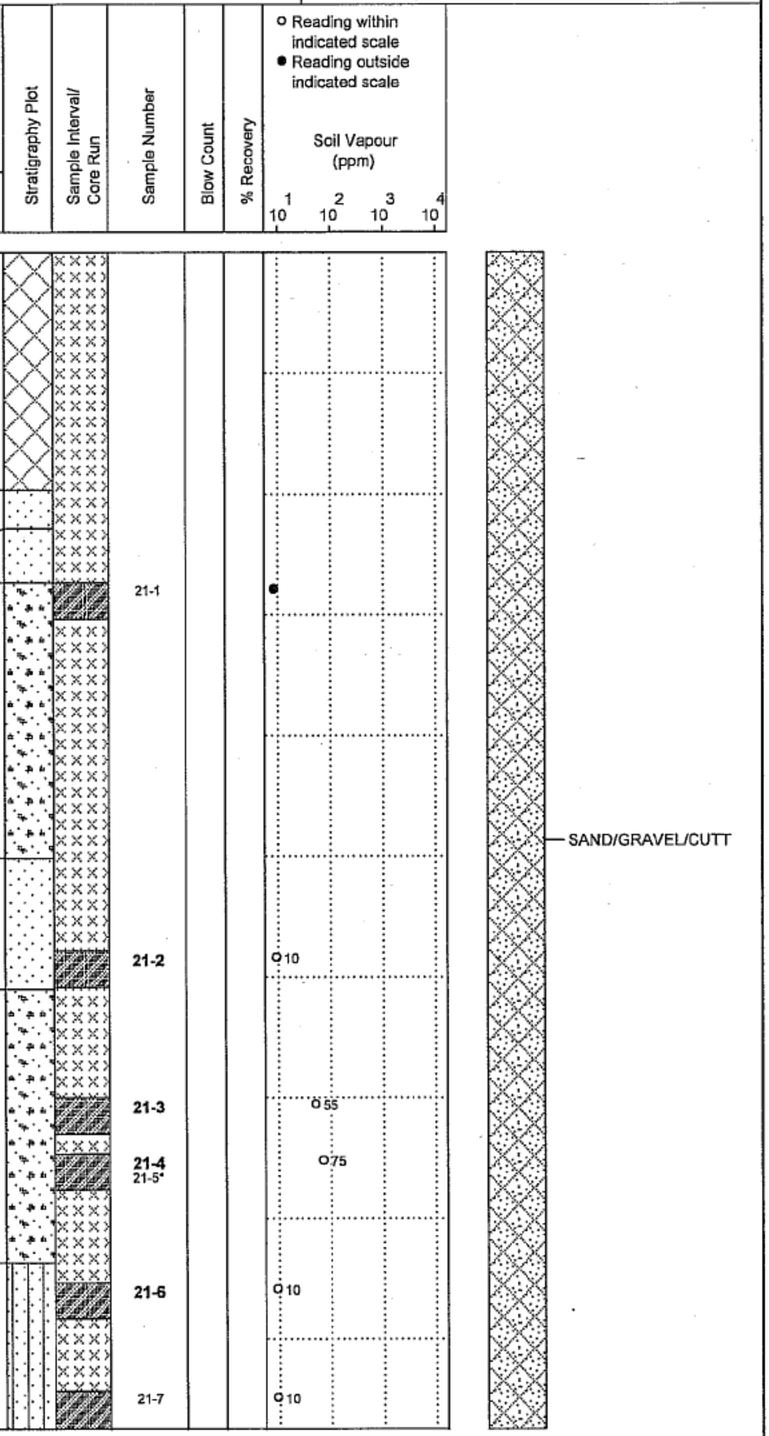
Ground Surf Elev. (m) : 298.769

Project Number : 131416
Borehole Logged By : TD
Date Drilled : 2009 08 31
Log Typed By : TLW

Drilling Legend
- ▨ Sample Interval
- ☒ Odex

Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

○ Reading within indicated scale
● Reading outside indicated scale



Depth in Metres	Soil Description	Sample Number	Soil Vapour (ppm)
0	SAND and GRAVEL (FILL), medium grained, trace silt, trace cobbles, brown, loose, damp, trace organics (rootlets).		
1	Below 0.9 m - no organics.		
2	SAND, fine grained, some silt, some gravel, light brown, medium dense, dry.		
	SAND, medium grained, some gravel, trace silt, brown, medium dense, damp.		
3	SAND and GRAVEL, medium grained, some to trace silt, trace cobbles, brown, medium dense, damp.	21-1	●
5	SAND, medium to coarse grained, gravelly, some silt, trace cobbles, brown, medium dense, damp.		
6	Below 5.8 m - some gravel, grey.	**21-2**	○10
	SAND and GRAVEL, medium to coarse grained, trace silt, trace cobbles, brown, medium dense, damp. Between 6.4 and 6.6 m - cobble.		
7	Below 7.0 m - grey, hydrocarbon-like odour.	**21-3**	○55
	Below 7.3 m - moist.	**21-4** 21-5*	○75
	Below 7.6 m - wet.		
8			
	SAND, medium to fine grained, silty, trace gravel, brown, medium dense to dense, damp to moist.	**21-6**	○10
9	Below 9.0 m - till-like, grey, dense.		
		21-7	○10
10	End of borehole at 9.8 m.		

Notes:
Bolded sample denotes sample analyzed.
*Sample 21-5 is a blind field duplicate of sample 21-4.

Print Date: 2010 02 12 QA1: PS 2009 10 29 QA2: TD 2010 02 10

Air Sparging Wells

SNC•LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : AS-1

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 299.775
Top of Casing Elev. (m) : 299.652

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2004 10 16
Log Typed By : JS

Drilling Legend
☒ Odex

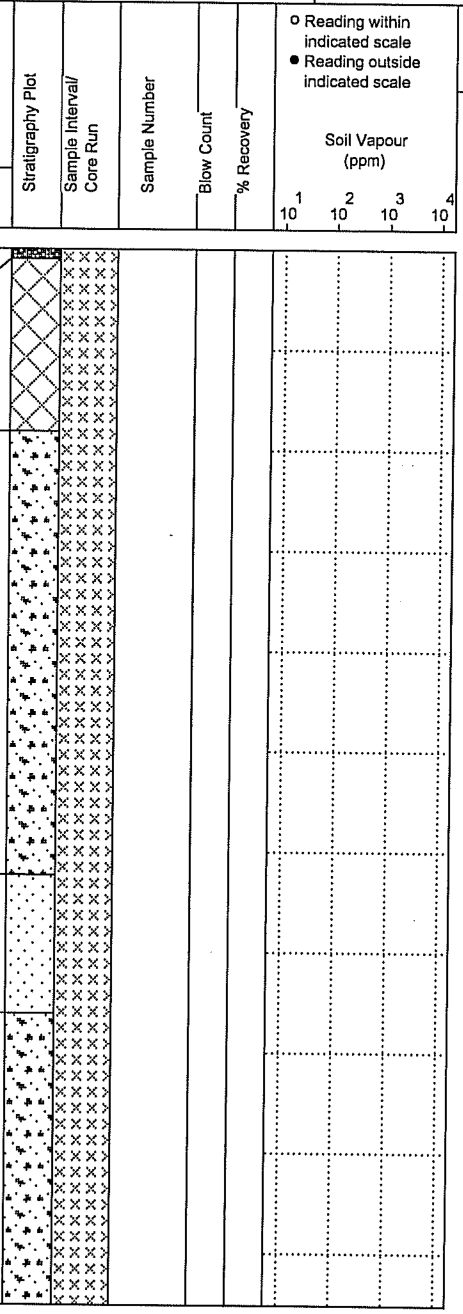
Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

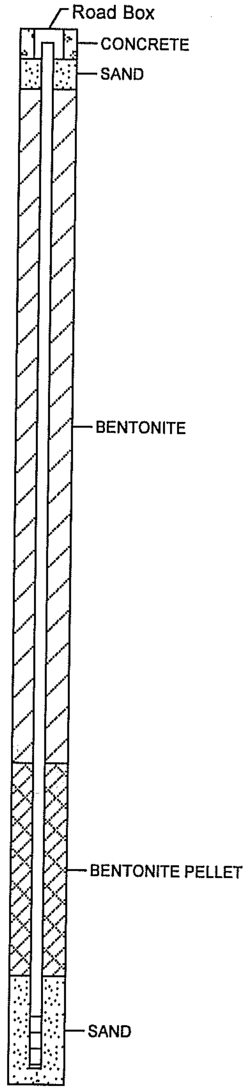
○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: AS-1

Depth in Metres	Soil Description
0	ASPHALT
	SAND and GRAVEL (FILL), medium grained, some silt, some cobbles, brown, medium dense to dense, dry.
2	SAND and GRAVEL, medium to fine grained, some cobbles, medium brown, some cobbles, damp. At 2.3 m - cobbley. At 3.7 m - cobbley. At 4.7 m - boulders with voids.
6	SAND, coarse grained, some gravel, trace cobbles, medium brown, medium dense, moist. At 6.9 m - boulders and silt. At 7.2 m - hydrocarbon-like odour. At 7.3 m - no hydrocarbon-like odour.
7.5	SAND and GRAVEL, fine to coarse, silty, trace to some cobbles, dense, saturated.
10.5	End of borehole at 10.5 m.





Notes:
1 x ORC installed on October 19, 2004

Print Date: 2008 07 21, Date Approved: 2005 07 06

SNC•LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : AS-2

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 299.987
Top of Casing Elev. (m) : 299.874

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2004 10 16
Log Typed By : JS

Drilling Legend
▨ Odex

Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

○ Reading within indicated scale
● Reading outside indicated scale

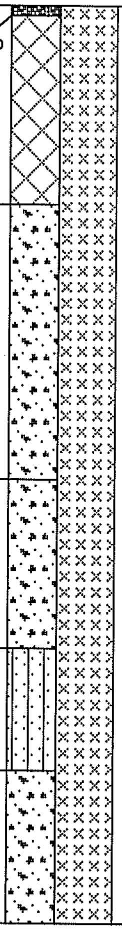
Soil Vapour (ppm): 10^1 10^2 10^3 10^4

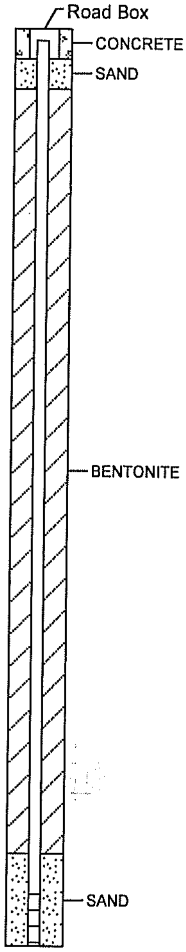
Solid PVC
Slotted PVC

Well Name: AS-2

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval/ Core Run	Sample Number	Blow Count	% Recovery
0	ASPHALT					
0–2	SAND and GRAVEL (FILL), medium grained, some silt, medium to light brown, dense to very dense, dry. At 1.4 m - medium brown,					
2–4.5	SAND and GRAVEL, medium to fine grained, some silt, trace cobbles, dark brown, medium dense, damp. Between 2.6 to 3.5 m - boulders. Between 3.7 to 4.3 m - boulder.					
4.5–6.2	SAND and GRAVEL, medium to fine grained, some silt, trace cobbles, dark grey to medium brown, dense to medium dense, damp. Between 4.9 to 5.2 m - cobbley. At 5.5 m - hydrocarbon-like odour.					
6.2–7.4	SAND, medium to fine grained, silty, trace cobbles and gravel, dark brown to dark grey, dense to very dense, moist to wet. At 7.0 m - saturated.					
7.4–9.1	SAND and GRAVEL, fine to coarse, trace to some silt, medium brown/grey, compact, saturated.					

End of borehole at 9.1 m.





Notes:
1 x ORC installed on October 19, 2004

Print Date: 2008 07 21, Date Approved: 2005 07 06

SNC•LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : AS-3

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 300.154
Top of Casing Elev. (m) : 300.025

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2004 10 17
Log Typed By : JS

Drilling Legend
☒ Odex

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
◇ NAPL

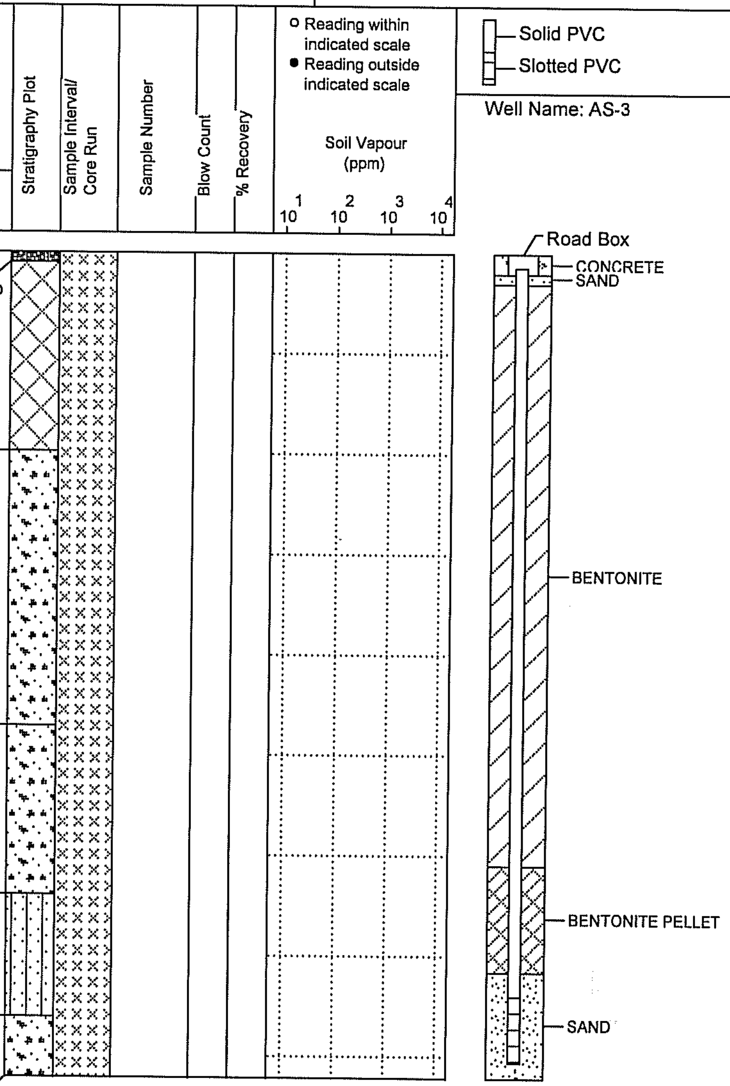
○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: AS-3

Depth in Metres	Soil Description
0	ASPHALT
0–2	SAND and GRAVEL (FILL), medium grained, some silt, medium to light brown, dense to very dense, dry. At 1.4 m - medium brown,
2–4.7	SAND and GRAVEL, medium to fine grained, some silt, trace cobbles, dark brown, medium dense, damp. Between 2.6 to 3.5 m - boulders. Between 3.7 to 4.3 m - boulder.
4.7–6.4	SAND and GRAVEL, medium to fine grained, some silt, trace cobbles, dark grey to medium brown, dense to medium dense, damp. Between 4.9 to 5.2 m - cobbley. At 5.5 m - hydrocarbon-like odour.
6.4–7.6	SAND, medium to fine grained, silty, trace cobbles and gravel, dark brown to dark grey, dense to very dense, moist to wet. At 7.0 m - saturated.
7.6–8.2	SAND and GRAVEL, fine to coarse, trace to some silt, medium/grey, compact, saturated. Below 8.2 m - bedrock.

End of borehole at 8.2 m.



Depth in Metres: 0 1 2 3 4 5 6 7 8 9 10 11 12

Notes:
2 x ORC installed on October 19, 2004

Print Date: 2008 07 21, Date Approved: 2005 07 06

SNC·LAVALIN Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : AS-4

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 300.014
Top of Casing Elev. (m) : 299.864

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2004 10 17
Log Typed By : JS

Drilling Legend
▨ Odex

Water/NAPL Levels
▼ Water Level 1
▽ Water Level 2
◆ NAPL
◇ NAPL

○ Reading within indicated scale
● Reading outside indicated scale

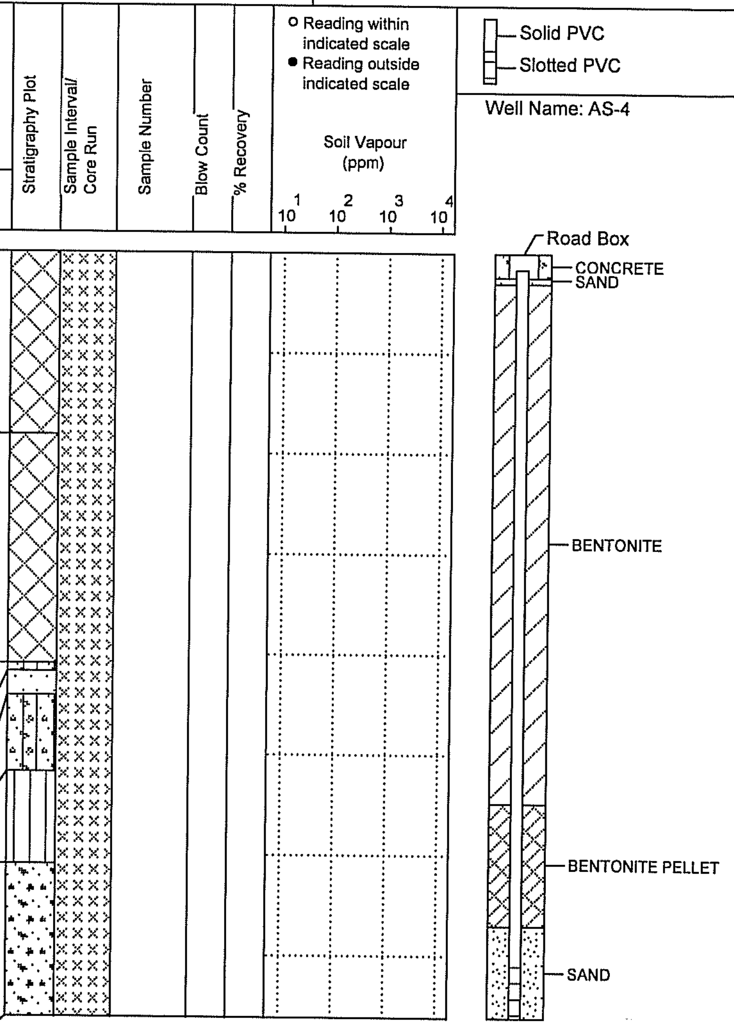
Solid PVC
Slotted PVC

Well Name: AS-4

Depth in Metres

Soil Description

Depth in Metres	Soil Description
0	SAND, (FILL), fine sand, gravelly, trace silt, orange brown.
2	SAND and GRAVEL, (FILL), medium sand, angular gravel, medium brown.
4	GRAVEL and SILT, gravel composed of black shale with orange oxidized fractures. Possibly local material used as fill.
	SAND, coarse quartzite sand, medium grey to black and white. Slight hydrocarbon-like odour detected.
5	GRAVEL and SILT, gravel composed of sericite schist. Possibly local material used as fill.
	SILT and clay, some gravel, grey, firm, moist, no hydrocarbon-like odour detected.
6	SAND and GRAVEL, fine to coarse, trace silt, dark grey, compact, moist, strong hydrocarbon-like odour. Below 6.3 m - saturated, sheen on water.
7	Below 7.6 m - bedrock (granite).
8	End of borehole at 7.6 m.



Notes:
2 x ORC installed on October 19, 2004

Print Date: 2008 07 21, Date Approved: 2005 07 06

SNC·LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : AS-5

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 300.242
Top of Casing Elev. (m) : 300.139

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2004 10 17
Log Typed By : JS

Drilling Legend
☒ Odex

Water/NAPL Levels
▼ Water Level 1
▽ Water Level 2
◆ NAPL
◇ NAPL

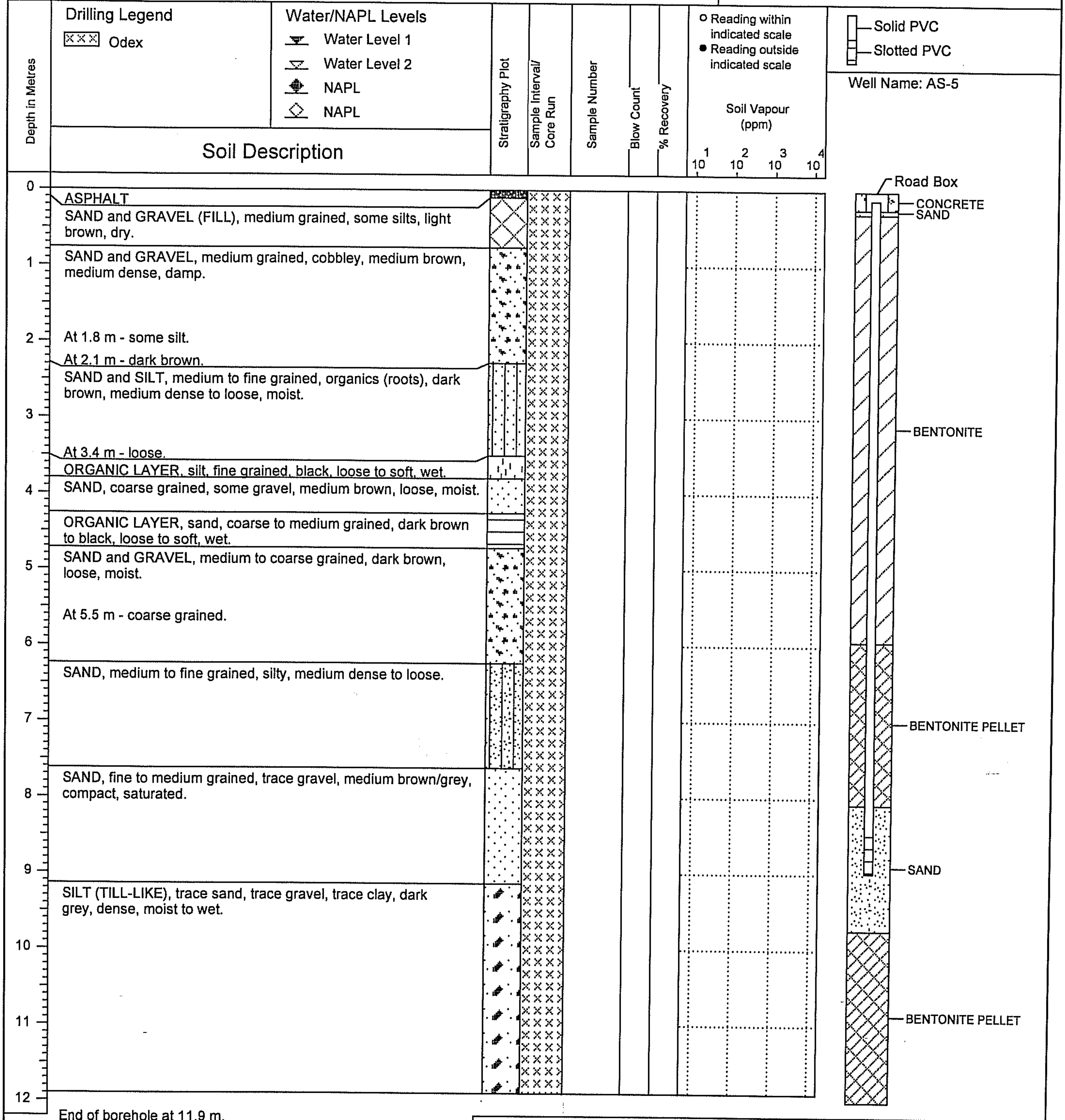
○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: AS-5

Depth in Metres	Soil Description
	ASPHALT
	SAND and GRAVEL (FILL), medium grained, some silts, light brown, dry.
	SAND and GRAVEL, medium grained, cobbley, medium brown, medium dense, damp. At 1.8 m - some silt. At 2.1 m - dark brown.
	SAND and SILT, medium to fine grained, organics (roots), dark brown, medium dense to loose, moist. At 3.4 m - loose.
	ORGANIC LAYER, silt, fine grained, black, loose to soft, wet.
	SAND, coarse grained, some gravel, medium brown, loose, moist.
	ORGANIC LAYER, sand, coarse to medium grained, dark brown to black, loose to soft, wet.
	SAND and GRAVEL, medium to coarse grained, dark brown, loose, moist. At 5.5 m - coarse grained.
	SAND, medium to fine grained, silty, medium dense to loose.
	SAND, fine to medium grained, trace gravel, medium brown/grey, compact, saturated.
	SILT (TILL-LIKE), trace sand, trace gravel, trace clay, dark grey, dense, moist to wet.

End of borehole at 11.9 m.



Notes:
1 x ORC installed on October 19, 2004

Print Date: 2008 07 21, Date Approved: 2005 07 06

SNC·LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : AS-6

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 299.169
Top of Casing Elev. (m) : 299.068

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2004 10 17
Log Typed By : JS

Drilling Legend
☒ Odex

Water/NAPL Levels
▼ Water Level 1
▽ Water Level 2
◆ NAPL
◇ NAPL

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: AS-6

Depth in Metres | Soil Description | Stratigraphy Plot | Sample Interval/ Core Run | Sample Number | Blow Count | % Recovery | Soil Vapour (ppm) 10^1 10^2 10^3 10^4

ASPHALT

SAND and GRAVEL, medium to coarse grained, medium brown, medium dense to dense, dry.
Between 0.8 to 1.2 m - boulders.

SAND and SILT, medium to fine grained, cobbley, some gravel, medium brown, dense, dry.
Between 2.3 to 2.7 m - cobbles.

SAND and GRAVEL, medium to coarse grained, trace silt, dark brown, medium dense, moist.

SAND, medium to coarse grained, some gravel, trace silt, dark brown, medium dense to loose, moist.

SAND and SILT, medium to fine grained, organics (roots), dark brown to black, loose to soft, moist.

COBBLES and SAND, medium grained, grey, medium dense, damp.

SAND and GRAVEL, medium grained, dark brown, medium dense to loose, damp to moist.

SAND, medium to coarse grained, some gravel, medium brown, medium dense, damp.
At 6.4 m - some cobbles and boulders.

SAND and GRAVEL, medium grained, trace cobbles, grey, medium dense, damp, slight hydrocarbon-like odour.

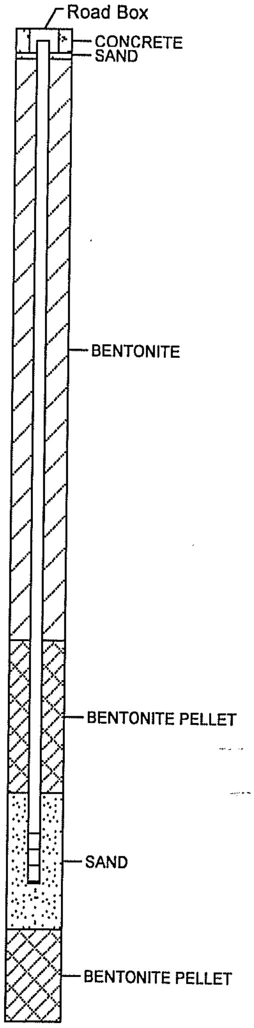
SAND and GRAVEL, medium grained, some silt, trace cobbles, medium brown, medium dense, damp. (BOULDER).

SAND and GRAVEL, fine to coarse, trace silt, trace cobbles, dark grey, dense, saturated, strong hydrocarbon-like odour.

SILT (TILL-LIKE), trace sand, trace gravel, medium grey, dense.

End of borehole at 9.9 m.

0 1 2 3 4 5 6 7 8 9 10 11 12



Notes:
1 x ORC installed on October 19, 2004

Print Date: 2008 07 21, Date Approved: 2005 07 06

SNC·LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : AS-7

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 299.579
Top of Casing Elev. (m) : 299.469

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2004 10 18
Log Typed By : JS

Drilling Legend
☒ Odex

Water/NAPL Levels
▼ Water Level 1
▽ Water Level 2
◆ NAPL
◇ NAPL

Depth in Metres

Soil Description

SAND, (FILL), fine sand, gravelly, trace silt, orange brown.

SAND and GRAVEL, (FILL), medium sand, angular gravel, medium brown.

GRAVEL and SILT, gravel composed of black shale with orange oxidized fractures. Possibly local material used as fill.

SAND, coarse quartzite sand, medium grey to black and white. Slight hydrocarbon-like odour detected.

GRAVEL and SILT, gravel composed of sericite schist. Possibly local material used as fill.

SILT and clay, some gravel, grey, firm, moist, no hydrocarbon-like odour detected.

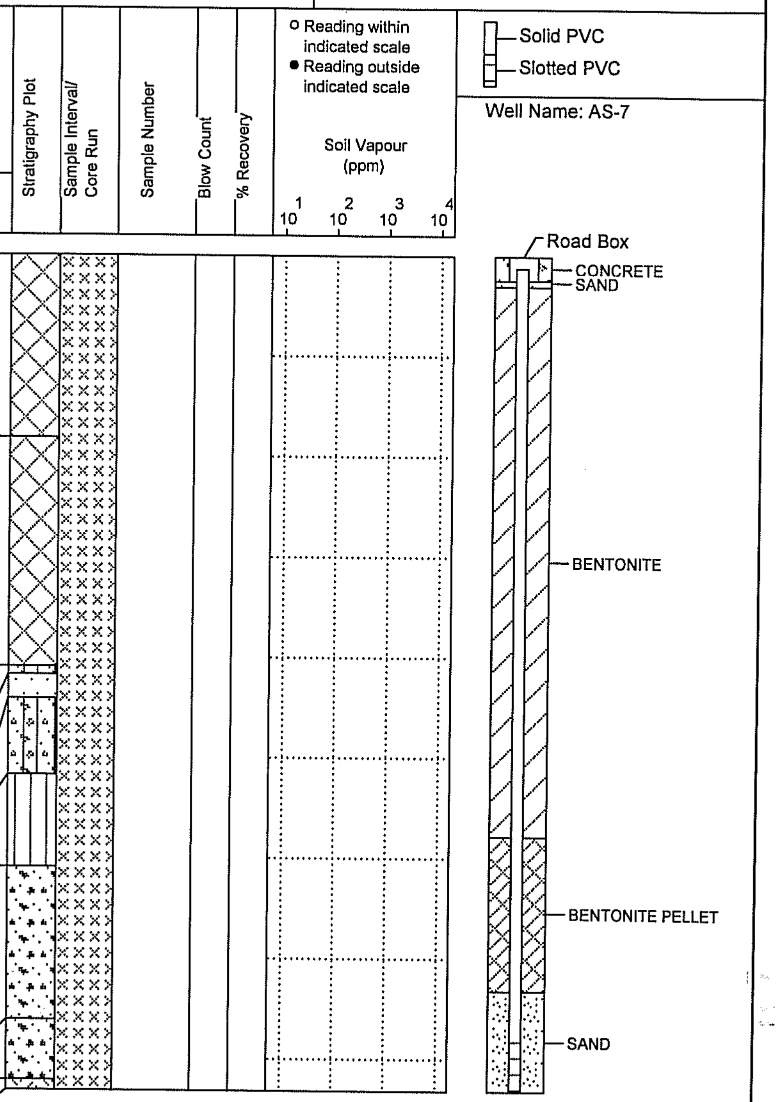
SAND and GRAVEL, fine to coarse, trace silt, dark grey, compact, moist, strong hydrocarbon-like odour.
Below 6.3 m - saturated, sheen on water.

Below 7.6 m - bedrock (granite).

SAND and GRAVEL, fine to coarse, trace silt, trace cobbles, dark grey, compact, saturated, hydrocarbon-like odour.

BEDROCK (GRANITE).

End of borehole at 8.2 m.



0
1
2
3
4
5
6
7
8
9
10
11
12

Notes:
2 x ORC installed on October 19, 2004

Print Date: 2008 07 21, Date Approved: 2005 07 06

SNC•LAVALIN Morrow Environmental

Client : **Public Works and Gov't Services Canada**

Location : **Pleasant Camp, BC**

Borehole No. : AS-8

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 299.119
Top of Casing Elev. (m) : 298.994

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2004 10 18
Log Typed By : JS

Drilling Legend
▨ Odex

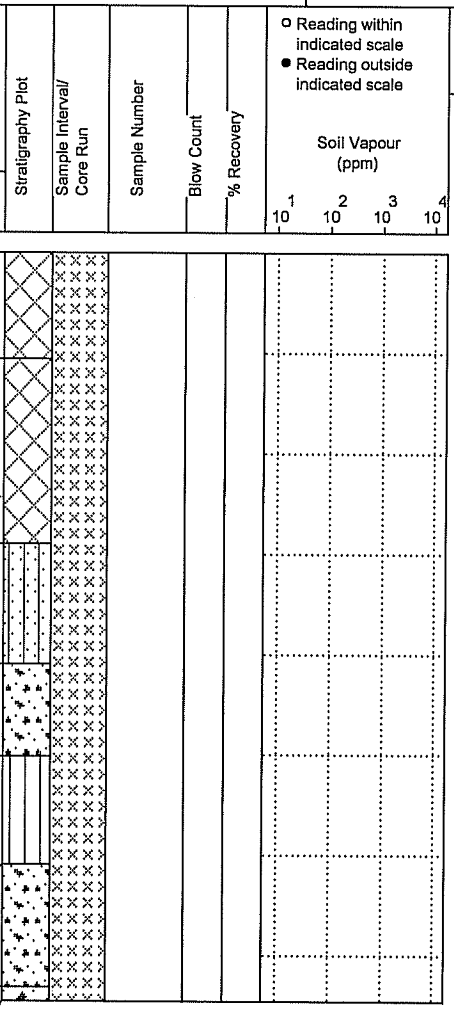
Water/NAPL Levels
▼ Water Level 1
▽ Water Level 2
◆ NAPL
◇ NAPL

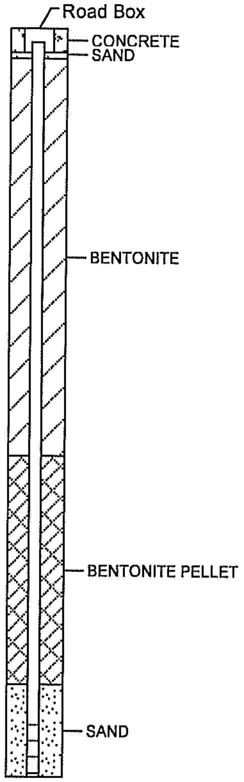
○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: AS-8

Depth in Metres	Soil Description
0	SAND, (TOPSOIL), trace gravel, reddish brown.
1	SAND and GRAVEL, (FILL), angular gravel, trace clay, grey brown, loose, dry.
2	
	SAND, medium grained, trace gravel, brown, dry.
3	SILT and SAND, some gravel, trace clay, brown grey, soft, dry, black and white sand/rocks from 2.97 m to 3.05 m. Silt content decreasing with depth to Silty SAND below 3.65 m.
4	GRAVEL and COBBLES, sandy, silty, some clay, fine angular gravel, grey brown, wet.
5	SILT and SAND, some gravel, some cobbles, trace to some clay, brown grey, soft, wet to 5.5 m.
6	Slight hydrocarbon-like odour at 5.8 m. Grey soils below this depth.
	SAND and GRAVEL, fine to coarse, trace silt, trace cobbles, compact, saturated.
7	
	SILT (TILL-LIKE), trace sand, trace gravel, medium grey, dense, damp.
8	End of borehole at 7.9 m.
9	
10	
11	
12	





Notes:
2 x ORC installed on October 19, 2004

Print Date: 2008 07 21, Date Approved: 2005 07 06

SNC•LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : AS-9

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 299.483
Top of Casing Elev. (m) : 299.383

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2005 09 08
Log Typed By : LL

Drilling Legend
- ▨ Sample Interval
- ▧ Split Spoon
- ▪▪▪ No Recovery
- ☒ Odex

Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- ◇ NAPL

Depth in Metres

Soil Description

ASPHALT.

SAND and GRAVEL (FILL), fine to medium grained, light brown, compact, dry.

At 2.1 m - boulder.

SAND, silty, medium brown, compact, moist.

Below 3.0 m - trace to some silt, fine to coarse grained, damp to moist.

SAND and GRAVEL, fine to coarse grained, trace silt, compact, moist.

At 4.6 m - boulder.

SAND, fine to medium grained, silty, trace gravel, medium brown-grey, compact, moist.

Between 6.3 m and 6.6 m - sand and gravel lens.

Below 7.3 m - moist to wet.

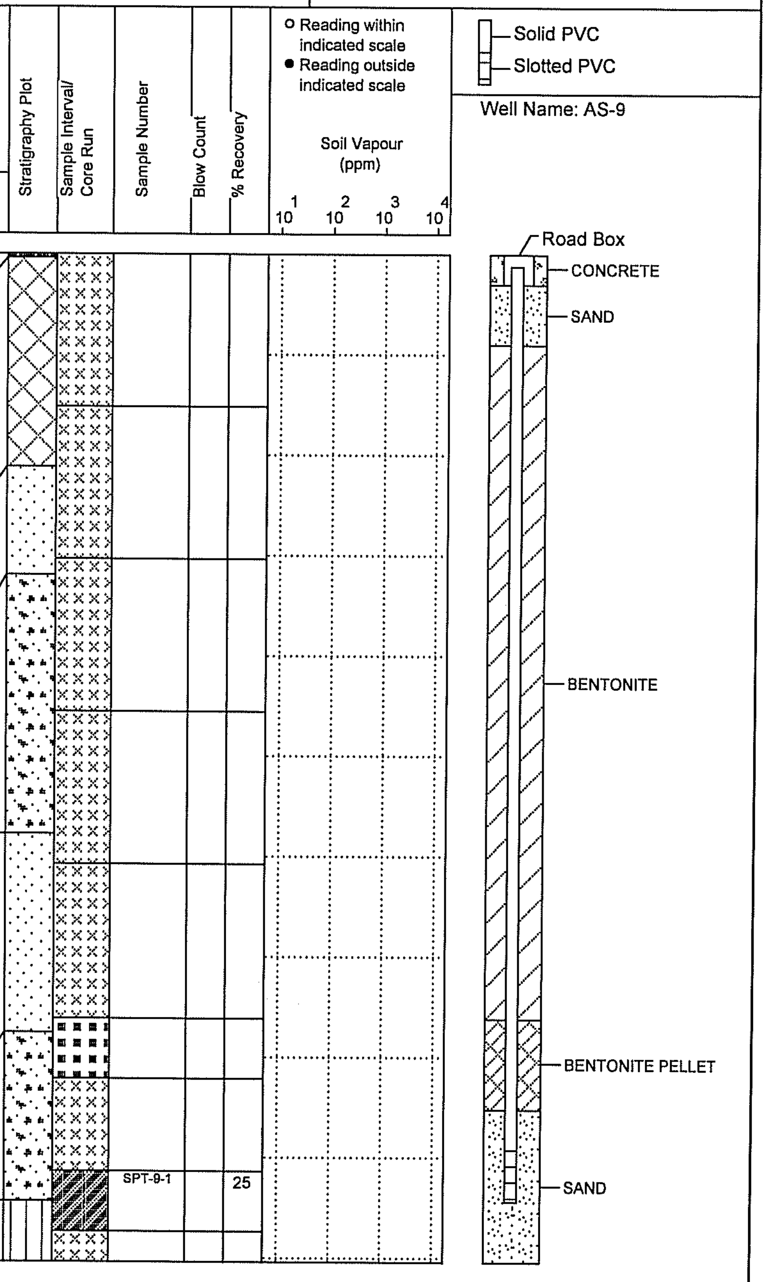
At 7.8 m - boulder.

SAND and GRAVEL, fine to coarse grained, trace silt, medium brown-grey, compact, wet.

Below 8.2 m - medium grey, wet to saturated, faint hydrocarbon-like odour.

SILT, trace to some sand, trace gravel, medium grey, stiff, moist to damp.

End of borehole at 10.1 m.



0 1 2 3 4 5 6 7 8 9 10 11 12

Notes:
Bolded sample denotes sample analyzed.
Remediation well: soil samples not collected. Soils logged via air return - split spoon samples taken for soil confirmation purposes only.
No recovery in split spoon (7.6 m - 8.2 m).

SNC·LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : AS-10

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 299.703
Top of Casing Elev. (m) : 299.623

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2005 09 08
Log Typed By : LL

Drilling Legend
- ▨ Sample Interval
- ▨ Split Spoon
- ☒ Odex

Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

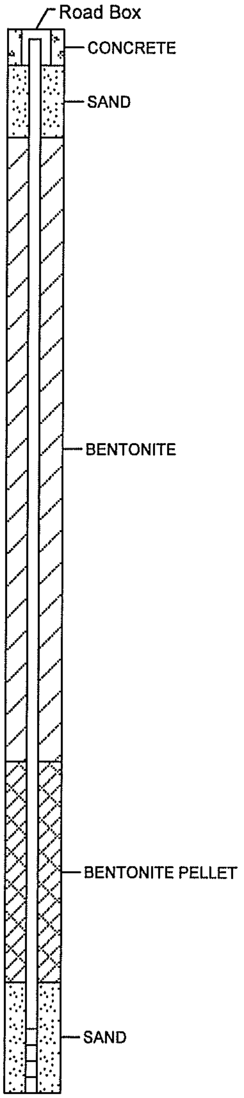
○ Reading within indicated scale
● Reading outside indicated scale

Soil Vapour (ppm): 10^1 10^2 10^3 10^4

Solid PVC
Slotted PVC

Well Name: AS-10

Depth in Metres	Soil Description	Sample Number	Blow Count	% Recovery
0	ASPHALT.			
	SAND and GRAVEL (FILL), fine to medium grained, trace to some cobbles, medium brown-grey, compact, dry to damp.			
	SAND, gravelly, trace silt, trace cobbles, medium brown-grey, compact to dense.			
	SAND, silty, trace gravel, medium brown, compact, moist to wet.	SPT-10-1		50
	SAND and GRAVEL, fine to coarse grained, trace to some silt, medium grey, compact, saturated.	SPT-10-2		50
		SPT-10-3		25
	End of borehole at 8.8 m.			



Notes:
Bolded sample denotes sample analyzed.
Remediation well: soil samples not collected. Soils logged via air return - split spoon samples taken for soil confirmation purposes only.

Print Date: 2008 07 21, Date Approved: 2006 10 31

SNC·LAVALIN Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : AS-11

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 300.31
Top of Casing Elev. (m) : 299.778

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2005 09 09
Log Typed By : LL

Drilling Legend
▨ Odex

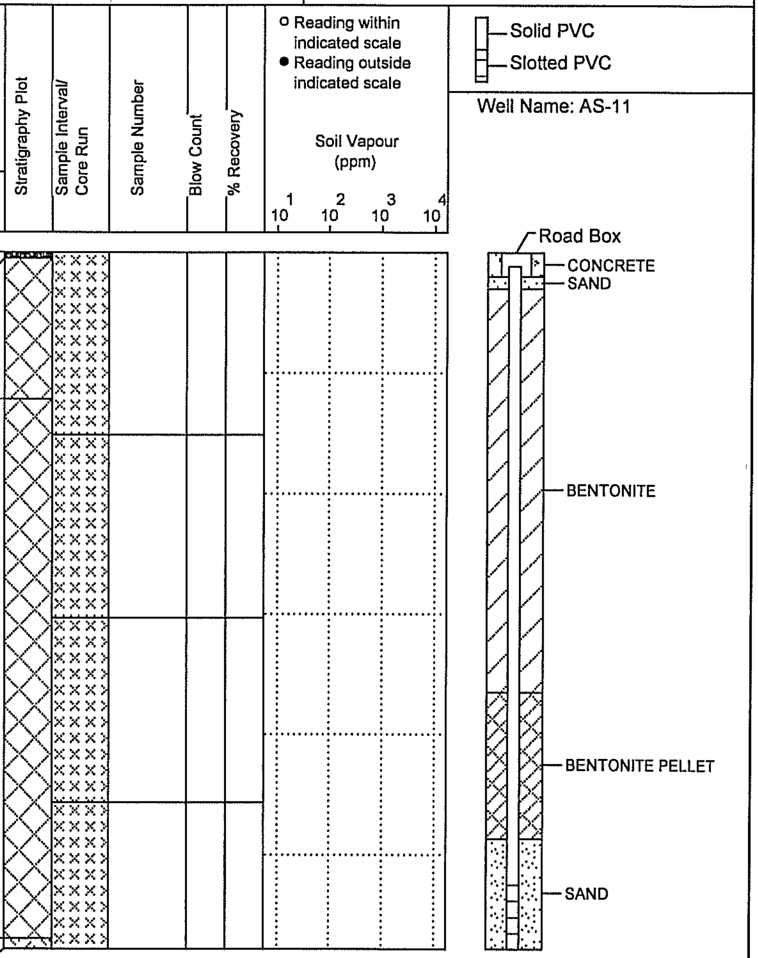
Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: AS-11

Depth in Metres	Soil Description
0	ASPHALT.
	SAND (FILL), fine grained, trace to some gravel, trace silt, orange brown, loose to compact, damp.
1.2	SAND and GRAVEL (FILL), fine to medium grained, medium brown. Between 3.7 m and 4.3 m - some cobbles. Below 4.6 m - some silt to silty. Below 5.3 m - slight to moderate hydrocarbon-like odour.
5.8	BEDROCK.
	End of borehole at 5.8 m.



Notes:
Bolded sample denotes sample analyzed.
Remediation well: soil samples not collected. Soils logged via air return - split spoon samples taken for soil confirmation purposes only.

Print Date: 2008 07 21, Date Approved: 2006 10 31

SNC•LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : AS-12

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 300.485
Top of Casing Elev. (m) : 300.365

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2005 09 09
Log Typed By : LL

Drilling Legend
☒ Odex

Water/NAPL Levels
▼ Water Level 1
▽ Water Level 2
◆ NAPL
◇ NAPL

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: AS-12

Depth in Metres | Soil Description | Stratigraphy Plot | Sample Interval/ Core Run | Sample Number | Blow Count | % Recovery | Soil Vapour (ppm)

0 ASPHALT.

SAND and GRAVEL (FILL), medium to fine grained, some silt, trace cobbles, light to medium brown, dense to compact, dry to damp, trace wood pieces.

5 SAND and GRAVEL, fine to coarse, trace silt, trace cobbles, medium brown-grey, dense, damp.

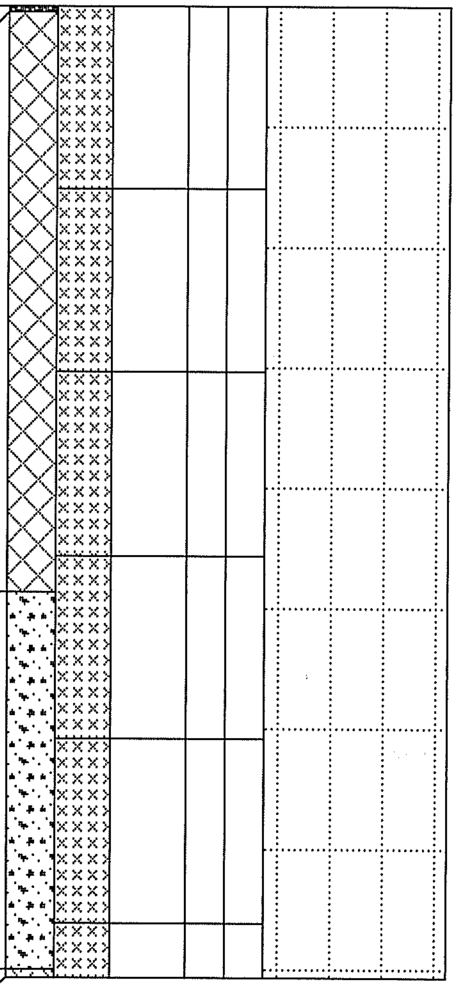
Below 5.5 m - trace to some silt, damp to moist.

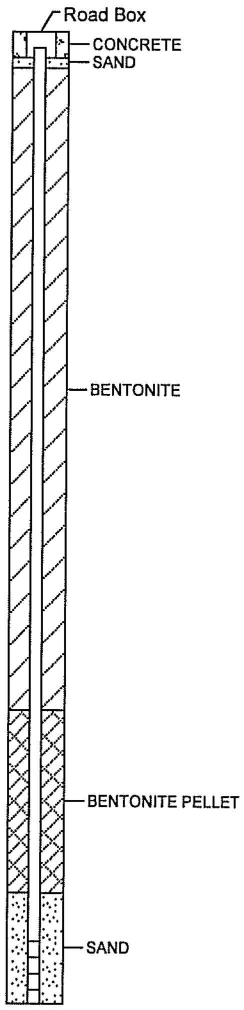
Below 6.4 m - dark grey, moist, faint hydrocarbon-like odour. Between 6.4 m and 7.6 m - increasing hydrocarbon-like odour with depth.

At 7.9 m - moist to wet.

8 BEDROCK.

End of borehole at 8.1 m.





Notes:
Bolded sample denotes sample analyzed.
Remediation well: soil samples not collected. Soils logged via air return - split spoon samples taken for soil confirmation purposes only.

Print Date: 2008 07 21, Date Approved: 2006 10 31

SNC•LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : AS-13

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 297.75
Top of Casing Elev. (m) : 297.68

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2005 09 09
Log Typed By : LL

Drilling Legend
- ▨ Sample Interval
- ▧ Split Spoon
- ☒ Odex

Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

○ Reading within indicated scale
● Reading outside indicated scale

Soil Vapour (ppm): 10^1 10^2 10^3 10^4

Solid PVC
Slotted PVC

Well Name: AS-13

Depth in Metres | Soil Description | Stratigraphy Plot | Sample Interval/Core Run | Sample Number | Blow Count | % Recovery

ORGANIC SILT, dark brown, soft, wet.

SAND and GRAVEL (FILL), some silt, trace cobbles, medium brown, compact, dry to damp.

SAND, some silt, some gravel, trace cobbles, medium grey, damp. Below 4.9 m - moist, faint hydrocarbon-like odour.

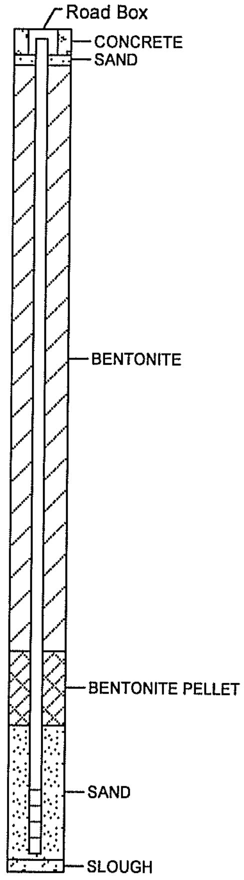
Below 5.8 m - moist to wet.

Below 6.4 m - medium brown-grey.

SILT (TILL-LIKE), trace sand, trace gravel, medium brown, dense, damp.

End of borehole at 7.0 m.

Sample Number	Blow Count	% Recovery
SPT-13-1		17



Notes:
Bolded sample denotes sample analyzed.
Remediation well: soil samples not collected. Soils logged via air return - split spoon samples taken for soil confirmation purposes only.

Print Date: 2008 07 21, Date Approved: 2006 10 31

SNC•LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : AS-14

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 297.53
Top of Casing Elev. (m) : 297.46

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2005 09 09
Log Typed By : LL

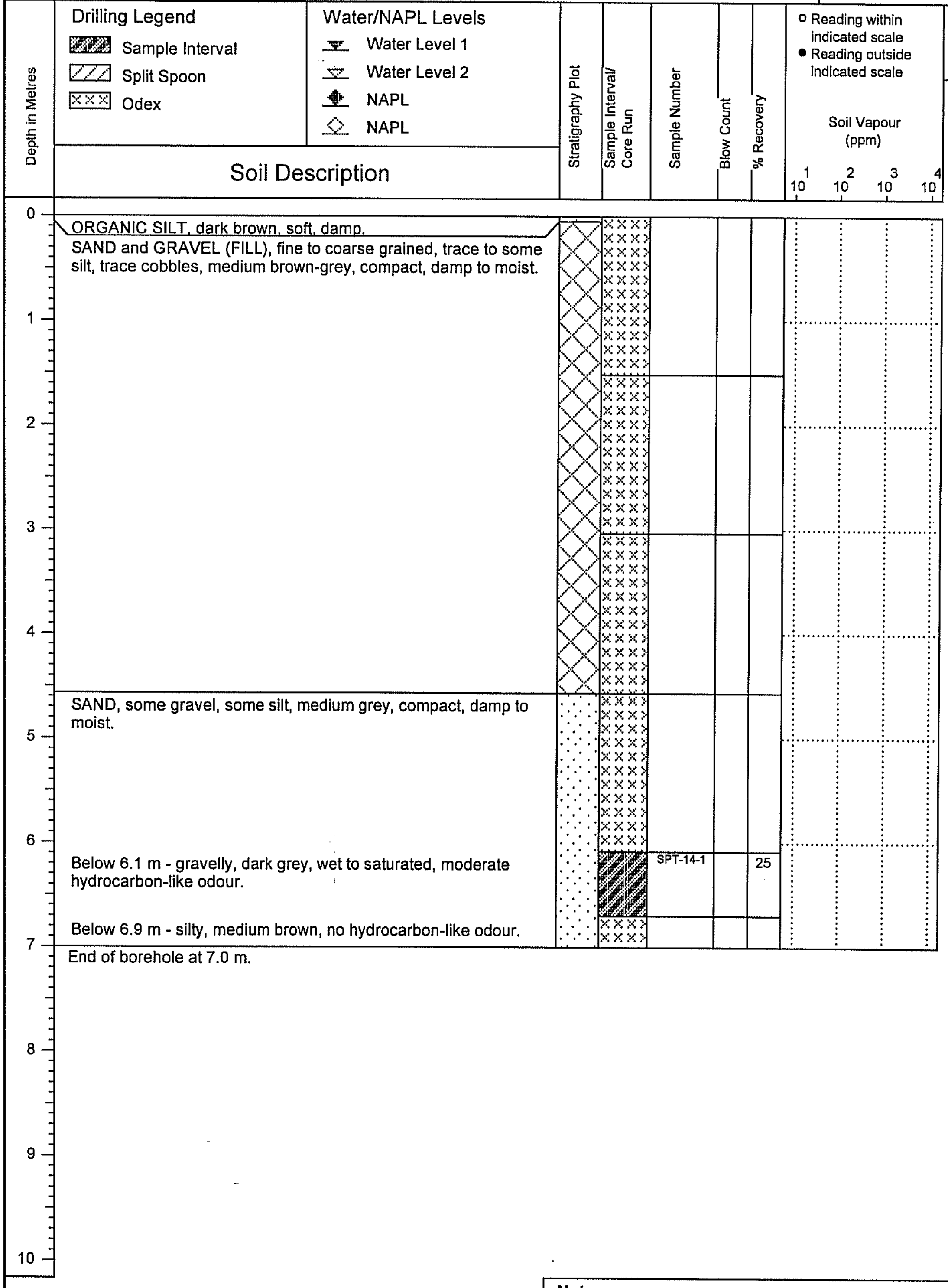
Drilling Legend	Water/NAPL Levels
▨ Sample Interval	▼ Water Level 1
▨ Split Spoon	▽ Water Level 2
☒ Odex	◆ NAPL
	◇ NAPL

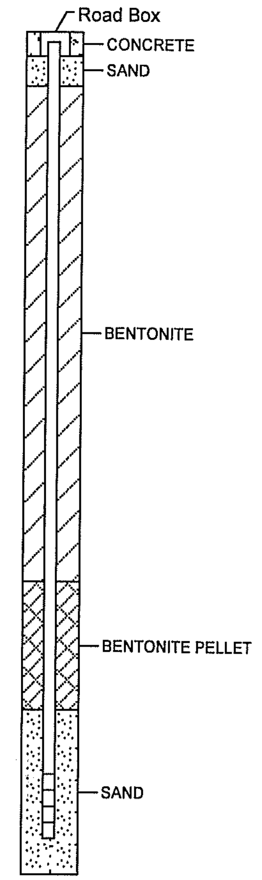
○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: AS-14

Depth in Metres	Soil Description	Sample Number	Blow Count	% Recovery
0	ORGANIC SILT, dark brown, soft, damp.			
	SAND and GRAVEL (FILL), fine to coarse grained, trace to some silt, trace cobbles, medium brown-grey, compact, damp to moist.			
	SAND, some gravel, some silt, medium grey, compact, damp to moist.			
	Below 6.1 m - gravelly, dark grey, wet to saturated, moderate hydrocarbon-like odour.	SPT-14-1		25
	Below 6.9 m - silty, medium brown, no hydrocarbon-like odour.			
7	End of borehole at 7.0 m.			





Notes:
Bolded sample denotes sample analyzed.
Remediation well: soil samples not collected. Soils logged via air return - split spoon samples taken for soil confirmation purposes only.

Print Date: 2008 07 21, Date Approved: 2006 10 31

SNC•LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : AS-15

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2005 09 10
Log Typed By : LL

Drilling Legend
- ▨ Sample Interval
- ▧ Split Spoon
- ■ No Recovery
- ☒ Odex

Water/NAPL Levels
- ▼ Water Level 1
- ▽ Water Level 2
- ◆ NAPL
- ◇ NAPL

○ Reading within indicated scale
● Reading outside indicated scale

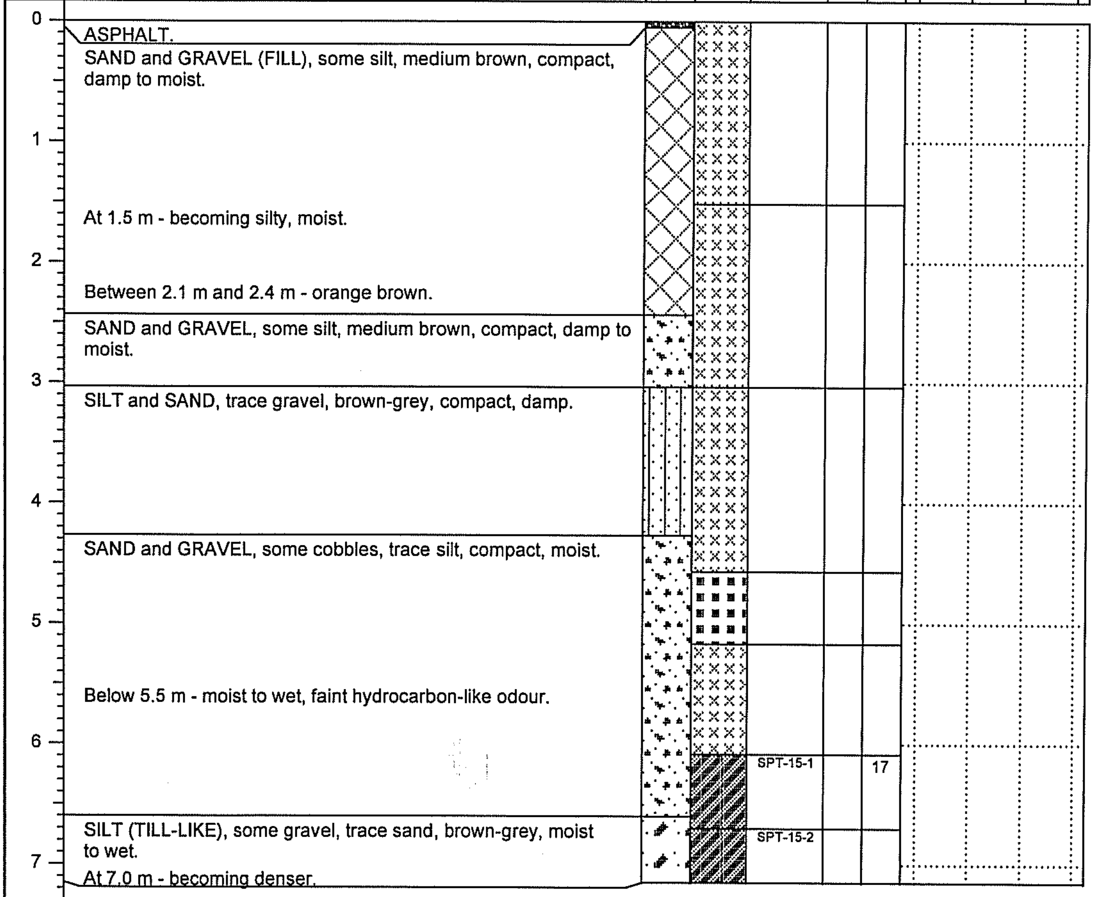
Soil Vapour (ppm)
10^1 10^2 10^3 10^4

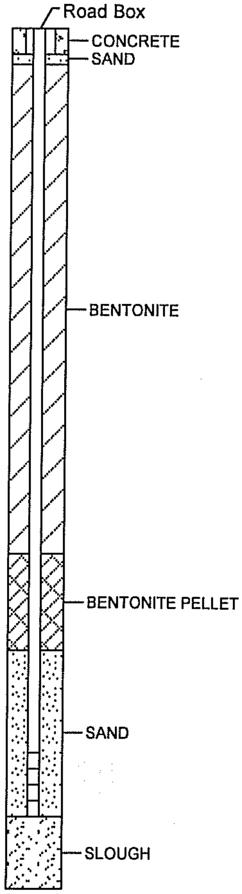
Solid PVC
Slotted PVC

Well Name: AS-15

Depth in Metres

Soil Description	Sample Number	Blow Count	% Recovery
ASPHALT.			
SAND and GRAVEL (FILL), some silt, medium brown, compact, damp to moist. At 1.5 m - becoming silty, moist. Between 2.1 m and 2.4 m - orange brown.			
SAND and GRAVEL, some silt, medium brown, compact, damp to moist.			
SILT and SAND, trace gravel, brown-grey, compact, damp.			
SAND and GRAVEL, some cobbles, trace silt, compact, moist. Below 5.5 m - moist to wet, faint hydrocarbon-like odour.	SPT-15-1		17
SILT (TILL-LIKE), some gravel, trace sand, brown-grey, moist to wet. At 7.0 m - becoming denser.	SPT-15-2		
End of borehole at 7.2 m.			





Notes:
Bolded sample denotes sample analyzed.
Remediation well: soil samples not collected. Soils logged via air return - split spoon samples taken for soil confirmation purposes only.
No recovery in split spoon (4.5 m - 4.9 m).
Top of casing and ground surface not surveyed due to obstruction.

Print Date: 2008 07 21, Date Approved: 2006 10 31

SNC·LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : AS-16

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 299.598
Top of Casing Elev. (m) : 299.521

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2005 09 10
Log Typed By : LL

Drilling Legend
- ▨ Sample Interval
- ▨ Split Spoon
- ☒ Odex

Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

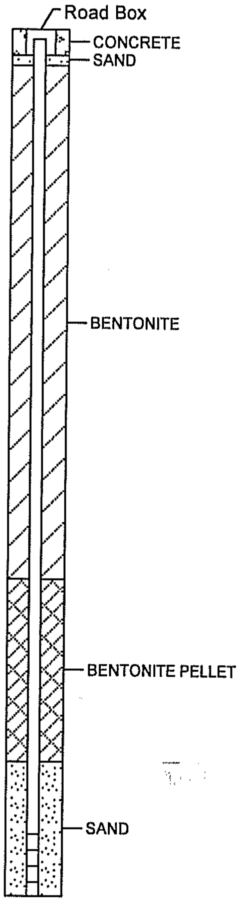
○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: AS-16

Depth in Metres	Soil Description	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
0	SAND, (FILL), fine sand, gravelly, trace silt, orange brown.				
1.8	SAND and GRAVEL, (FILL), medium sand, angular gravel, medium brown.				
5.2	SILT, sandy, some gravel, grey, firm, moist.				
6.1	SAND and GRAVEL, fine to coarse, trace silt, dark grey, compact, moist, strong hydrocarbon-like odour.	SPT-16-1		13	
		SPT-16-2			
7.2	End of borehole at 7.2 m.				

Soil Vapour scale: 10^1 10^2 10^3 10^4



Notes:
Bolded sample denotes sample analyzed.
Remediation well: soil samples not collected. Soils logged via air return - split spoon samples taken for soil confirmation purposes only.

Print Date: 2008 07 21, Date Approved: 2006 10 31

SNC•LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : AS-17

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 299.447
Top of Casing Elev. (m) : 299.401

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2005 09 11
Log Typed By : LL

Drilling Legend
- ▨ Sample Interval
- ▧ Split Spoon
- ☒ Odex

Water/NAPL Levels
- ▼ Water Level 1
- ▽ Water Level 2
- ◆ NAPL
- ◇ NAPL

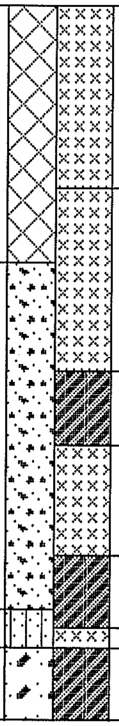
- ○ Reading within indicated scale
- ● Reading outside indicated scale

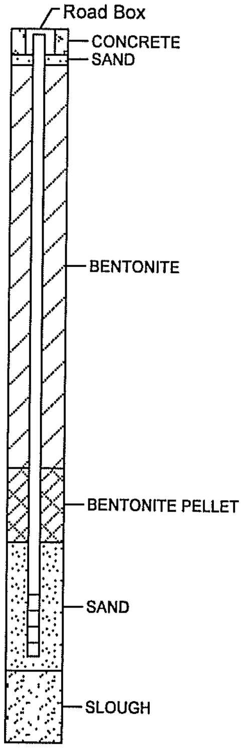
Soil Vapour (ppm): 10^1 10^2 10^3 10^4

- Solid PVC
- Slotted PVC

Well Name: AS-17

Depth in Metres	Soil Description	Sample Number	Blow Count	% Recovery
0	SAND (FILL), silty, trace gravel, medium brown, loose to compact, damp to moist.			
2	SAND and GRAVEL, silty, trace cobbles, medium brown-grey, compact to dense, damp.			
3		SPT-17-1		17
4	At 4.0 m - boulder.			
	Below 4.6 m - moist to wet, faint hyrdrocarbon-like odour.	SPT-17-2		4
5	SAND, silty, medium brown, compact, moist.			
	SILT (TILL-LIKE), trace sand, trace gravel, medium brown-grey, dense, damp.	SPT-17-3		8
6	End of borehole at 5.9 m.			





Notes:
Bolded sample denotes sample analyzed.
Remediation well: soil samples not collected. Soils logged via air return - split spoon samples taken for soil confirmation purposes only.

Print Date: 2008 07 21, Date Approved: 2006 10 31

SNC•LAVALIN Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : AS-18

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 299.445
Top of Casing Elev. (m) : 299.365

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2005 09 11
Log Typed By : LL

Drilling Legend
- ▨ Sample Interval
- ▨ Split Spoon
- ☒ Odex

Water/NAPL Levels
- ▼ Water Level 1
- ▽ Water Level 2
- ◆ NAPL
- ◇ NAPL

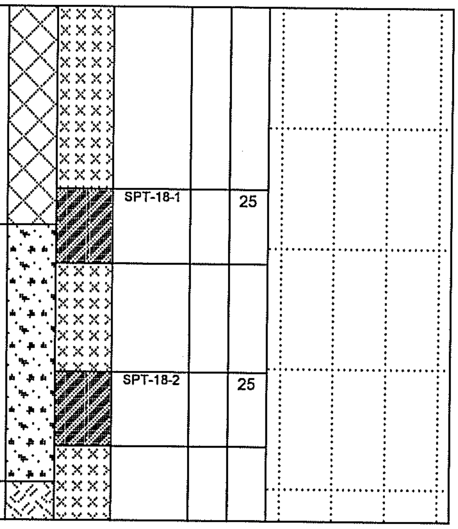
- ○ Reading within indicated scale
- ● Reading outside indicated scale

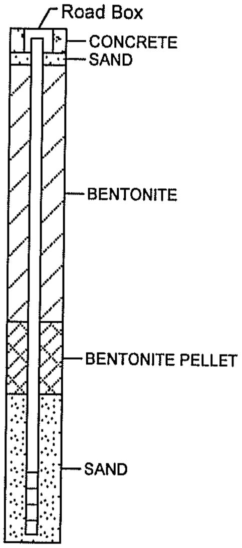
Soil Vapour (ppm): 10^1 10^2 10^3 10^4

- Solid PVC
- Slotted PVC

Well Name: AS-18

Depth in Metres	Soil Description	Sample Number	Blow Count	% Recovery
0	SAND (FILL), silty, trace gravel, medium brown, compact, damp.			
1.6		SPT-18-1		25
1.8	SAND and GRAVEL, silty, trace to some cobbles, medium brown-grey, dense, damp.			
3	Below 3.0 m - compact, moist to wet.	SPT-18-2		25
4	BEDROCK.			
4.3	End of borehole at 4.3 m.			





Notes:
Bolded sample denotes sample analyzed.
Remediation well: soil samples not collected. Soils logged via air return - split spoon samples taken for soil confirmation purposes only.

Print Date: 2008 07 21, Date Approved: 2006 10 31

SNC•LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : AS-19

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 299.485
Top of Casing Elev. (m) : 299.409

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2005 09 11
Log Typed By : LL

Drilling Legend
- ▨ Sample Interval
- ▨ Split Spoon
- ☒ Odex

Water/NAPL Levels
- ▼ Water Level 1
- ▽ Water Level 2
- ◆ NAPL
- ◇ NAPL

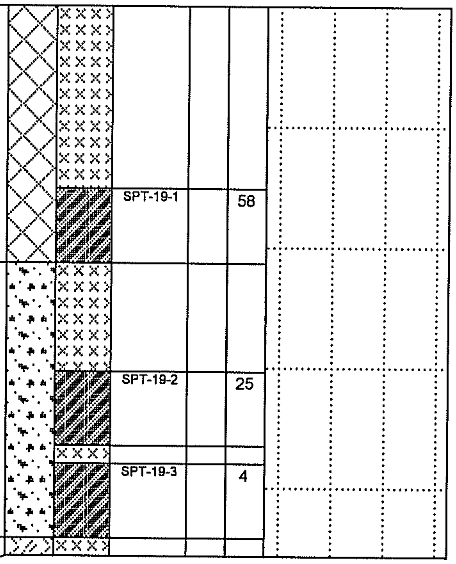
○ Reading within indicated scale
● Reading outside indicated scale

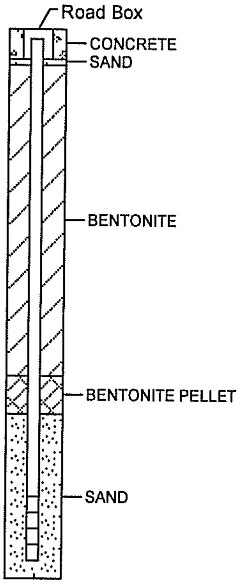
Soil Vapour (ppm): 10^1 10^2 10^3 10^4

Solid PVC
Slotted PVC

Well Name: AS-19

Soil Description	Sample Number	Blow Count	% Recovery
SAND (FILL), silty, trace gravel, trace cobbles, medium brown, loose, damp.			
At 1.2 m - boulder.			
Below 1.5 m - dark brown-grey, moist, faint hydrocarbon-like odour.	SPT-19-1		58
SAND and GRAVEL, silty, trace cobbles, medium brown-grey, dense to compact, moist to wet.			
	SPT-19-2		25
Below 4.0 m dark grey, compact, wet.	SPT-19-3		4
BEDROCK, fractured.			
End of borehole at 4.6 m.			





Notes:
Bolded sample denotes sample analyzed.
Remediation well: soil samples not collected. Soils logged via air return - split spoon samples taken for soil confirmation purposes only.

SNC•LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : AS-20

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 299.585
Top of Casing Elev. (m) : 299.486

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2005 09 11
Log Typed By : LL

Drilling Legend
- ▨ Sample Interval
- ▧ Split Spoon
- ☒ Odex

Water/NAPL Levels
- ▼ Water Level 1
- ▽ Water Level 2
- ◆ NAPL
- ◇ NAPL

- ○ Reading within indicated scale
- ● Reading outside indicated scale

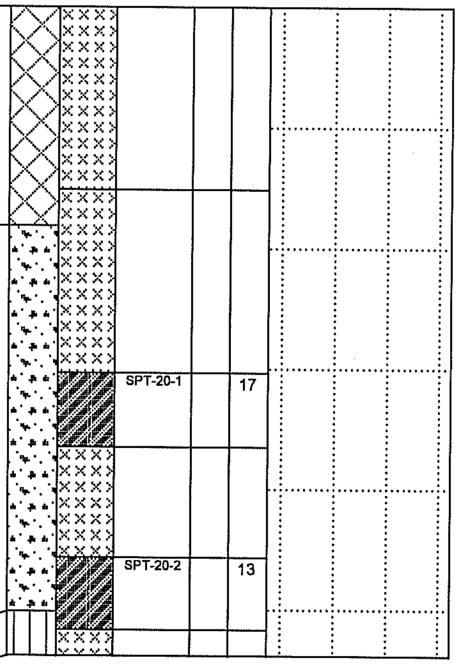
Soil Vapour (ppm): 10^1 10^2 10^3 10^4

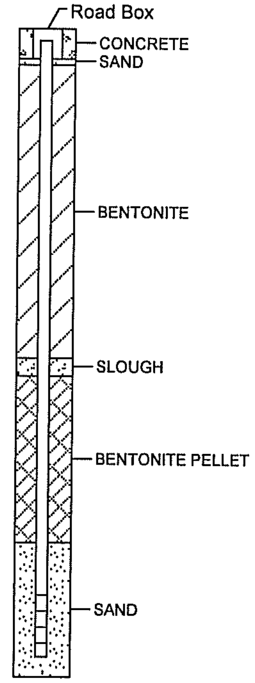
- Solid PVC
- Slotted PVC

Well Name: AS-20

Depth in Metres	Soil Description	Sample Number	Blow Count	% Recovery
0	SAND (FILL), silty, trace gravel, dark brown, loose, damp.			
1.8	SAND and GRAVEL, silty, trace cobble, orange brown, compact, damp to moist. At 2.1 m - silt seam. Below 2.1 m - brown-grey, compact to dense.			
3.0		SPT-20-1		17
3.7	Below 3.7 m - dark brown-grey, compact, moist to wet.			
4.6	At 4.6 m - wet, faint hydrocarbon-like odour.	SPT-20-2		13
4.9	Below 4.9 m - dark grey, wet to saturated.			
5.1	SILT (TILL-LIKE), trace sand, trace gravel, medium brown-grey, dense, damp to moist.			

End of borehole at 5.4 m.





Notes:
Bolded sample denotes sample analyzed.
Remediation well: soil samples not collected. Soils logged via air return - split spoon samples taken for soil confirmation purposes only.

SNC•LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : AS-21

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 299.91
Top of Casing Elev. (m) : 299.811

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2005 09 12
Log Typed By : LL

Drilling Legend
- ▨ Sample Interval
- ▧ Split Spoon
- ▪▪▪ No Recovery
- ☒ Odex

Water/NAPL Levels
- ▼ Water Level 1
- ▽ Water Level 2
- ◆ NAPL
- ◇ NAPL

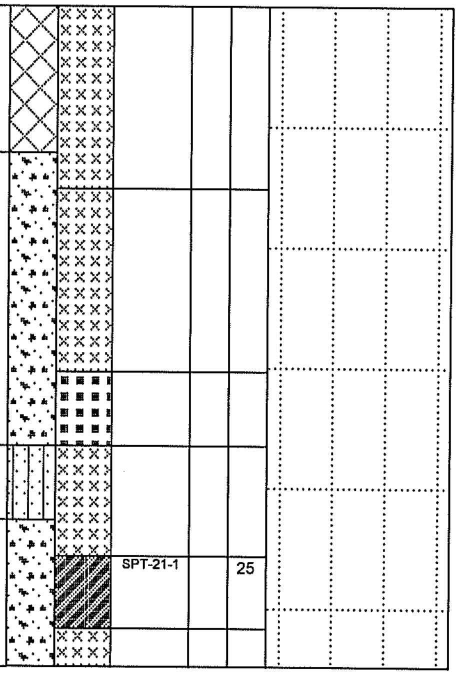
- ○ Reading within indicated scale
- ● Reading outside indicated scale

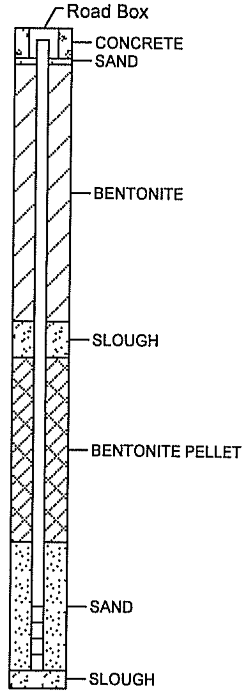
Soil Vapour (ppm): 10^1 10^2 10^3 10^4

- Solid PVC
- Slotted PVC

Well Name: AS-21

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval/ Core Run	Sample Number	Blow Count	% Recovery
0	SAND (FILL), silty, trace gravel, medium brown, loose, damp.					
	SAND and GRAVEL, fine to coarse grained, trace cobbles, medium brown-grey, compact to dense, damp. At 1.5 m - boulder.					
	SAND and SILT, dark brown, compact, damp to moist.					
	SAND and GRAVEL, trace to some silt, dark grey, compact, wet, moderate hydrocarbon-like odour. At 5.5 m - bedrock.			SPT-21-1		25
	End of borehole at 5.5 m.					





Notes:
Bolded sample denotes sample analyzed.
Remediation well: soil samples not collected. Soils logged via air return - split spoon samples taken for soil confirmation purposes only.
No recovery in split spoon (3.1 m - 3.6 m).

Print Date: 2008 07 21, Date Approved: 2006 10 31

SNC•LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : AS-22

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 299.939
Top of Casing Elev. (m) : 299.832

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2005 09 12
Log Typed By : LL

Drilling Legend
- ▨ Sample Interval
- ▧ Split Spoon
- ☒ Odex

Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- ◇ NAPL

- ○ Reading within indicated scale
- ● Reading outside indicated scale

Soil Vapour (ppm): 10^1 10^2 10^3 10^4

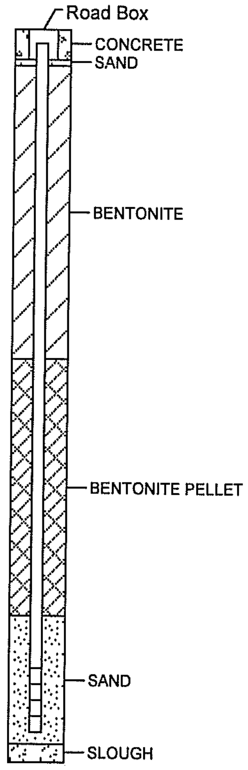
- Solid PVC
- Slotted PVC

Well Name: AS-22

Depth in Metres: 0 – 10

Soil Description	Sample Number	Blow Count	% Recovery
SAND (FILL), silty, trace gravel, medium brown, loose, damp.			
SAND and GRAVEL, trace silt, trace cobble, medium brown-grey, compact, damp to moist. At 4.0 m - rust-orange stained seam, approximately 10 cm thickness. Below 4.3 m - medium grey, moist, faint hydrocarbon-like odour. Below 5.2 m - wet.	SPT-22-1		25
SILT (TILL-LIKE), trace sand, trace gravel, medium grey, stiff, damp. At 6.1 m - bedrock.			

End of borehole at 6.1 m.



Notes:
Bolded sample denotes sample analyzed.
Remediation well: soil samples not collected. Soils logged via air return - split spoon samples taken for soil confirmation purposes only.

Print Date: 2008 07 21, Date Approved: 2006 10 31

SNC•LAVALIN Morrow Environmental

Client : **Public Works and Gov't Services Canada**

Location : **Pleasant Camp, BC**

Borehole No. : AS-23

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

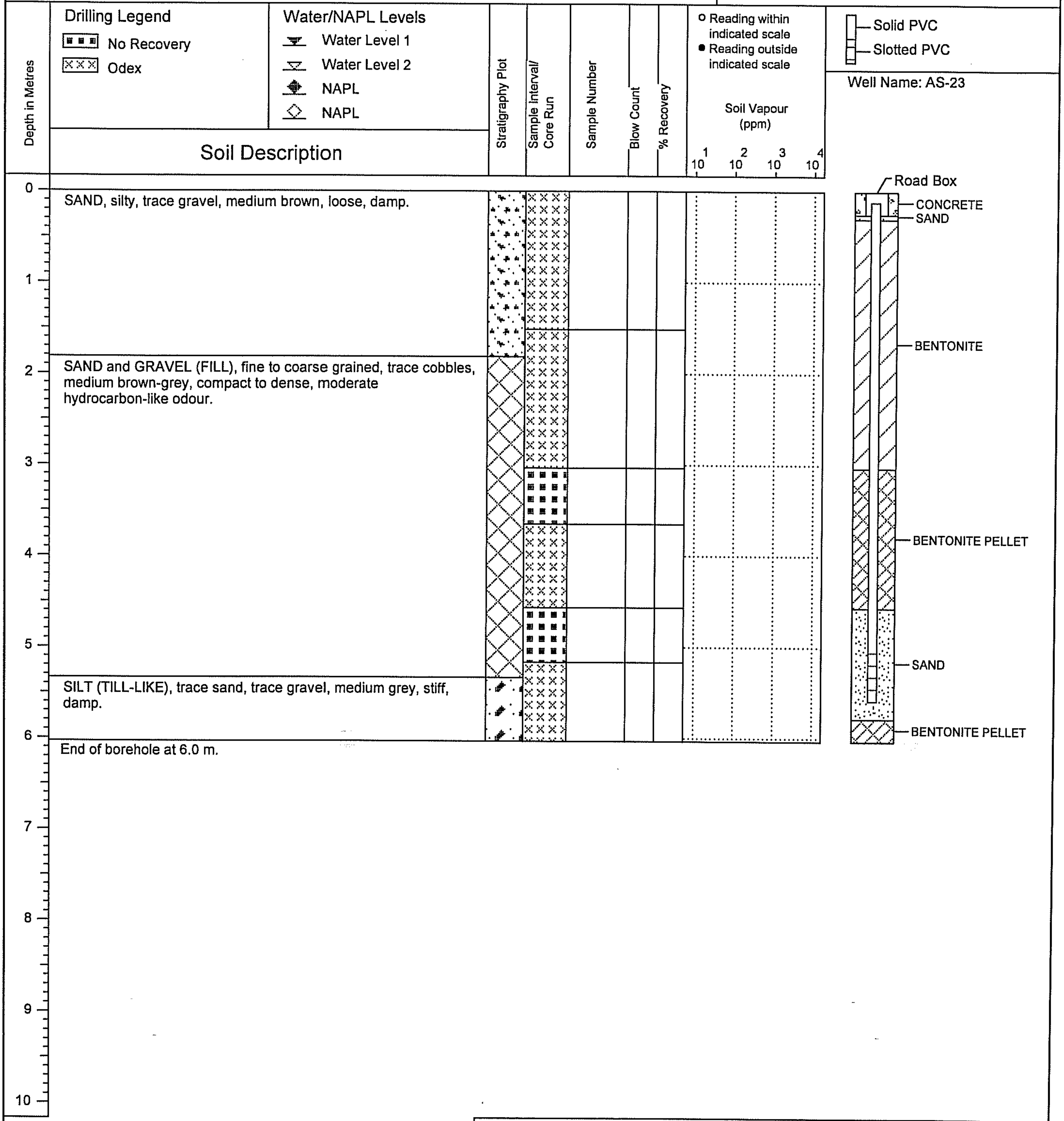
Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 299.73
Top of Casing Elev. (m) : 299.615

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2005 09 12
Log Typed By : LL

Drilling Legend
- ▣ No Recovery
- ☒ Odex

Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- ◇ NAPL

- ○ Reading within indicated scale
- ● Reading outside indicated scale



Soil Description

SAND, silty, trace gravel, medium brown, loose, damp.

SAND and GRAVEL (FILL), fine to coarse grained, trace cobbles, medium brown-grey, compact to dense, moderate hydrocarbon-like odour.

SILT (TILL-LIKE), trace sand, trace gravel, medium grey, stiff, damp.

End of borehole at 6.0 m.

Notes:
Bolded sample denotes sample analyzed.
Remediation well: soil samples not collected. Soils logged via air return - split spoon samples taken for soil confirmation purposes only.
No recovery in split spoon (3.1 m - 3.6 m and 4.5 m to 5.2 m).

Print Date: 2008 07 21, Date Approved: 2006 10 31

SNC•LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 03-03

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex/Solid Stem Auger
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 298.124
Top of Casing Elev. (m) : 298.045

Project Number : 130846
Borehole Logged By : RNS
Date Drilled : 2003 09 04
Log Typed By : PKR

Drilling Legend
▨ Sample Interval
☒ Odex

Water/LPH Levels
Water Level 1
Water Level 2
◆ LPH
◇ LPH

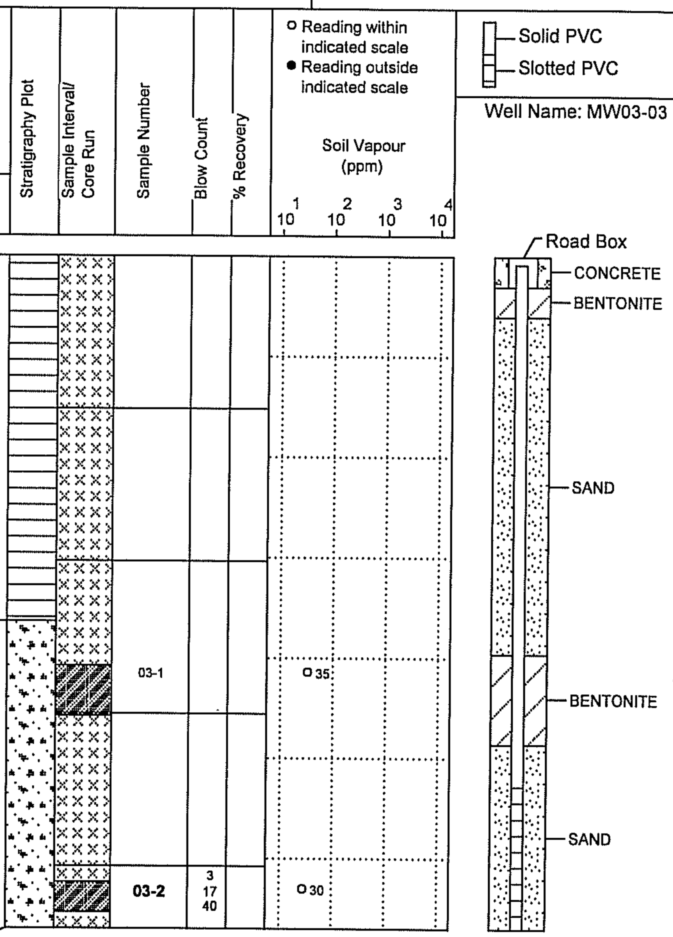
○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: MW03-03

Soil Description

Depth in Metres	Soil Description	Sample Number	Blow Count	Soil Vapour (ppm)
0	TOPSOIL and COBBLES, some silts, dark brown, moist.			
1	Between 0.9 to 2.3 m - boulder.			
2–3	At 2.3 m - sand and silt, organic seam. At 2.4 m - boulder. At 2.7 m - small sand seam. At 2.9 m - boulder.			
4	SAND and GRAVEL, medium grained, cobbley, some silt, medium dense, dark brown, moist.	03-1		○ 35
5	Between 4.9 to 5.5 m - boulders.			
6	At 5.9 m - hydrocarbon-like odour.	**03-2**	3 17 40	○ 30
6.7	At 6.7 m - refusal (bedrock).			
7	End of borehole at 6.7 m.			



Depth in Metres: 0 1 2 3 4 5 6 7 8 9 10 11 12

Notes:
Bolded sample denotes sample analyzed.
Converted to AS well - November 2005.

Print Date: 2008 07 21, Date Approved: 2005 03 04

SNC•LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 03-04

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex/Solid Stem Auger
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 297.378
Top of Casing Elev. (m) : 297.328

Project Number : 130846
Borehole Logged By : RNS
Date Drilled : 2003 09 04
Log Typed By : PKR

Drilling Legend
- ▨ Sample Interval
- ☒ Odex

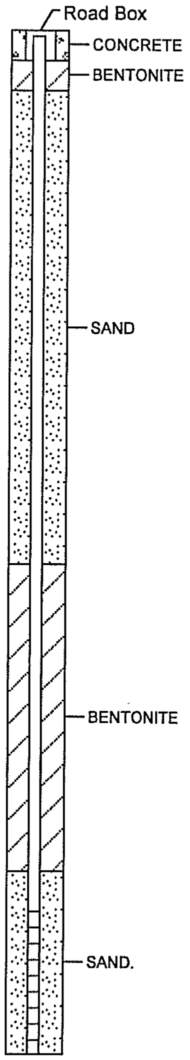
Water/LPH Levels
- Water Level 1
- Water Level 2
- LPH
- LPH

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: MW03-04

Depth in Metres	Soil Description	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
0	SAND and GRAVEL, medium grained, some silt, dark brown, medium dense to loose, damp. At 1.1 m - cobbley.				
2	SAND, fine grained, some silt, some cobbles, trace gravel, dark brown to black, loose, moist.				
3	SAND and GRAVEL, medium grained, some cobbles, trace silt, dark brown, medium dense, moist. Between 2.9 to 3.2 m - boulders.				
4	SAND, medium to fine grained, some gravel, trace cobbles, dark brown, loose, moist.	04-1	22 70	67	○ 35
5	Between 5.0 to 5.5 m - cobbley.				
6	SAND and GRAVEL, medium to fine grained, some silt, some cobbles, medium dense, moist. At 5.9 m - hydrocarbon-like odour. At 6.3 m - wet.	**04-2**	27 70	25	375 ○
7	SAND, coarse grained, some cobbles, medium dense, trace boulders, dark grey, wet, hydrocarbon-like odour. At 7.2 m - sand and silt, medium to fine grained, hydrocarbon-like odour.				
8	SAND and COBBLES, medium to coarse grained, dark grey, dense, moist.				
9	SAND, fine grained, some gravel and cobbles, medium to dark grey, medium dense, moist. At 8.4 m - medium grained - fine grained, brown, - medium to dark grey. At 8.7 m - cobbley.				
10	SAND, coarse grained, some gravel, medium brown, loose, wet. At 9.9 m - gravel, angular, dense.				
	End of borehole at 10.2 m.				



Notes:
Bolded sample denotes sample analyzed.
Converted to AS well - November 2005.

Print Date: 2008 07 21, Date Approved: 2005 03 04

SNC·LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : 03-05

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex/Solid Stem Auger
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

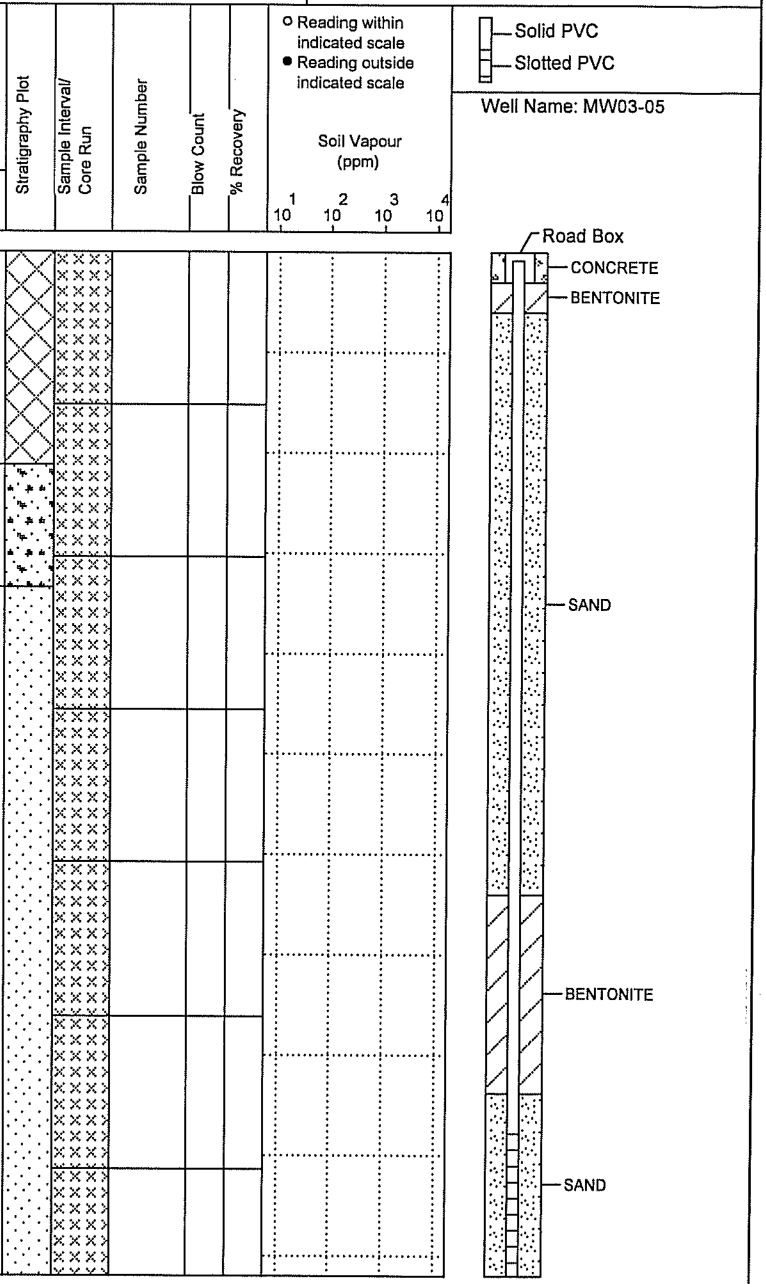
Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 296.659
Top of Casing Elev. (m) : 296.597

Project Number : 130846
Borehole Logged By : RNS
Date Drilled : 2003 09 04
Log Typed By : PKR

Drilling Legend
▨ Odex

Water/LPH Levels
Water Level 1
Water Level 2
LPH
LPH

Depth in Metres	Soil Description
0 – 2.1	SAND and GRAVEL (FILL), medium to fine grained, some silt, dark brown, loose, damp.
2.1 – 3.4	SAND and GRAVEL, medium to fine grained, some silt, subangular gravel, brown to dark grey, medium dense to loose, moist. Between 2.7 to 3.4 m - boulders.
3.4 – 10.2	SAND, fine grained, some gravel, light brown, medium dense, damp. At 3.7 m - cobbley. At 4.7 m - dense. At 5.2 m - boulders with voids. At 5.5 m - medium grey to light brown. At 5.8 m - medium grey and light to medium brown, moist to wet, (sample attempt 0 recovery). AT 6.4 m - wet. At 7.0 m - boulders. At 7.9 m - sample attempt. At 9.3 m - light grey.
10.2	End of borehole at 10.2 m.



Notes:
Bolded sample denotes sample analyzed.
Converted to AS well - November 2005.

Print Date: 2008 07 21, Date Approved: 2005 03 04

SNC·LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : AS07-1

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.11
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Project Number : 131416
Borehole Logged By : FG
Date Drilled : 2007 09 15
Log Typed By : SGP

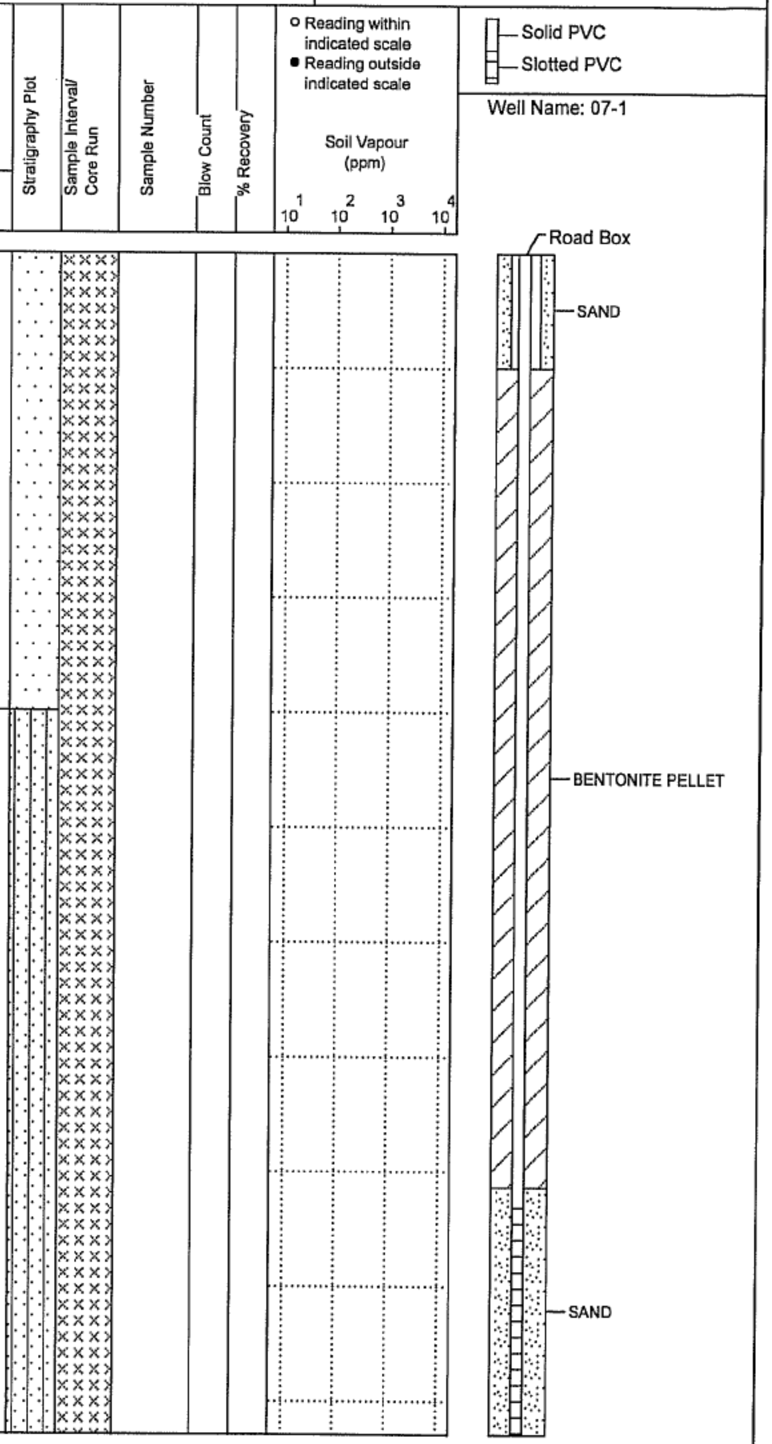
Depth in Metres

Drilling Legend
▨ Odex

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Soil Description

Depth in Metres	Soil Description
0	SAND, some gravel, trace silt, brown, damp.
2	At 2.25 m - cobbles.
4	SAND, silty, fine grained sand, some gravel, light brown, moist.
5	At 5.5 m - hydrocarbon-like odour, grey.
7	At 6.75 m - silt lense.
8	At 8.0 m - silt lense.
10	End of borehole at 10.3 m.



Notes:
Depth to water at 03-4 was at 6.8 m.

Print Date: 2008 07 21 QA1: FG 2007 09 25

SNC·LAVALIN Morrow Environmental

Client :	Public Works and Gov't Services Canada
Location :	Pleasant Camp, BC

Borehole No. : AS07-2

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.11
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Project Number : 131416
Borehole Logged By : FG
Date Drilled : 2007 09 15
Log Typed By : SGP

Drilling Legend
▨ Odex

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

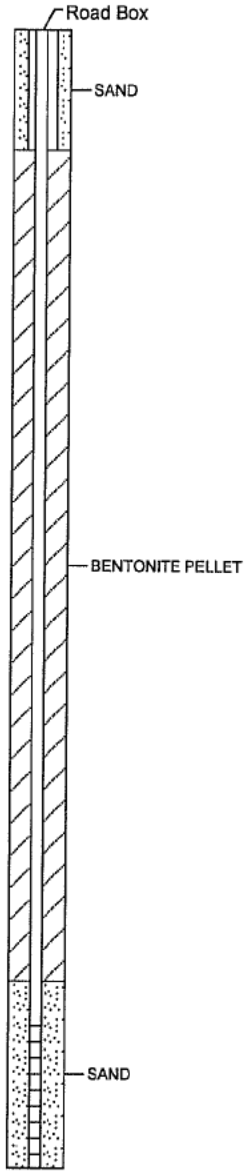
○ Reading within indicated scale
● Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Solid PVC
Slotted PVC

Well Name: 07-2

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval/ Core Run	Sample Number	Blow Count	% Recovery
0	SAND, some silt, some gravel, dark brown, damp.					
	SAND, coarse to fine grained sand, some gravel, some silt, trace clay, brown, moist, silty layers.					
6	SAND, coarse to fine grained sand, some silt, some gravel, trace clay, silt layers, grey, moist.					
	End of borehole at 9.4 m.					



Notes:

Print Date: 2008 07 21 QA1: FG 2007 09 25

Soil Vapour Extraction Wells

SNC•LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : SVE-1

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 299.526
Top of Casing Elev. (m) : 299.428

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2005 09 10
Log Typed By : LL

Drilling Legend
▨ Odex

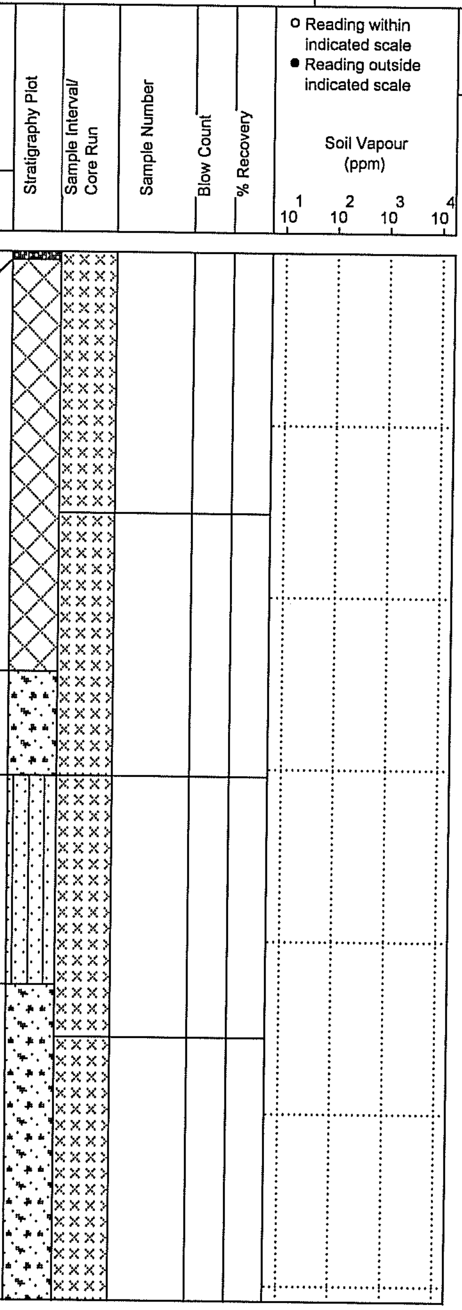
Water/NAPL Levels
▼ Water Level 1
▽ Water Level 2
◆ NAPL
◇ NAPL

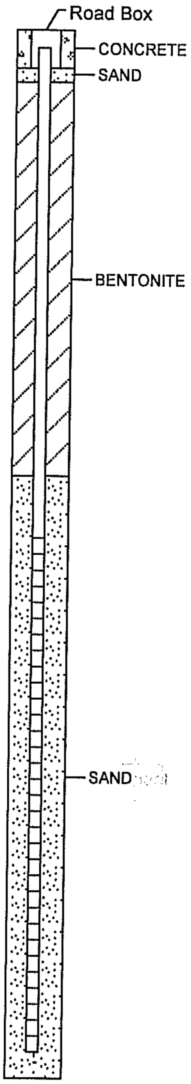
● Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: SVE-1

Depth in Metres	Soil Description
0	ASPHALT.
	SAND and GRAVEL (FILL), some silt, medium brown, compact, damp to moist.
	At 1.2 m - boulder.
	At 1.5 m - becoming silty, moist.
	Between 2.1 m and 2.4 m - orange brown.
	SAND and GRAVEL, some silt, medium brown, compact, damp to moist.
3	SILT and SAND, trace gravel, brown-grey, compact, damp.
	SAND and GRAVEL, some cobbles, trace silt, compact, moist.
	Below 5.5 m - moist to wet, faint hydrocarbon-like odour.
	End of borehole at 6.1 m.





Notes:
Soil vapour extraction well installation.
Remediation well: soil samples not collected. Soils logged via air return - split spoon samples taken for soil confirmation purposes only.

Print Date: 2008 07 21, Date Approved: 2006 10 31

SNC·LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : SVE-2

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.05
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 299.473
Top of Casing Elev. (m) : 299.358

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2005 09 10
Log Typed By : LL

Drilling Legend
☒ Odex

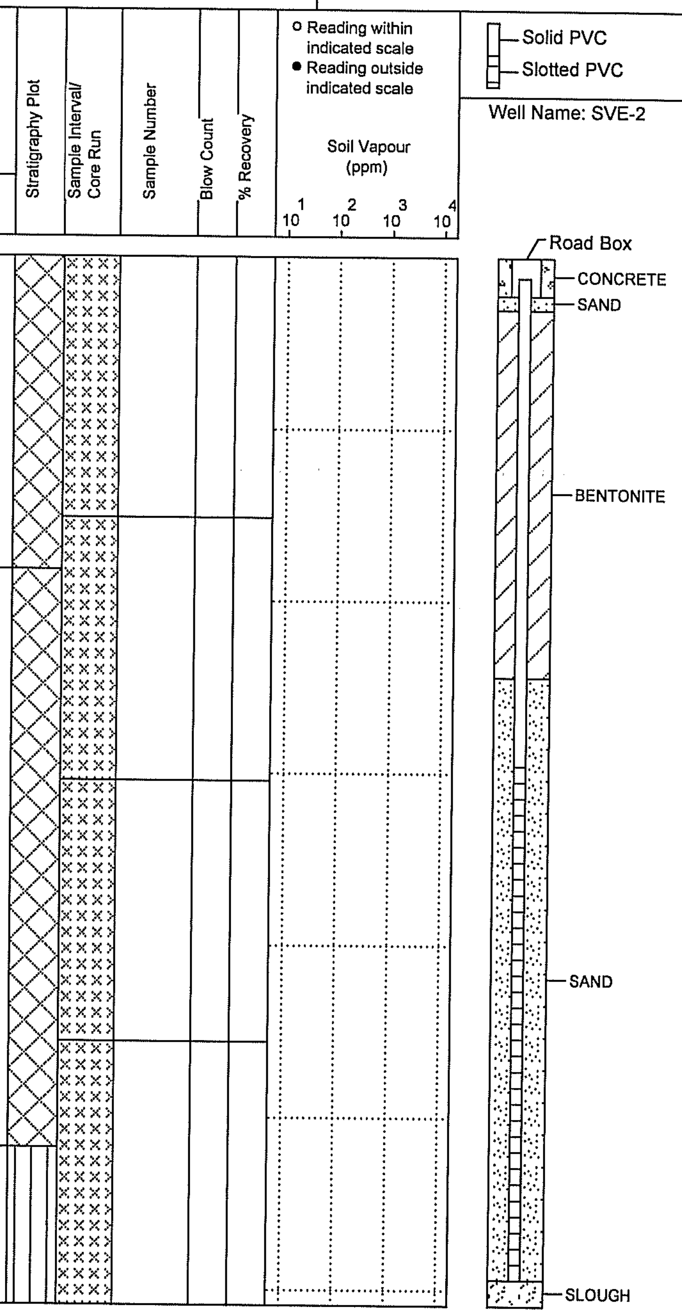
Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: SVE-2

Depth in Metres	Soil Description
0	SAND, (FILL), fine sand, gravelly, trace silt, orange brown.
1.8	SAND and GRAVEL, (FILL), medium sand, angular gravel, medium brown.
5.2	SILT, some sand, some gravel, grey, firm, moist.
6.1	End of borehole at 6.1 m.



Notes:
Soil vapour extraction well installation.
Remediation well: soil samples not collected. Soils logged via air return - split spoon samples taken for soil confirmation purposes only.

Print Date: 2008 07 21, Date Approved: 2006 10 31

SNC·LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : SVE-3

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 299.475
Top of Casing Elev. (m) : 299.425

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2005 09 11
Log Typed By : LL

Drilling Legend
- ▨ Sample Interval
- ▨ Split Spoon
- ☒ Odex

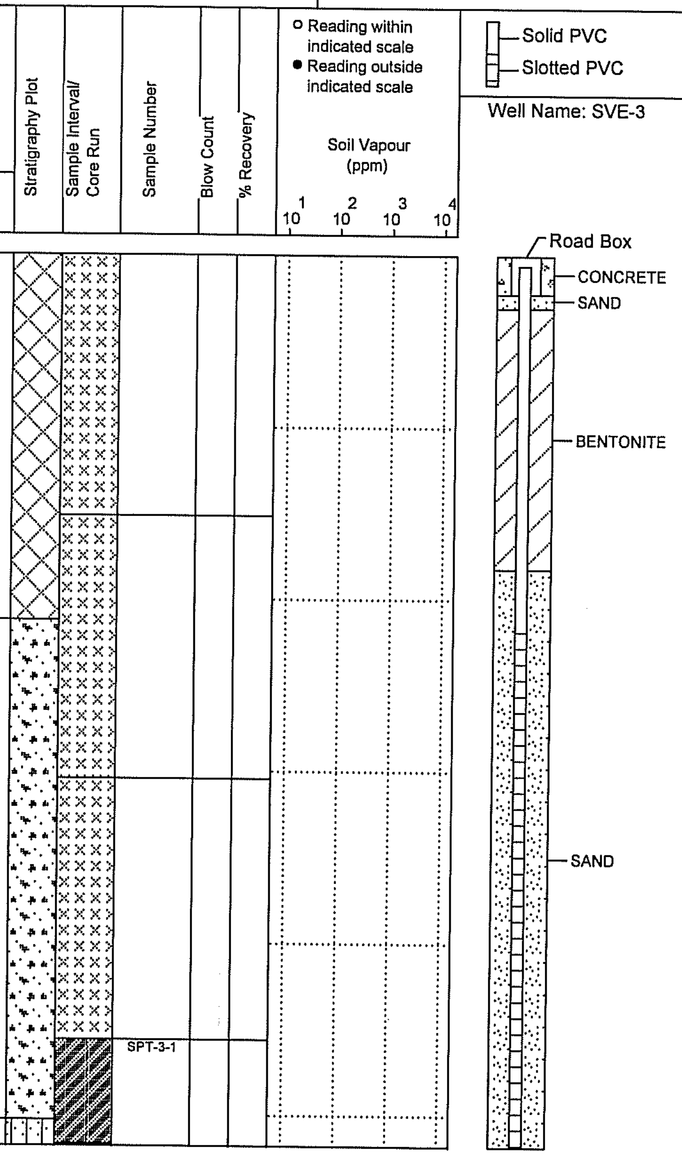
Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: SVE-3

Depth in Metres	Soil Description
0	SAND (FILL), silty, trace gravel, medium brown, loose to compact, damp to moist.
2	SAND and GRAVEL, silty, trace cobbles, medium brown-grey, compact to dense, damp. At 2.7 m - boulder. Below 4.6 m - moist to wet, faint hyrdrocarbon-like odour.
5	SAND, silty, medium brown, compact, moist.
	End of borehole at 5.2 m.



Depth in Metres: 0 1 2 3 4 5 6 7

Notes:
Soil vapour extraction well installation.
Remediation well: soil samples not collected. Soils logged via air return - split spoon samples taken for soil confirmation purposes only.

Print Date: 2008 07 21, Date Approved: 2006 10 31

SNC•LAVALIN Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : SVE-4

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 299.725
Top of Casing Elev. (m) : 299.635

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2005 09 11
Log Typed By : LL

Drilling Legend
- ▨ Sample Interval
- ▧ Split Spoon
- ☒ Odex

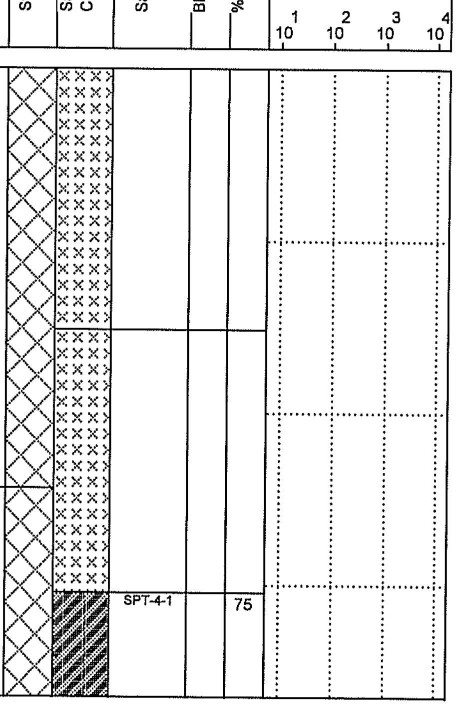
Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- ◇ NAPL

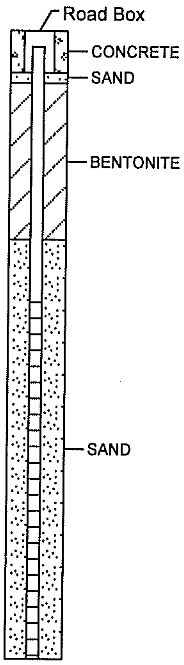
○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: SVE-4

Depth in Metres	Soil Description	Sample Number	Blow Count	% Recovery
0	SAND (FILL), silty, trace gravel, medium brown, loose, moist to damp.			
1.8	At 1.8 m - boulder.			
2.4	SAND and GRAVEL (FILL), fine to coarse grained, trace to some silt, trace cobble, medium brown, compact to dense, damp.			
3.1		SPT-4-1		75
3.7	At 3.7 m - bedrock.			
	End of borehole at 3.7 m.			





Notes:
Soil vapour extraction well installation.
Remediation well: soil samples not collected. Soils logged via air return - split spoon samples taken for soil confirmation purposes only.

Print Date: 2008 07 21, Date Approved: 2006 10 31

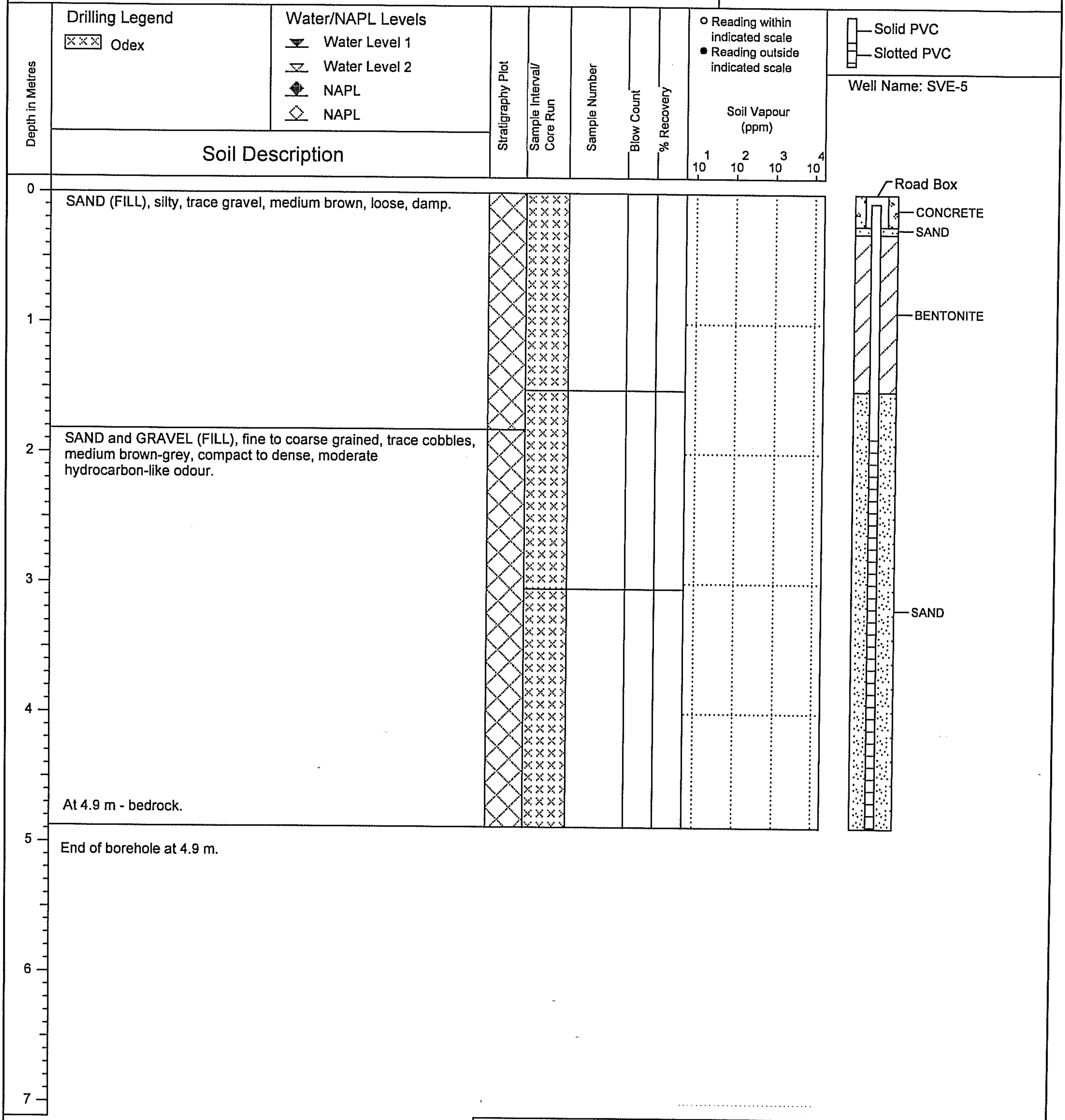
SNC•LAVALIN
Morrow Environmental

Client : **Public Works and Gov't Services Canada**	**Borehole No. : SVE-5**
Location : **Pleasant Camp, BC**	(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Odex
Borehole Dia. (m) : 0.10
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 299.69
Top of Casing Elev. (m) : 299.628

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2005 09 12
Log Typed By : LL



SAND (FILL), silty, trace gravel, medium brown, loose, damp.

SAND and GRAVEL (FILL), fine to coarse grained, trace cobbles, medium brown-grey, compact to dense, moderate hydrocarbon-like odour.

At 4.9 m - bedrock.

End of borehole at 4.9 m.

Notes:
Soil vapour extraction well installation.
Remediation well: soil samples not collected. Soils logged via air return - split spoon samples taken for soil confirmation purposes only.

Print Date: 2008 07 21, Date Approved: 2006 10 31

Soil Vapour Monitoring Wells

SNC·LAVALIN Morrow Environmental

Client : **Public Works and Gov't Services Canada**

Location : **Pleasant Camp, BC**

Borehole No. : SVW-1

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Solid Stem Auger
Borehole Dia. (m) : 0.15
Pipe/Slotted Pipe Dia. (m): 0.03, 0.03

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 299.526
Top of Casing Elev. (m) : 299.428

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2005 09 10
Log Typed By : LL

Drilling Legend

▯ Auger Flyte

Water/NAPL Levels

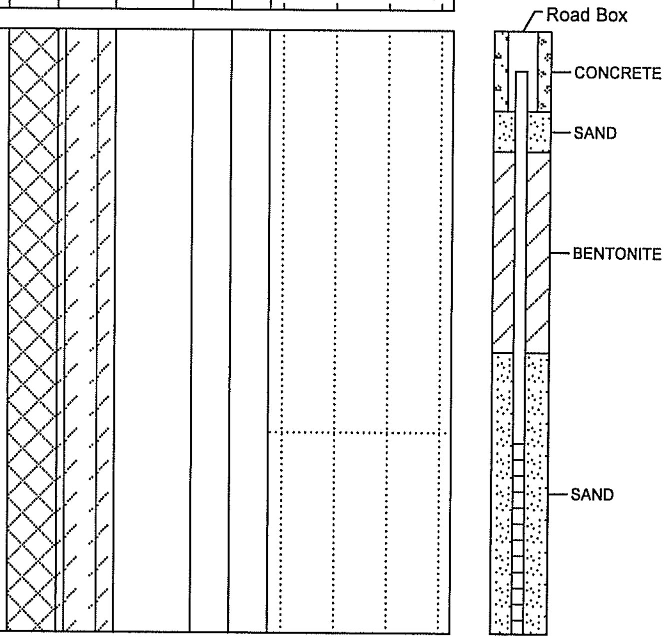
▼ Water Level 1
▽ Water Level 2
◆ NAPL
◇ NAPL

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: SVW-1

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval/ Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
0	SAND (FILL), silty, trace gravel, medium brown, loose, damp.						
1							
1.5	End of borehole at 1.5 m.						
2							
3							



Notes:
Soil vapour well installation.

Print Date: 2008 07 21, Date Approved: 2006 10 31

SNC•LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : SVW-2

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Solid Stem Auger
Borehole Dia. (m) : 0.15
Pipe/Slotted Pipe Dia. (m): 0.03, 0.03

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 299.473
Top of Casing Elev. (m) : 299.358

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2005 09 10
Log Typed By : LL

Drilling Legend
- ⊡ Auger Flyte

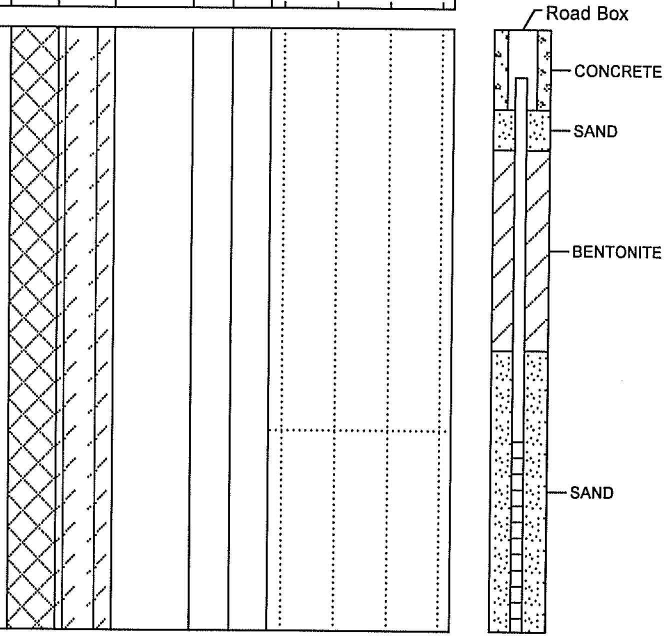
Water/NAPL Levels
- Water Level 1
- Water Level 2
- ◆ NAPL
- ◇ NAPL

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: SVW-2

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval/ Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
0	SAND (FILL), silty, trace gravel, medium brown, loose, damp.						
1.5	End of borehole at 1.5 m.						



Depth in Metres: 0, 1, 2, 3

Notes:
Soil vapour well installation.

Print Date: 2008 07 21, Date Approved: 2006 10 31

SNC·LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : SVW-3

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Solid Stem Auger
Borehole Dia. (m) : 0.15
Pipe/Slotted Pipe Dia. (m): 0.03, 0.03

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 299.644
Top of Casing Elev. (m) : 299.5444

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2005 09 10
Log Typed By : LL

Drilling Legend
[.] Auger Flyte

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
◇ NAPL

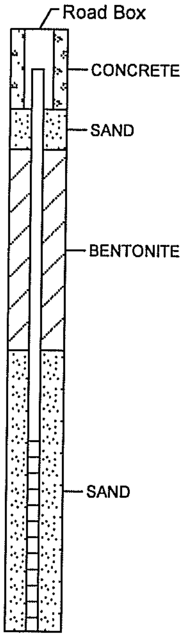
○ Reading within indicated scale
● Reading outside indicated scale

Soil Vapour (ppm): 10^1 10^2 10^3 10^4

Solid PVC
Slotted PVC

Well Name: SVW-3

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval/ Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
0	SAND (FILL), fine grained, silty, trace gravel, medium brown, loose, damp.						
1							
1.5	End of borehole at 1.5 m.						
2							
3							



Notes:
Soil vapour well installation.

Print Date: 2008 07 21, Date Approved: 2006 10 31

SNC•LAVALIN
Morrow Environmental

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : SVW-4

(Page 1 of 1)

Drilling Contractor: Geotech Drilling Services Ltd
Drilling Method : Solid Stem Auger
Borehole Dia. (m) : 0.15
Pipe/Slotted Pipe Dia. (m): 0.03, 0.03

Date Monitored : 2005 07 06
Ground Surf Elev. (m) : 299.428
Top of Casing Elev. (m) : 299.328

Project Number : 130846
Borehole Logged By : RDS
Date Drilled : 2005 09 10
Log Typed By : LL

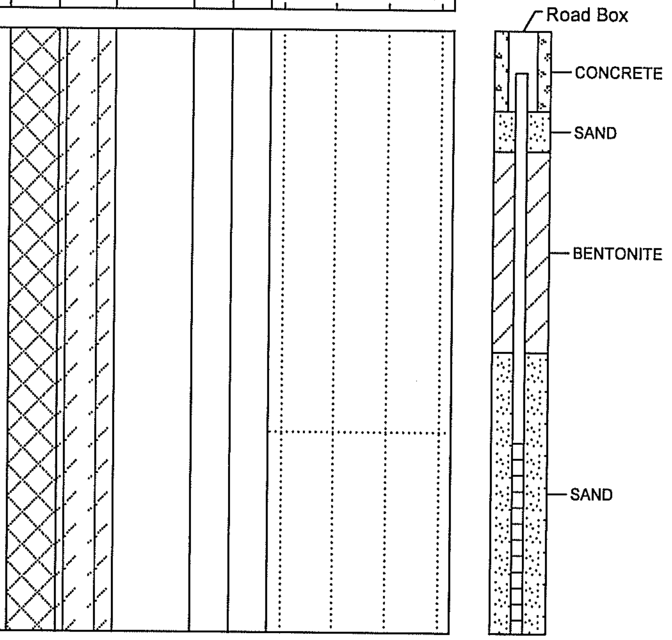
Drilling Legend	Water/NAPL Levels
⊏⊐ Auger Flyte	Water Level 1 Water Level 2 NAPL ◇ NAPL

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval/ Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
0	SAND (FILL), fine grained, silty, trace gravel, medium brown, loose, damp.						
1							
	End of borehole at 1.5 m.						
2							
3							

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: SVW-4



Notes:
Soil vapour well installation.

Print Date: 2008 07 21, Date Approved: 2006 10 31

SNC·LAVALIN Environment

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : SVW09-1

(Page 1 of 1)

Drilling Contractor: Rocky Mountain Soil Sampling
Drilling Method : Hand Excavation
Borehole Dia. (m) : 0.20
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Project Number : 131416
Borehole Logged By : SRW
Date Drilled : 2009 07 09
Log Typed By : GP

Drilling Legend
- ▨ Sample Interval
- ⦚ Hand Auger

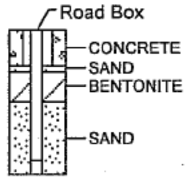
Water/NAPL Levels
- ▼ Water Level 1
- ▽ Water Level 2
- ◆ NAPL
- ◇ NAPL

○ Reading within indicated scale
● Reading outside indicated scale

- ▯ Solid PVC
- ▯ Slotted PVC

Well Name: 09-1

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval/ Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
0	CONCRETE SLAB, large gravel, some cobbles, rebar.						
	SILTY SAND, gravel and cobbles, grey, dense, damp, no hydrocarbon-like vapours.						
	End of borehole at 0.6 m.						
1							
2							
3							
4							
5							



Notes:

Print Date: 2010 04 23

SNC•LAVALIN Environment

Client : **Public Works and Gov't Services Canada**

Location : **Pleasant Camp, BC**

Borehole No. : SVW09-2

(Page 1 of 1)

Drilling Contractor: Rocky Mountain Soil Sampling
Drilling Method : Hand Auger
Borehole Dia. (m) : 0.20
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Project Number : 131416
Borehole Logged By : SRW
Date Drilled : 2009 07 09
Log Typed By : GP

Drilling Legend
▨ Sample Interval
▥ Hand Auger

Water/NAPL Levels
▼ Water Level 1
▽ Water Level 2
◆ NAPL
◇ NAPL

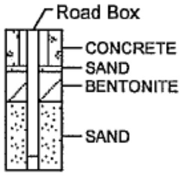
○ Reading within indicated scale
● Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Solid PVC
Slotted PVC

Well Name: 09-2

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval/ Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
0	CONCRETE SLAB, large gravel, some cobbles, rebar.						
	SILTY SAND, gravel and cobbles, grey, dense, damp, no hydrocarbon-like vapours.						
	End of borehole at 0.6 m.						
1							
2							
3							
4							
5							



Notes:

Print Date: 2010 04 23

SNC•LAVALIN Environment

Client :
Public Works and Gov't Services Canada

Location :
Pleasant Camp, BC

Borehole No. : SVW09-3

(Page 1 of 1)

Drilling Contractor: Rocky Mountain Soil Sampling
Drilling Method : Hollow Stem Auger
Borehole Dia. (m) : 0.20
Pipe/Slotted Pipe Dia. (m): 0.05, 0.05

Project Number : 131416
Borehole Logged By : SRW
Date Drilled : 2009 07 09
Log Typed By : GP

Drilling Legend
▨ Sample Interval
⦙ Hand Auger

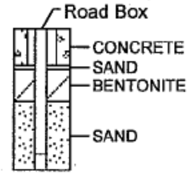
Water/NAPL Levels
▼ Water Level 1
▽ Water Level 2
◈ NAPL
◇ NAPL

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name: 09-3

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval/ Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
0	CONCRETE SLAB, large gravel, some cobbles, rebar.						
	SILTY SAND, grave and cobbles, grey, dense, damp, no hydrocarbon-like vapours.						
	End of borehole at 0.6 m.						
1							
2							
3							
4							
5							



Notes:

Print Date: 2010 04 23

APPENDIX IV

Groundwater Monitoring Data

SNC•LAVALIN Environment

MONITORING REPORT

Project No.: 131416

Date: 2009-07-10
Observer: SRW
Weather: 25°C Sun with smoke haze
Time: 12:00

Approved by: DWB

Public Works and Gov't Services Canada
Pleasant Camp, BC

Monitoring Well No.	Reference Elevation[1] (m)	Depth to NAPL [2] (m)	Apparent NAPL [2] Thickness (mm)	Depth to Water (m)	Potentio-Metric Elevation[3] (m)	Depth to Bottom (m)	Vapour Conc. (ppm)[4]	Redox (mV)	DO (mg/L)	Temp. (°C)	Comments
P2	275.17	-	0	3.460	271.71	3.555	20	-	-	-	
P4	275.47	-	-	-	-	-	-	-	-	-	could not remove bolts
P13	276.1	-	0	4.730	271.37	4.800	10	-	-	-	
01-14	275.77	-	-	-	-	5.790	30	-	-	-	dry
01-17D	272.99	-	0	5.375	267.62	6.550	85	10	4.4	9.0	*
01-17S	272.89	-	-	-	-	4.880	30	-	-	-	dry
01-19	272.13	-	0	3.805	268.33	5.580	25	48	12.8	8.3	*
01-20	274.35	-	-	-	-	5.880	20	-	-	-	* dry
01-21	274.25	-	0	8.075	266.18	9.550	100	5	2.6	8.3	*
01-22	275.11	-	-	-	-	5.520	20	-	-	-	* dry
01-23	273.79	-	0	7.885	265.91	9.320	85	-	-	-	bailer
01-24	275.39	-	0	4.630	270.76	4.640	70	-	-	-	
03-01	273.99	-	0	8.010	265.98	9.490	5	52	3.2	9.8	* j-plug ajar
03-03	273.85	-	0	5.950	267.90	6.550	70	30	3.2	9.5	
03-06	273.99	-	0	5.720	268.27	8.530	185	-	-	-	*
03-08	274.82	-	0	7.345	267.48	8.780	80	-10	4.9	8.3	* j-plug off
03-09	275.09	-	0	7.590	267.50	8.095	90	125	2.3	8.0	*
03-10	275.46	-	0	7.190	268.27	8.400	60	40	7.0	12.3	*
03-02	274.58	-	-	-	-	6.310	115	-	-	-	* dry
03-07	274.48	-	0	6.285	268.20	6.960	140	126	10.0	8.4	*
03-10D	275.46	-	0	8.750	266.71	10.320	90	-	-	-	
03-11	275.72	-	0	6.830	268.89	6.970	40	-	-	-	
04-1	274.06	-	0	6.550	267.51	6.660	40	-	-	-	*
04-2	274.25	-	0	6.740	267.51	7.270	55	-47	4.4	7.0	*
04-3	272.76	-	0	6.795	265.97	9.200	125	10	2.5	8.3	*
04-4	275.69	-	0	6.600	269.09	7.315	30	104	6.8	8.7	*
04-5	275.94	-	0	7.780	268.16	8.310	70	-	-	-	*
04-6	276.09	-	0	6.870	269.22	8.055	55	83	11.7	8.6	*
AS-1	275.45	-	0	6.810	268.64	7.610	375	-	-	-	
AS-2	275.68	-	0	7.217	268.46	8.800	30	-	-	-	
AS-3	275.83	-	0	7.390	268.44	8.020	450	-	-	-	
AS-4	275.67	-	0	6.945	268.73	7.130	120	-	-	-	
AS-5	275.94	-	0	7.162	268.78	8.620	325	-	-	-	
AS-6	274.87	-	-	-	-	-	-	-	-	-	glued cap
AS-7	275.27	-	-	-	-	-	-	-	-	-	could not remove bolts
AS-8	274.8	-	0	6.020	268.78	6.870	220	-	-	-	
AS-9	275.18	-	0	7.330	267.85	9.390	375	-	-	-	
AS-10	275.42	-	0	7.535	267.89	7.890	50	-	-	-	
AS-11	275.58	-	0	5.075	270.51	5.330	50	-	-	-	
AS-12	276.17	-	0	7.525	268.65	7.540	95	-	-	-	
AS-13	273.48	-	0	5.185	268.30	6.405	40	-32	1.8	6.9	
AS-14	273.26	-	0	4.860	268.40	6.390	35				
AS-15	-	-	0	5.530	-	5.690	140	-	-	-	
AS-16	275.32	-	0	6.470	268.85	6.540	120	-	-	-	
AS-17	-	-	-	-	-	-	-	-	-	-	glued cap
AS-18	275.17	-	-	-	-	-	-	-	-	-	glued cap
AS-19	275.21	-	-	-	-	-	-	-	-	-	glued cap
AS-20	275.29	-	-	-	-	-	-	-	-	-	glued cap
AS-21	275.61	-	-	-	-	-	-	-	-	-	glued cap
AS-22	275.63	-	0	4.700	270.93	5.380	40	-15	2.0	8.5	
AS-23	275.42	-	0	3.975	271.45	5.420	20	41	2.8	9.0	
SVE-1	275.23	-	0	5.050	270.18	5.120	50	-	-	-	
SVE-2	275.16	-	-	-	-	5.480	35	-	-	-	dry
SVE-3	275.23	-	0	4.355	270.88	4.900	30	-	-	-	
SVE-4	275.44	-	-	-	-	3.260	25	-	-	-	dry

SNC·LAVALIN Environment

MONITORING REPORT

Project No.: 131416

Date: 2009-07-10
Observer: SRW
Weather: 25°C Sun with smoke haze
Time: 12:00

Approved by: DWB

Public Works and Gov't Services Canada
Pleasant Camp, BC

Monitoring Well No.	Reference Elevation[1] (m)	Depth to NAPL [2] (m)	Apparent NAPL [2] Thickness (mm)	Depth to Water (m)	Potentio-Metric Elevation[3] (m)	Depth to Bottom (m)	Vapour Conc. (ppm)[4]	Redox (mV)	DO (mg/L)	Temp. (°C)	Comments
SVE-5	275.43	-	0	4.315	271.12	4.530	100	-	-	-	
06-1	274.99	-	0	3.101	271.89	3.240	75	-	-	-	*
06-2	275.05	-	0	6.275	268.78	7.210	50	2	4.55	8.0	*
06-3	273.08	-	-	-	-	2.780	60	-	-	-	dry
06-4	273.04	-	0	4.917	268.12	6.275	120	-	-	-	*
06-5	273.29	-	0	5.140	268.15	6.320	80	35	4.42	8.0	*
06-6	275.1	-	0	4.361	270.74	4.780	25	20	7.20	11.0	*
07-1	0	-	0	5.410	-5.41	7.850	175	-	-	-	
07-2	0	-	0	4.938	-4.94	9.280	65	-	-	-	
08-1	272.67	-	0	5.092	267.58	5.790	90	20	9.70	9.2	*
08-2	273.59	-	0	4.340	269.25	6.265	50	-75	2.05	7.0	*
08-3	275.97	-	0	4.400	271.57	5.995	25	15	8.34	7.0	* j-plug broken,not sealed
08-4	275.93	-	0	6.638	269.29	42.330	10	-	-	-	
08-5	274.04	-	0	7.317	266.72	9.440	115	41	4.46	9.0	*
08-6	274.71	-	0	7.185	267.53	7.950	20	5	4.90	9.0	*
08-7	275.39	-	0	7.225	268.17	9.200	150	-20	2.85	8.0	*
08-8	276.36	-	0	7.670	268.69	8.225	150	85	6.10	9.8	*

NOTES: * Waterra in well during measurements

[1] Reference Elevation is a mark on the rim of the monitoring well standpipe surveyed with respect to local datum.
[2] Non-Aqueous Phase Liquid.
[3] NAPL specific gravity assumed to be 0.80.
[4] 1% LEL is approximately equivalent to 110 ppm.

SNC•LAVALIN Environment

MONITORING REPORT

Project No.: 131416

Date: 2009-08-26
Observer: TD
Weather: 12°C light Rain
Time: 12:00

Approved by: DWB

Public Works and Gov't Services Canada
Pleasant Camp, BC

Monitoring Well No.	Reference Elevation[1] (m)	Depth to NAPL [2] (m)	Apparent NAPL [2] Thickness (mm)	Depth to Water (m)	Potentio-Metric Elevation[3] (m)	Depth to Bottom (m)	Vapour Conc. (ppm)[4]	Temp. (°C)	Comments
03-10	275.46	-	0	7.705	267.76	8.370	80	9.8	*
08-6	274.71	-	0	7.484	267.23	7.950	50	9.6	*
08-7	275.39	-	0	7.710	267.68	9.210	175	9.6	*
08-8	276.36	-	0	7.655	268.71	8.205	45	9.7	*

NOTES: * Waterra in well during measurements

[1] Reference Elevation is a mark on the rim of the monitoring well standpipe surveyed with respect to local datum.
[2] Non-Aqueous Phase Liquid.
[3] NAPL specific gravity assumed to be 0.80.
[4] 1% LEL is approximately equivalent to 110 ppm.

MONITORING REPORT

Project No.: 131416

Date: 2009-09-23
Observer: TL/SRW
Weather: 10°C Rain
Time: 12:00

Approved by: DWB

Public Works and Gov't Services Canada
Pleasant Camp, BC

Monitoring Well No.	Reference Elevation[1] (m)	Depth to NAPL [2] (m)	Apparent NAPL [2] Thickness (mm)	Depth to Water (m)	Potentio-Metric Elevation[3] (m)	Depth to Bottom (m)	Vapour Conc. (ppm)[4]	Redox (mV)	Temp. (°C)	Comments
P2	275.17	-	0	3.2	271.97	3.555	125	-	-	
P4	275.47	-	0	4.574	270.90	5.52	95	4.6	11.0	
P13	276.1	-	0	4.452	271.65	4.765	70	99.9	10.4	
01-14	275.77	-	-	-	-	5.775	90	-	-	*Dry
01-17D	272.99	4.497	0	4.497	268.49	6.625	135	52.1	8.0	
01-17S	272.89	4.416	0	4.416	268.47	4.88	130	-	-	
01-19	272.13	-	0	3.14	268.99	5.508	40	175.5	8.8	
01-20	274.35	-	0	3.759	270.59	5.867	25	170.4	8.1	*
01-21	274.25	-	0	7.533	266.72	9.66	70	113.7	7.2	
01-22	275.11	-	0	5.318	269.79	5.52	135	-	-	
01-23	273.79	-	0	7.423	266.37	-	50	-	-	Bailer inside
01-24	275.39	-	0	4.24	271.15	4.64	120	-	-	
03-01	273.99	-	0	7.507	266.48	-	100	-	-	*
03-03	273.85	-	0	4.961	268.89	6.56	75	119.9	7.7	
03-06	273.99	-	0	5.076	268.91	8.53	100	-	-	*
03-08	274.82	-	0	6.667	268.15	8.625	130	126.2	7.3	*
03-09	275.09	-	0	6.915	268.18	8.12	100	146.6	7.6	*
03-10	275.46	-	0	5.892	269.57	8.36	120	166.2	7.6	*
03-02	274.58	-	-	-	-	6.31	95	-	-	*Dry
03-07	274.48	-	0	5.7	268.78	6.88	120	199.4	7.2	
03-10D	274.99	-	0	2.562	272.43	3.16	110	86.7	8.3	*
03-11	275.72	-	0	5.395	270.33	6.97	110	191.8	8.3	
04-1	274.06	-	0	5.934	268.13	6.555	25	177.4	7.8	*
04-2	274.25	-	0	6.104	268.15	7.225	35	116.2	7.4	*
04-3	272.76	-	0	6.33	266.43	9.2	90	-	-	*
04-4	275.69	-	0	5.9	269.79	7.35	60	181.0	9.5	*
04-5	275.94	-	0	6.505	269.44	8.19	110	78.6	7.5	*
04-6	276.09	-	0	5.399	270.69	7.98	100	165.0	9.2	*
AS-1	275.45	-	0	5.698	269.75	7.61	150	-	-	
AS-2	275.68	-	0	5.84	269.84	8.8	95	-	-	
AS-3	275.83	-	0	6.114	269.72	8.02	175	-	-	
AS-4	275.67	-	0	5.745	269.93	7.13	100	86.3	8.1	
AS-5	275.94	-	0	6.358	269.58	8.62	65	-	-	
AS-6	274.87	-	-	-	-	-	-	-	-	Cap glued
AS-7	275.27	-	-	-	-	-	-	-	-	Bolts stuck
AS-8	274.8	-	0	4.915	269.89	6.87	135	-	-	
AS-9	275.18	-	0	6.62	268.56	9.39	100	-	-	
AS-10	275.42	-	0	5.509	269.91	7.89	125	-	-	
AS-11	275.58	-	0	4.754	270.83	5.32	125	21.9	8.3	
AS-12	276.17	-	0	6.245	269.93	7.54	160	-	-	
AS-13	273.48	-	0	4.038	269.44	6.555	65	-30.4	7.2	
AS-14	273.26	-	0	3.75	269.51	6.39	120	-	-	
AS-15	-	-	0	4.975	-	5.63	145	97.7	8.1	
AS-16	275.32	-	0	5.305	270.02	6.54	175	-	-	
AS-17	275.23	-	0	4.032	271.20	4.9	150	-	-	
AS-18	275.21	-	-	-	-	-	-	-	-	Cap glued
AS-19	275.29	-	-	-	-	-	-	-	-	Cap glued
AS-20	275.44	-	0	3.238	272.20	3.26	110	-	-	
AS-21	275.63	-	0	4.152	271.48	5.365	100	16.4	8.6	
AS-22	275.42	-	0	3.354	272.07	5.42	75	-	-	
AS-23	275.43	-	0	3.705	271.73	4.53	150	-	-	
SVE-1	275.23	-	0	4.89	270.34	5.12	115	-	-	
SVE-2	275.16	-	0	5.24	269.92	5.48	110	-	-	

MONITORING REPORT

Project No.: 131416

Date: 2009-09-23
Observer: TL/SRW
Weather: 10°C Rain
Time: 12:00

Approved by: DWB

Public Works and Gov't Services Canada
Pleasant Camp, BC

Monitoring Well No.	Reference Elevation[1] (m)	Depth to NAPL [2] (m)	Apparent NAPL [2] Thickness (mm)	Depth to Water (m)	Potentio-Metric Elevation[3] (m)	Depth to Bottom (m)	Vapour Conc. (ppm)[4]	Redox (mV)	Temp. (°C)	Comments
SVE-3	275.17	-	-	-	-	-	-	-	-	Cap glued
SVE-4	275.61	-	-	-	-	-	-	-	-	Cap glued
SVE-5	275.46	-	0	8.1	267.36	10.32	60	-	-	*
06-1	275.05	-	0	5.304	269.75	7.178	95	148.8	8.4	*
06-2	273.08	-	-	-	-	2.76	55	-	-	Dry
06-3	273.04	-	0	3.93	269.11	6.17	110	89.3	8.4	*
06-4	273.29	-	0	3.948	269.34	6.32	80	-	-	
06-5	275.1	-	0	3.793	271.31	4.78	110	-	-	
06-6	0	-	0	4.54	-4.54	7.8	140	-	-	
07-1	0	-	0	4.081	-4.08	9.265	100	-	-	
07-2	272.67	-	0	4.224	268.45	5.79	90	-	-	*
08-1	273.59	-	0	4.215	269.38	6.265	80	0.5	8.3	*
08-2	275.97	-	0	4.063	271.91	5.85	100	91.3	8.3	*
08-3	275.93	-	0	6.092	269.84	42.33	25	-203.3	8.8	
08-4	274.04	-	0	6.853	267.19	-	100	-	-	*
08-5	274.71	-	0	5.961	268.75	7.865	50	74.7	8.0	*
08-6	275.39	-	0	5.972	269.42	9.314	70	31.0	7.7	*
08-7	276.36	-	0	6.857	269.50	8.2	110	173.3	8.4	*Box needs repair
08-8	275.14	-	0	4.125	271.02	5.562	160	9.7	9.1	*
09-16	276.34	-	0	5.165	271.18	5.625	70	88.3	7.9	*
09-20	276.41	-	0	6.644	269.77	6.755	75	-	-	

[1] Reference Elevation is a mark on the rim of the monitoring well standpipe surveyed with respect to local datum.

[2] Non-Aqueous Phase Liquid.

[3] NAPL specific gravity assumed to be 0.80.

[4] 1% LEL is approximately equivalent to 110 ppm.

TABLE IV-1: Groundwater Monitoring Data Report (2001 to 2009)

MW ID	Date	Reference Elevation[1] (m geod)	Depth to Water (m bTOC)	Depth to Water (m bgs)	Depth to Well Bottom (m bTOC)	Depth to NAPL[2] (m bTOC)	Apparent NAPL Thickness (mm)	Potentiometric Elevation (m geod)	Dissolved Oxygen (mg/L)	Comments
Monitoring Wells										
P2	2001-09-28	275.17	2.870	2.911	3.48		0	272.30		
	2004-10-01		3.456	3.497	3.48		0	271.71		
	2004-10-18									did not monitor
	2005-07-06		3.493	3.534			0	271.68		
	2006-06-14		3.186	3.227			0	271.98	4.91	
	2006-06-18		3.465	3.506			0	271.71	5.71	
	2006-07-16		3.495	3.536	3.51		0	271.68		
	2007-09-24				3.52					Dry
	2008-06-16		3.069	3.110	3.50		0	272.10		
	2008-09-30		3.218	3.259	3.56		0	271.95		
	2009-07-10		3.460	3.501	3.56		0	271.71		almost dry
	2009-09-23		3.200	3.241	3.56		0	271.97		
P3	2001-09-28	275.22	3.830	3.871	5.58		0	271.39		
	2004-10-01		4.283	4.324	5.58		0	270.94		
	2004-10-18									did not monitor
	2005-07-06		4.361	4.402	5.55		0	270.86	2.45	*
	2006-06-14									could not locate
	2006-07-16									Unable to locate
P4	2001-09-28	275.47	4.440	4.491	5.52	4.439	1	271.03		
	2004-10-01		4.784	4.835	5.52	4.782	2	270.69		
	2004-10-18									did not monitor
	2005-07-06		4.999	5.050			0	270.47		*
	2006-07-16		4.932	4.983	5.51		0	270.54		
	2008-06-17		4.100	4.151	4.65		0	271.37		very silty
	2008-09-30		4.592	4.643	5.55		0	270.88		
	2009-07-10									could not remove bolts
	2009-09-23		4.574	4.625	5.52		0	270.90		
P11	2001-09-28	273.19	3.285	3.316	6.13		0	269.91		Sheen
	2004-10-01		4.112	4.143	6.13		0	269.08		
	2004-10-18									did not monitor
	2005-07-06		4.724	4.755	6.09		0	268.47		*
	2006-06-14									could not locate
	2006-07-16									Unable to locate
P13	2001-09-28	276.1	4.250	4.278	4.74		0	271.85		
	2005-07-06		4.623	4.651			0	271.48		
	2006-06-14		3.542	3.570			0	272.56	5.41	
	2006-06-18		4.568	4.596			0	271.53	4.5	
	2006-07-16		4.579	4.607	4.76		0	271.52		
	2008-06-16		4.671	4.699	4.77		0	271.43		almost dry
	2008-09-30		4.348	4.376	4.81		0	271.75		
	2009-07-10		4.730	4.758	4.80		0	271.37		almost dry
	2009-09-23		4.452	4.480	4.77		0	271.65		
01-14	2001-09-28	275.77			5.79					Dry
	2003-09-11		5.585	5.726	5.79	5.582	3	270.19		
	2004-10-01				5.79					DRY
	2004-10-18				5.79					did not monitor
	2005-07-06		5.774	5.915			0	270.00		
	2006-07-16		5.781	5.922	5.81		0	269.99		
	2008-06-16				5.76					dry
	2008-09-30				5.80					
	2009-07-10				5.79					dry
	2009-09-23				5.78					*Dry
01-16	2001-09-28	274.96	2.540	2.601	3.36		0	272.42		
	2004-10-01		3.118	3.179	3.36		0	271.84		
	2004-10-18				3.36					did not monitor
	2005-07-06				3.31					*, Dry
	2006-06-14									could not locate
	2006-07-16									Unable to locate
01-17D	2001-09-28	272.99	4.300	4.351	6.63		0	268.69		Sheen
	2003-09-04		5.720	5.771	6.61		0	267.27		
	2003-09-11		5.585	5.636	6.61		0	267.41		
	2004-10-01		5.228	5.279	6.63		0	267.76	9.9	ORC present
	2004-10-18				6.63				9.9	ORC present
	2006-07-16		5.361	5.412	6.66		0	267.63		
	2007-09-24		5.621	5.672	6.63		0	267.37		
	2008-06-16		4.472	4.523	6.62		0	268.52		*
	2008-09-30		4.935	4.986	6.62		0	268.06		*
	2009-07-10		5.375	5.426	6.55		0	267.62		*
	2009-09-23		4.497	4.548	6.63	4.497	0	268.49		
01-17S	2001-09-28	272.89	4.190	4.256	4.89		0	268.70		
	2004-10-01				4.89					DRY
	2004-10-18				4.89					did not monitor
	2005-07-06				4.90					*, Dry
	2006-06-14		4.533	4.599			0	268.36	4.87	
	2006-06-18		4.879	4.945			0	268.01	10.67	
	2006-07-16									Dry @ 4.892
	2008-06-16		4.310	4.376	4.85		0	268.58		
	2008-09-30		4.814	4.880	4.91		0	268.08		
	2009-07-10				4.88					dry
	2009-09-23		4.416	4.482	4.88	4.416	0	268.47		
01-18	2001-09-28	272.93	3.340	3.371	4.89		0	269.59		

TABLE IV-1: Groundwater Monitoring Data Report (2001 to 2009)

MW ID	Date	Reference Elevation[1] (m geod)	Depth to Water (m bTOC)	Depth to Water (m bgs)	Depth to Well Bottom (m bTOC)	Depth to NAPL[2] (m bTOC)	Apparent NAPL Thickness (mm)	Potentiometric Elevation (m geod)	Dissolved Oxygen (mg/L)	Comments
	2003-09-11		5.000	5.031	4.84		0	267.93		
	2003-09-04				4.84					
	2004-10-01				4.89					DRY
	2004-10-18				4.89					did not monitor
	2005-07-06		4.666	4.697	4.90		0	268.26		*
	2006-06-14									could not locate
	2006-07-16									Unable to locate
01-19	2001-09-28	272.13	2.955	3.026	5.56		0	269.18		
	2003-09-11		4.385	4.456	5.60		0	267.75		
	2003-09-04		4.415	4.486	5.60		0	267.72		
	2004-10-01		4.570	4.641	5.56		0	267.56	9.9	ORC installed
	2004-10-18				5.56				9.9	ORC present
	2006-06-14		3.232	3.303			0	268.90	10.77	
	2006-06-18		3.366	3.437			0	268.76	7.97	
	2006-07-16		4.036	4.107	5.58		0	268.09		
	2007-09-24		4.130	4.201	5.60		0	268.00	9.83	
	2008-06-16		3.024	3.095	5.58		0	269.11		bailer
	2008-09-30		3.456	3.527	5.58		0	268.67	2.3	*
	2009-07-10		3.805	3.876	5.58		0	268.33		*
	2009-09-23		3.140	3.211	5.51		0	268.99		
01-20	2001-09-28	274.35	3.620	3.716	5.78		0	270.73		
	2003-09-04		8.350	8.446	9.66		0	266.00		
	2003-10-23		4.280	4.376	5.81		0	270.07	7.9	
	2004-10-01		4.589	4.685	5.81		0	269.76	9.5	
	2004-10-18				5.81				7.92	samples collected
	2005-07-06				5.87					*, Dry
	2006-06-14		4.500	4.596			0	269.85	12.04	
	2006-06-18		4.535	4.631			0	269.82	11.2	
	2006-07-16		5.760	5.856	5.87		0	268.59		*
	2007-09-24		5.844	5.940	5.88		0	268.51		Not enough water to sample.
	2008-06-16		4.473	4.569	5.87		0	269.88		*
	2008-09-30		3.900	3.996	5.91			270.45	11.1	*
	2009-07-10				5.88					* dry
	2009-09-23		3.759	3.855	5.87		0	270.59		*
01-21	2001-09-28	274.25	7.460	7.601	9.57		0	266.79		
	2003-09-11		8.285	8.426	9.66		0	265.97		
	2003-10-23		7.820	7.961	9.67		0	266.43	1.8	
	2004-10-01		8.279	8.420	9.67		0	265.97	4.6	
	2004-10-18				9.67				3.12	samples collected
	2005-07-06		7.991	8.132	9.66		0	266.26	1.5	*
	2006-06-14		6.687	6.828			0	267.56	3.43	
	2006-06-18		8.467	8.608			0	265.78	7.4	
	2006-07-16		8.169	8.310	9.58		0	266.08		*
	2007-09-24		8.432	8.573	9.29		0	265.82	1.38	
	2008-06-16		7.685	7.826	9.65		0	266.57		*
	2008-09-30		7.755	7.896	9.58		0	266.50	3.3	*
	2009-07-10		8.075	8.216	9.55		0	266.18		*
	2009-09-23		7.533	7.674	9.66		0	266.72		
01-22	2001-09-28	275.11	4.705	4.796	5.45	4.703	2	270.41		
	2003-09-11				9.23					Dry
	2004-10-01				5.45					DRY
	2004-10-18				5.45					did not monitor
	2005-07-06				5.44					*, Dry
	2006-06-14		5.145	5.236			0	269.97	3.27	
	2006-06-18		5.238	5.329			0	269.87	4.8	
	2006-07-16									Dry @ 5.475
	2008-06-16		5.117	5.208	5.43		0	269.99		* almost dry
	2008-09-30				5.52					*
	2009-07-10				5.52					* dry
	2009-09-23		5.318	5.409	5.52		0	269.79		
01-23	2001-09-28	273.79	7.100	7.521	9.53		0	266.69		
	2003-09-11		8.935	9.356	9.23		0	264.86		
	2003-09-04		8.975	9.396	9.23		0	264.82		
	2003-10-23		7.530	7.951	9.25		0	266.26	2.8	
	2004-10-01		7.980	8.401	9.25		0	265.81	3.2	
	2004-10-18		7.540	7.961	9.25		0	266.25	2.1	
	2005-07-06		7.767	8.188	9.25		0	266.02		*
	2006-06-14		7.449	7.870			0	266.34	5.95	no bolt
	2006-06-18		7.673	8.094			0	266.12	6.55	
	2006-07-16		7.589	8.010	9.29		0	266.20		
	2007-09-24		8.060	8.481	9.31		0	265.73	2.82	
	2008-06-16		6.458	6.879	9.29		0	267.33		bailer
	2008-09-30		7.634	8.055	9.33		0	266.16		
	2009-07-10		7.885	8.306	9.32		0	265.91		bailer
	2009-09-23		7.423	7.844			0	266.37		Bailer inside
01-24	2001-09-28	275.39	4.090	4.216	4.65	4.089	1	271.30		
	2004-10-01				4.65					DRY
	2004-10-18				4.65					did not monitor
	2005-07-06				4.68					*, Dry
	2006-06-14									could not locate
	2006-07-16		4.685	4.811	4.70	4.671	14	270.72		
	2008-06-17		4.555	4.681	5.51		0	270.84		very silty

TABLE IV-1: Groundwater Monitoring Data Report (2001 to 2009)

MW ID	Date	Reference Elevation[1] (m geod)	Depth to Water (m bTOC)	Depth to Water (m bgs)	Depth to Well Bottom (m bTOC)	Depth to NAPL[2] (m bTOC)	Apparent NAPL Thickness (mm)	Potentiometric Elevation (m geod)	Dissolved Oxygen (mg/L)	Comments
	2008-09-30		4.193	4.319	4.71		0	271.20		
	2009-07-10		4.630	4.756	4.64		0	270.76		dry
	2009-09-23		4.240	4.366	4.64		0	271.15		
03-01	2003-09-11	273.99	8.105	8.242	9.55		0	265.89		
	2003-10-23		7.635	7.772	9.47		0	266.36	4.5	
	2004-10-01		8.120	8.257	9.47		0	265.87	3.8	
	2004-10-18		7.655	7.792	9.47		0	266.34		did not sample
	2005-07-06		7.852	7.989	9.48		0	266.14		*
	2006-06-14		7.508	7.645			0	266.48		
	2006-06-18		4.944	5.081			0	269.05	10.3	
	2006-07-16		7.996	8.133	9.47		0	265.99		*
	2007-09-24		8.159	8.296	9.57		0	265.83	7.62	
	2008-06-16		7.557	7.694	9.55		0	266.43		bailer
	2008-09-30		7.735	7.872	9.59		0	266.26	4.4	*
	2009-07-10		8.010	8.147	9.49		0	265.98		* j-plug ajar
	2009-09-23		7.507	7.644			0	266.48		*
03-02	2003-09-11	274.58			7.08					Dry
	2003-10-23		6.740	6.839	7.09		0	267.84		
	2004-10-01				7.09					DRY
	2004-10-18		6.660	6.759	7.09		0	267.92		did not sample
	2005-07-06		7.025	7.124	7.04		0	267.56		*
	2006-06-14		6.518	6.617			0	268.06	9.29	
	2006-06-18		6.985	7.084			0	267.60	9.84	silty
	2006-07-16									*, Dry @ 6.990
	2008-06-16				6.29					* dry
	2008-09-30				6.33					*
	2009-07-10				6.31					* dry
	2009-09-23				6.31					*Dry
03-06	2003-09-11	273.99	6.225	6.417	8.65		0	267.77		
	2003-10-23		5.405	5.597	8.55		0	268.59	5.4	
	2004-10-01		7.070	7.262	8.55		0	266.92	6.7	
	2004-10-18		5.313	5.505	8.55		0	268.68	6.7	samples collected
	2005-07-06		5.665	5.857			0	268.33		*
	2006-06-14		5.164	5.356			0	268.83		waterra stuck in well, no DO
	2006-06-17		5.250	5.442			0	268.74	8.58	
	2006-07-16		5.642	5.834	8.65		0	268.35		*
	2007-09-24		6.029	6.221	8.59		0	267.96	8.44	
	2008-06-16		5.023	5.215	8.65		0	268.97		*
	2008-09-30		5.398	5.590	8.53		0	268.59		
	2009-07-10		5.720	5.912	8.53		0	268.27		*
	2009-09-23		5.076	5.268	8.53		0	268.91		*
03-07	2003-09-11	274.48	6.790	6.916	6.93		0	267.69		
	2003-10-23		5.880	6.006	6.92		0	268.60	5.1	
	2004-10-01		6.896	7.022	6.92		0	267.58	5.1	
	2004-10-18		5.867	5.993	6.92		0	268.61	6.5	samples collected
	2005-07-06		6.208	6.334	6.92		0	268.27	3.98	*
	2006-06-14		5.668	5.794			0	268.81	7.92	lost pen in well
	2006-06-17		5.718	5.844			0	268.76	7.47	
	2006-07-16		6.155	6.281	6.87		0	268.33		*
	2007-09-24		6.555	6.681	6.94		0	267.93	12.27	
	2008-06-16		5.381	5.507	6.92		0	269.10		*
	2008-09-30		5.965	6.091	6.96		0	268.52		*
	2009-07-10		6.285	6.411	6.96		0	268.20		*
	2009-09-23		5.700	5.826	6.88		0	268.78		
03-08	2003-09-11	274.82	7.320	7.477	8.71		0	267.50		
	2003-10-23		6.965	7.122	9.74		0	267.86	2	
	2004-10-01		7.154	7.311	9.74		0	267.67		
	2004-10-18		6.837	6.994	9.74		0	267.98	1.55	samples collected
	2005-07-06		7.261	7.418	8.66		0	267.56	1.55	*
	2006-06-14		6.788	6.945			0	268.03	3.7	
	2006-06-17		7.245	7.402			0	267.58	12.1	
	2006-07-16		7.585	7.742	8.67		0	267.24		*
	2007-09-24		7.613	7.770	8.54		0	267.21	5.35	
	2008-06-16		6.825	6.982	8.74		0	268.00		*
	2008-09-30		7.188	7.345	8.78		0	267.63		
	2009-07-10		7.345	7.502	8.78		0	267.48		* j-plug off
	2009-09-23		6.667	6.824	8.63		0	268.15		*
03-09	2003-09-11	275.09	7.545	7.737	8.34		0	267.55		Sheen
	2003-10-23		6.165	6.357	8.34		0	268.93	5	
	2004-10-01		7.371	7.563	8.34		0	267.72	0.8	
	2004-10-18		7.066	7.258	8.34		0	268.02	4.55	samples collected
	2005-07-06		7.492	7.684	8.34		0	267.60	1.2	*
	2006-06-14		7.038	7.230			0	268.05		waterra stuck in well, no DO
	2006-06-17		7.619	7.811			0	267.47	10.97	
	2006-07-16		7.730	7.922	7.82		0	267.36		*
	2007-09-24		7.747	7.939	7.98		0	267.34	7.89	
	2008-06-16		7.117	7.309	8.00		0	267.97		bailer
	2008-09-30		7.445	7.637	8.10		0	267.65		*
	2009-07-10		7.590	7.782	8.10		0	267.50		*
	2009-09-23		6.915	7.107	8.12		0	268.18		*
03-10	2003-09-11	275.46	6.735	6.880	8.37		0	268.73		Sheen
	2003-10-23		5.915	6.060	8.36		0	269.55	1.9	

TABLE IV-1: Groundwater Monitoring Data Report (2001 to 2009)

MW ID	Date	Reference Elevation^1 (m geod)	Depth to Water (m bTOC)	Depth to Water (m bgs)	Depth to Well Bottom (m bTOC)	Depth to NAPL^2 (m bTOC)	Apparent NAPL Thickness (mm)	Potentiometric Elevation (m geod)	Dissolved Oxygen (mg/L)	Comments
	2004-10-01		7.091	7.236	8.36		0	268.37	0.4	
	2004-10-18		5.925	6.070	8.36		0	269.54		samples collected
	2005-07-06									ORC in well.
	2006-06-14		5.659	5.804			0	269.80	4.39	
	2006-06-17		5.724	5.869			0	269.74	1.74	
	2006-07-16			8.322			0	267.28		
	2007-09-24		7.046	7.191	8.38		0	268.41	0.72	
	2008-06-16		5.644	5.789	8.18		0	269.82		*
	2008-09-30		6.070	6.215	8.40		0	269.39		*
	2009-07-10		7.190	7.335	8.40		0	268.27		*
	2009-09-23		5.892	6.037	8.36		0	269.57		*
03-10D	2006-07-16	275.46	8.177		10.28					ORC present
	2008-06-16		8.443	8.588	10.28		0	267.02		
	2008-09-30		8.721	8.866	10.32		0	266.74		
	2009-07-10		8.750	8.895	10.32		0	266.71		
	2009-09-23		8.100	8.245	10.32		0	267.36		*
03-11	2003-09-11	275.72	7.340	7.469	7.47	7.338	2	268.38		
	2003-10-23		6.655	6.784	7.44		0	269.07	1.6	
	2004-10-01		6.970	7.099	7.44		0	268.75	0.2	
	2004-10-18		5.620	5.749	7.44		0	270.10	0.8	samples collected
	2005-07-06				7.40					*, Dry
	2006-07-16		5.928	6.057			0	269.79		
	2008-06-19		5.538	5.667	6.83		0	270.18		
	2008-09-30		5.457	5.586	6.97		0	270.26	1.9	
	2009-07-10		6.830	6.959	6.97		0	268.89		almost dry
	2009-09-23		5.395	5.524	6.97		0	270.33		
04-1	2004-10-18	274.06	6.091	6.196			0	267.97	6.1	samples collected
	2005-07-06		6.472	6.577	6.63		0	267.59		*
	2006-06-14		5.039	5.144			0	269.02	5.41	
	2006-06-18		6.194	6.299			0	267.87	12.41	
	2006-07-16		6.586	6.691	6.63		0	267.47		*
	2007-09-24		6.554	6.659	6.65		0	267.51		Not enough water to sample.
	2008-06-16		6.082	6.187	6.63		0	267.98		*
	2008-09-30		6.410	6.515	6.66		0	267.65	10.4	*
	2009-07-10		6.550	6.655	6.66		0	267.51		*almost dry
	2009-09-23		5.934	6.039	6.56		0	268.13		*
04-2	2004-10-18	274.25	6.265	6.340			0	267.99	2.8	samples collected
	2005-07-06		6.646	6.721	7.25		0	267.60	1.1	*
	2006-06-14		6.208	6.283			0	268.04	2.39	
	2006-06-18		6.627	6.702			0	267.62	7	
	2006-07-16		6.755	6.830	7.23		0	267.50		*
	2007-09-24		6.788	6.863	7.30		0	267.46	2.76	
	2008-06-16		6.321	6.396	7.22		0	267.93		*
	2008-09-30		6.579	6.654	7.27		0	267.67	5.2	*
	2009-07-10		6.740	6.815	7.27		0	267.51		*
	2009-09-23		6.104	6.179	7.23		0	268.15		*
04-3	2004-10-18	272.76	6.976	6.336			0	265.78	3.02	samples collected
	2005-07-06		6.627	5.987	8.58		0	266.13	0.88	*
	2006-06-14		6.326	5.686			0	266.43	4.72	
	2006-06-18		6.710	6.070			0	266.05	2.89	
	2006-07-16		6.785	6.145	9.10		0	265.98		*
	2007-09-24		7.072	6.432	9.19		0	265.69	1.96	
	2008-06-16		6.357	5.717	9.17		0	266.40		bailer
	2008-09-30		6.511	5.871	9.20		0	266.25	4.8	
	2009-07-10		6.795	6.155	9.20		0	265.97		*
	2009-09-23		6.330	5.690	9.20		0	266.43		*
04-4	2004-10-18	275.69	6.028	6.193			0	269.66	6.1	samples collected
	2005-07-06		6.427	6.592	7.35		0	269.26	1.9	*
	2006-06-14		5.942	6.107			0	269.75	4.75	
	2006-06-17		6.063	6.228			0	269.63	3.55	
	2006-07-16		6.429	6.594	7.35		0	269.26		*
	2007-09-24		6.504	6.669	7.30		0	269.19	2.13	
	2008-06-16		5.942	6.107	7.29		0	269.75		*
	2008-09-30		5.970	6.135	7.32		0	269.72	3.1	*
	2009-07-10		6.600	6.765	7.32		0	269.09		*
	2009-09-23		5.900	6.065	7.35		0	269.79		*
04-5	2004-10-18	275.94	6.856	6.959			0	269.08	1.17	samples collected
	2005-07-06		7.677	7.780	8.12		0	268.26	0.76	*
	2006-06-14		6.500	6.603			0	269.44	5.59	
	2006-06-17		7.237	7.340			0	268.70	10.26	
	2006-07-16		7.901	8.004	8.15		0	268.04		*
	2007-09-24		7.759	7.862	8.30		0	268.18	7.26	
	2008-06-16		6.410	6.513	8.22		0	269.53		* Fe on waterra
	2008-09-30		6.657	6.760	8.31		0	269.28	3.3	*
	2009-07-10		7.780	7.883	8.31		0	268.16		*almost dry
	2009-09-23		6.505	6.608	8.19		0	269.44		*
04-6	2004-10-18	276.09	6.782	6.899			0	269.31	7.54	samples collected
	2005-07-06		7.060	7.177	8.01		0	269.03	3.92	*
	2006-06-14		5.625	5.742			0	270.47	5.96	
	2006-06-17		5.565	5.682			0	270.53	6.4	
	2006-07-16		6.680	6.797	7.99		0	269.41		*
	2007-09-24		6.063	6.180	7.96		0	270.03	8.84	

TABLE IV-1: Groundwater Monitoring Data Report (2001 to 2009)

MW ID	Date	Reference Elevation[1] (m geod)	Depth to Water (m bTOC)	Depth to Water (m bgs)	Depth to Well Bottom (m bTOC)	Depth to NAPL[2] (m bTOC)	Apparent NAPL Thickness (mm)	Potentiometric Elevation (m geod)	Dissolved Oxygen (mg/L)	Comments
	2008-06-16		5.671	5.788	8.02		0	270.42		*
	2008-09-30		5.788	5.905	8.06		0	270.30	5.3	*
	2009-07-10		6.870	6.987	8.06		0	269.22		*
	2009-09-23		5.399	5.516	7.98		0	270.69		*
06-1	2007-09-24	274.99	2.991	3.082	3.20		0	272.00		Not enough water to sample.
	2008-06-16		2.717	2.808	3.03		0	272.27		* almost dry
	2008-09-30		2.570	2.661	3.24		0	272.42		*
	2009-07-10		3.101	3.192	3.24		0	271.89		*almost dry
	2009-09-23		2.562	2.653	3.16		0	272.43		*
06-2	2007-09-24	275.05	6.194	6.305	7.19		0	268.86	0.63	
	2008-06-16		5.073	5.184	7.18		0	269.98		*
	2008-09-30		5.424	5.535	7.21		0	269.63		*
	2009-07-10		6.275	6.386	7.21		0	268.78		*
	2009-09-23		5.304	5.415	7.18		0	269.75		*
06-3	2008-06-16	273.08			2.75					dry
	2008-09-30				2.81					
	2009-07-10				2.78					dry
	2009-09-23				2.76					Dry
06-4	2007-09-24	273.04	4.602	4.683	6.18		0	268.44	8.05	
	2008-06-16		3.741	3.822	6.20		0	269.30		*
	2008-09-30		4.292	4.373	6.28		0	268.75	2.7	
	2009-07-10		4.917	4.998	6.28		0	268.12		*
	2009-09-23		3.930	4.011	6.17		0	269.11		*
06-5	2007-09-24	273.29	4.541	4.587	6.23		0	268.75	10.58	
	2008-06-16		3.740	3.786	6.31		0	269.55		*
	2008-09-30		4.338	4.384	6.35		0	268.95	5.6	*
	2009-07-10		5.140	5.186	6.32		0	268.15		*
	2009-09-23		3.948	3.994	6.32		0	269.34		
06-6	2007-09-24	275.1	4.175	4.296	4.78		0	270.93	5.92	
	2008-06-16		3.607	3.728	4.77		0	271.49		*
	2008-09-30		3.778	3.899	4.81		0	271.32	7.6	*
	2009-07-10		4.361	4.482	4.78		0	270.74		*
	2009-09-23		3.793	3.914	4.78		0	271.31		
07-1	2008-09-30	0								Could not remove cap
	2009-07-10		5.410	278.540	7.85		0	-5.41		
	2009-09-23		4.540	277.670	7.80		0	-4.54		
07-2	2008-09-30	0	4.534		9.30		0			
	2009-07-10		4.938	277.468	9.28		0	-4.94		
	2009-09-23		4.081	276.611	9.27		0	-4.08		
08-1	2008-09-30	272.67	4.620	4.692	5.82		0	268.05	6	*
	2009-07-10		5.092	5.164	5.79		0	267.58		*
	2009-09-23		4.224	4.296	5.79		0	268.45		*
08-2	2008-09-30	273.59	4.517	4.578	6.27		0	269.07		*
	2009-07-10		4.340	4.401	6.27		0	269.25		*
	2009-09-23		4.215	4.276	6.27		0	269.38		*
08-3	2008-09-30	275.97	4.104	4.134	6.00		0	271.87	4.1	*
	2009-07-10		4.400	4.430	6.00		0	271.57		* j-plug broken,not sealed
	2009-09-23		4.063	4.093	5.85		0	271.91		*
08-4	2008-09-30	275.93	7.920	7.941	42.33		0	268.01	4.6	
	2009-07-10		6.638	6.659	42.33		0	269.29		
	2009-09-23		6.092	6.113	42.33		0	269.84		
08-5	2008-09-30	274.04	7.115	6.333	9.53		0	266.93	4.6	*
	2009-07-10		7.317	6.535	9.44		0	266.72		*
	2009-09-23		6.853	6.071			0	267.19		*
08-6	2008-09-30	274.71	6.398	5.659	7.96		0	268.31	7.9	*
	2009-07-10		7.185	6.446	7.95		0	267.53		*
	2009-09-23		5.961	5.222	7.87		0	268.75		*
08-7	2008-09-30	275.39	6.376	5.799	9.34		0	269.01		*
	2009-07-10		7.225	6.648	9.20		0	268.17		*
	2009-09-23		5.972	5.395	9.31		0	269.42		*
08-8	2008-09-30	276.36	7.225	7.297	8.23		0	269.14		*
	2009-07-10		7.670	7.742	8.23		0	268.69		*
	2009-09-23		6.857	6.929	8.20		0	269.50		*Box needs repair
09-5	2009-09-23	275.14	4.125	4.260	5.56		0	271.02		*
09-16	2009-09-23	276.34	5.165	5.281	5.63		0	271.18		*
09-20	2009-09-23	276.41	6.644	4.753	6.76		0	269.77		
Air Sparge Wells										
AS-1	2004-10-18	275.45	5.932	6.610			0	269.52	9.9	1 X ORC installed
	2008-09-30		5.882	6.560	7.61		0	269.57		
	2009-07-10		6.810	7.488	7.61		0	268.64		
	2009-09-23		5.698	6.376	7.61		0	269.75		
AS-2	2004-10-18	275.68	6.595	6.703			0	269.09	9.9	1 X ORC installed
	2006-07-16		6.931	7.039	8.57		0	268.75		
	2008-09-30		6.103	6.211	8.82		0	269.58		
	2009-07-10		7.217	7.325	8.80		0	268.46		
	2009-09-23		5.840	5.948	8.80		0	269.84		
AS-3	2004-10-18	275.83	6.760	6.760			0	269.07	9.9	2 X ORC installed
	2008-09-30		6.659	6.659	8.03		0	269.17		
	2009-07-10		7.390	7.390	8.02		0	268.44		
	2009-09-23		6.114	6.114	8.02		0	269.72		
AS-4	2004-10-18	275.67	6.660	6.805			0	269.01	9.9	2 X ORC installed
	2008-06-19		5.950	6.095	7.05		0	269.72		very silty

TABLE IV-1: Groundwater Monitoring Data Report (2001 to 2009)

MW ID	Date	Reference Elevation[1] (m geod)	Depth to Water (m bTOC)	Depth to Water (m bgs)	Depth to Well Bottom (m bTOC)	Depth to NAPL[2] (m bTOC)	Apparent NAPL Thickness (mm)	Potentiometric Elevation (m geod)	Dissolved Oxygen (mg/L)	Comments
	2008-09-30		6.125	6.270	7.15		0	269.55		
	2009-07-10		6.945	7.090	7.13		0	268.73		almost dry
	2009-09-23		5.745	5.890	7.13		0	269.93		
AS-5	2004-10-18	275.94	6.838	6.941			0	269.10	9.9	1 X ORC installed
	2006-07-16		6.991	7.094	8.33		0	268.95		
	2008-09-30									Could not remove cap
	2009-07-10		7.162	7.265	8.62		0	268.78		
	2009-09-23		6.358	6.461	8.62		0	269.58		
AS-6	2004-10-18	274.87	6.851	6.951			0	268.02	9.9	1 X ORC installed
	2008-09-30									Glued cap
	2009-07-10									glued cap
	2009-09-23									Cap glued
AS-7	2004-10-18	275.27	5.105	5.215			0	270.17	9.9	2 X ORC installed
	2008-09-30		5.906	6.016	8.09		0	269.36		
	2009-07-10									could not remove bolts
	2009-09-23									Bolts stuck
AS-8	2004-10-18	274.8	5.437	5.557			0	269.36	9.9	2 X ORC installed
	2008-09-30		5.047	5.167	6.87		0	269.75		
	2009-07-10		6.020	6.140	6.87		0	268.78		
	2009-09-23		4.915	5.035	6.87		0	269.89		
AS-9	2006-07-16	275.18	7.379	7.483	9.38		0	267.80		
	2008-09-30									Could not remove cap
	2009-07-10		7.330	7.434	9.39		0	267.85		
	2009-09-23		6.620	6.724	9.39		0	268.56		
AS-10	2008-09-30	275.42	5.921	6.005	7.96		0	269.50		
	2009-07-10		7.535	7.619	7.89		0	267.89		
	2009-09-23		5.509	5.593	7.89		0	269.91		
AS-11	2008-09-30	275.58	4.844	4.948	5.35		0	270.74	2.5	False vapour due to glue (22%)
	2009-07-10		5.075	5.179	5.33		0	270.51		almost dry
	2009-09-23		4.754	4.858	5.32		0	270.83		
AS-12	2008-09-30	276.17	6.784	6.900	7.62		0	269.39	5.5	
	2009-07-10		7.525	7.641	7.54		0	268.65		dry
	2009-09-23		6.245	6.361	7.54		0	269.93		
AS-13	2008-09-30	273.48	4.355	4.426	6.46		0	269.13		
	2009-07-10		5.185	5.256	6.41		0	268.30		
	2009-09-23		4.038	4.109	6.56		0	269.44		
AS-14	2008-09-30	273.26	4.128	4.199	6.41		0	269.13		
	2009-07-10		4.860	4.931	6.39		0	268.40		
	2009-09-23		3.750	3.821	6.39		0	269.51		
AS-15	2008-06-19		4.841		5.50		0			
	2008-09-30		5.089		5.72		0		5.7	False vapour due to glue (35%)
	2009-07-10		5.530		5.69		0			almost dry
	2009-09-23		4.975		5.63		0			
AS-16	2008-06-19	275.32	5.227	5.306	6.53		0	270.09		
	2008-09-30		5.454	5.533	6.57		0	269.87		
	2009-07-10		6.470	6.549	6.54		0	268.85		dry
	2009-09-23		5.305	5.384	6.54		0	270.02		
AS-17	2008-09-30	275.2								Glued cap
	2009-07-10									glued cap
AS-18	2008-09-30	275.17								Glued cap
	2009-07-10									glued cap
	2009-09-23									Cap glued
AS-19	2008-09-30	275.21								Glued cap
	2009-07-10									glued cap
	2009-09-23									Cap glued
AS-20	2008-09-30	275.29								Glued cap
	2009-07-10									glued cap
	2009-09-23									Cap glued
AS-21	2008-09-30	275.61								Glued cap
	2009-07-10									glued cap
	2009-09-23									Cap glued
AS-22	2008-06-19	275.63	4.162	4.272	5.30		0	271.47		
	2008-09-30		4.207	4.317	5.41		0	271.42	1.9	
	2009-07-10		4.700	4.810	5.38		0	270.93		
	2009-09-23		4.152	4.262	5.37		0	271.48		
AS-23	2008-09-30	275.42	3.367	3.478	5.36		0	272.05	3.5	False vapour due to glue (30%)
	2009-07-10		3.975	4.086	5.42		0	271.45		
	2009-09-23		3.354	3.465	5.42		0	272.07		
03-03	2003-09-11	273.85	6.020	6.095	6.59		0	267.83		Sheen
	2004-10-01		5.742	5.817	6.59		0	268.11	9.9	ORC installed
	2004-10-18				6.59				9.9	ORC present
	2006-07-16		6.870	6.945	9.98		0	266.98		
	2008-06-19		4.962	5.037	6.45		0	268.89		
	2008-09-30		5.375	5.450	6.55		0	268.48		
	2009-07-10		5.950	6.025	6.55		0	267.90		
	2009-09-23		4.961	5.036	6.56		0	268.89		
03-04 (Decommissioned in 2007)	2003-09-11	273.13	7.045	7.094	10.13		0	266.09		
	2004-10-01		6.080	6.129	10.13		0	267.05	9.9	ORC installed
	2004-10-18				10.13				9.9	ORC present
	2006-07-16		5.320	5.369	9.76		0	267.81		
03-05 (Decommissioned	2003-09-11	272.4	5.430	5.490	10.05		0	266.97		
	2004-10-01		5.235	5.295	10.05		0	267.17	9.9	ORC installed

TABLE IV-1: Groundwater Monitoring Data Report (2001 to 2009)

MW ID	Date	Reference Elevation[1] (m geod)	Depth to Water (m bTOC)	Depth to Water (m bgs)	Depth to Well Bottom (m bTOC)	Depth to NAPL[2] (m bTOC)	Apparent NAPL Thickness (mm)	Potentiometric Elevation (m geod)	Dissolved Oxygen (mg/L)	Comments
in 2007)	2004-10-18				10.05				9.9	ORC present
Soil Vapour Extraction Wells										
SVE-1	2008-09-30	275.23								Could not monitor
	2009-07-10		5.050	5.147	5.12		0	270.18		dry
	2009-09-23		4.890	4.987	5.12		0	270.34		
SVE-2	2008-09-30	275.16	5.393	5.507	5.59		0	269.77		
	2009-07-10				5.48					dry
	2009-09-23		5.240	5.354	5.48		0	269.92		
SVE-3	2008-09-30	275.23	4.120	4.166	4.93		0	271.11		
	2009-07-10		4.355	4.401	4.90		0	270.88		
	2009-09-23		4.032	4.078	4.90		0	271.20		
SVE-4	2008-09-30	275.44			3.30					
	2009-07-10				3.26					dry
	2009-09-23		3.238	3.324	3.26		0	272.20		
SVE-5	2008-09-30	275.43	3.723	3.784	4.56		0	271.71		
	2009-07-10		4.315	4.376	4.53		0	271.12		
	2009-09-23		3.705	3.766	4.53		0	271.73		

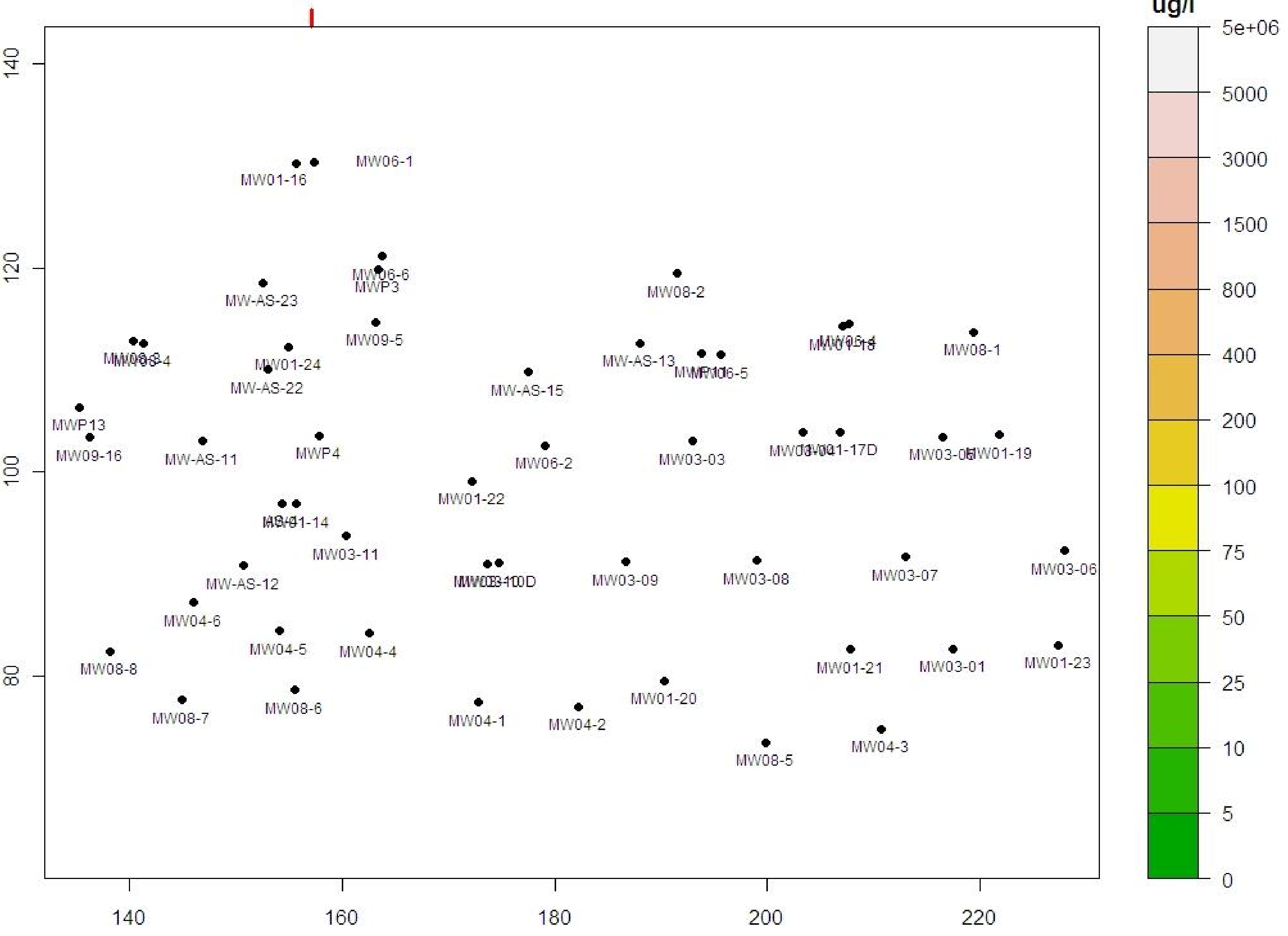
APPENDIX V

GWSDAT Output

Pleasant Camp

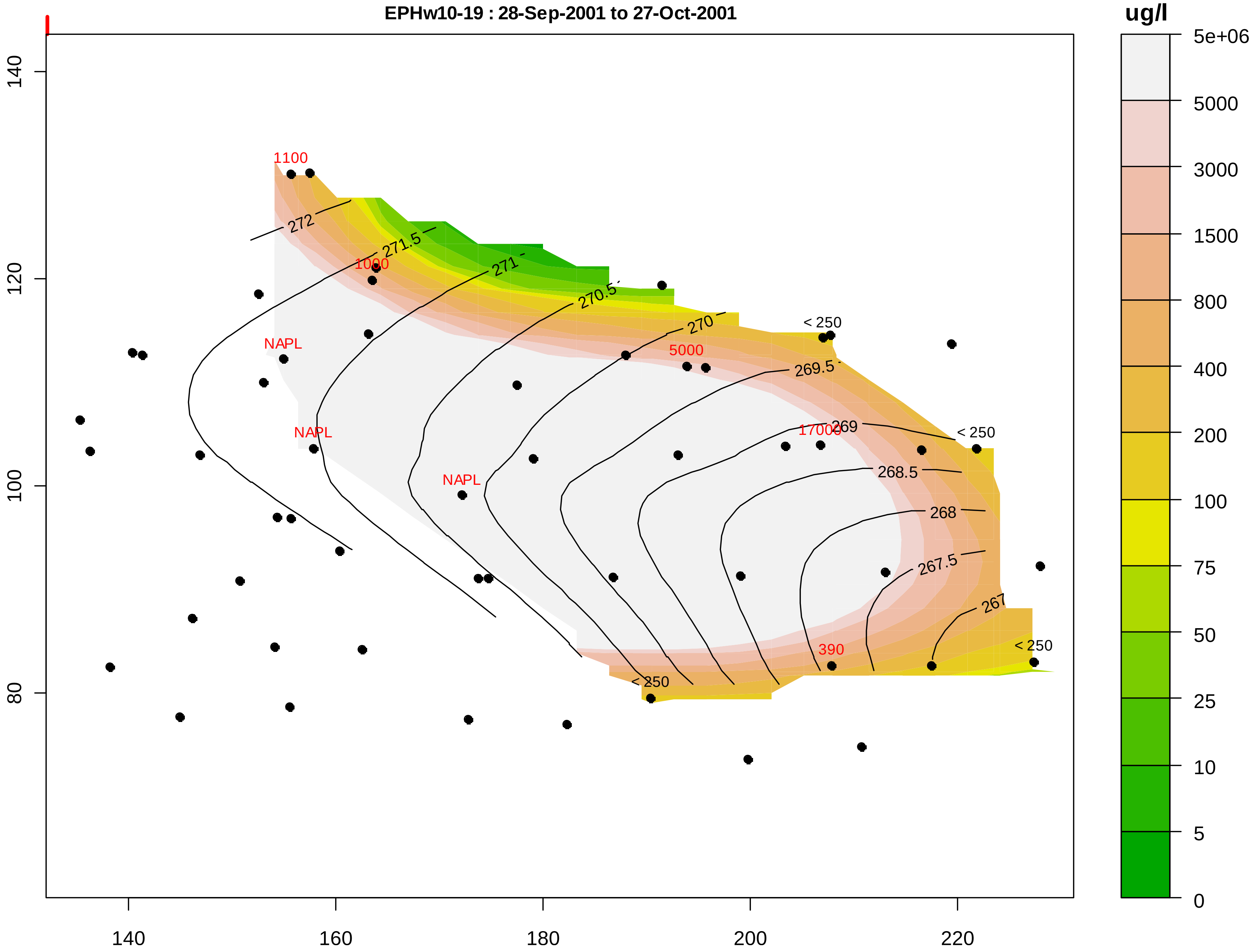
GWSDAT Spatial-Temporal
Trend Smoother
Groundwater Data 2009

Model Site Plan – Pleasant Camp



EPHw10-19 Distribution

2001 to 2009



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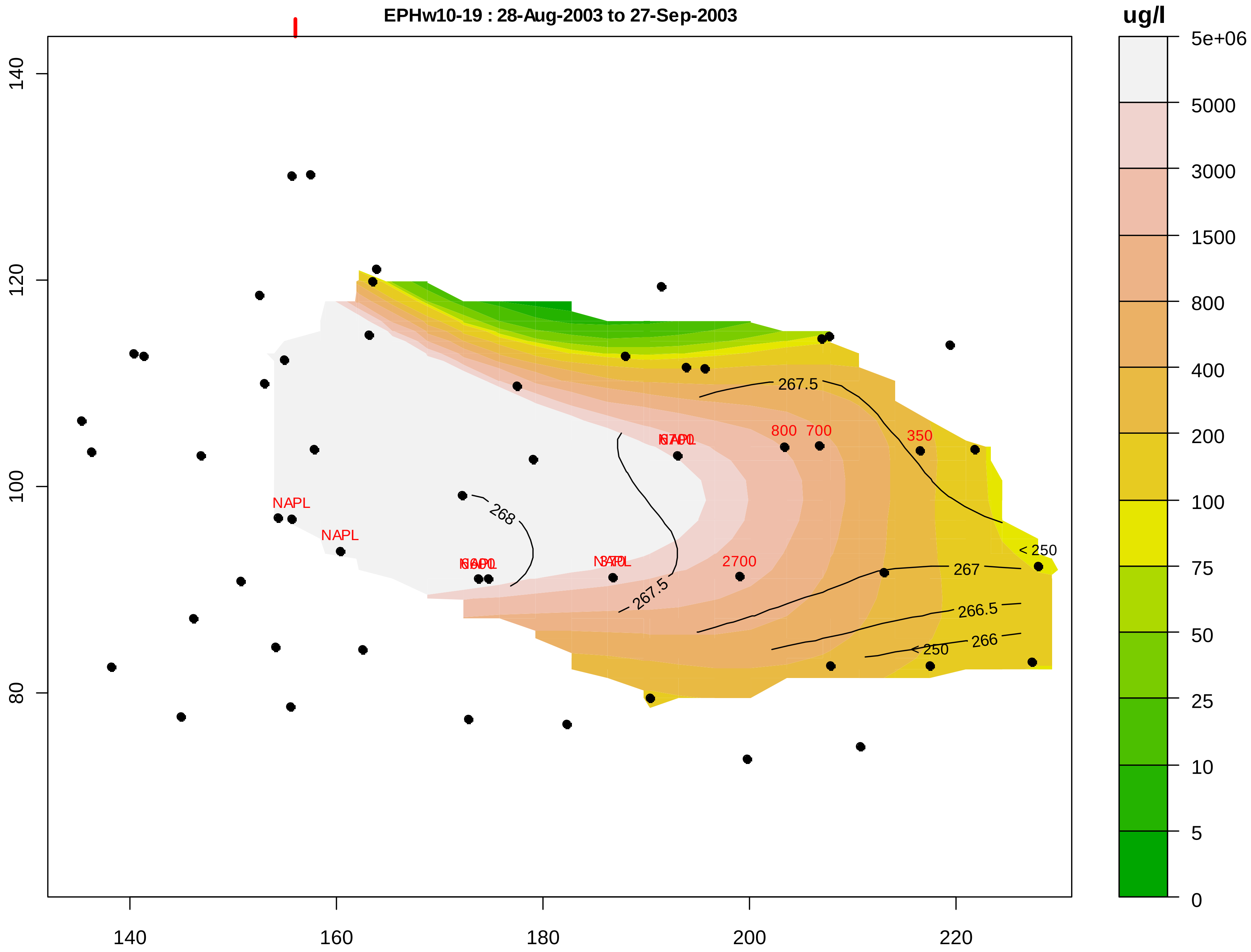

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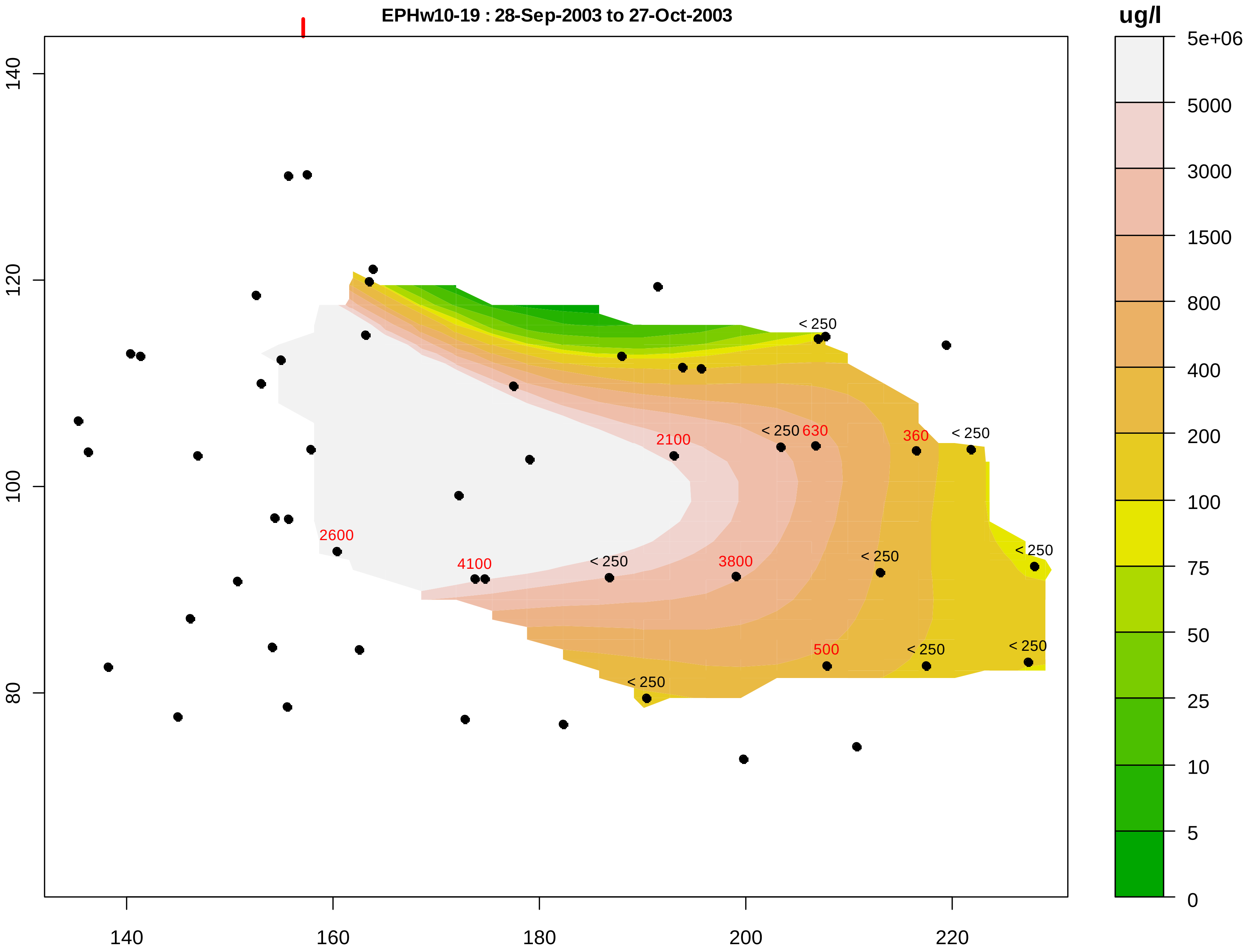
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5
0
140
120
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80
140
160
180
200
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< 250
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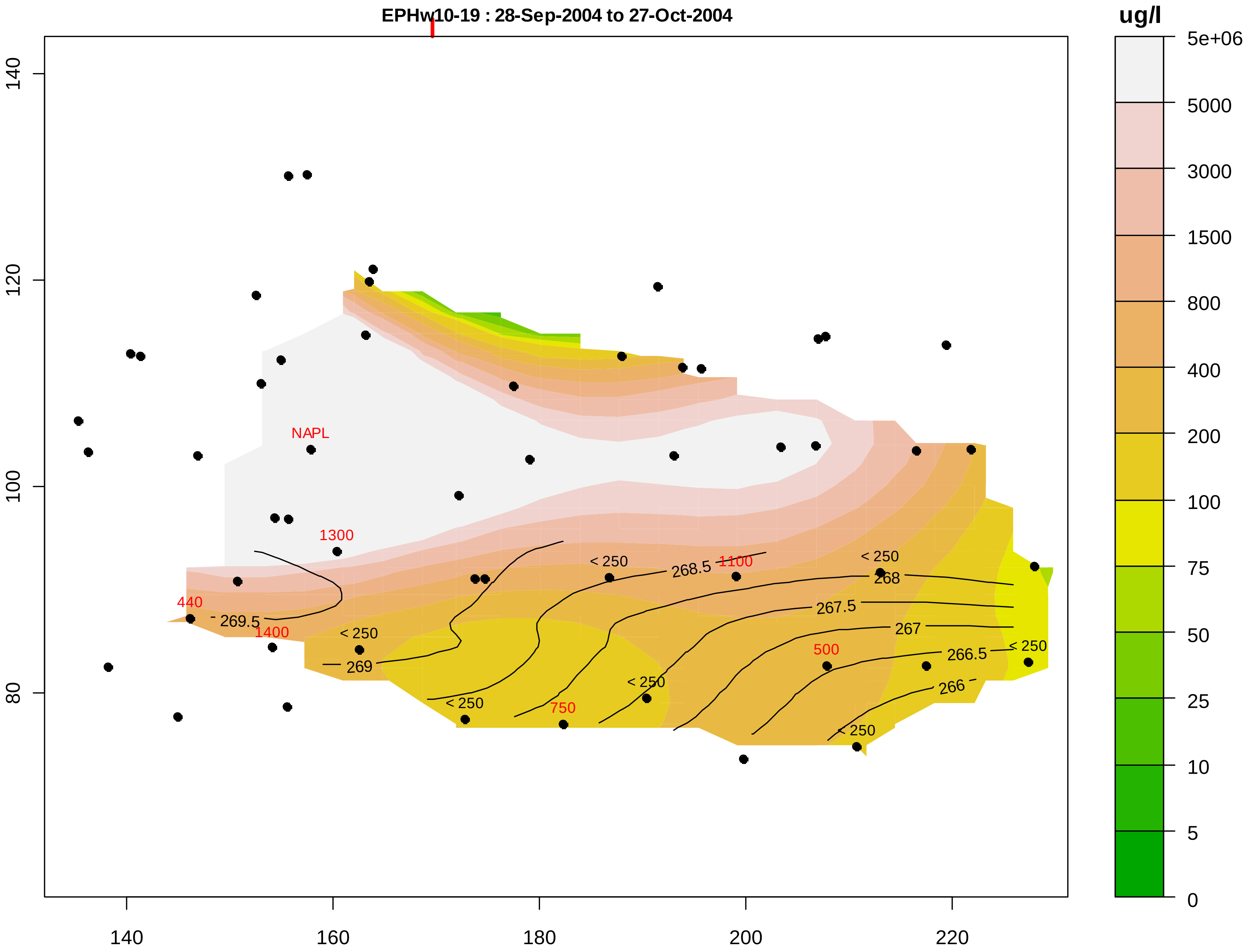

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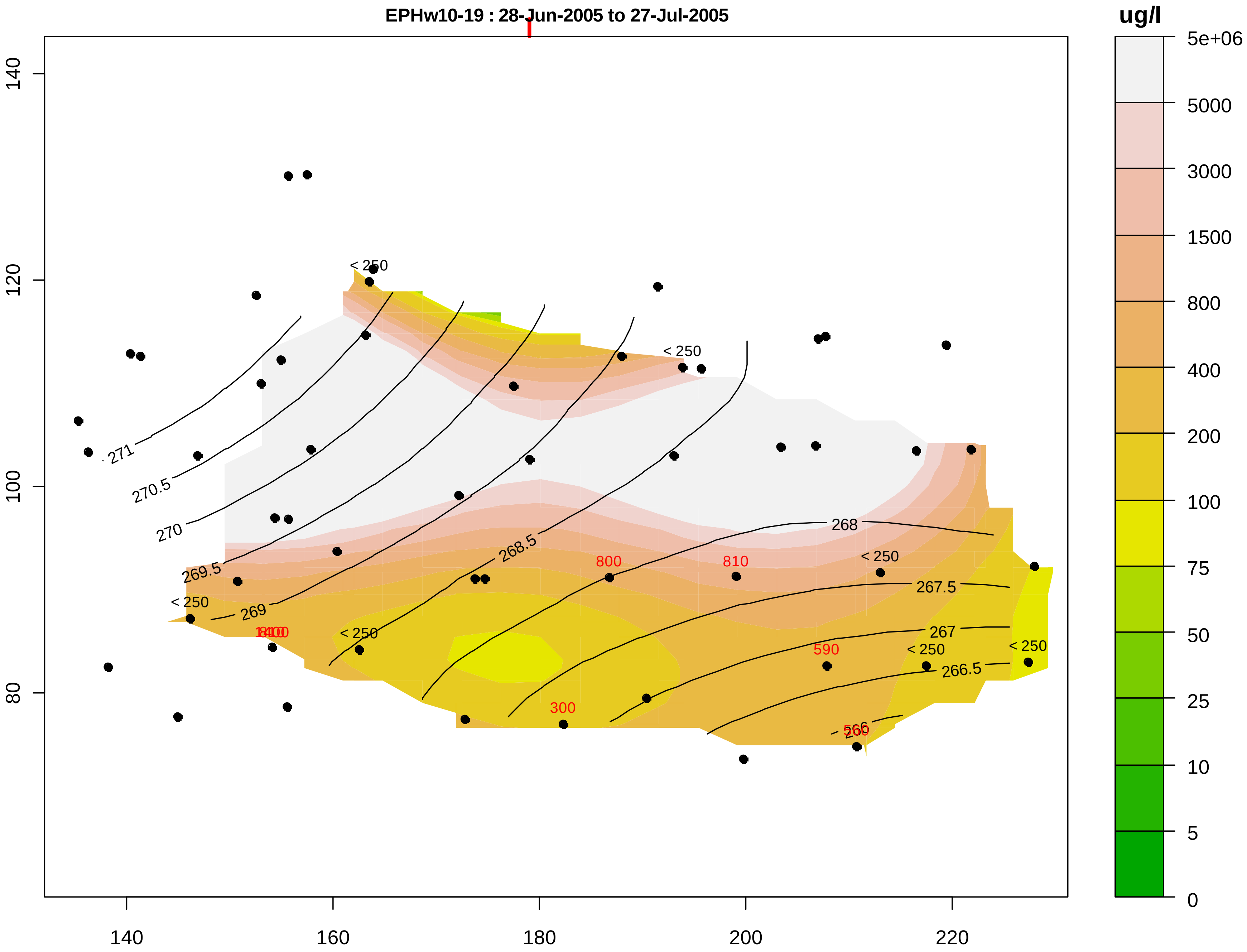

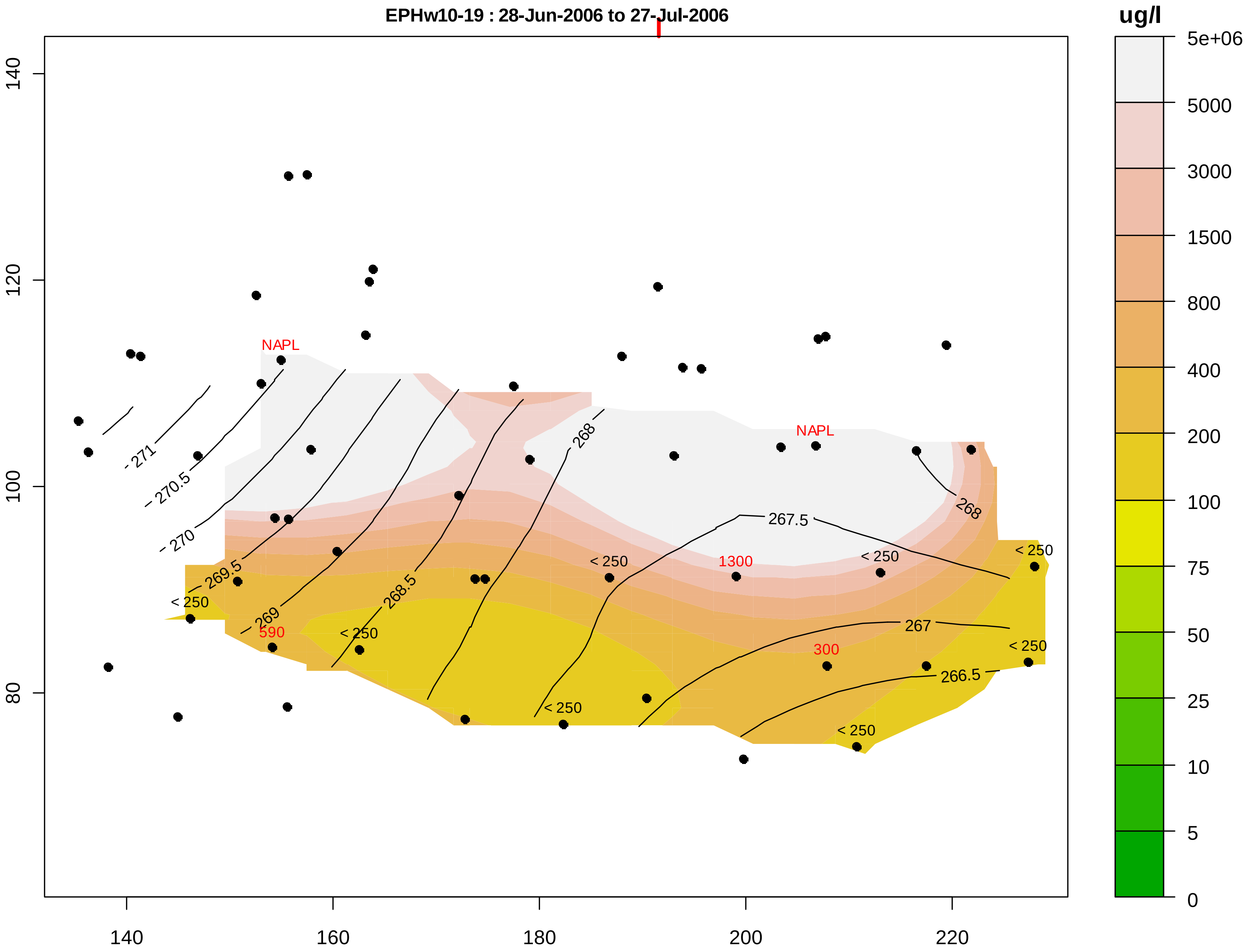
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10
5
0
NAPL
NAPL
1300
590
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< 250
< 250
< 250
< 250
< 250
< 250
< 250
< 250
< 250
271
270.5
270
269.5
269
268.5
268
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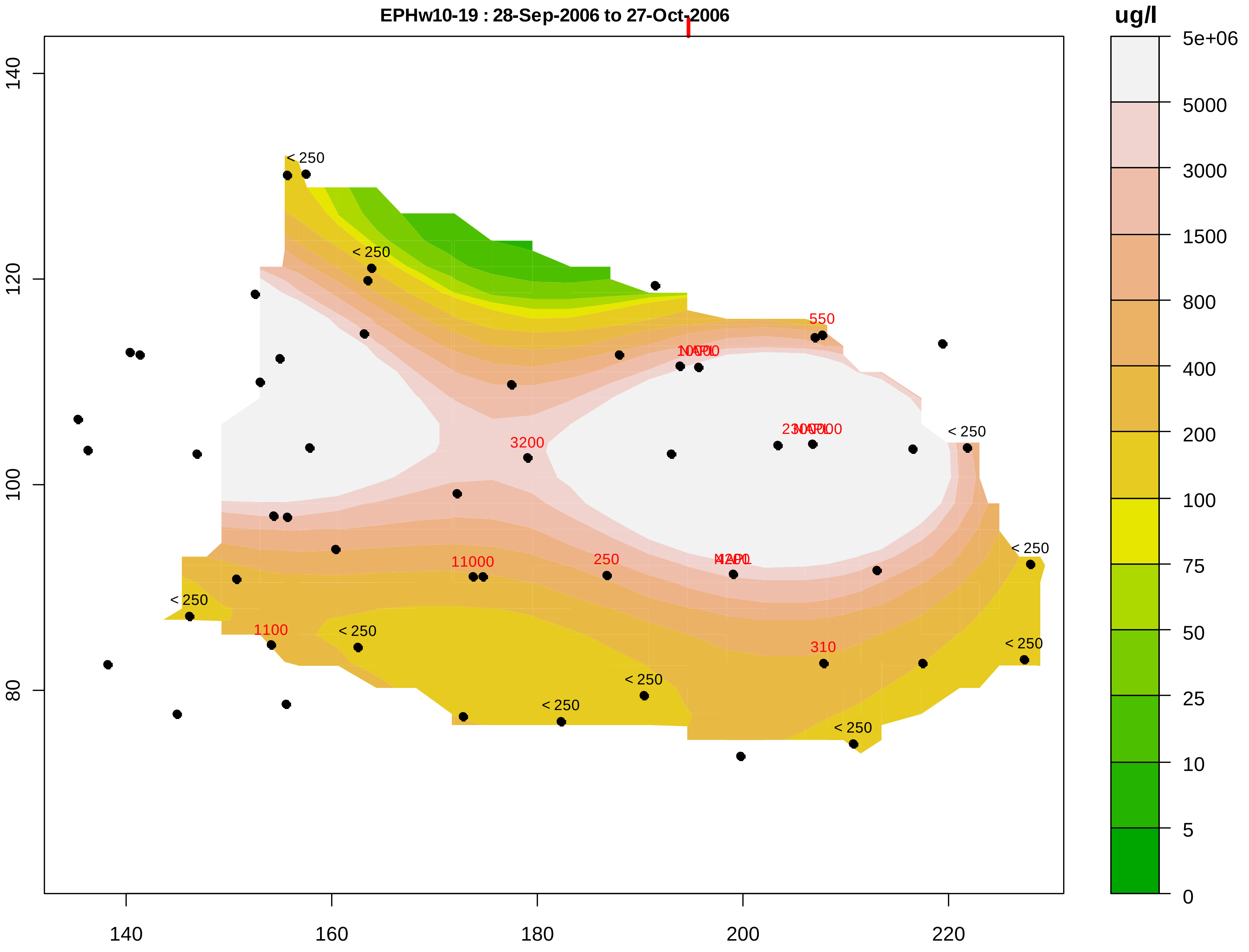
EPHw10-19 : 28-Sep-2006 to 27-Oct-2006



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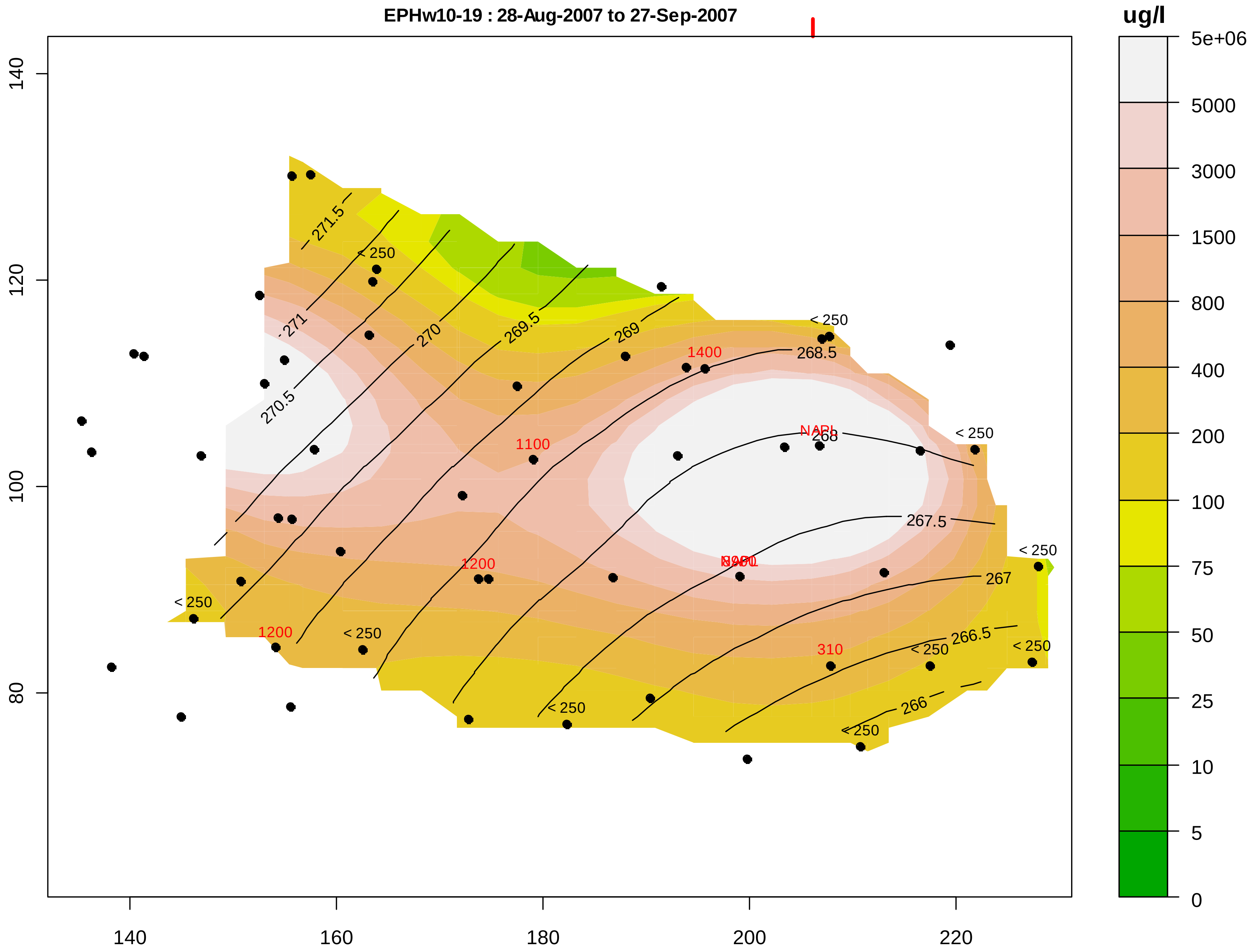

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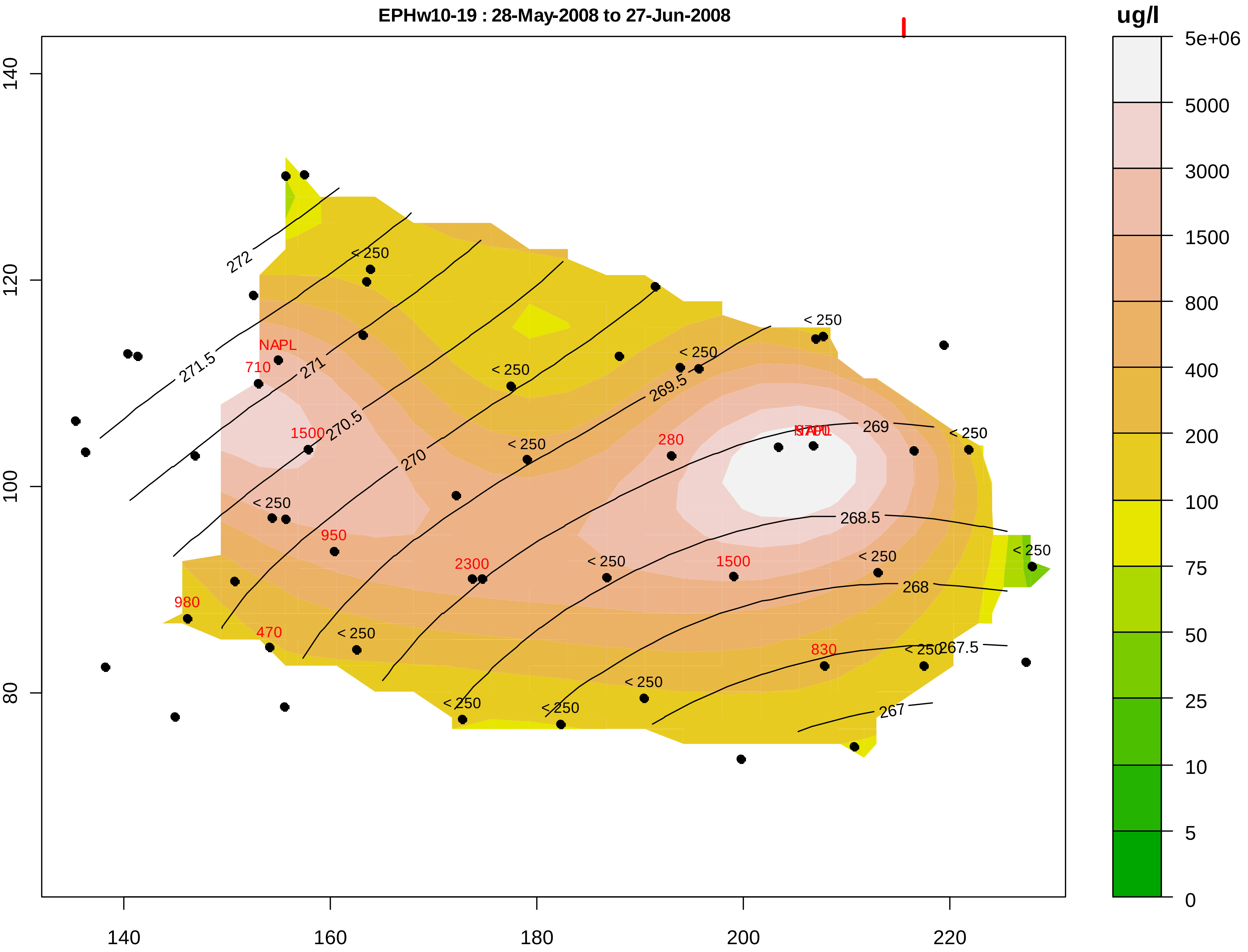

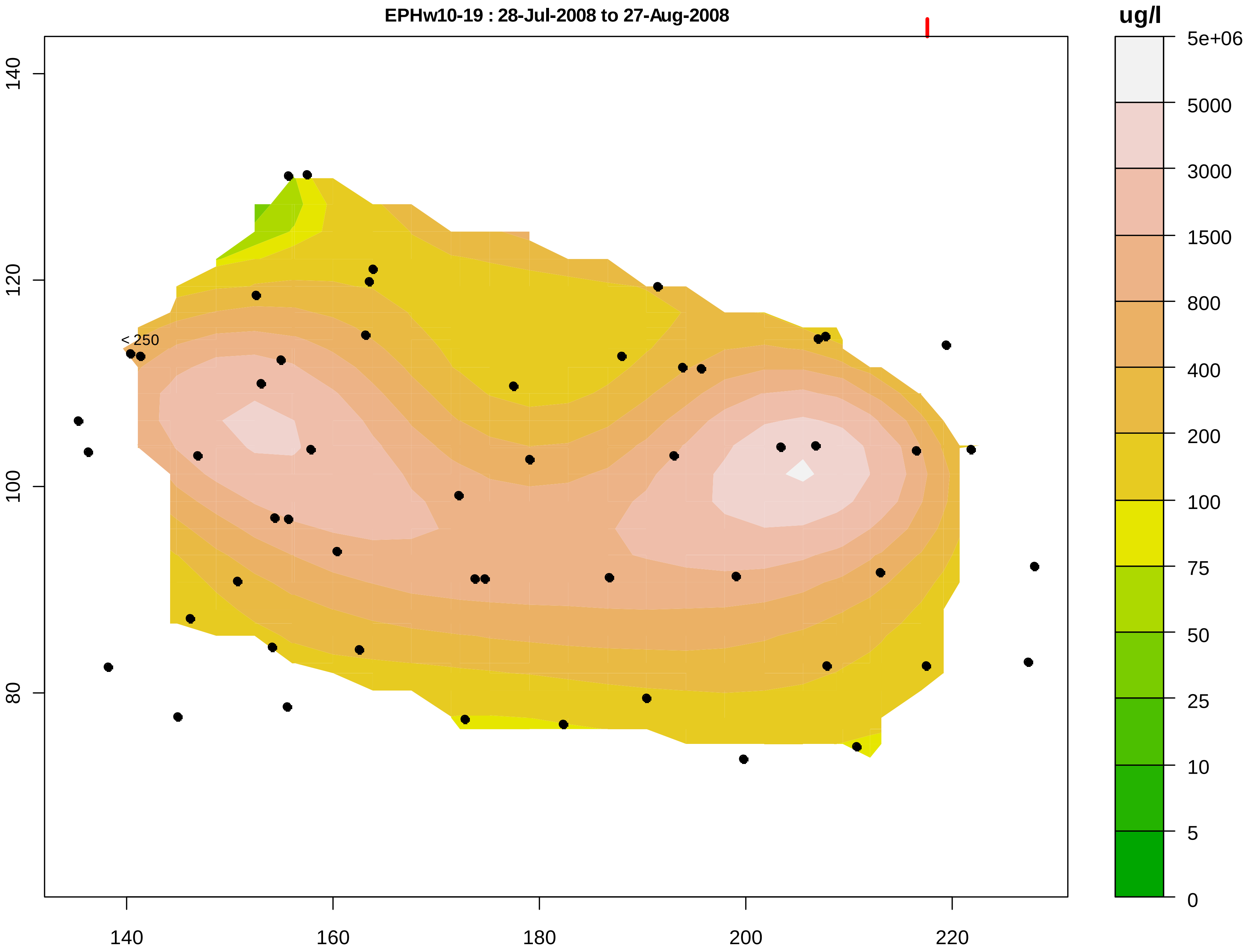

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1500
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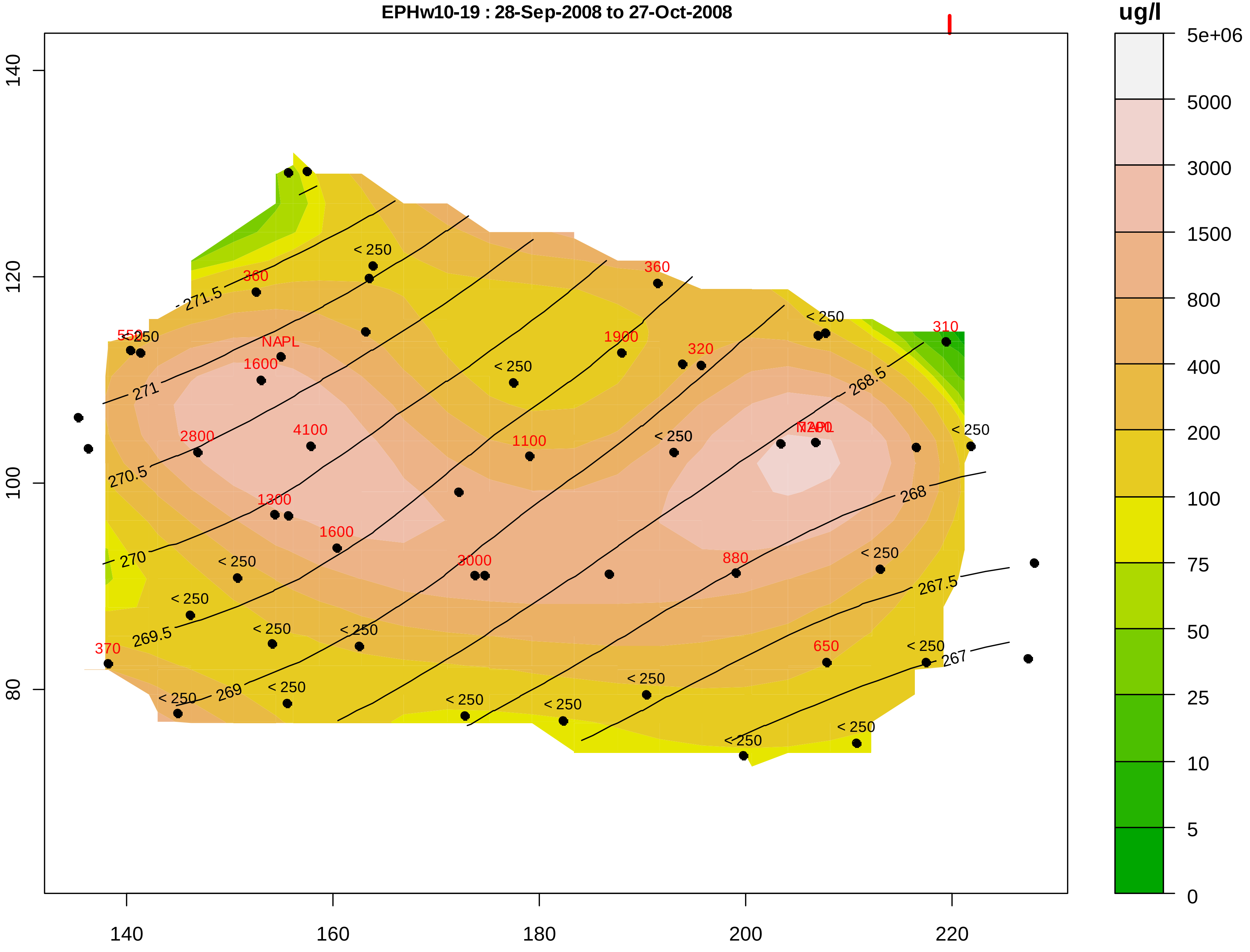

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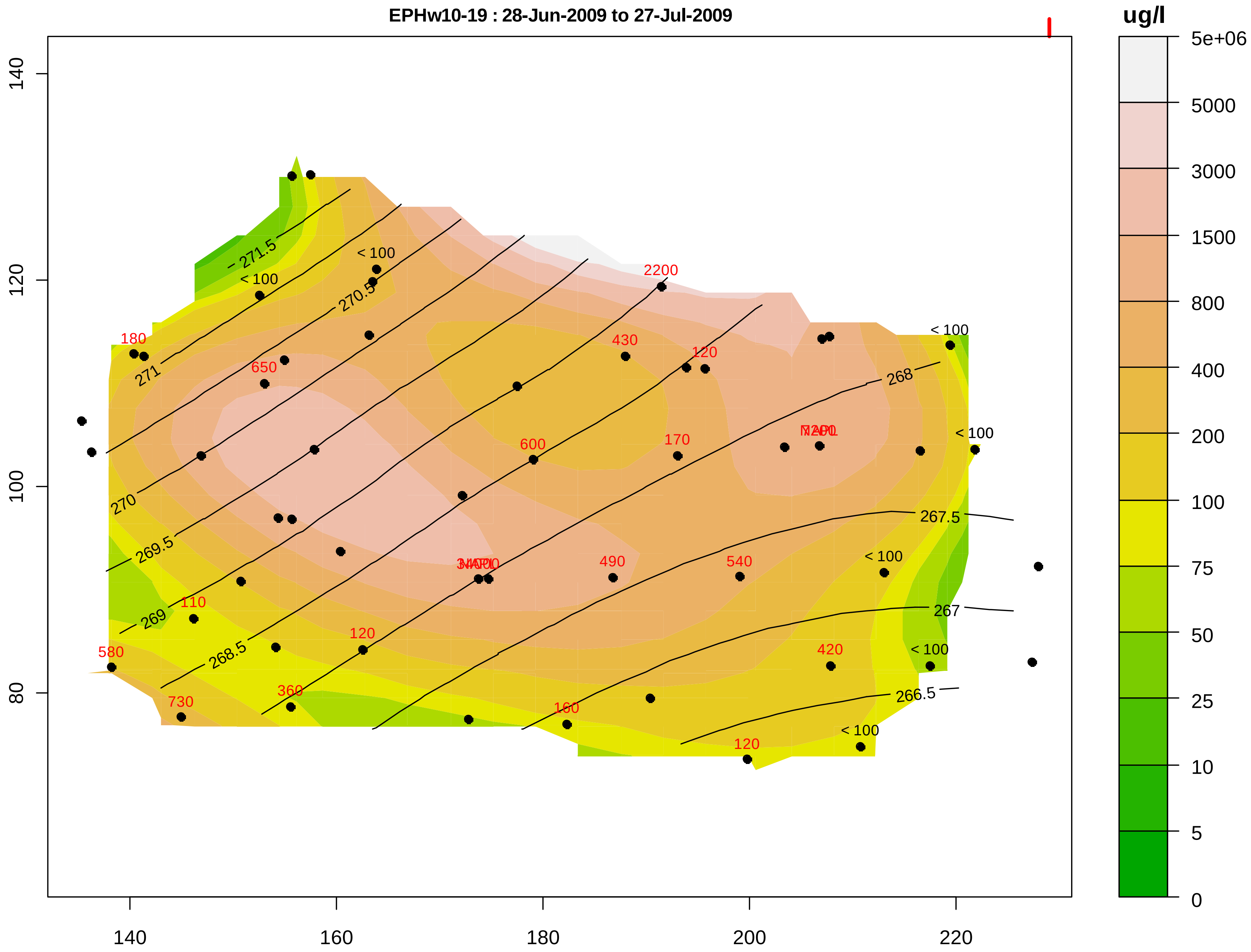
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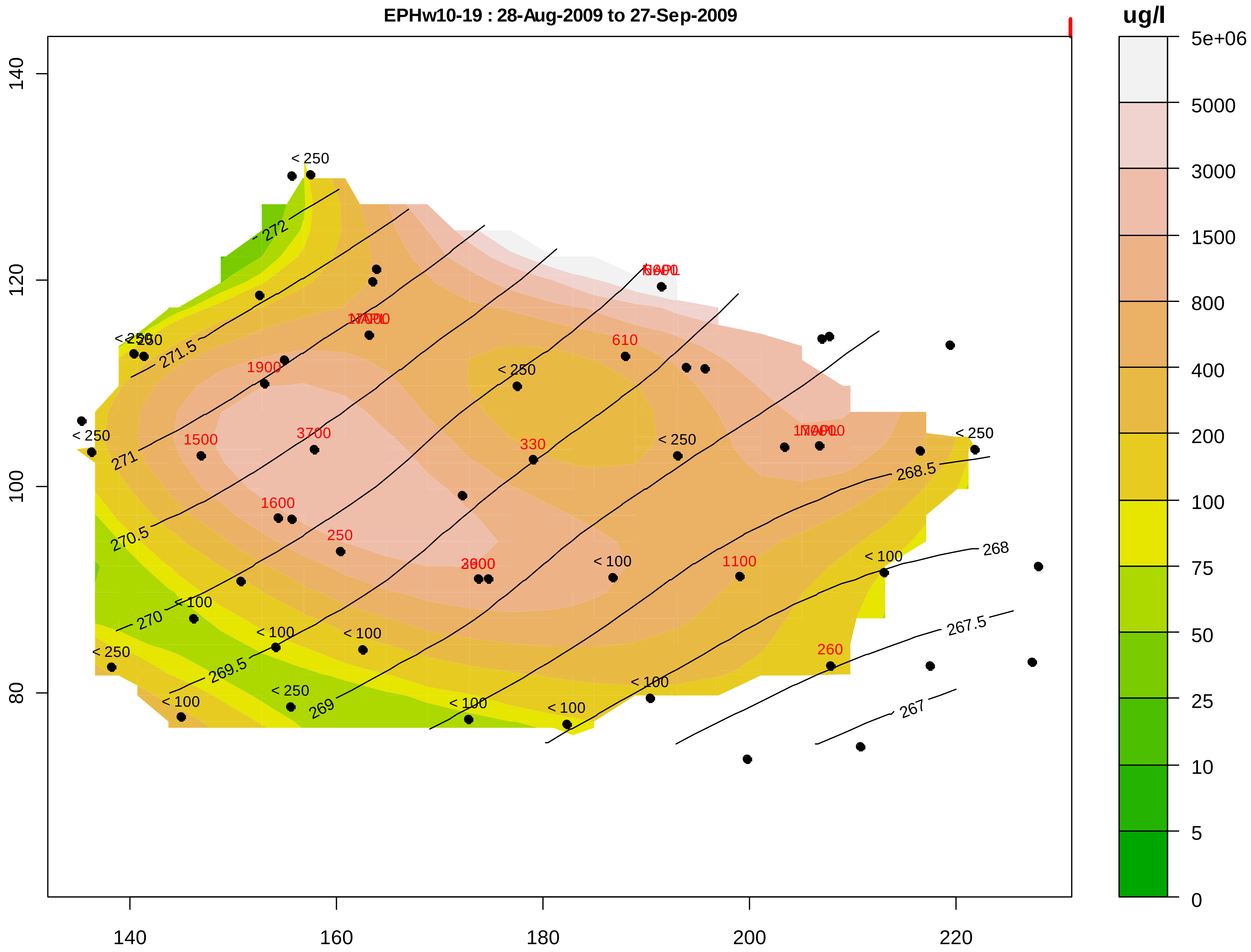

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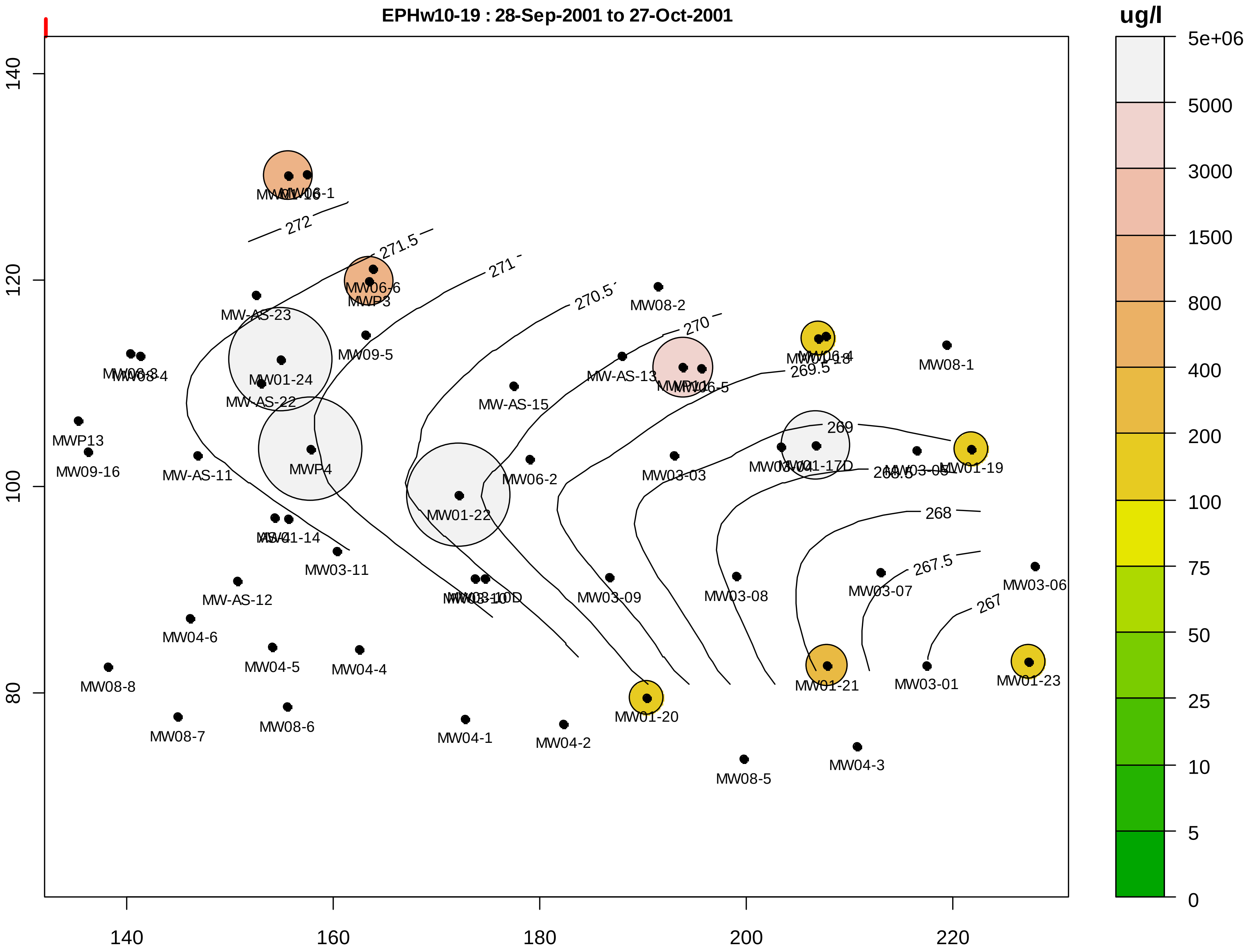
EPHw10-19
Terrain-circle Distribution

2001 to 2009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0
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160
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200
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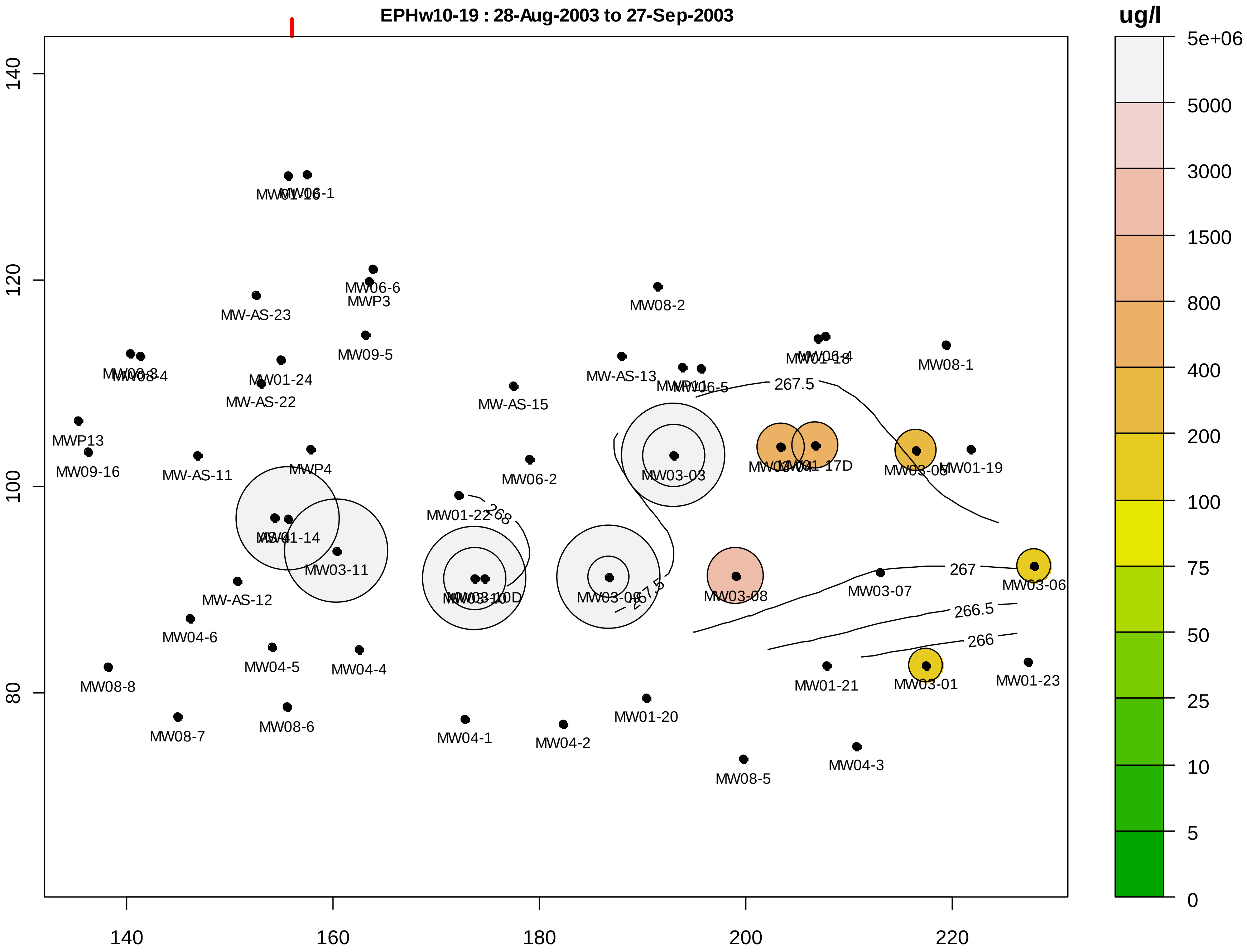
MW04-3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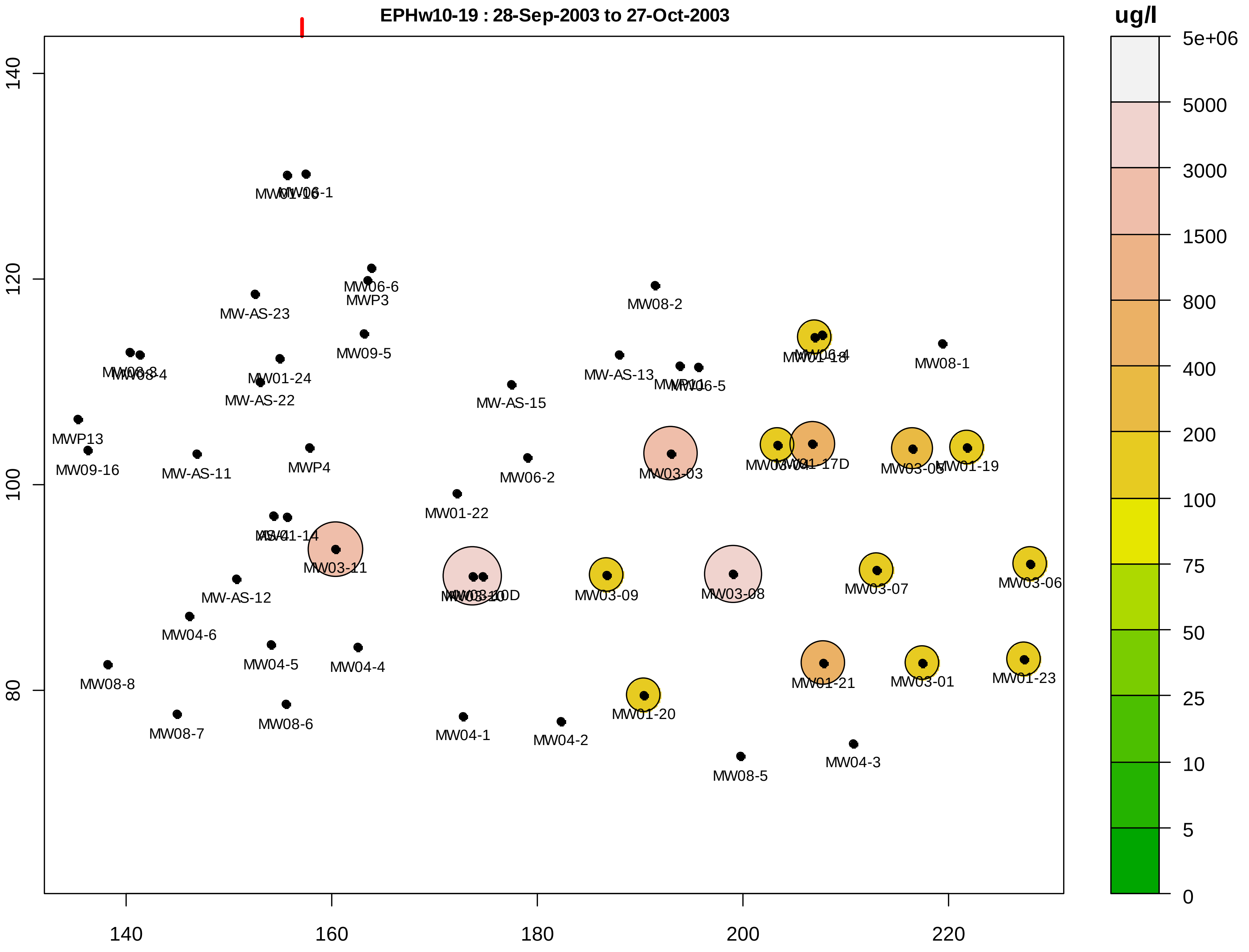
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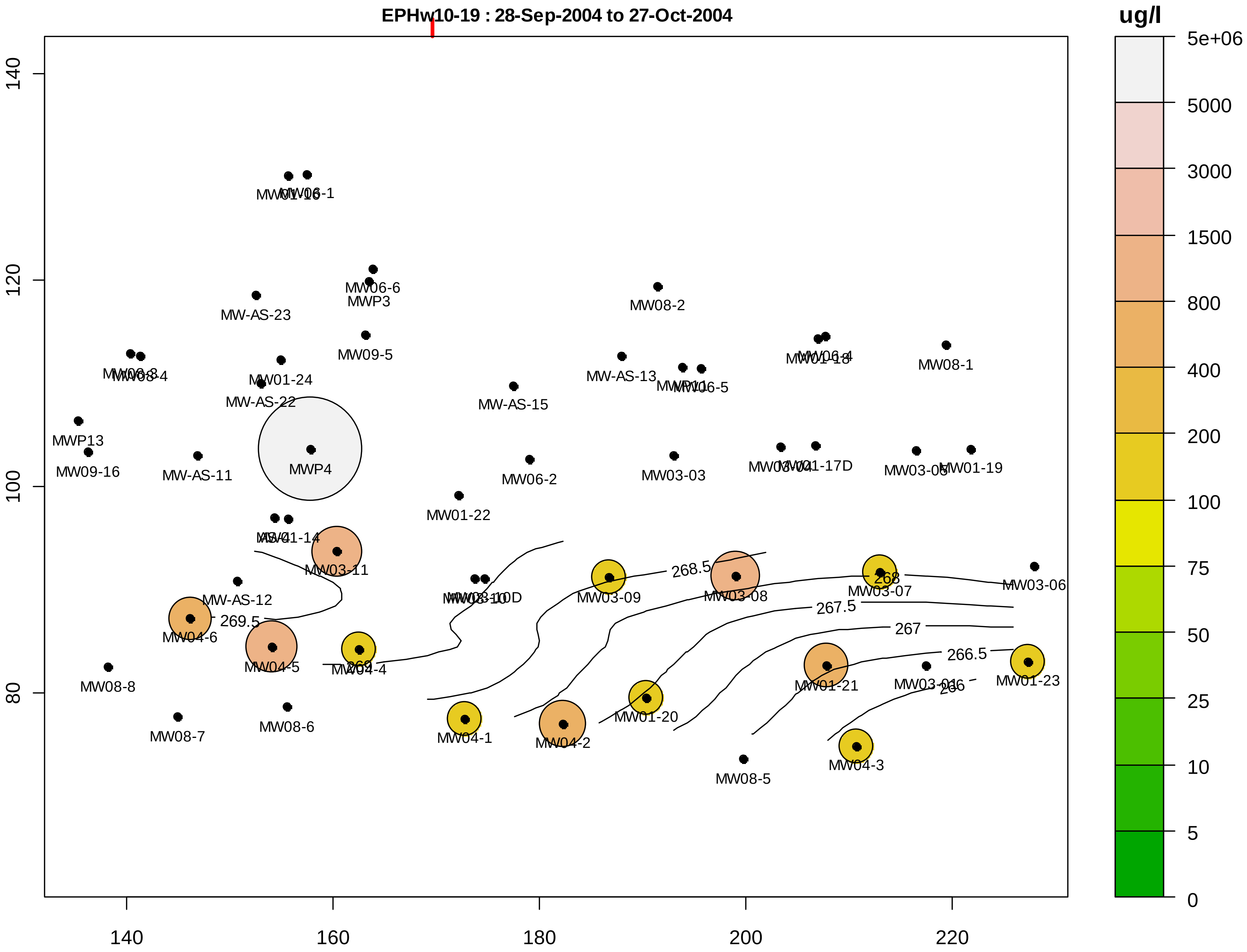
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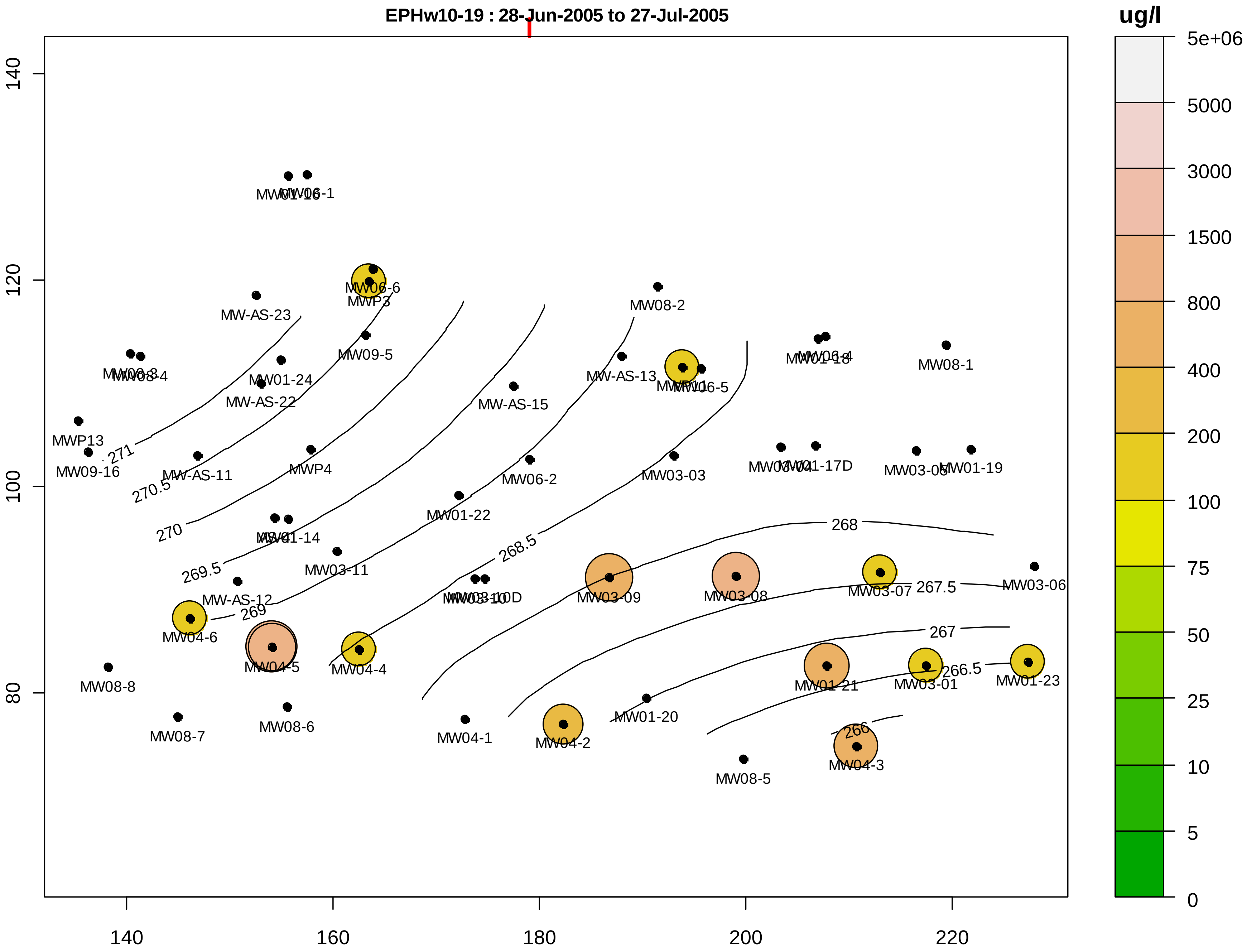
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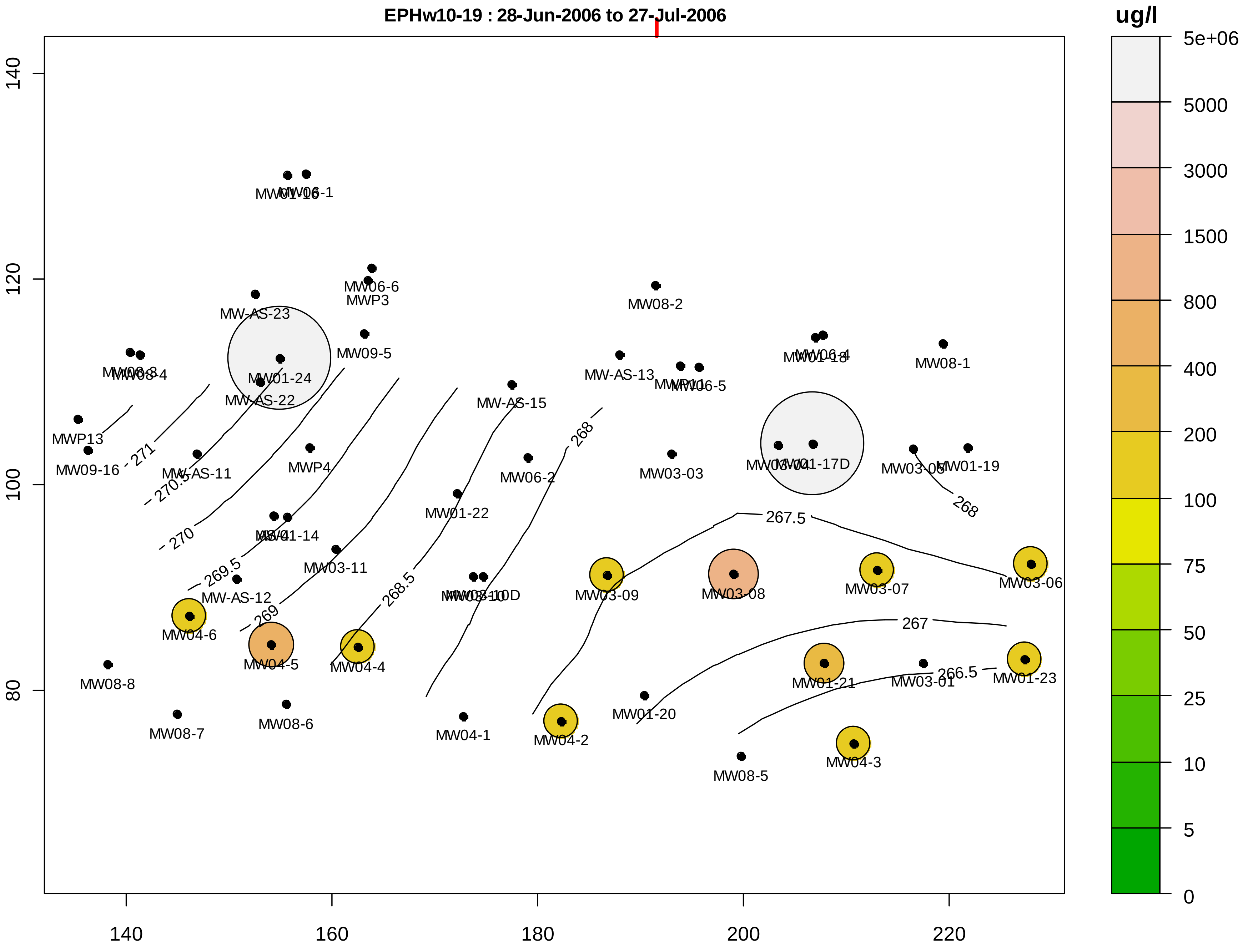
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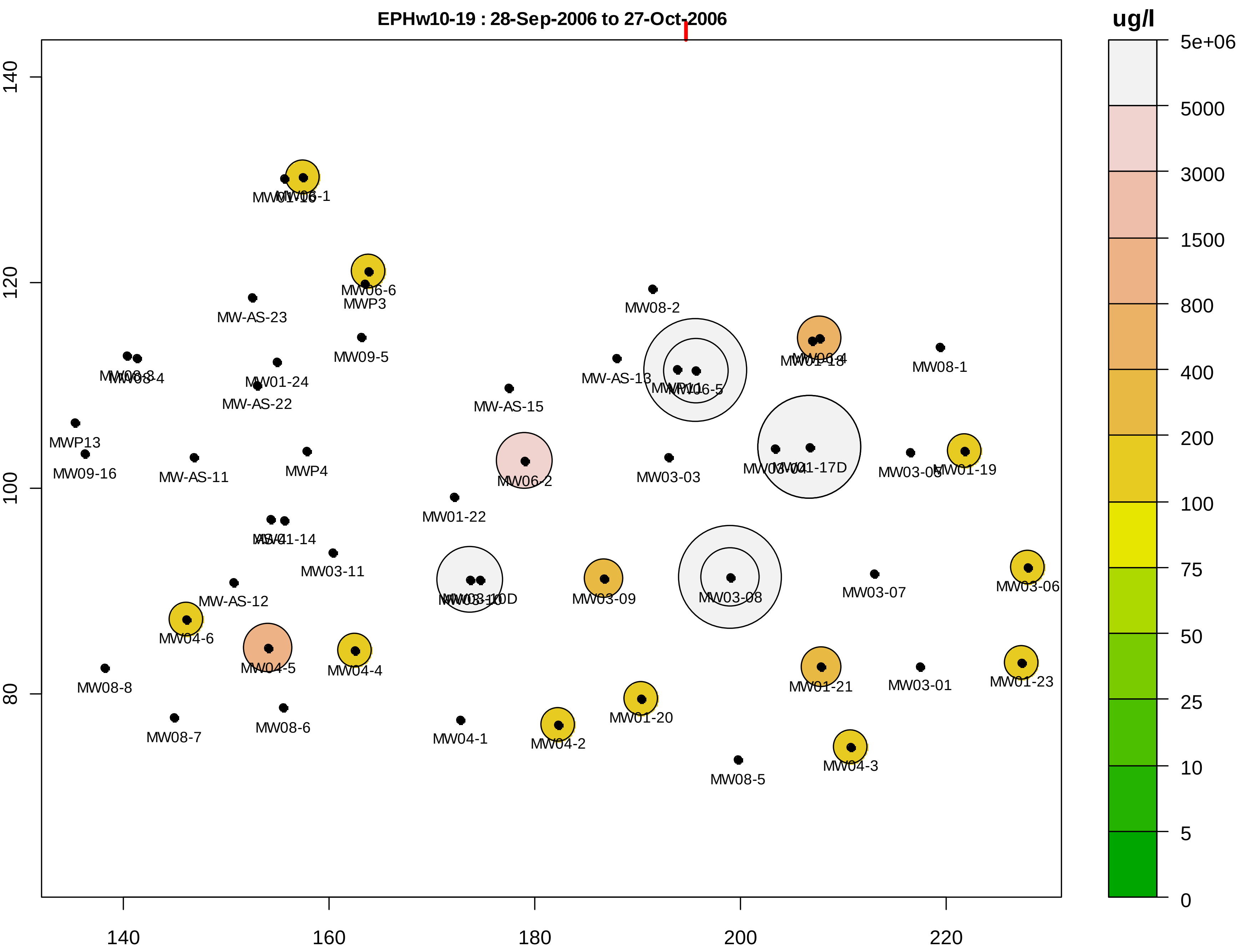

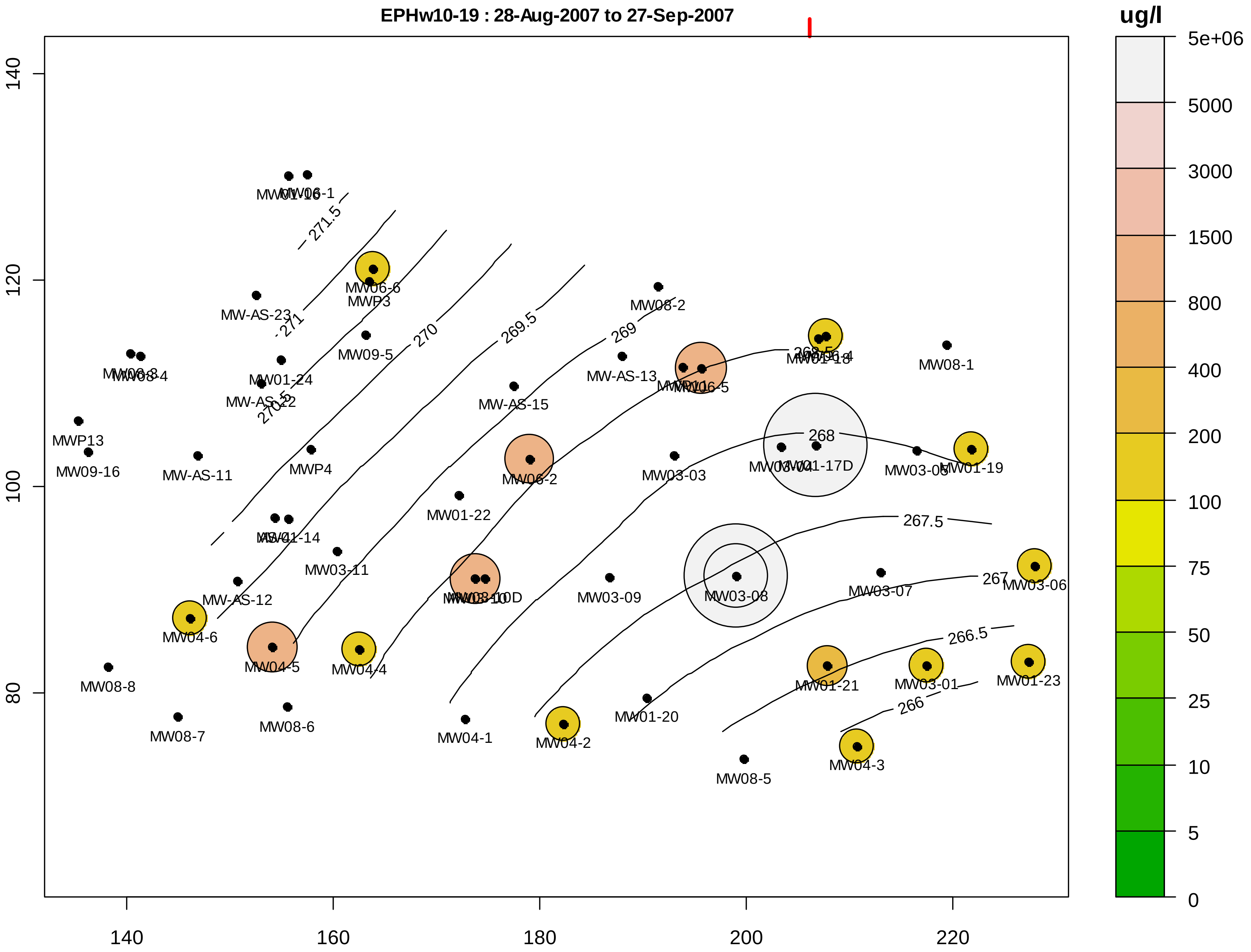

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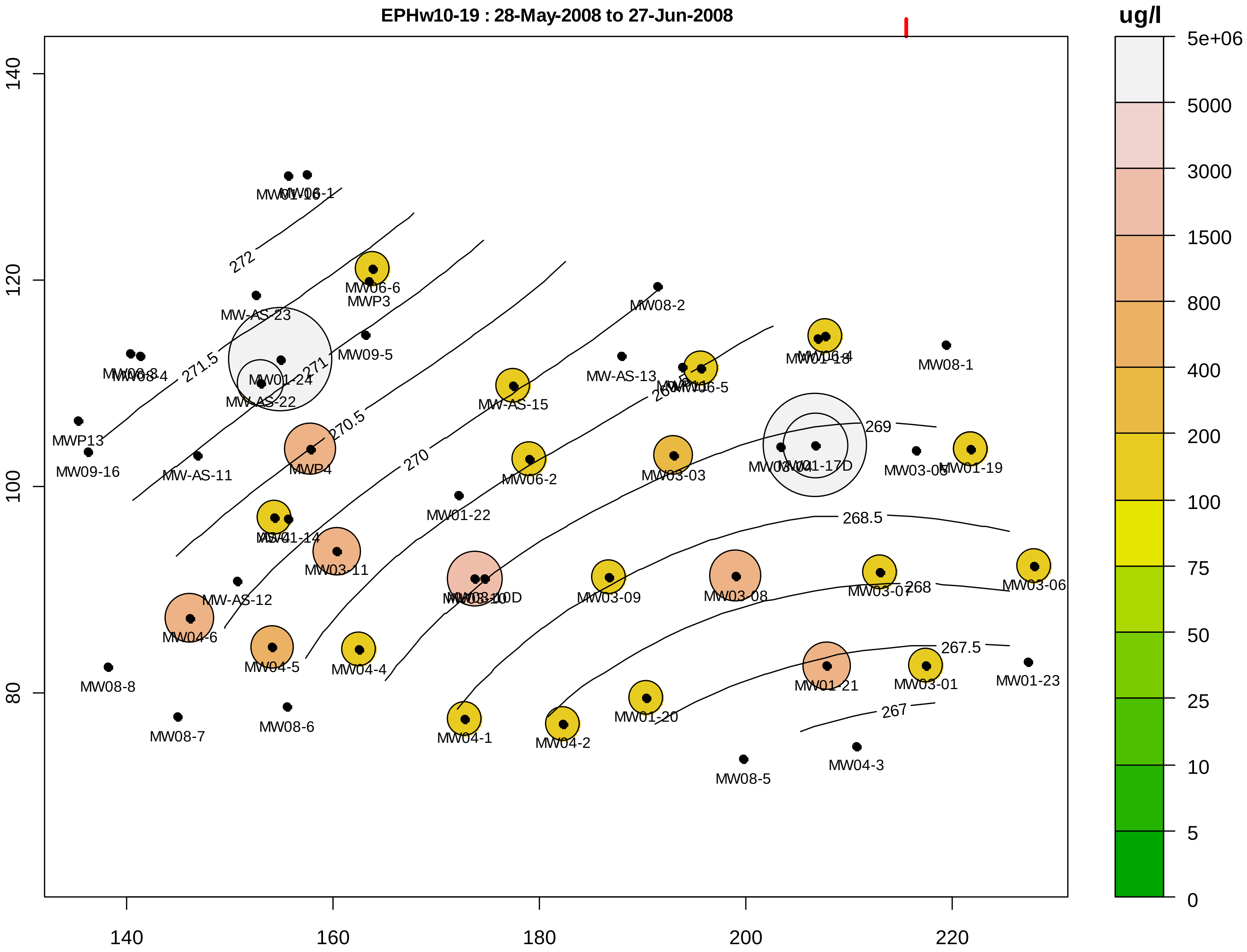
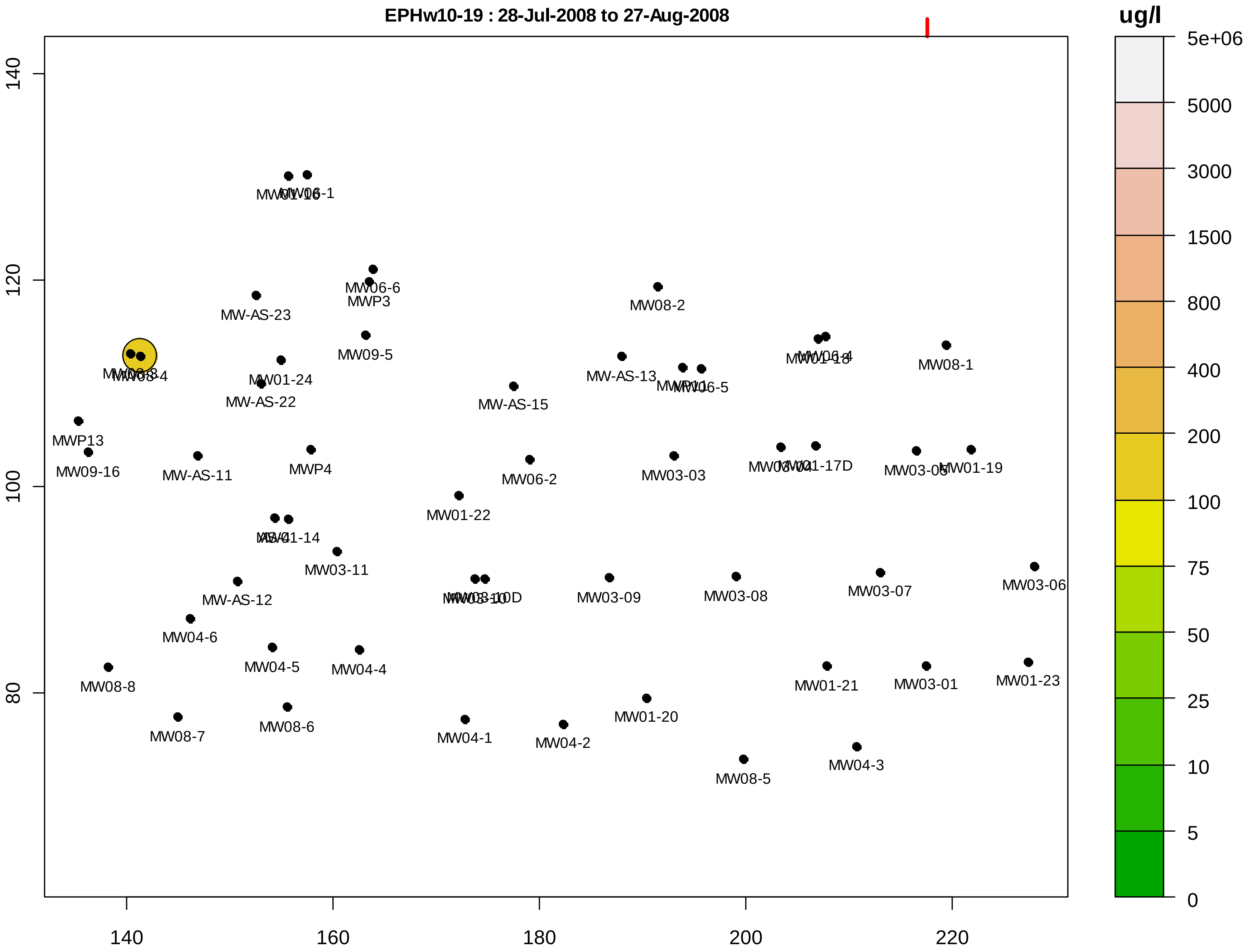
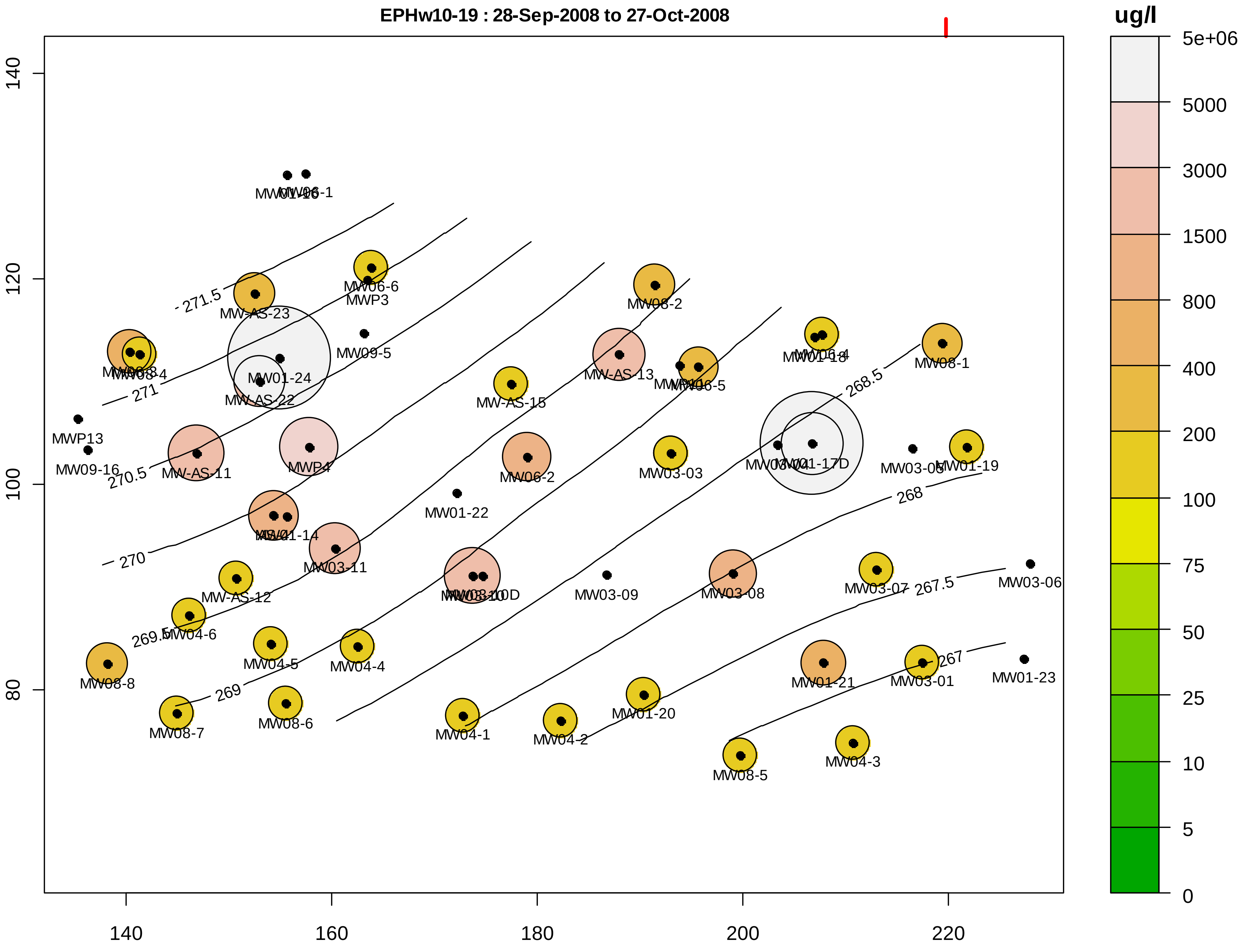
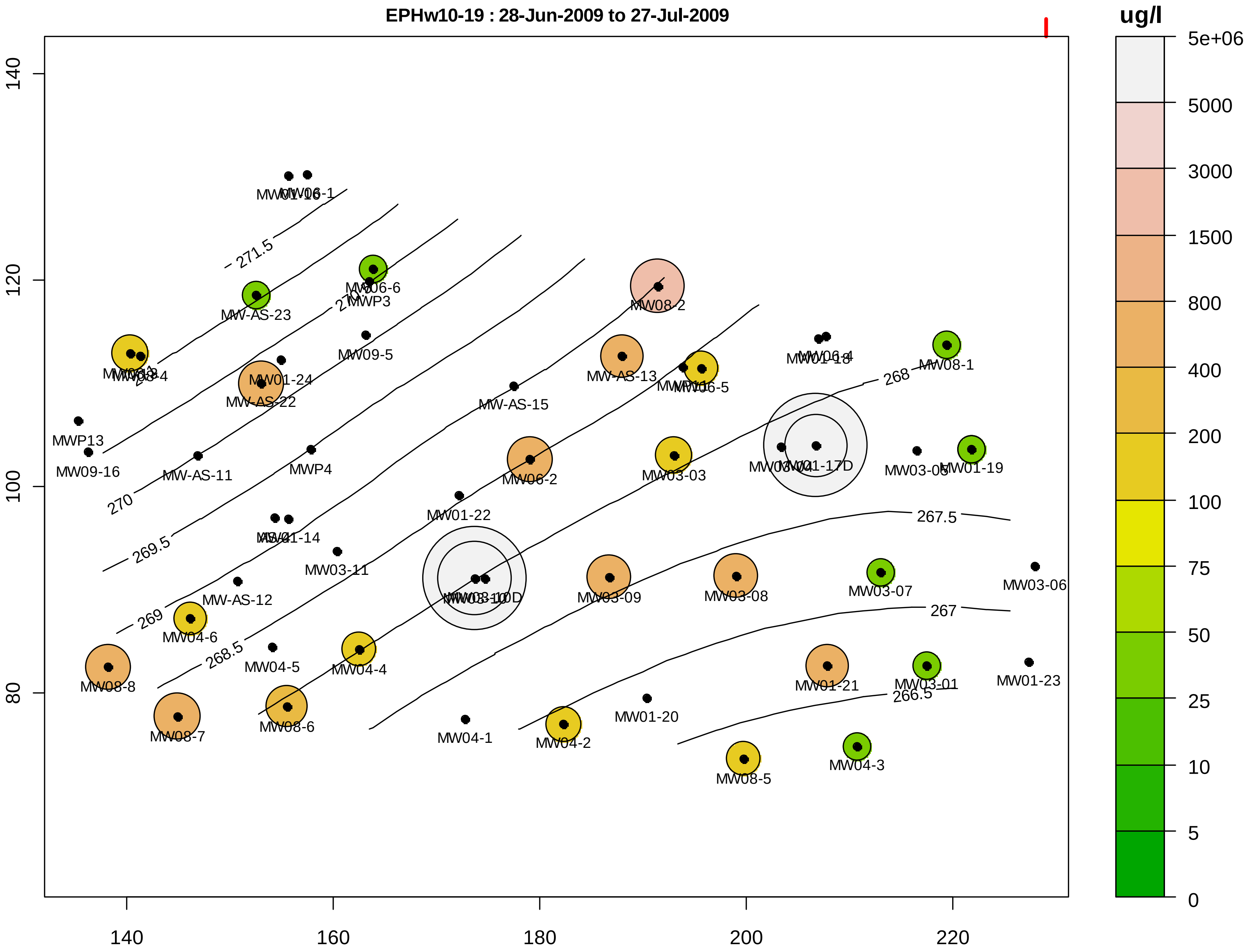
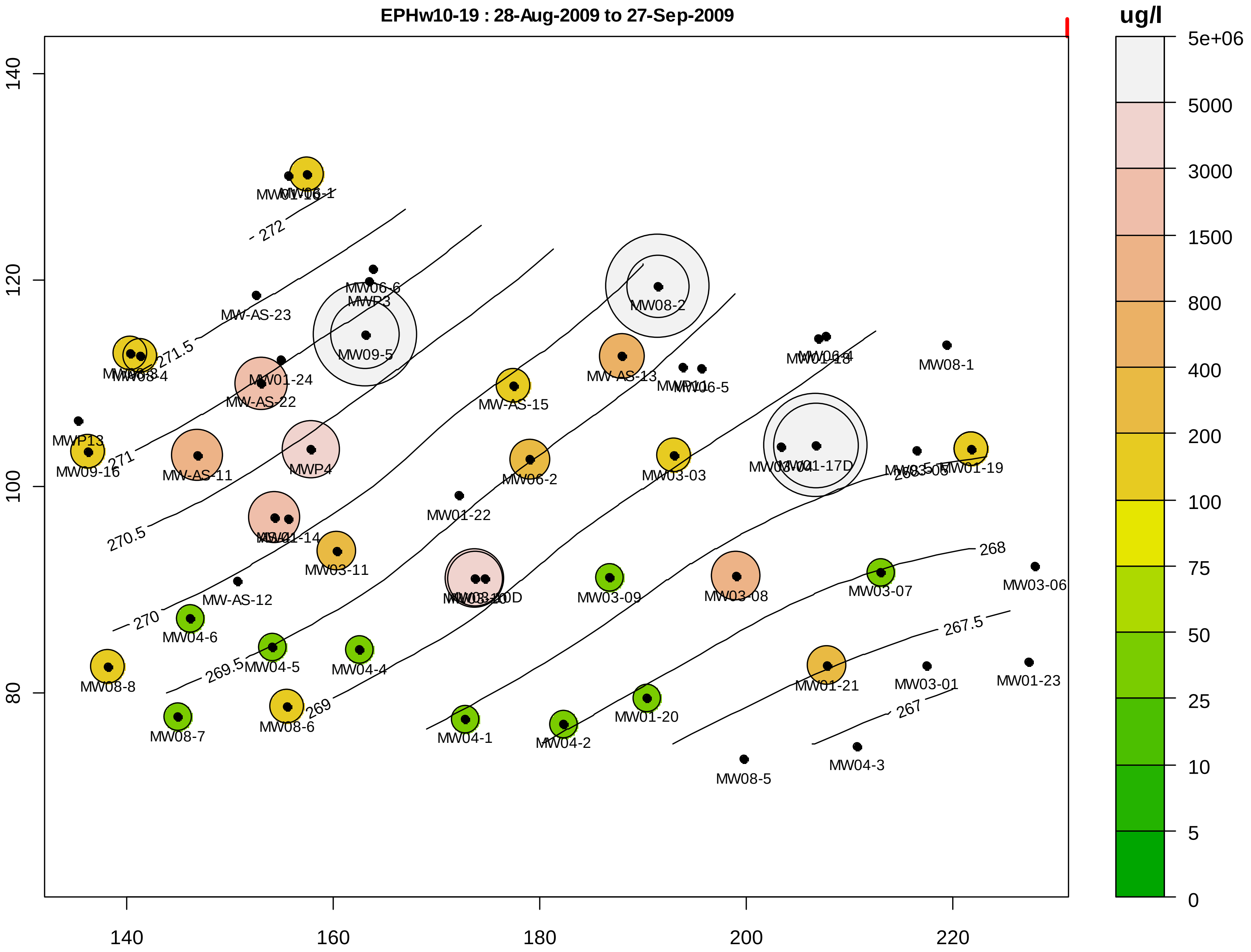




EPHw10-19 : 28-Jul-2008 to 27-Aug-2008


EPHw10-19 : 28-Sep-2008 to 27-Oct-2008

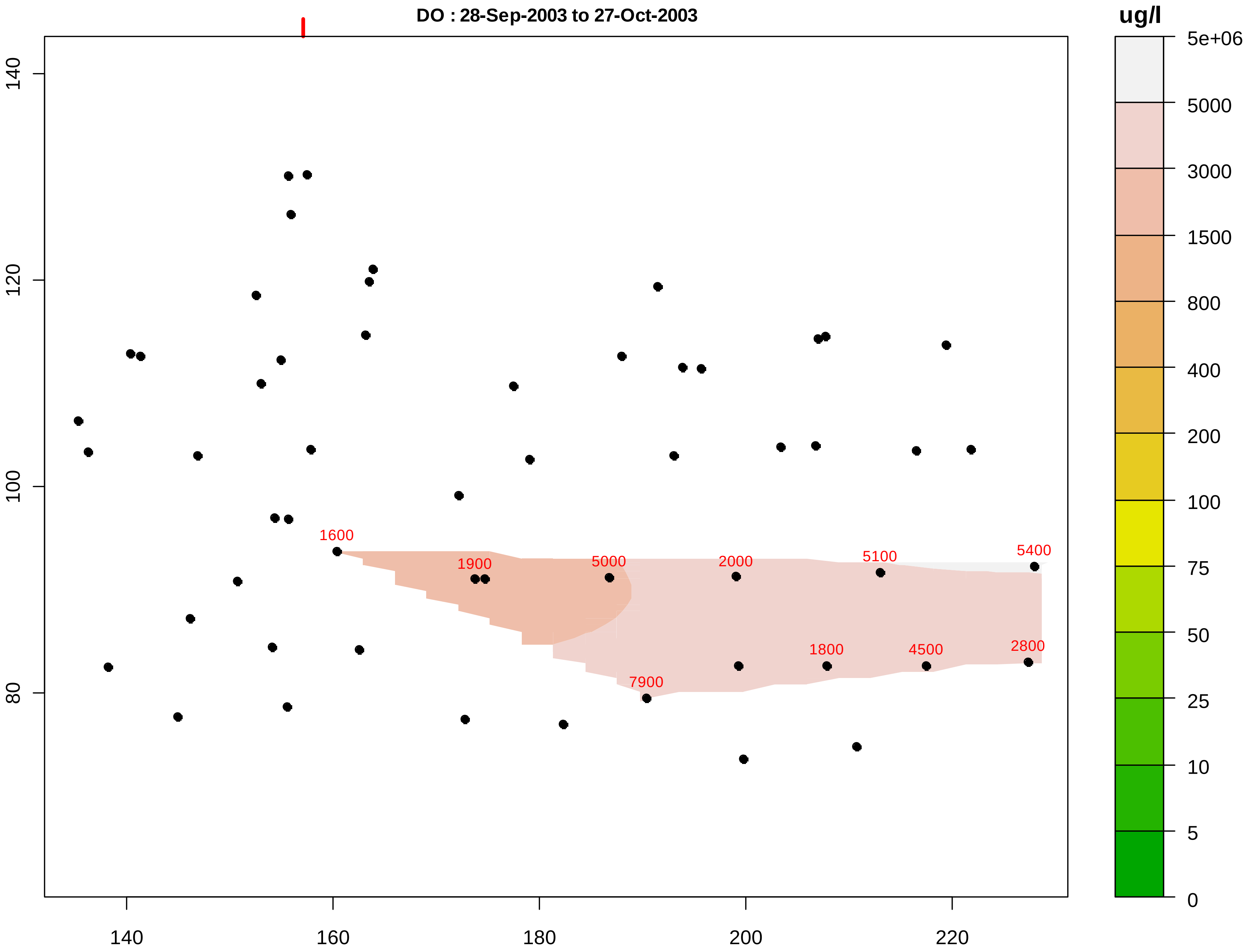

EPHw10-19 : 28-Jun-2009 to 27-Jul-2009
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
140
120
100
80
140
160
180
200
220
271.5
270
270
269.5
269
268.5
268
267.5
267
266.5
MW01-16
MW06-1
MW-AS-23
MW06-6
MWP3
MW08-2
MW09-5
MW08-3
MW08-4
MW01-24
MW-AS-22
MW-AS-13
MWP11
MW06-5
MW01-18
MW06-4
MW08-1
MWP13
MW09-16
MW-AS-11
MWP4
MW-AS-15
MW06-2
MW03-03
MW03-02
MW01-17D
MW03-05
MW01-19
MW01-22
AS-4
MW01-14
MW03-11
MW-AS-12
MW03-10
MW03-10D
MW03-09
MW03-08
MW03-07
MW03-06
MW04-6
MW04-5
MW04-4
MW08-8
MW08-7
MW08-6
MW04-1
MW04-2
MW01-20
MW08-5
MW04-3
MW01-21
MW03-01
MW01-23

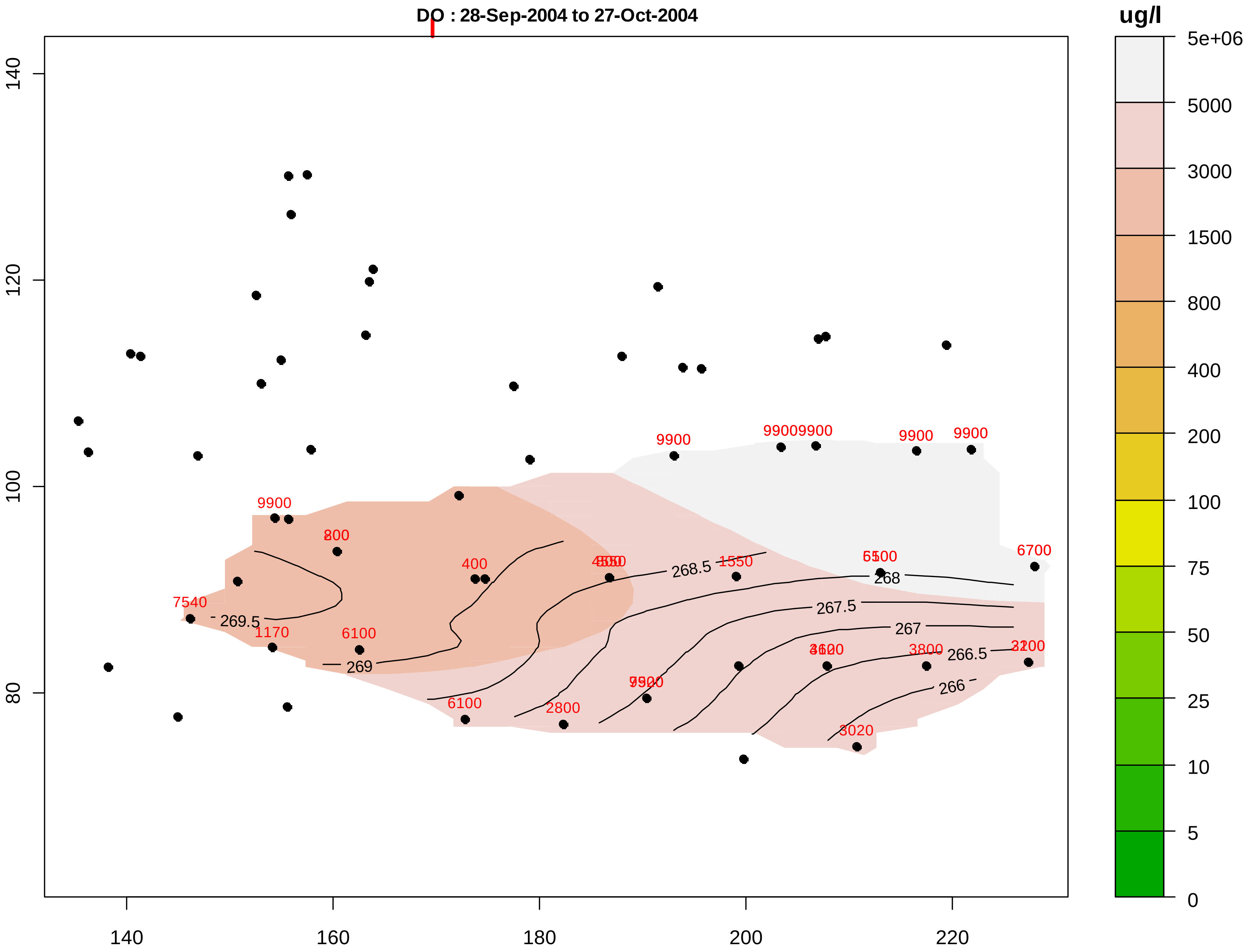


EPHw10-19 : 28-Aug-2009 to 27-Sep-2009

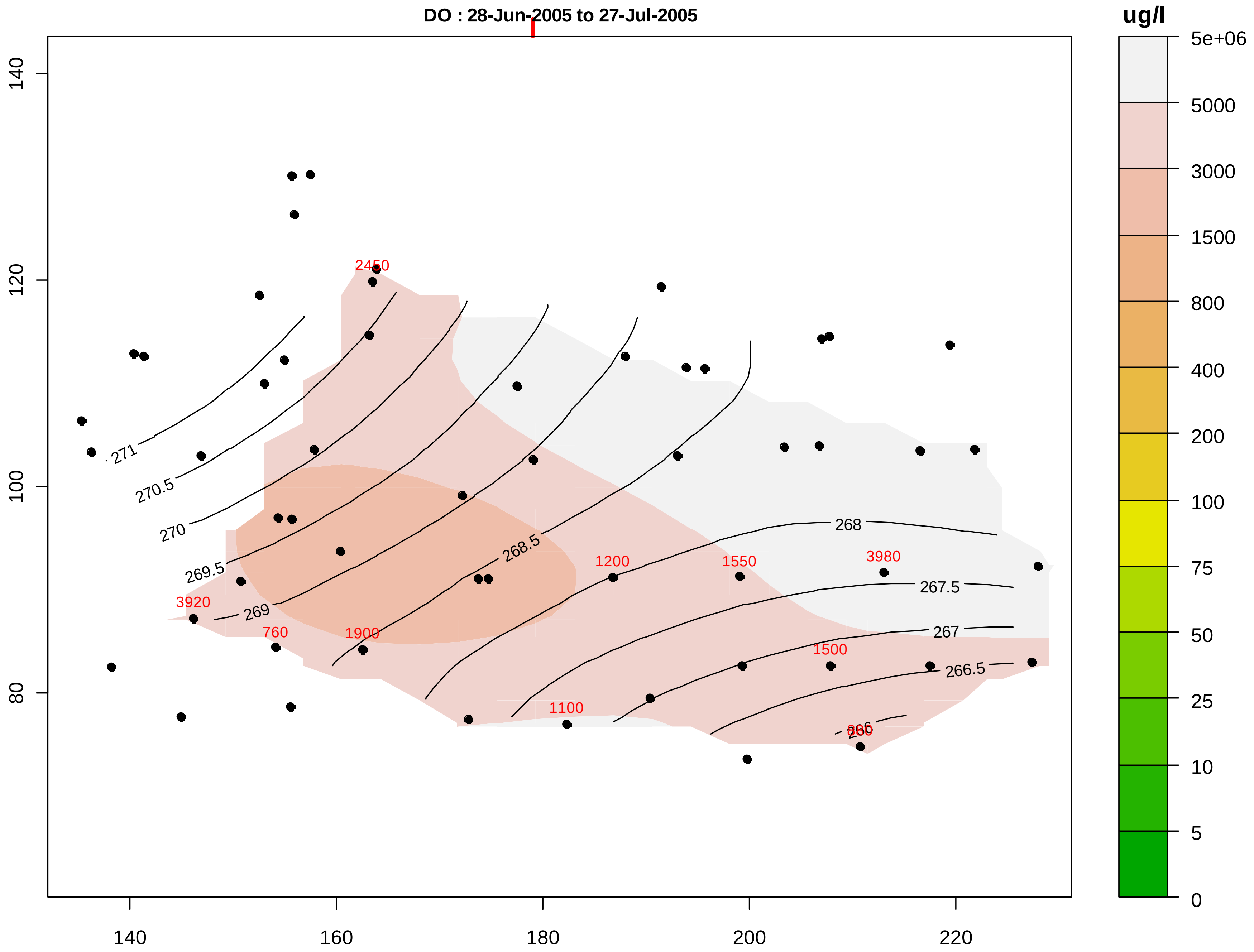
Dissolved Oxygen (DO) Distribution

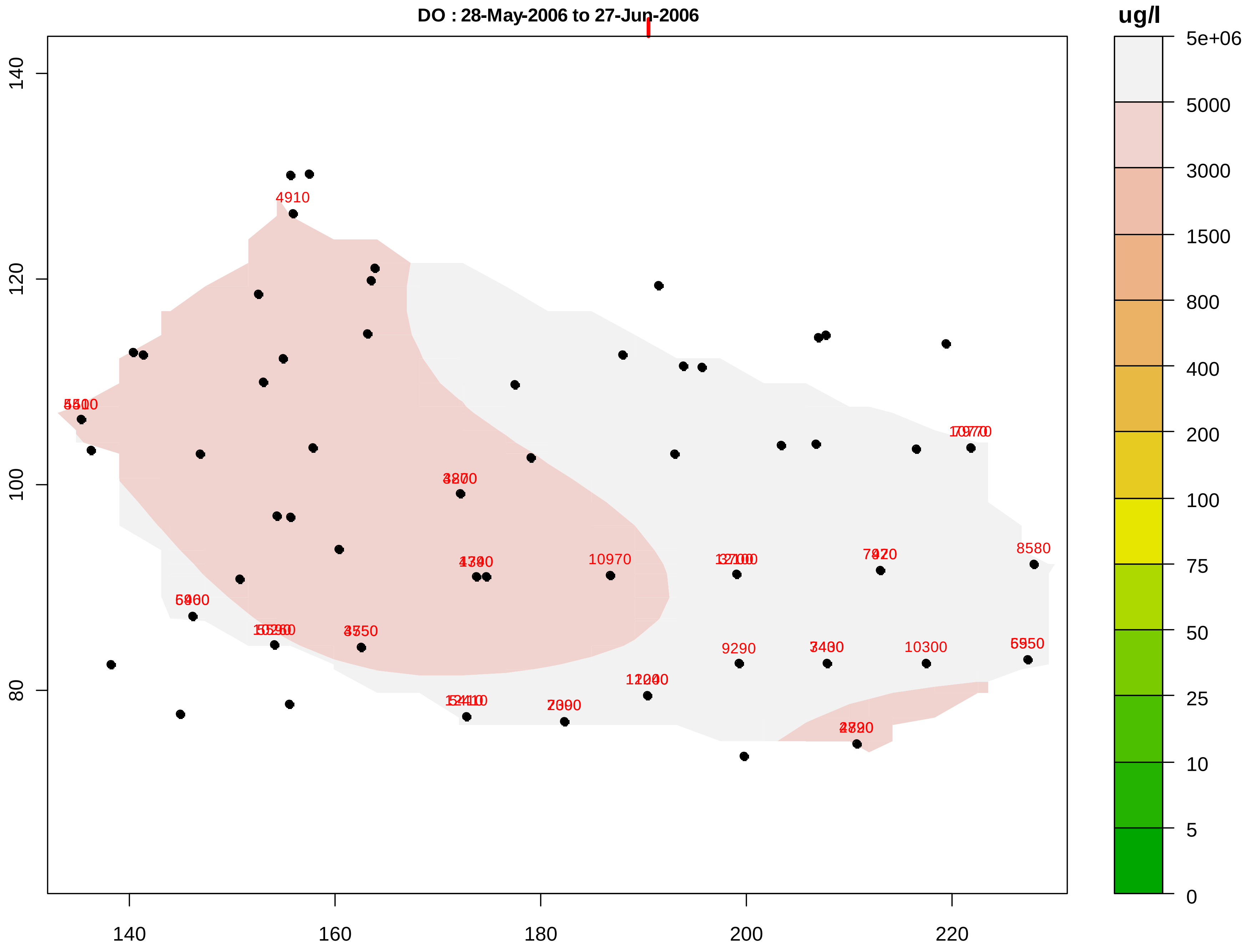
2001 to 2009

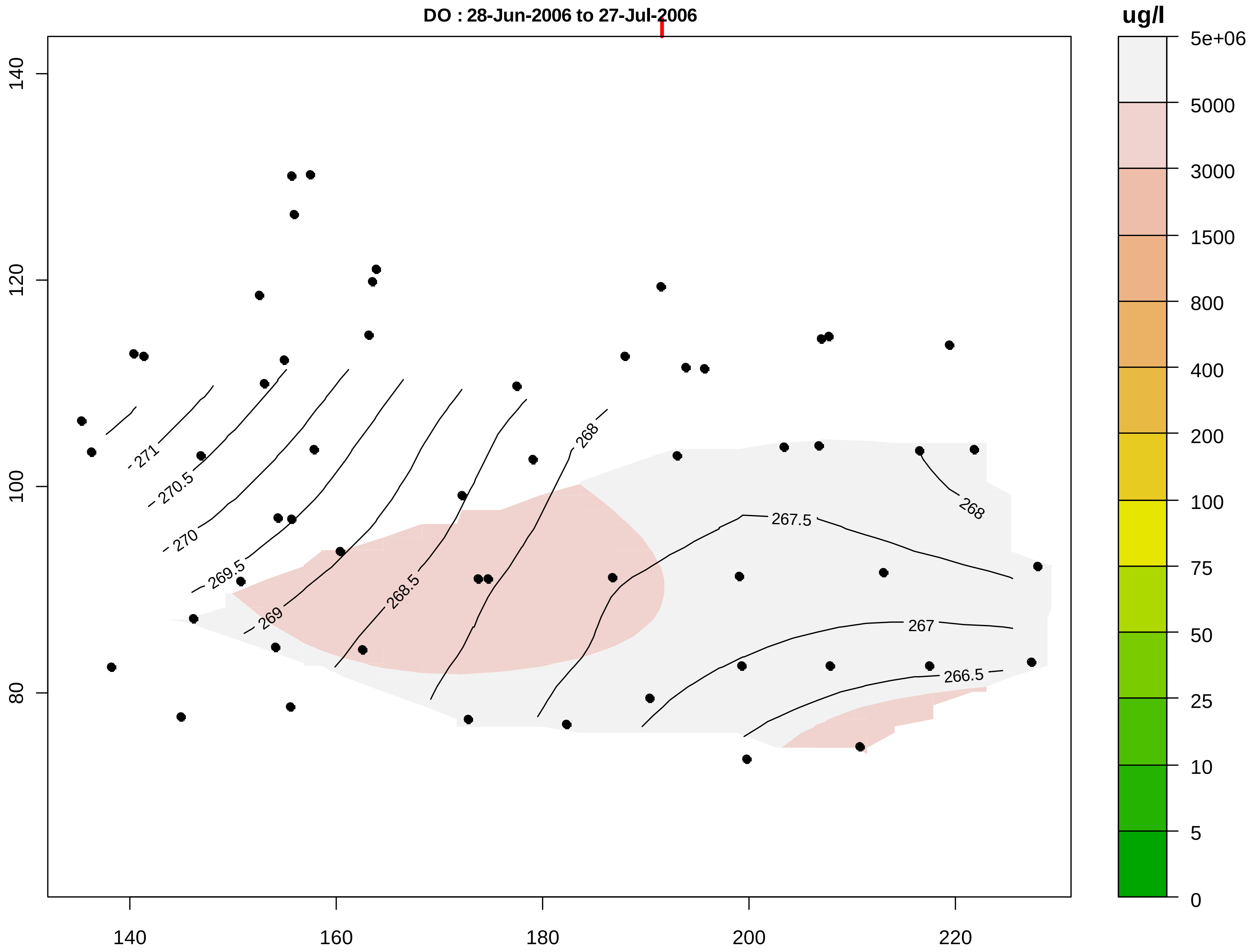

DO : 28-Sep-2003 to 27-Oct-2003
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
140
120
100
80
140
160
180
200
220
1600
1900
5000
2000
5100
5400
1800
4500
2800
7900



DO : 28-Sep-2004 to 27-Oct-2004
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
140
120
100
80
140
160
180
200
220
9900
9900
9900
9900
9900
9900
800
400
1550
6700
7540
269.5
1170
6100
269
268.5
268
267.5
267
266.5
266
3800
3200
6100
2800
3020


DO : 28-Jun-2005 to 27-Jul-2005
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
140
120
100
80
140
160
180
200
220
271
270.5
270
269.5
269
268.5
268
267.5
267
266.5
266
2450
3920
760
1900
1200
1550
3980
1500
1100
260


DO : 28-May-2006 to 27-Jun-2006
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
140
120
100
80
140
160
180
200
220
4910
10970
8580
9290
10300


DO : 28-Jun-2006 to 27-Jul-2006
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
140
120
100
80
140
160
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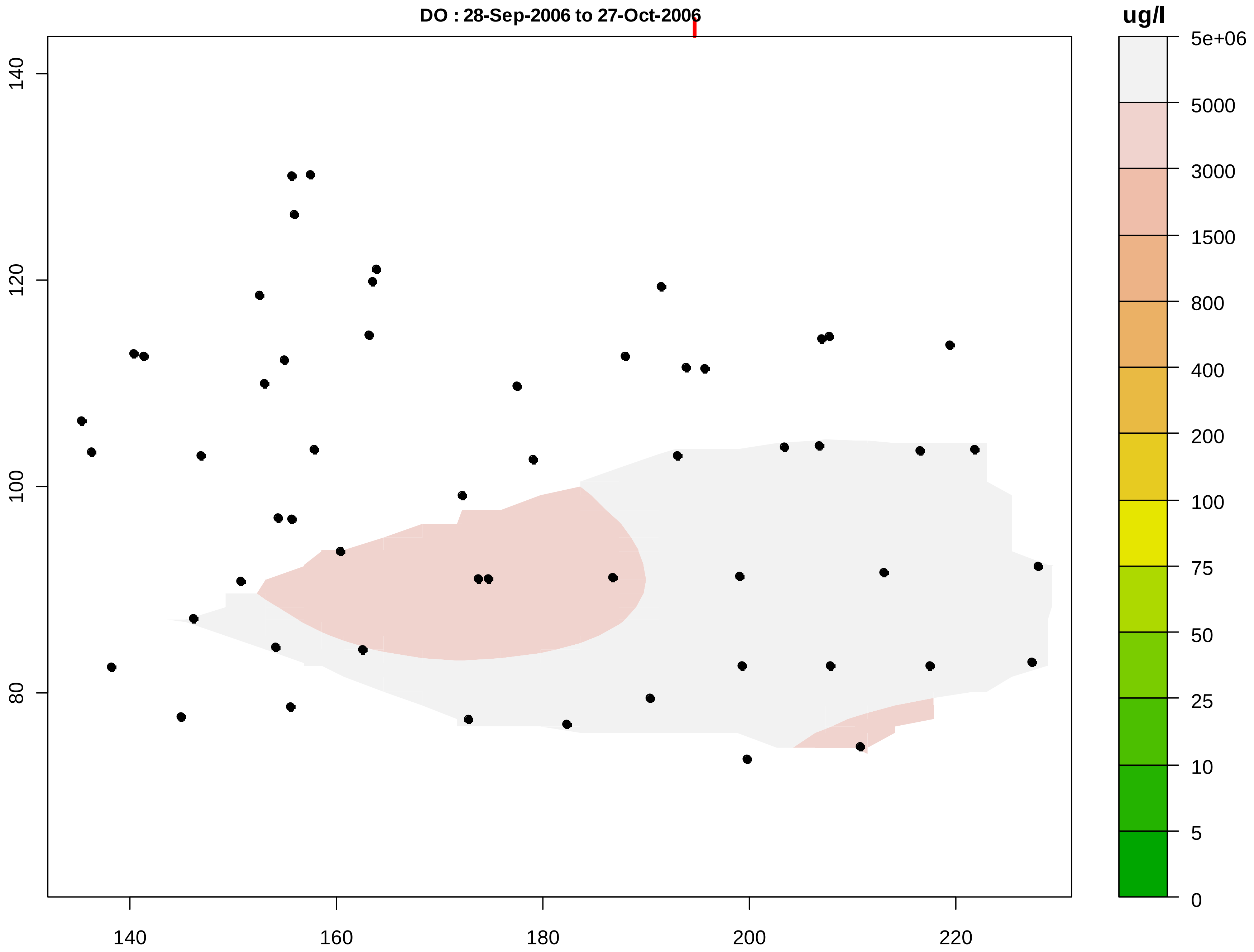
200
220
271
270.5
270
269.5
269
268.5
268
268
267.5
267
266.5


DO : 28-Sep-2006 to 27-Oct-2006
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
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120
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80
140
160
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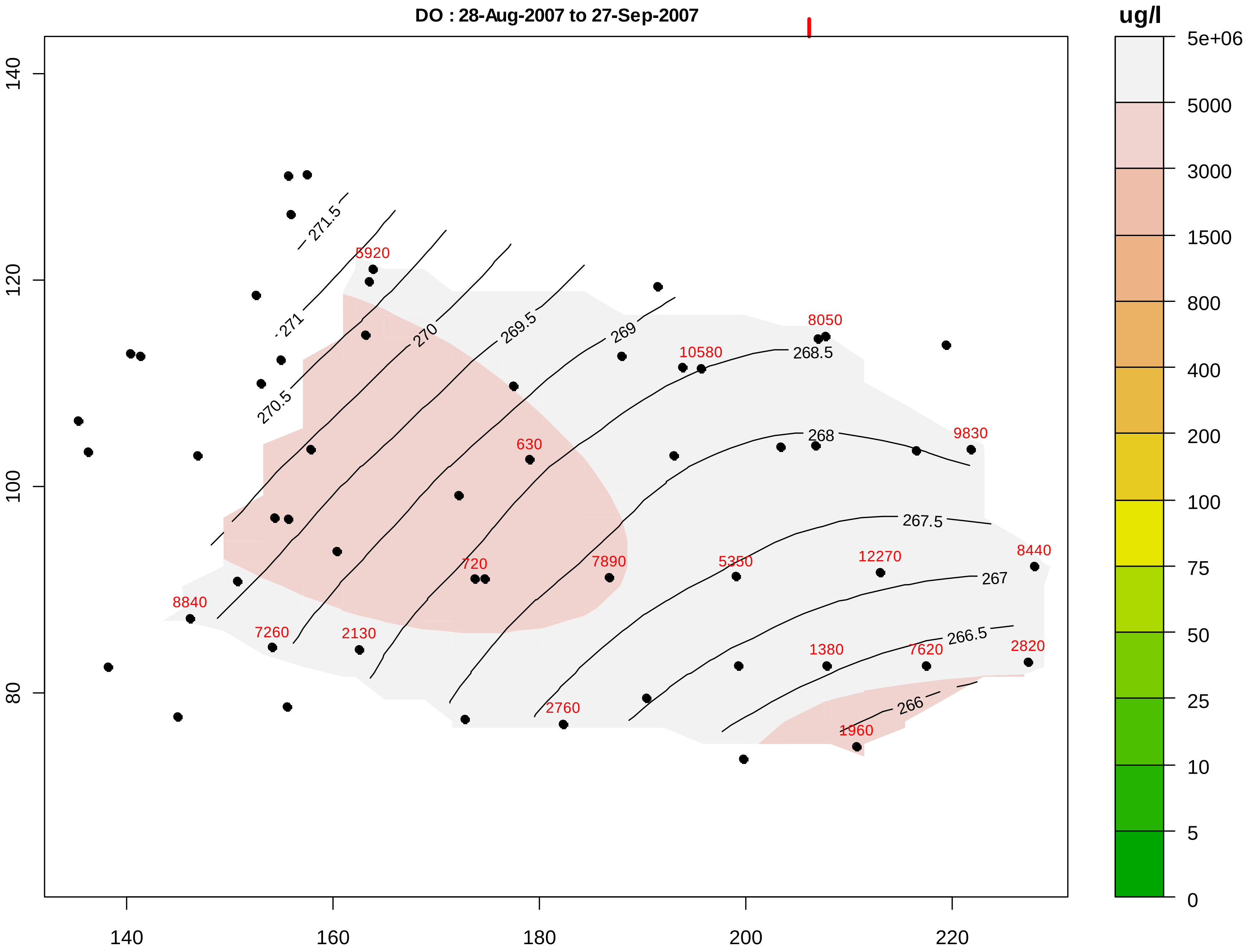
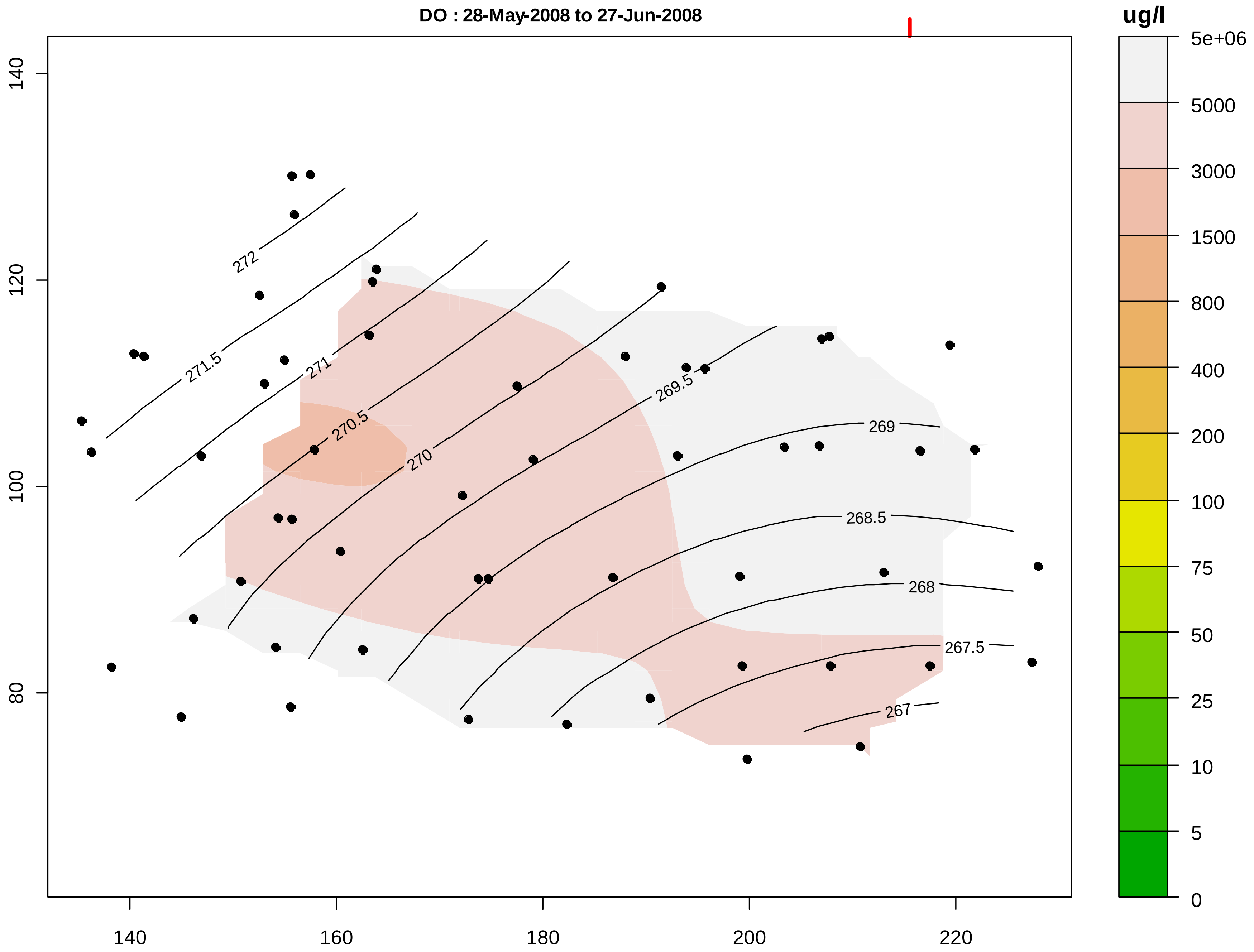
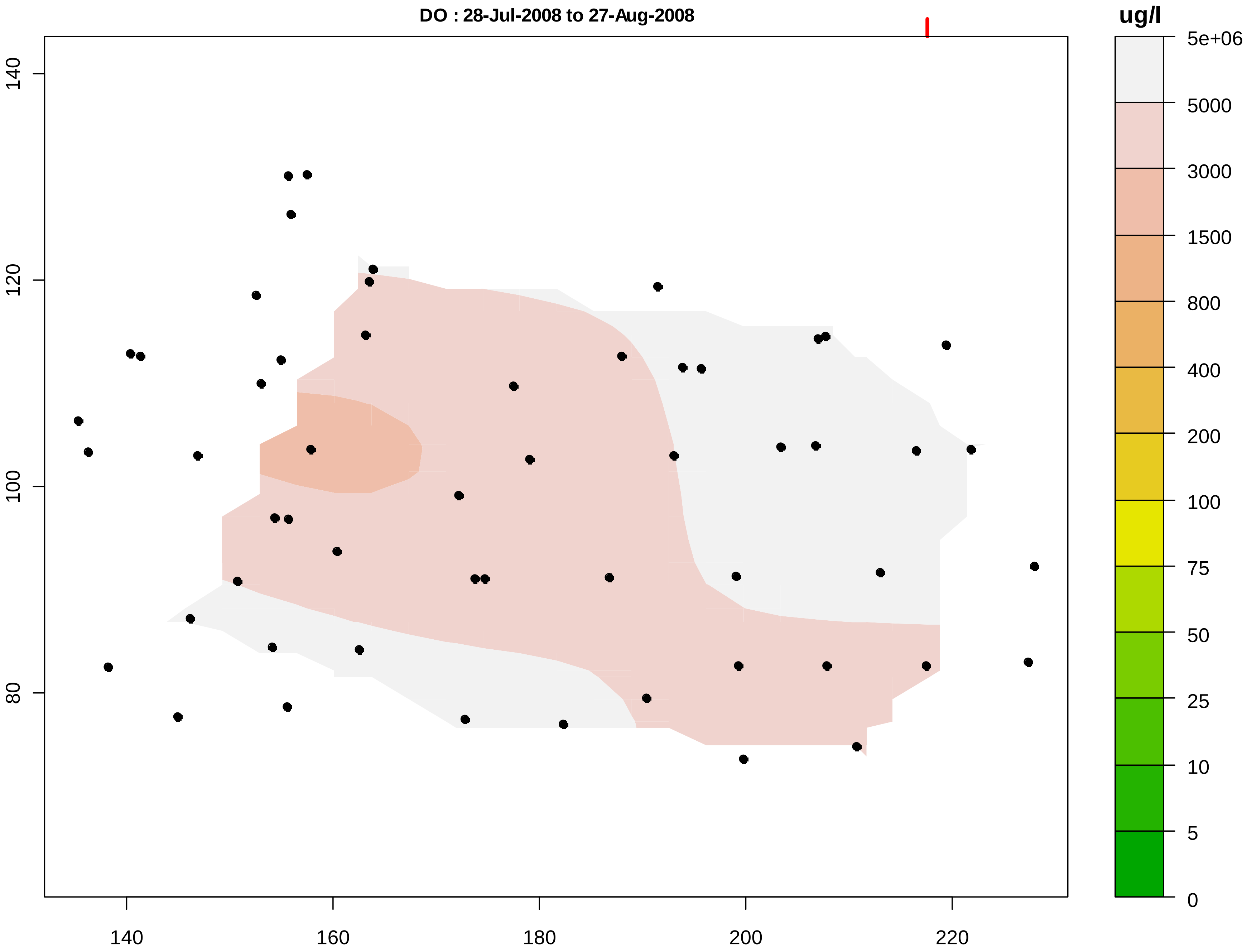
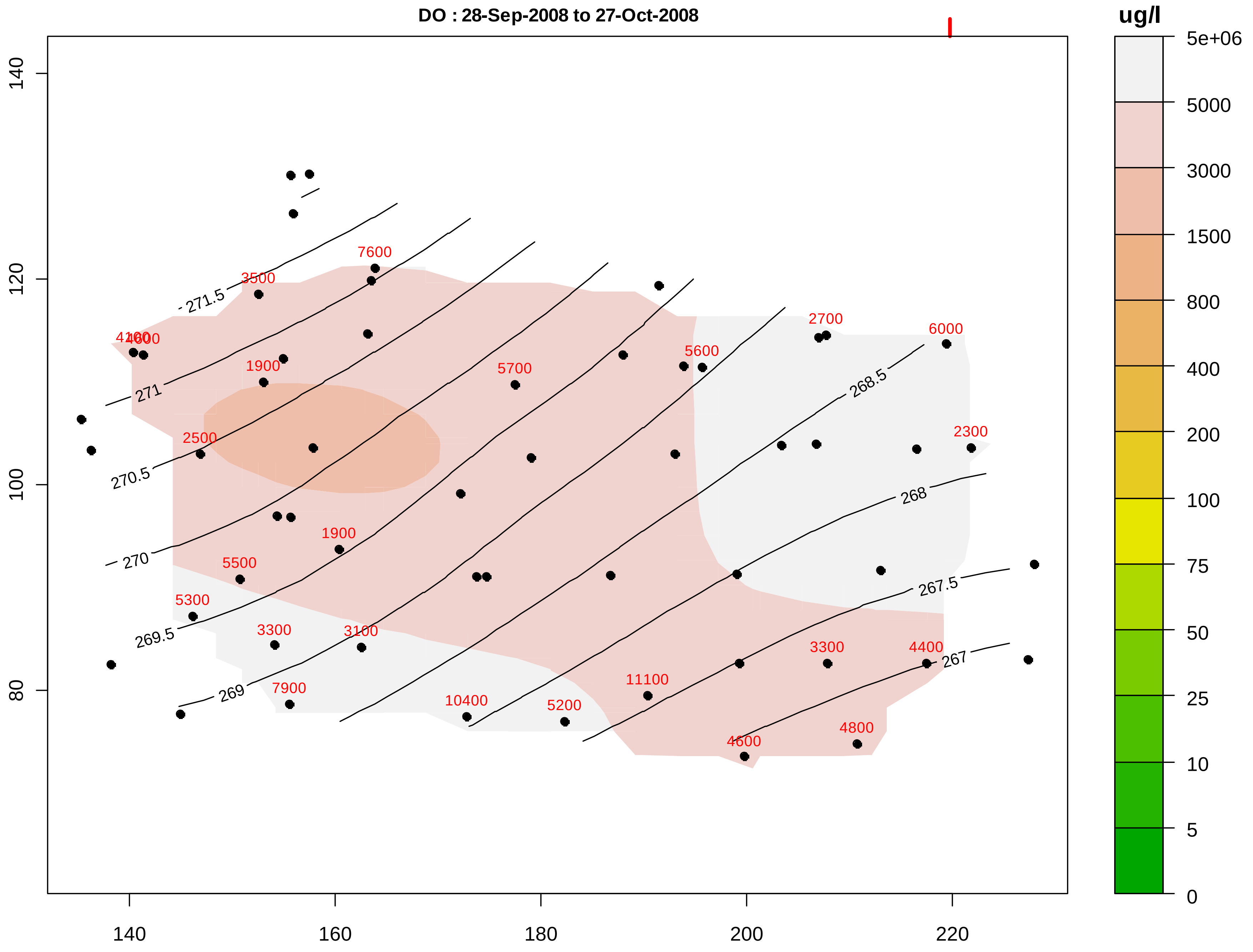
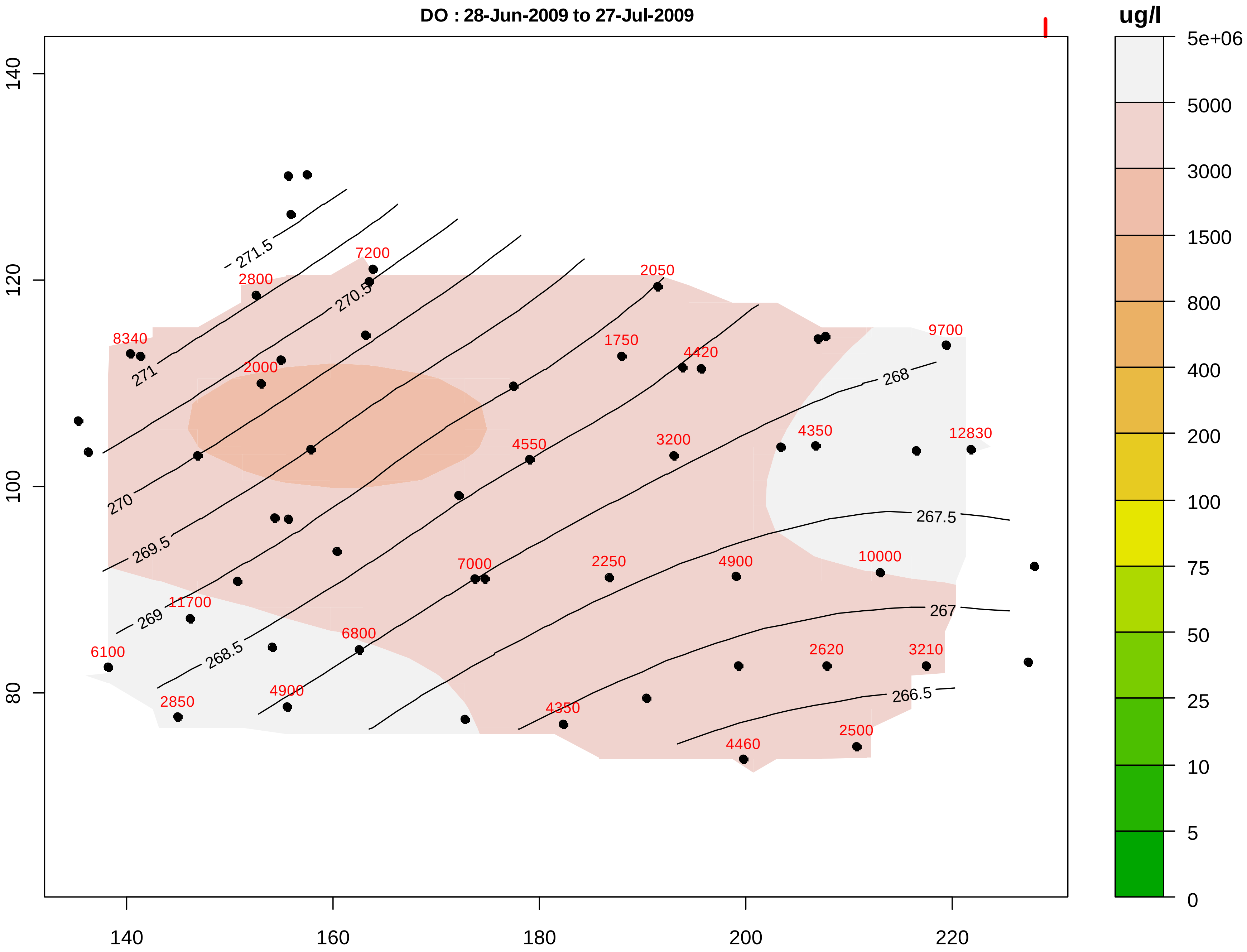
200
220


DO : 28-Aug-2007 to 27-Sep-2007
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
140
120
100
80
140
160
180
200
220
271.5
271
270.5
270
269.5
269
268.5
268
267.5
267
266.5
266
5920
8050
10580
9830
630
8440
12270
5350
7890
720
8840
7260
2130
1380
7620
2820
2760
1960


DO : 28-May-2008 to 27-Jun-2008
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
272
271.5
271
270.5
270
269.5
269
268.5
268
267.5
267
140
120
100
80
140
160
180
200
220

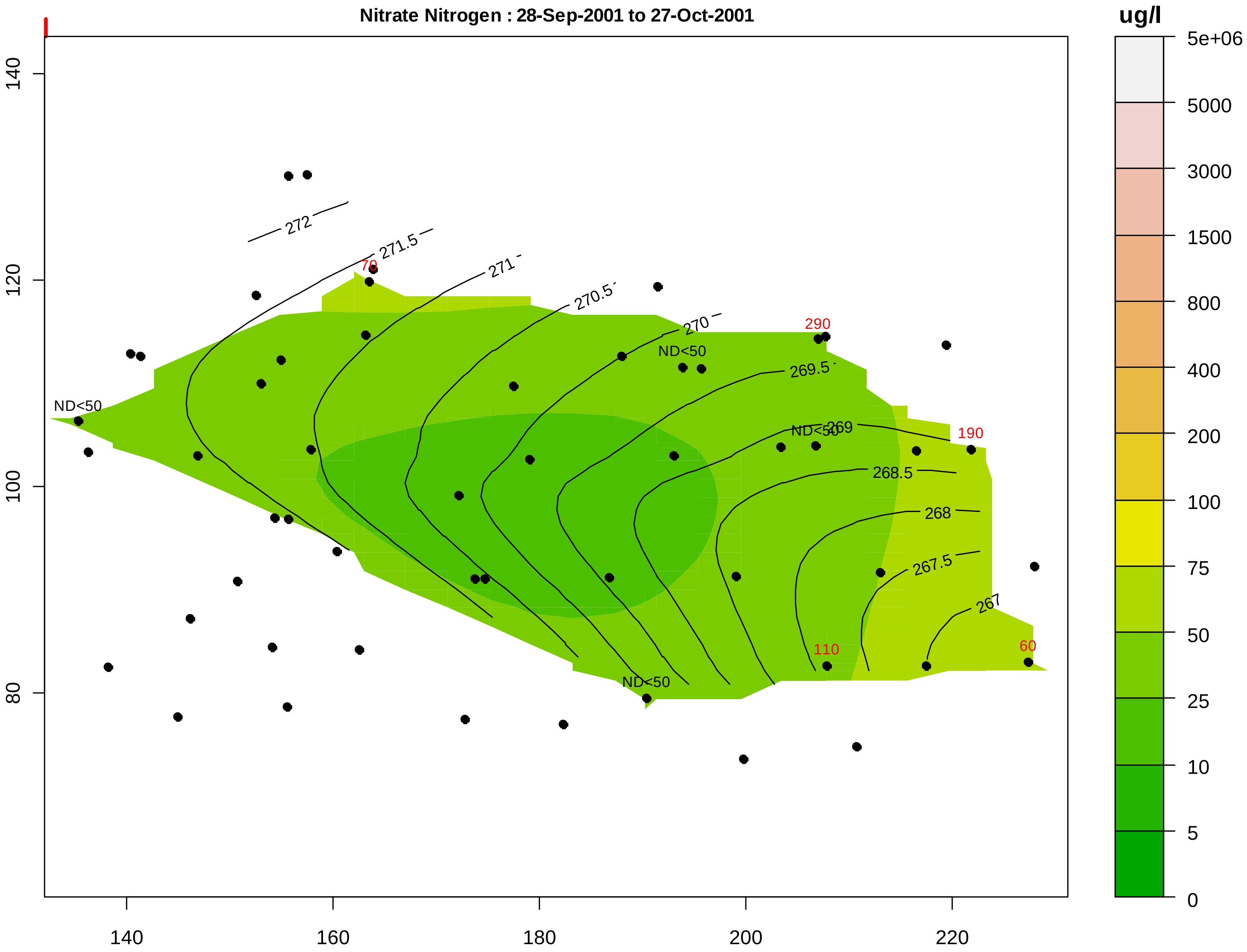

DO : 28-Jul-2008 to 27-Aug-2008
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
140
120
100
80
140
160
180
200
220

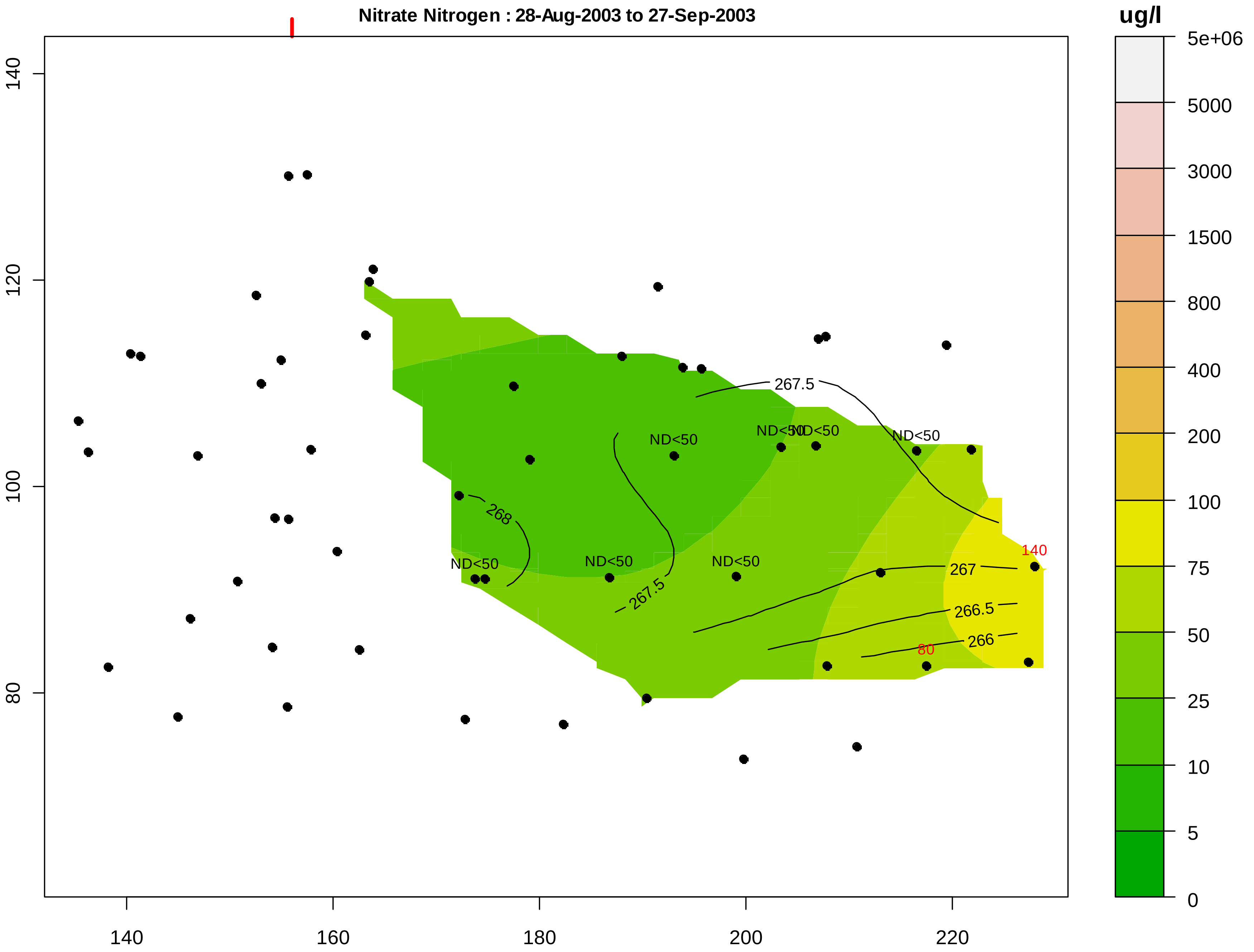

DO : 28-Sep-2008 to 27-Oct-2008
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
140
120
100
80
140
160
180
200
220
271.5
271
270.5
270
269.5
269
268.5
268
267.5
267
3500
7600
4100
4600
1900
5700
5600
2700
6000
2500
2300
1900
5500
5300
3300
3100
7900
10400
5200
11100
3300
4400
4600
4800


DO : 28-Jun-2009 to 27-Jul-2009
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
140
120
100
80
140
160
180
200
220
271.5
271
270.5
270
269.5
269
268.5
268
267.5
267
266.5
7200
2800
2050
8340
2000
1750
4420
9700
4550
3200
4350
12830
7000
2250
4900
10000
11700
6100
6800
2620
3210
2850
4900
4350
2500
4460

Nitrate Distribution

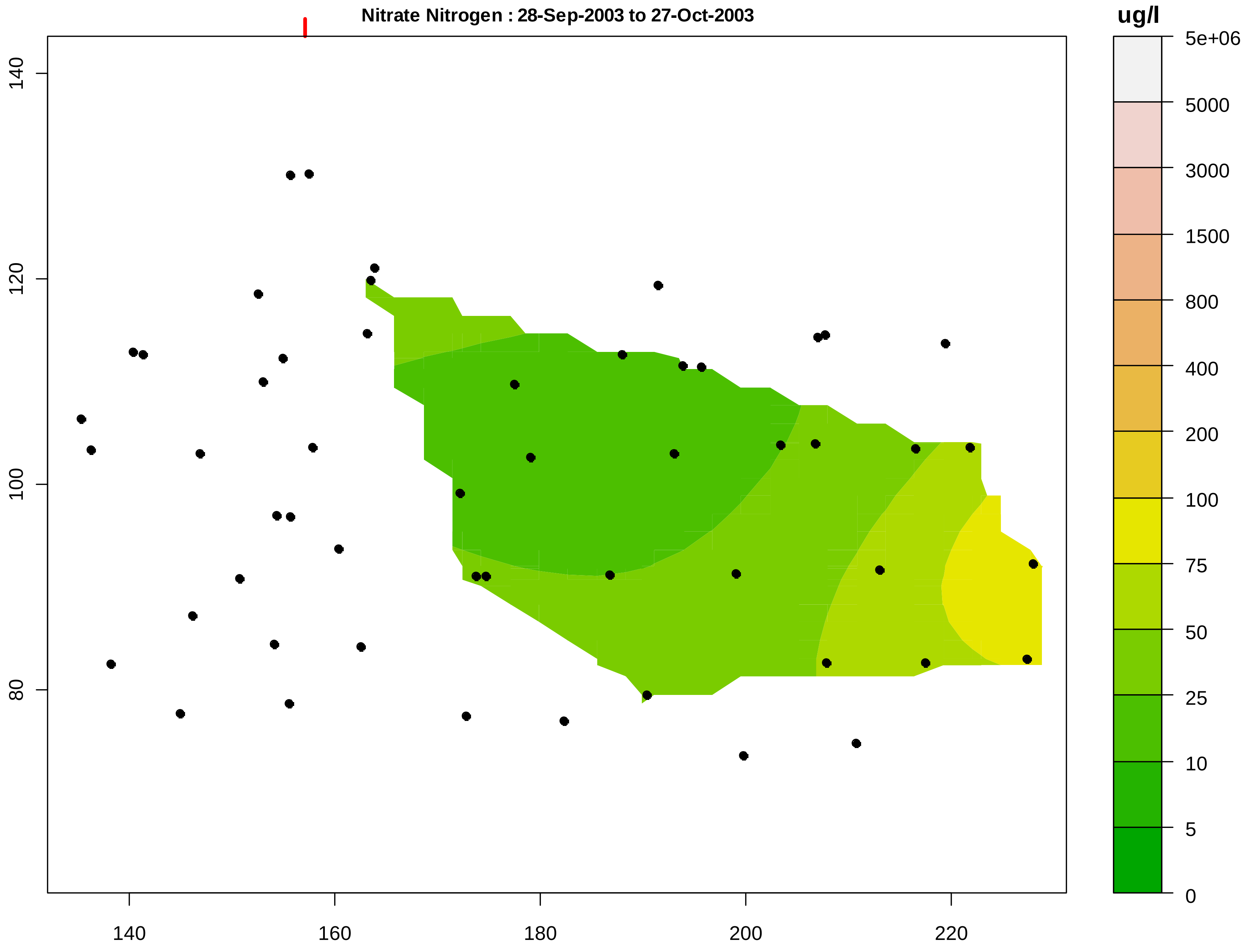
2001 to 2009

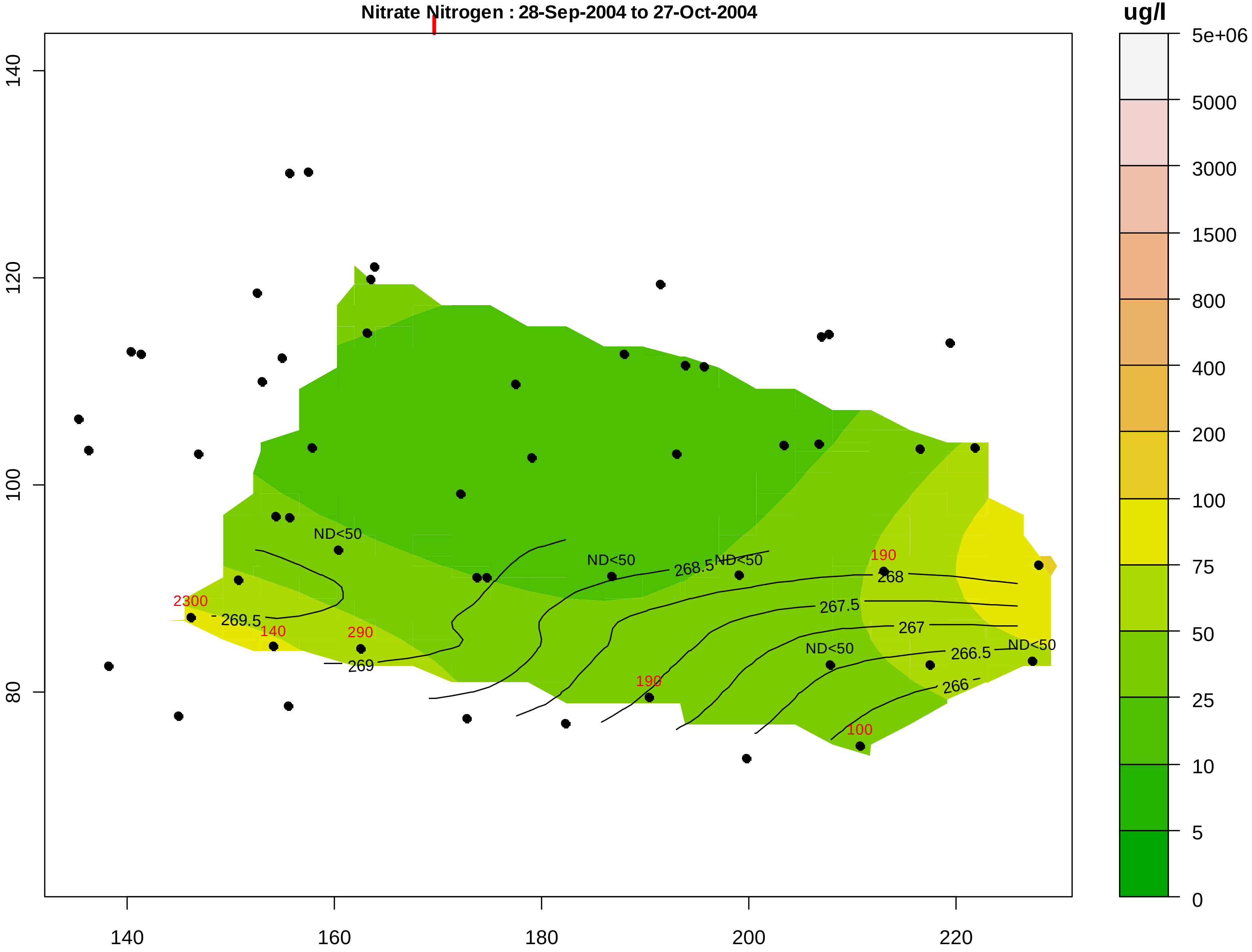

Nitrate Nitrogen : 28-Sep-2001 to 27-Oct-2001
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
140
120
100
80
140
160
180
200
220
272
271.5
271
270.5
270
269.5
269
268.5
268
267.5
267
70
290
190
110
60
ND<50
ND<50
ND<50
ND<50



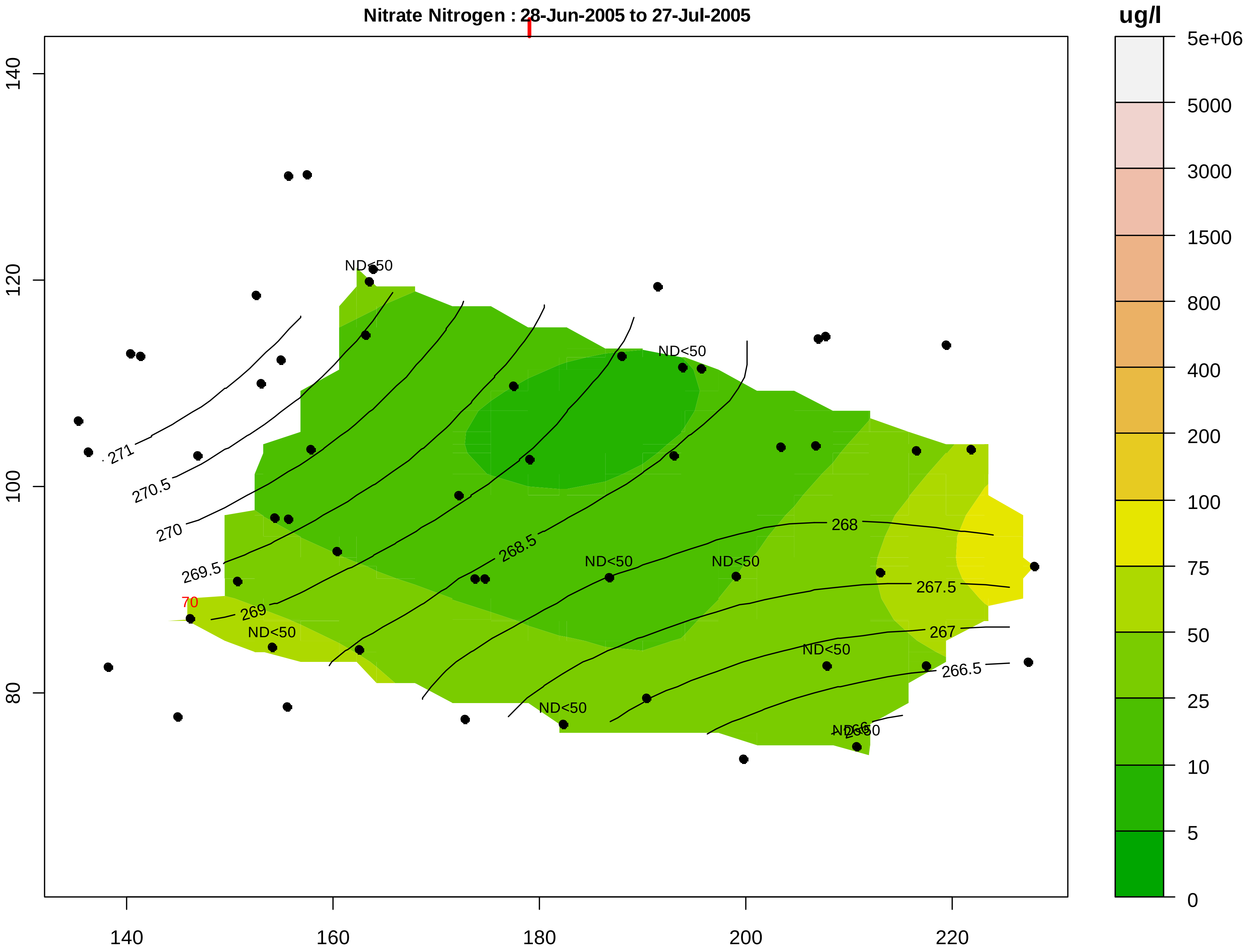
Nitrate Nitrogen : 28-Aug-2003 to 27-Sep-2003
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
140
120
100
80
140
160
180
200
220
267.5
268
267.5
267
266.5
266
ND<50
ND<50
ND<50
ND<50
ND<50
ND<50
ND<50
140
80

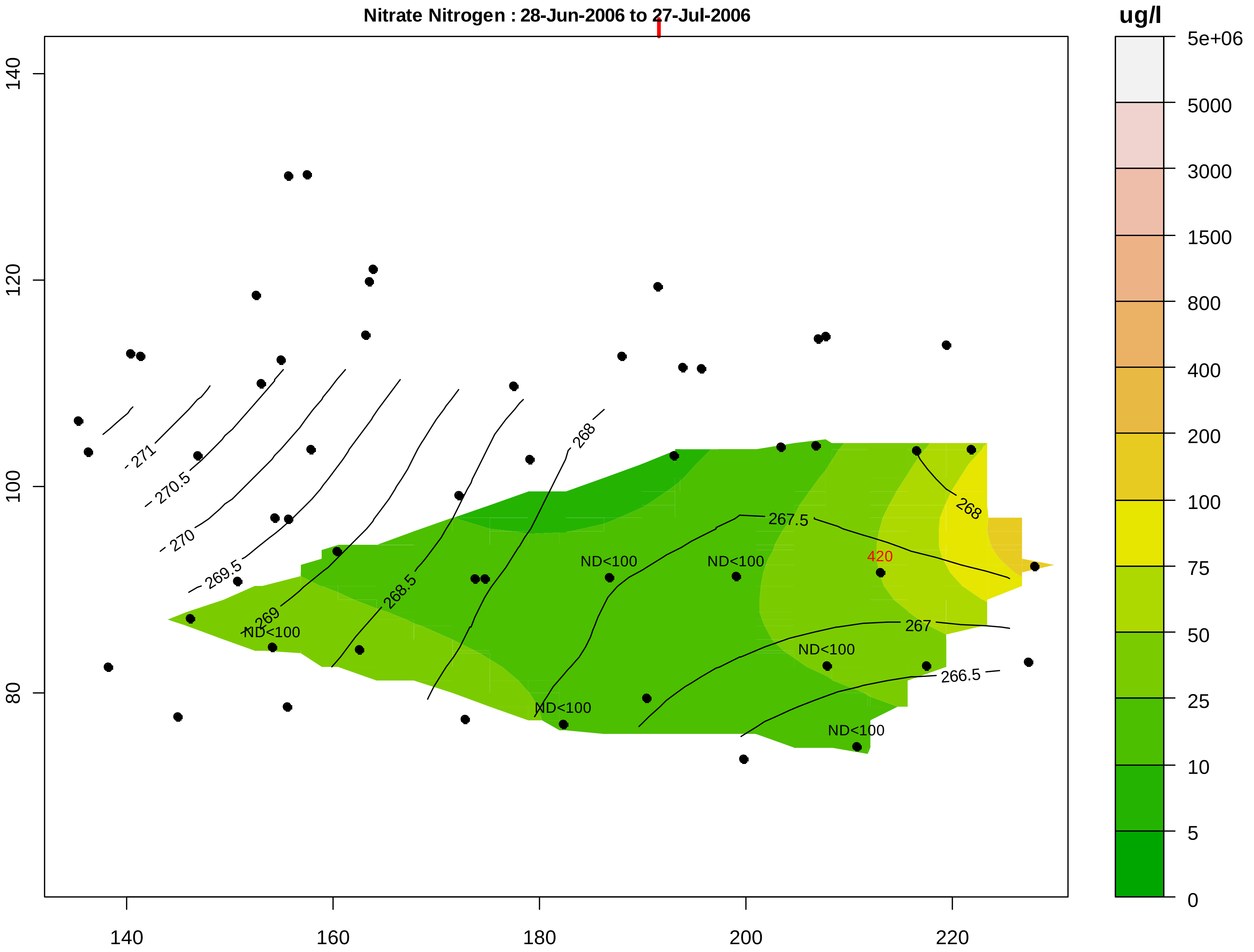
Nitrate Nitrogen : 28-Sep-2003 to 27-Oct-2003

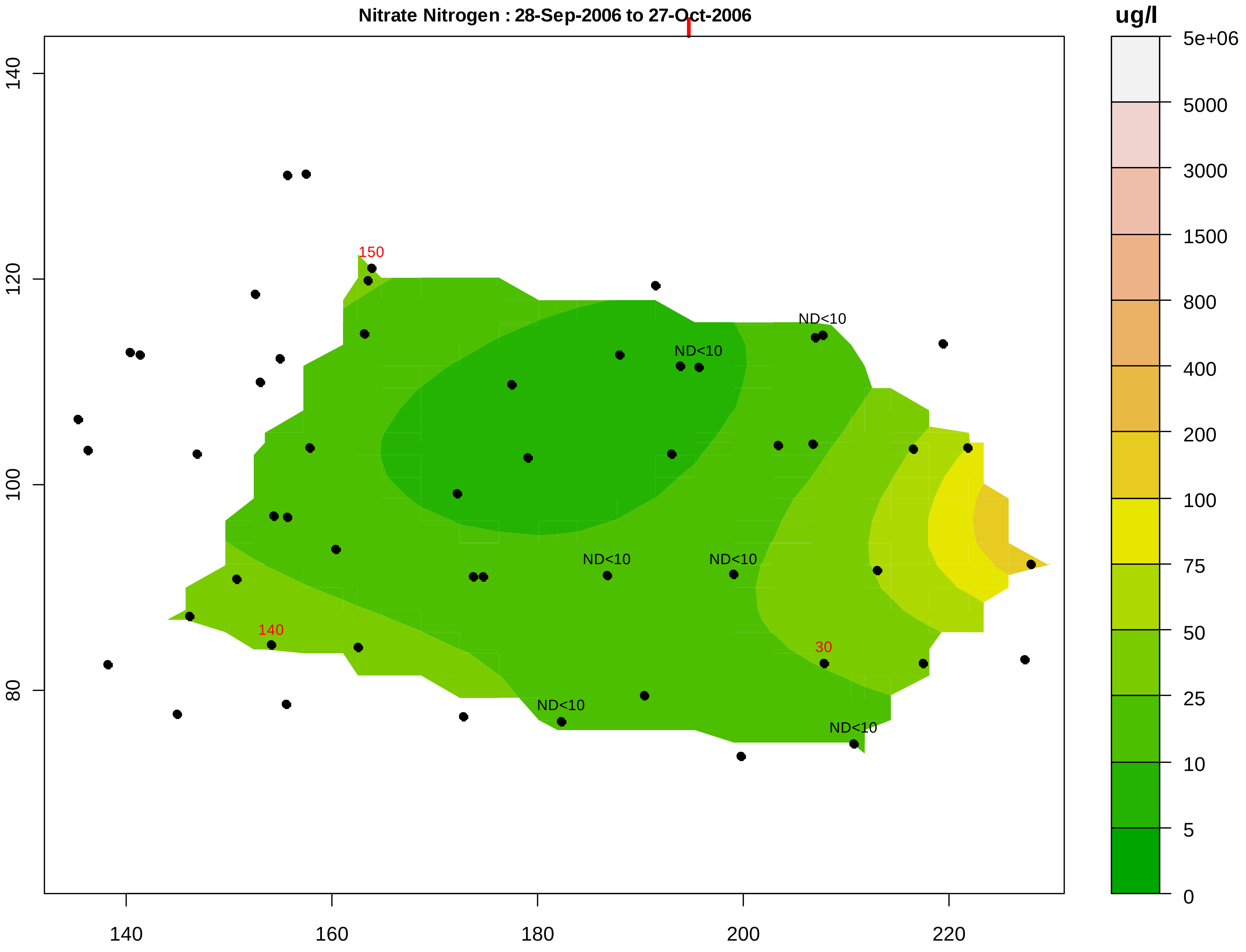



Nitrate Nitrogen : 28-Sep-2004 to 27-Oct-2004
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
140
120
100
80
140
160
180
200
220
ND<50
ND<50
268.5
ND<50
190
268
2300
269.5
140
290
267.5
267
ND<50
266.5
ND<50
269
190
266
100

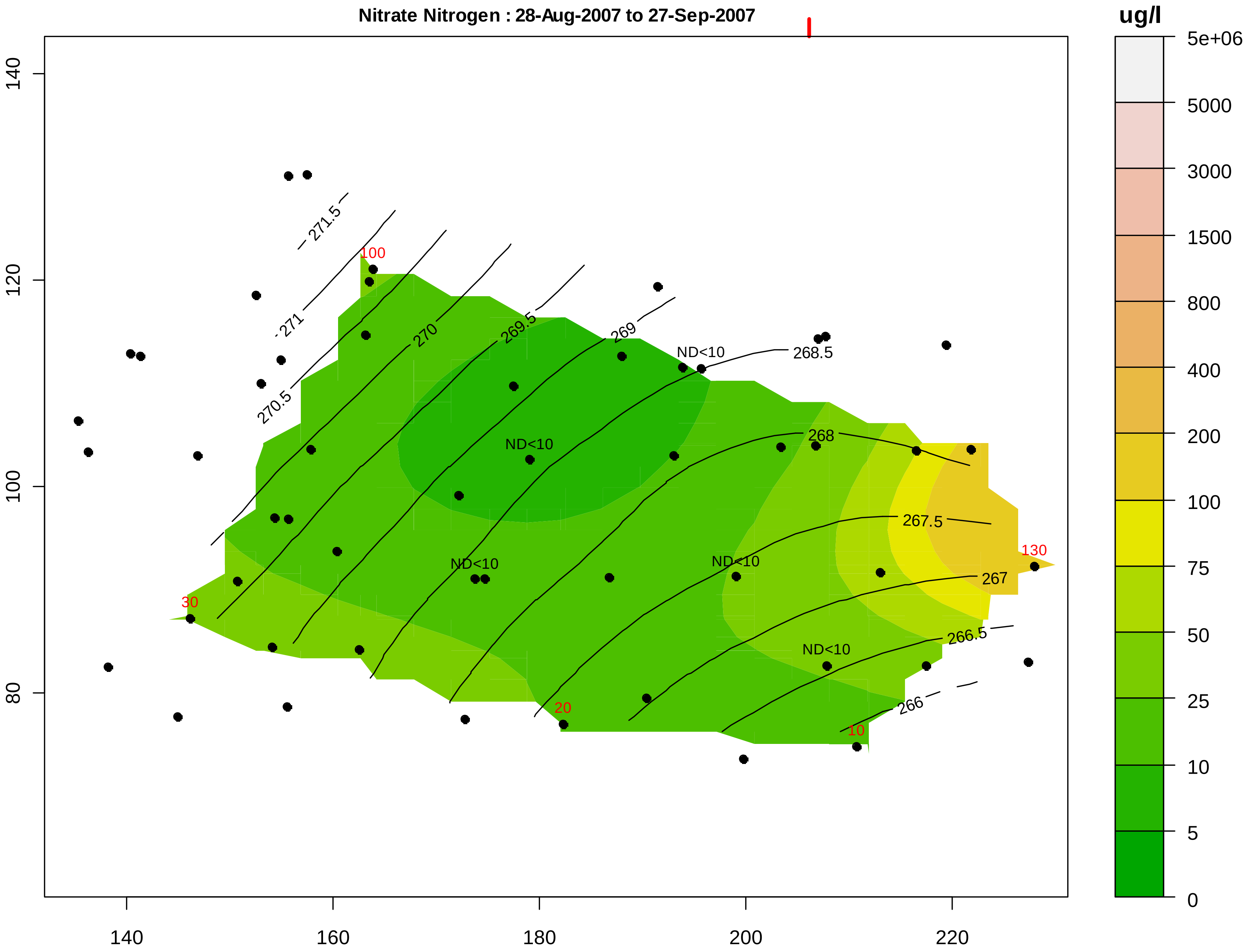
Nitrate Nitrogen : 28-Jun-2005 to 27-Jul-2005

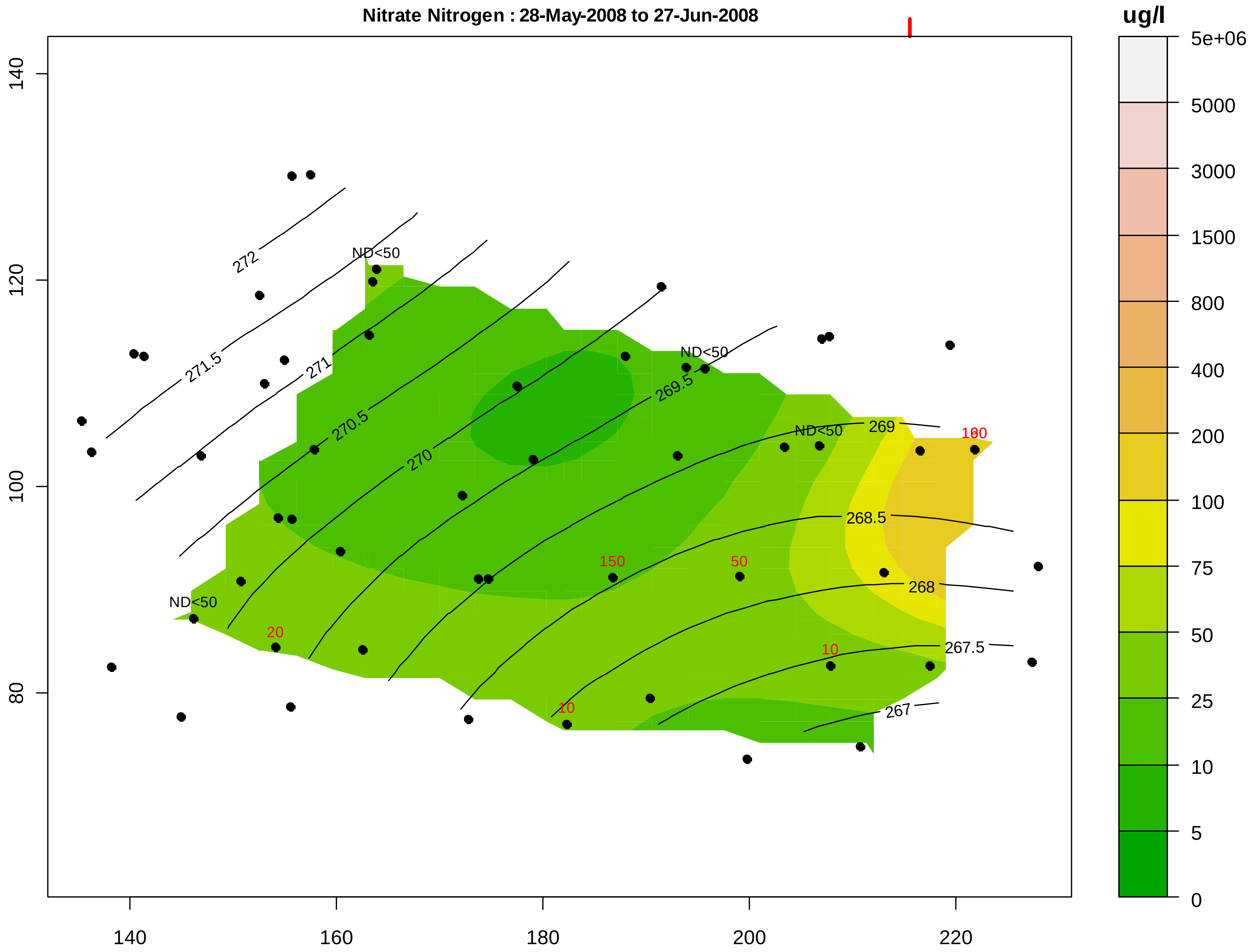



Nitrate Nitrogen : 28-Jun-2006 to 27-Jul-2006
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
140
120
100
80
140
160
180
200
220
271
270.5
270
269.5
269
268.5
268
267.5
267
266.5
268
ND<100
ND<100
ND<100
ND<100
ND<100
ND<100
420

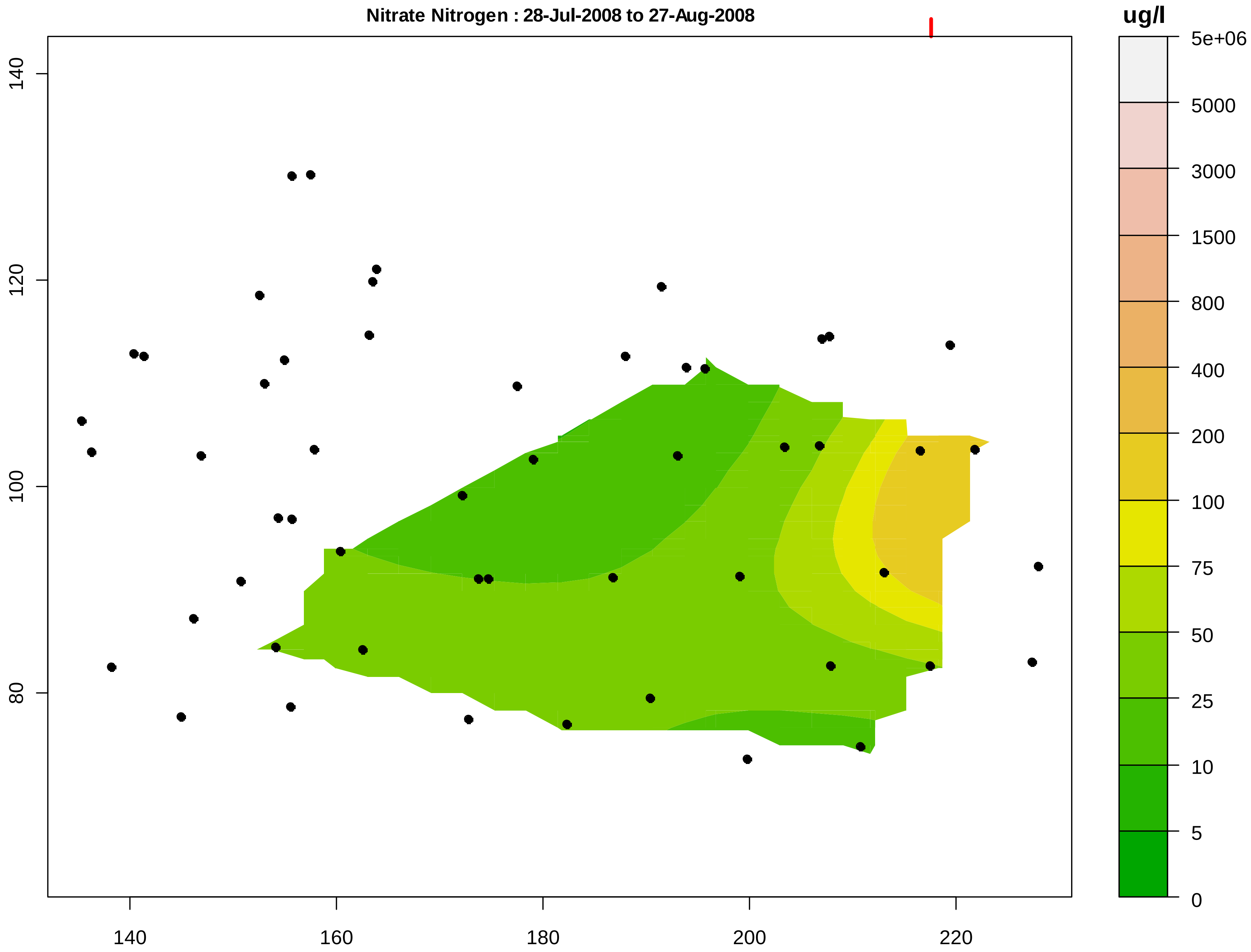


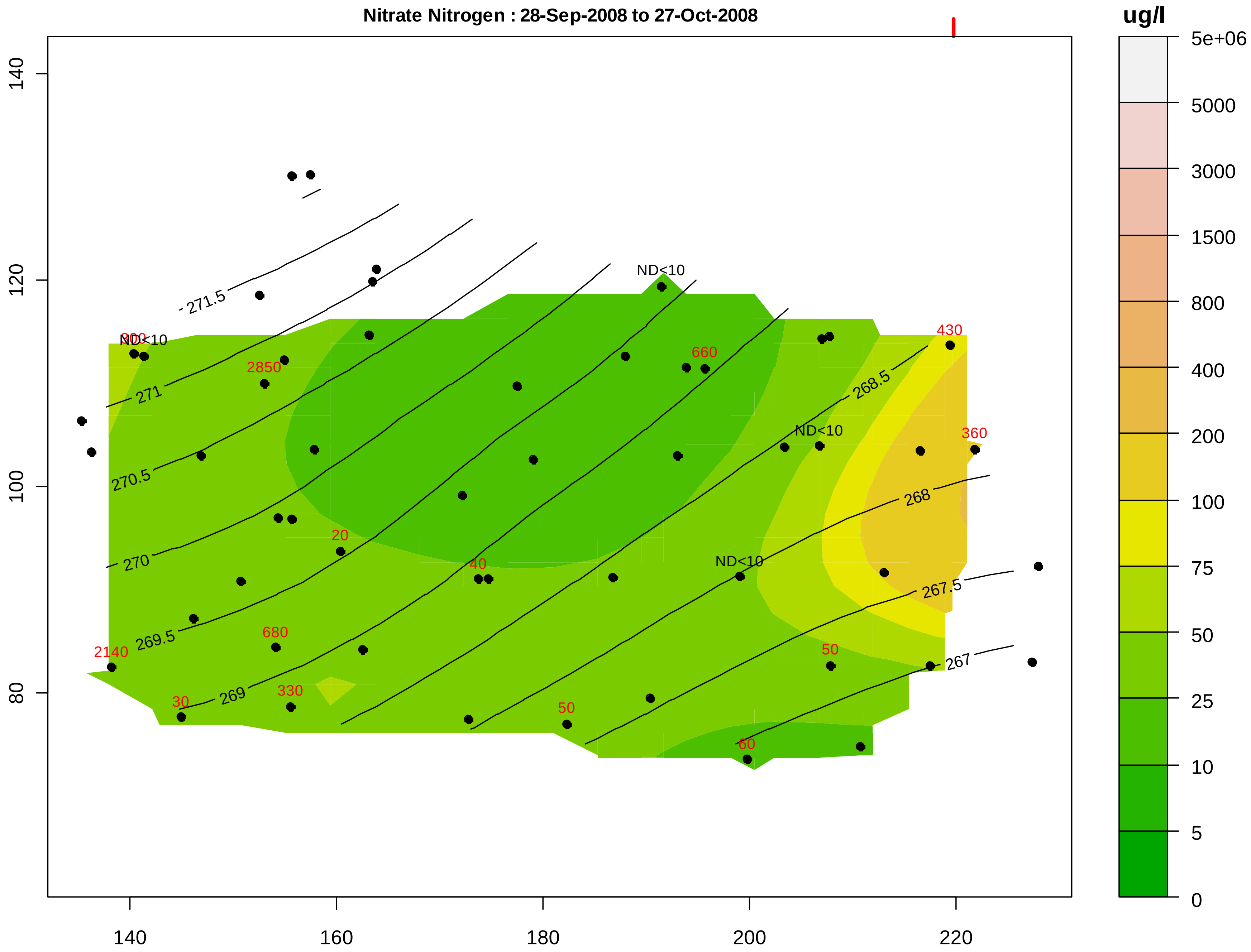
Nitrate Nitrogen : 28-Sep-2006 to 27-Oct-2006

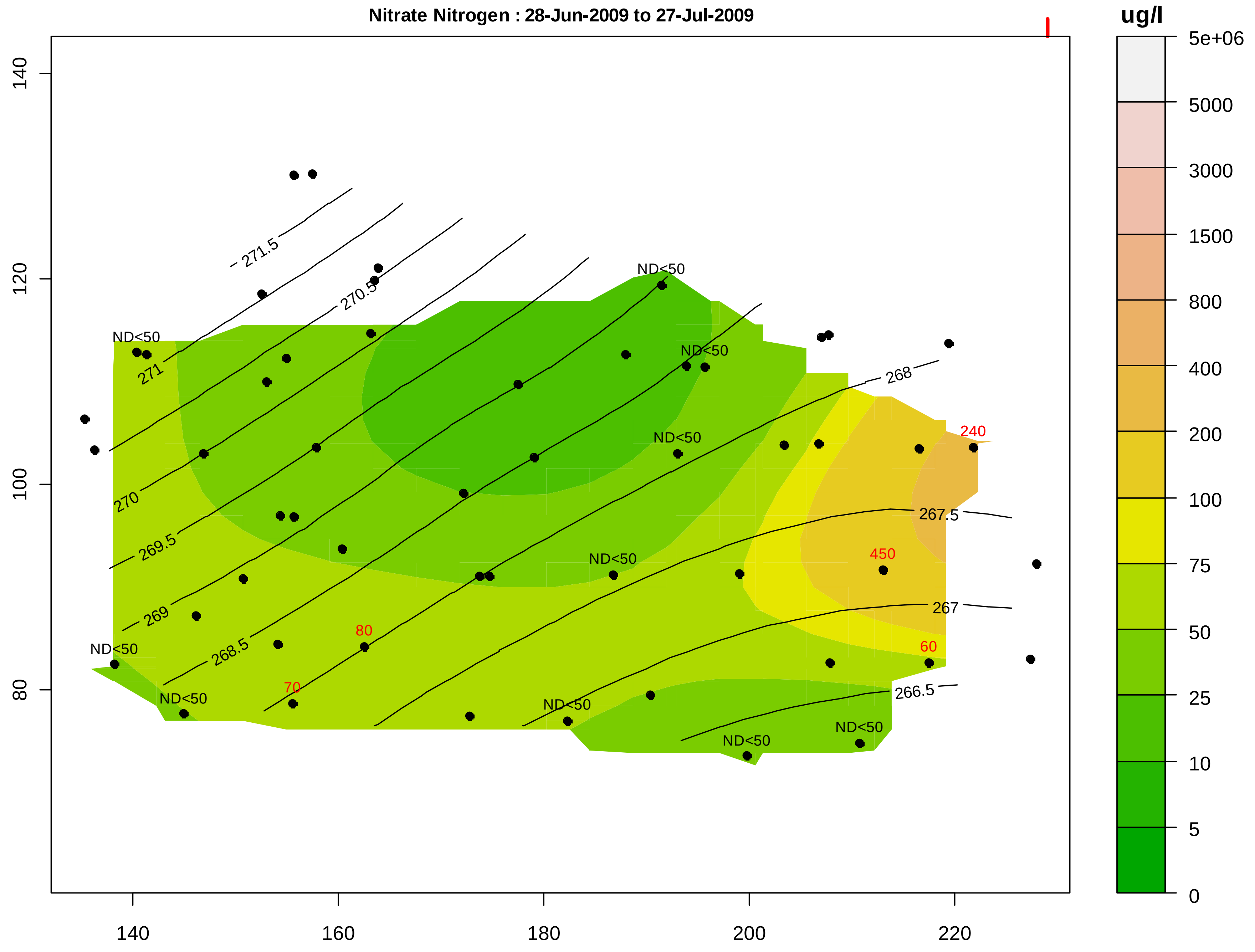

Nitrate Nitrogen : 28-Aug-2007 to 27-Sep-2007
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
140
120
100
80
140
160
180
200
220
271.5
271
270.5
270
269.5
269
268.5
268
267.5
267
266.5
266
ND<10
ND<10
ND<10
ND<10
ND<10
100
30
20
10
130



Nitrate Nitrogen : 28-May-2008 to 27-Jun-2008

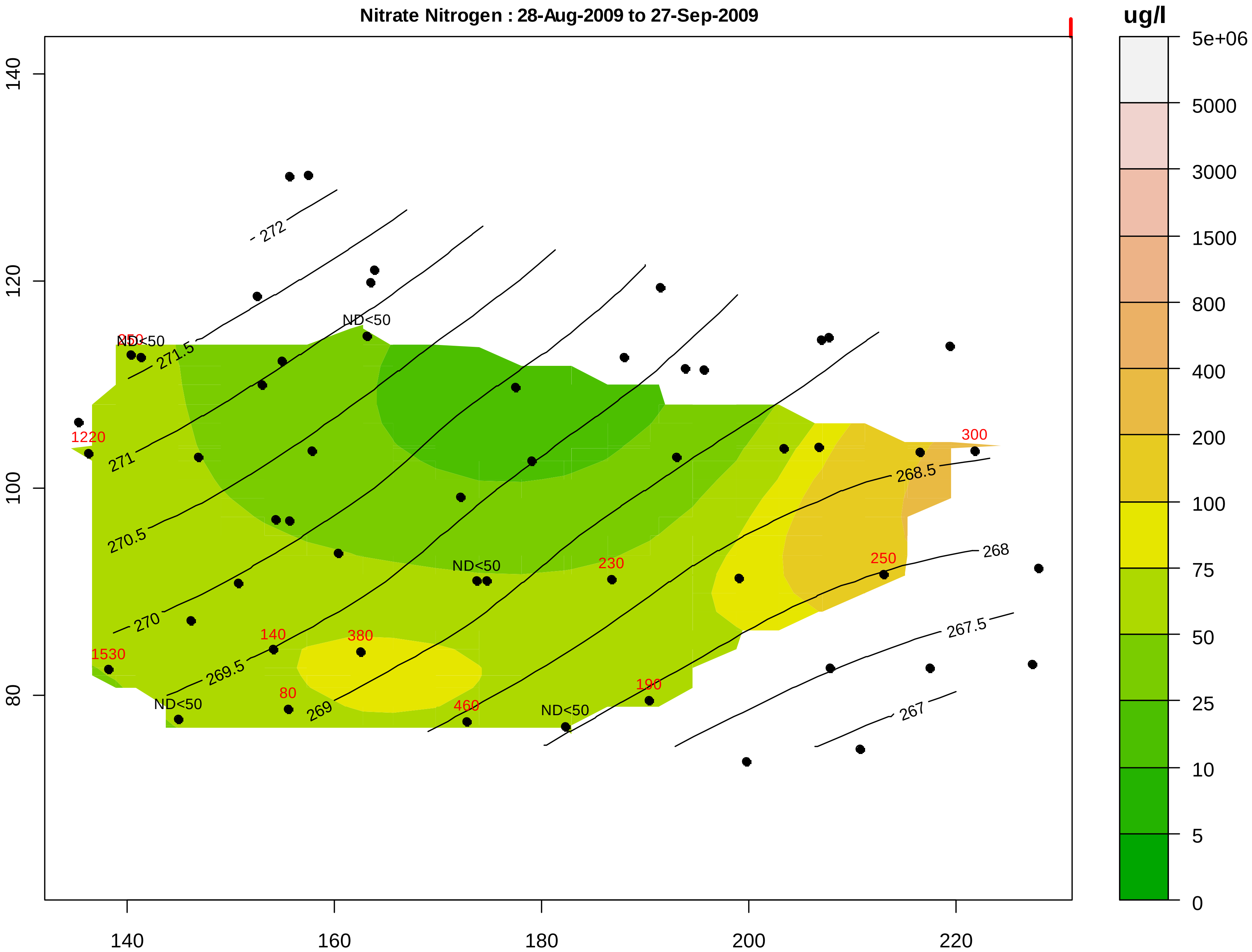

Nitrate Nitrogen : 28-Jul-2008 to 27-Aug-2008
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
140
120
100
80
140
160
180
200
220


Nitrate Nitrogen : 28-Sep-2008 to 27-Oct-2008
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
140
120
100
80
140
160
180
200
220
271.5
271
270.5
270
269.5
269
268.5
268
267.5
267
ND<10
900
ND<10
2850
660
430
ND<10
360
20
40
ND<10
680
2140
50
30
330
50
60



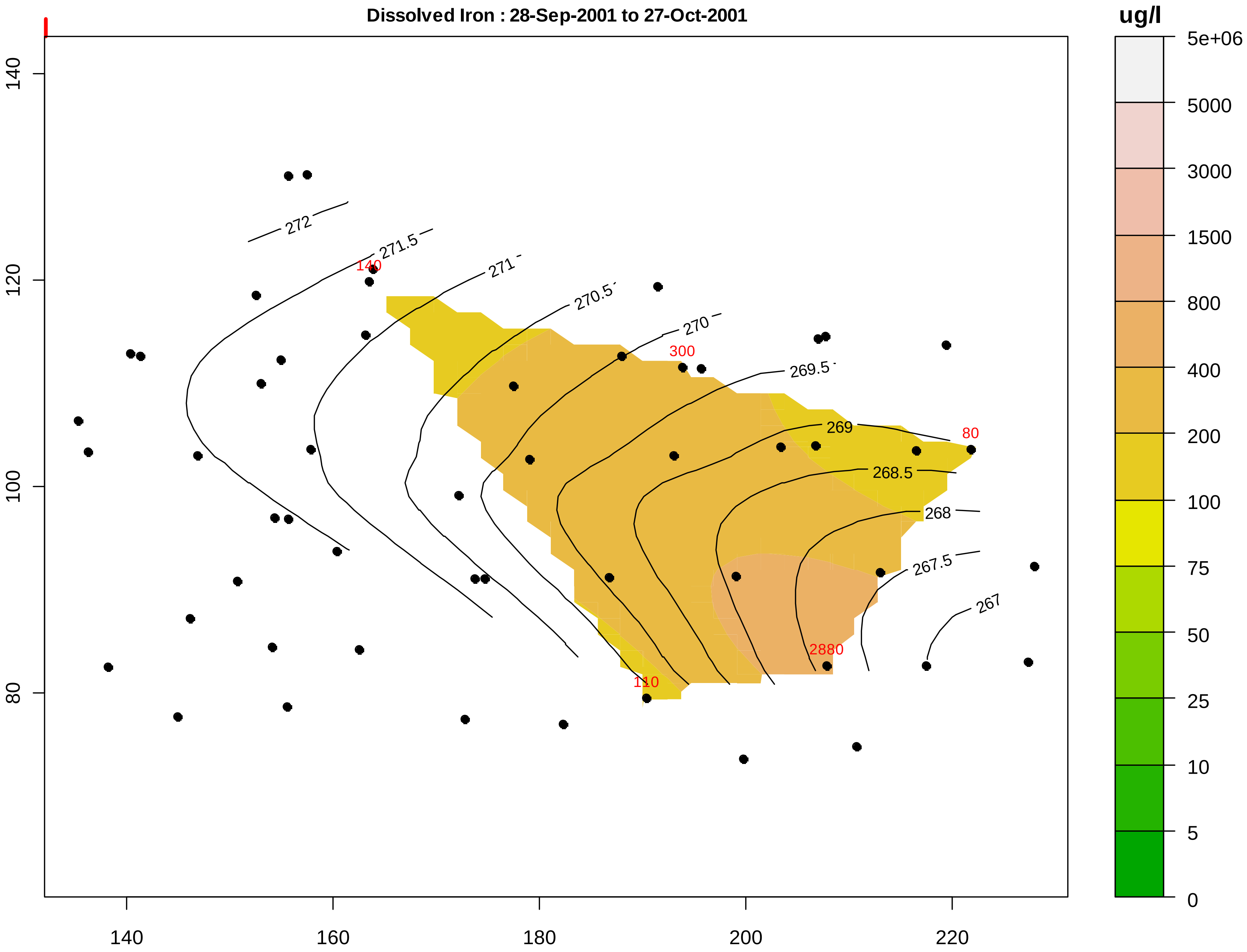
Nitrate Nitrogen : 28-Jun-2009 to 27-Jul-2009
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
140
120
100
80
140
160
180
200
220
271.5
271
270.5
270
269.5
269
268.5
268
267.5
267
266.5
ND<50
240
450
80
70
60

Nitrate Nitrogen : 28-Aug-2009 to 27-Sep-2009

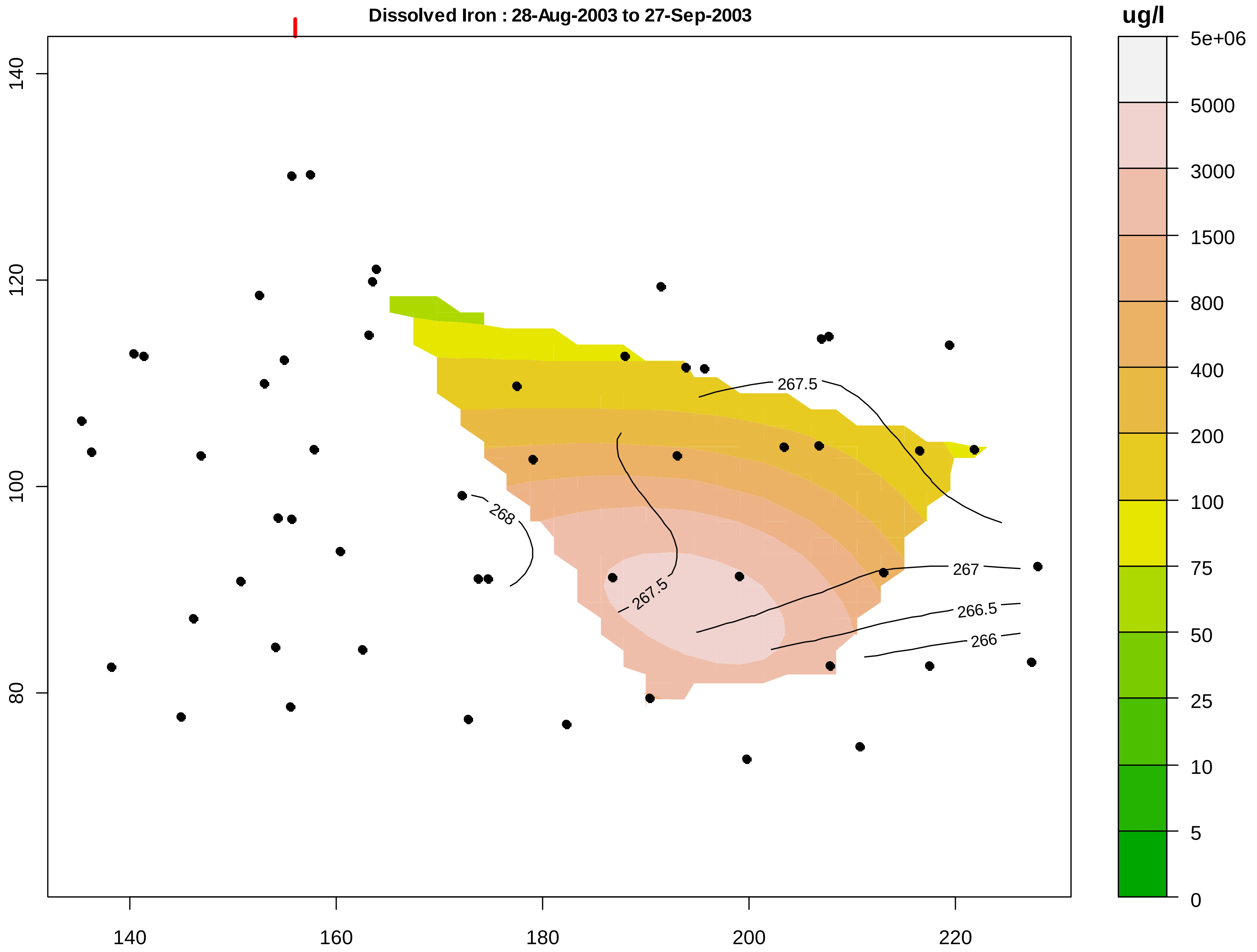


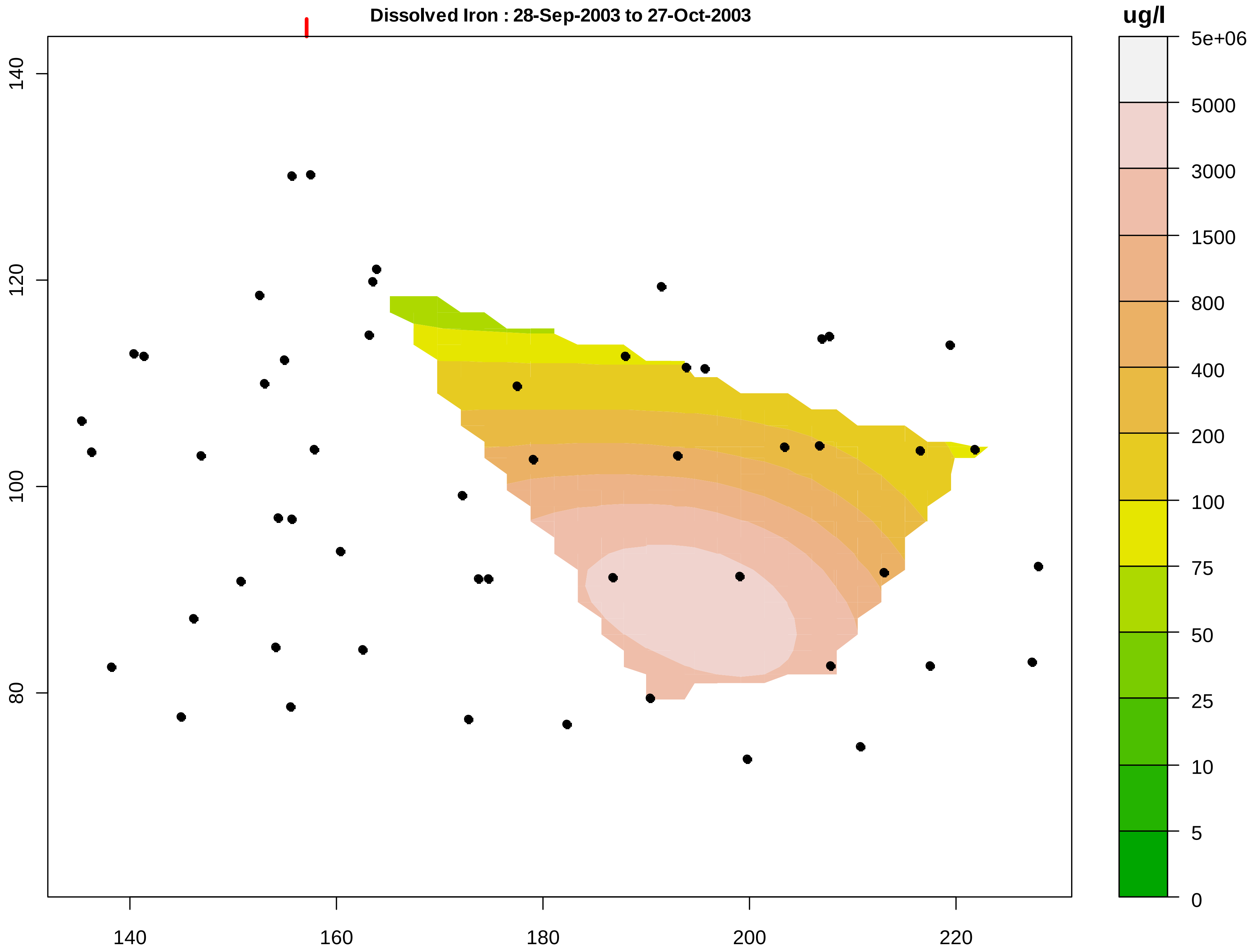
Dissolved Iron Distribution

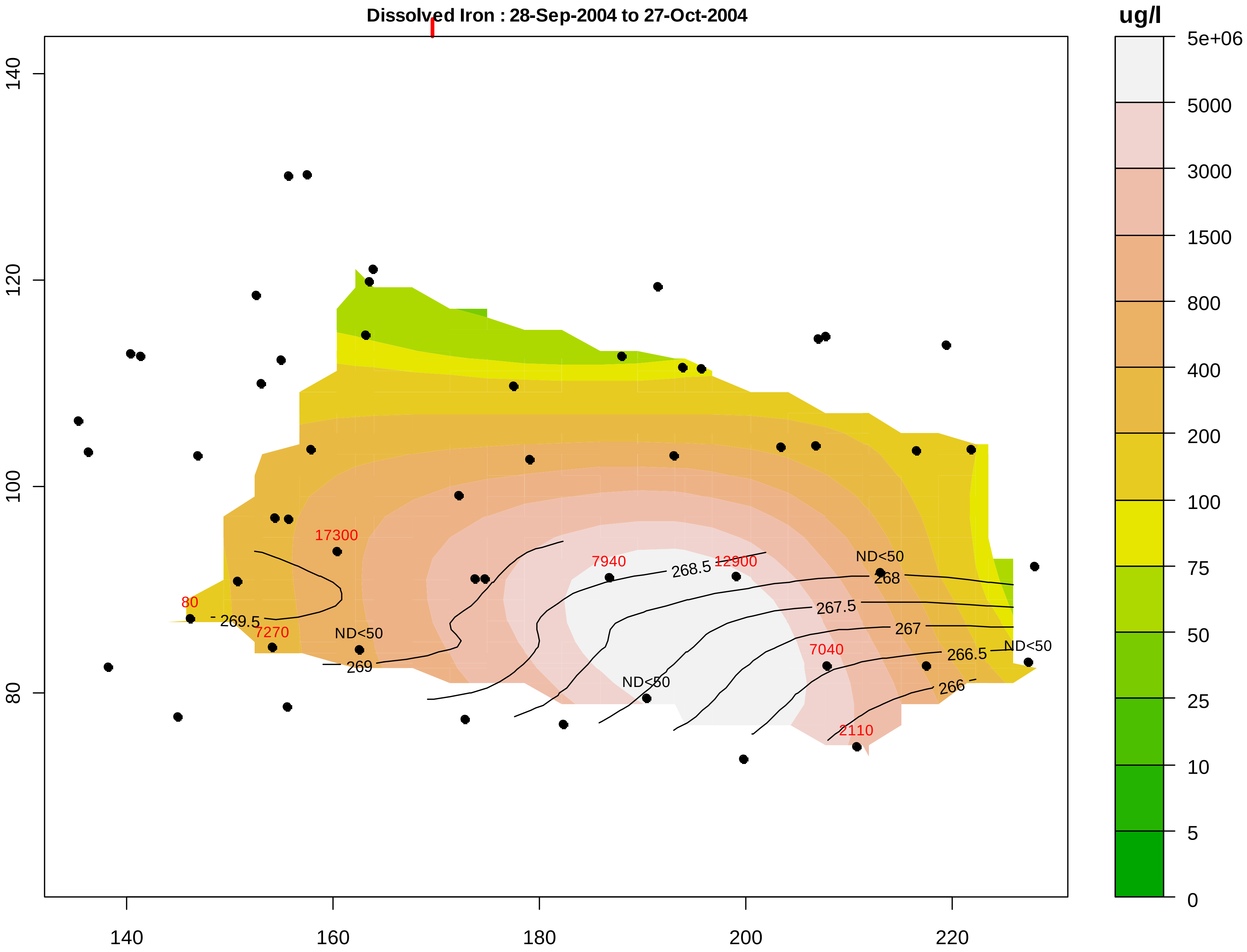
2001 to 2009



Dissolved Iron : 28-Sep-2001 to 27-Oct-2001

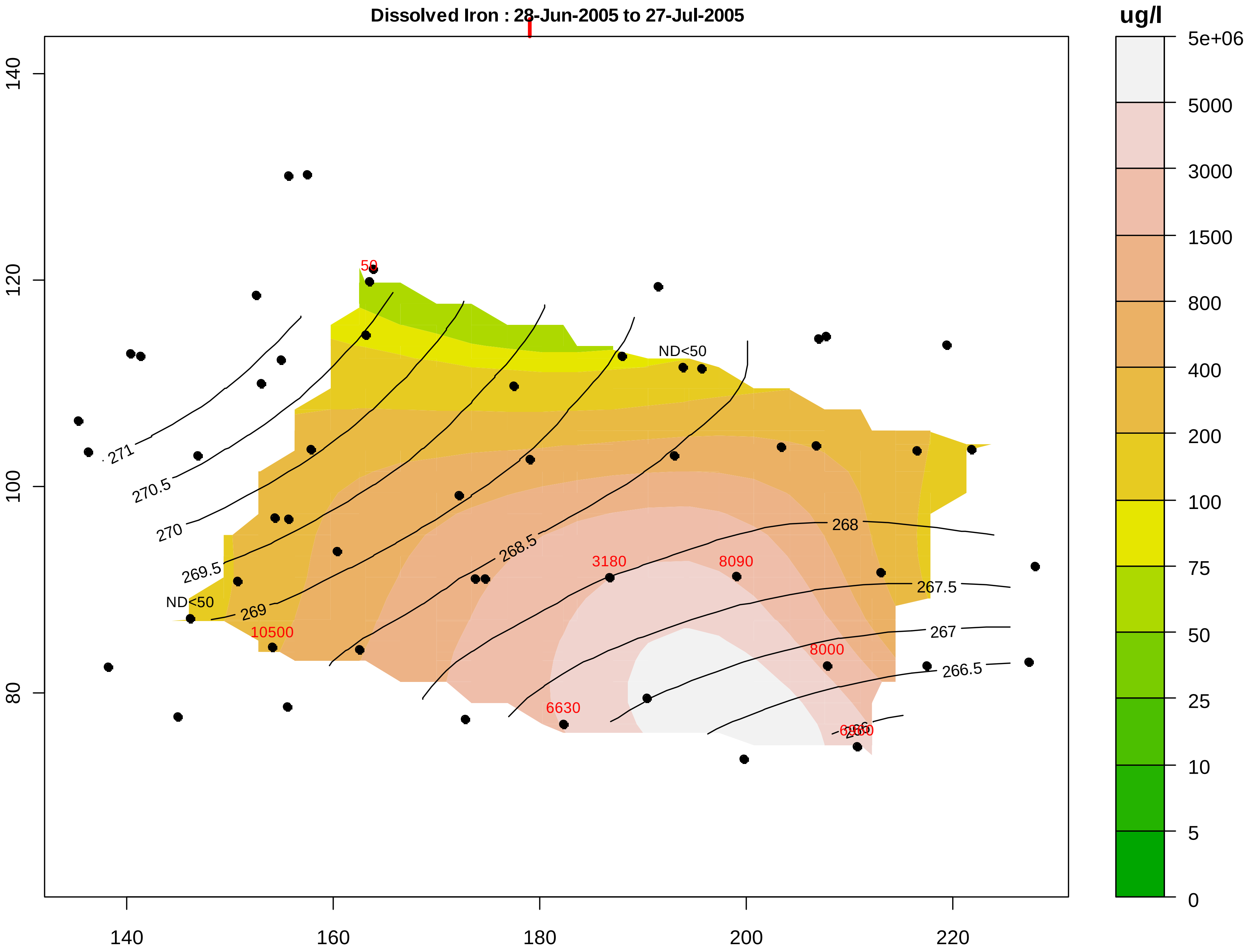

Dissolved Iron : 28-Aug-2003 to 27-Sep-2003
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
140
120
100
80
140
160
180
200
220
267.5
268
267.5
267
266.5
266

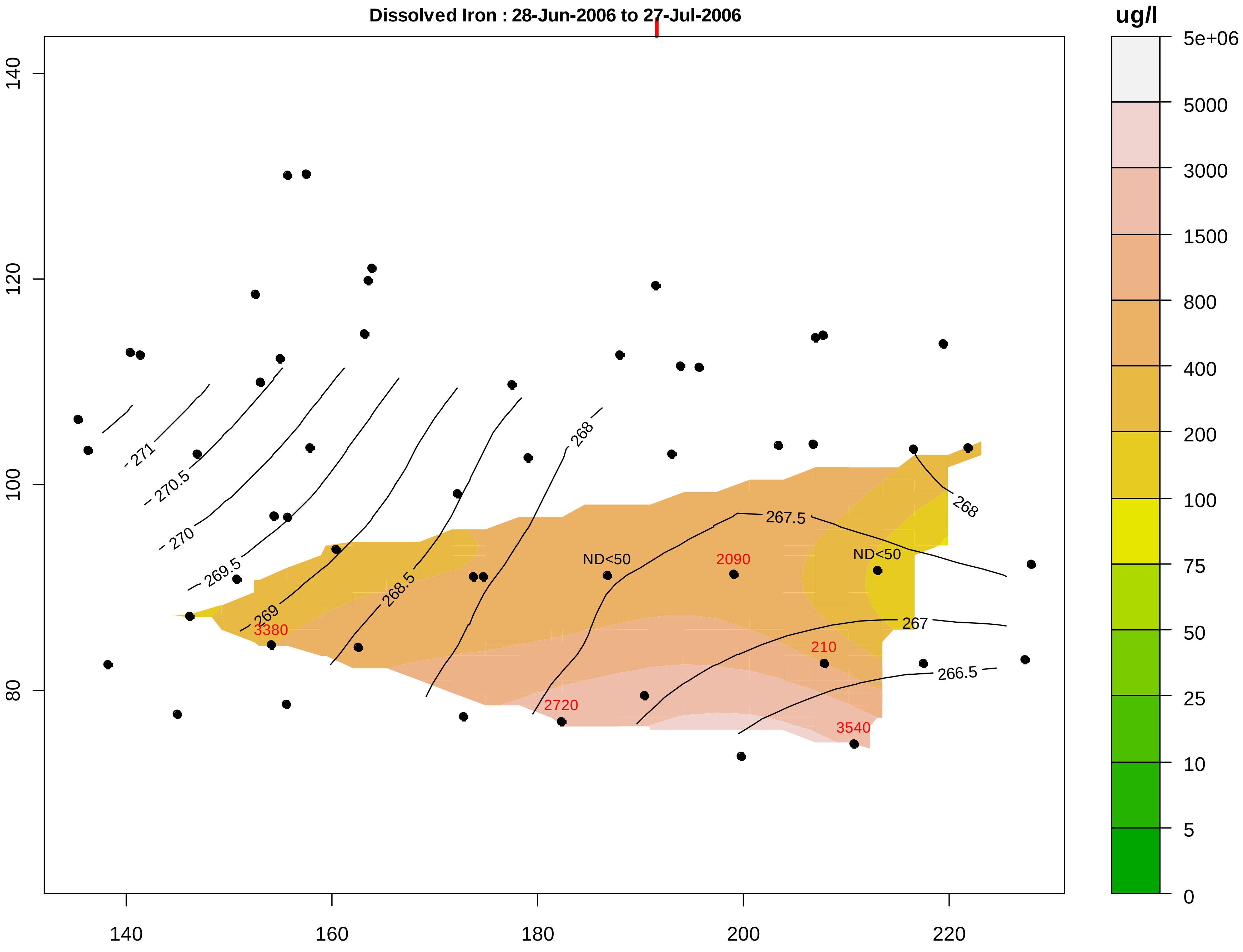

Dissolved Iron : 28-Sep-2003 to 27-Oct-2003
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
140
120
100
80
140
160
180
200
220

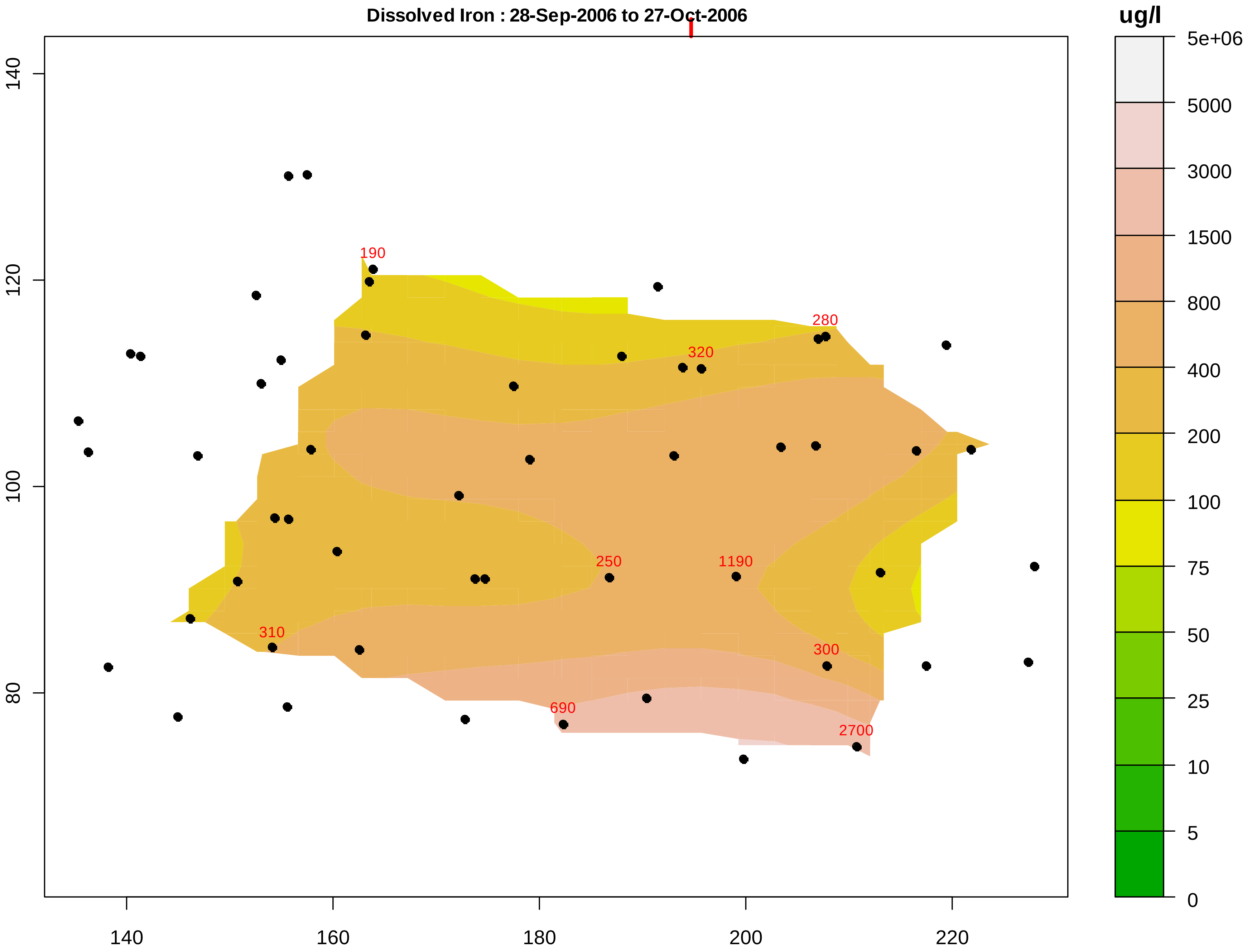


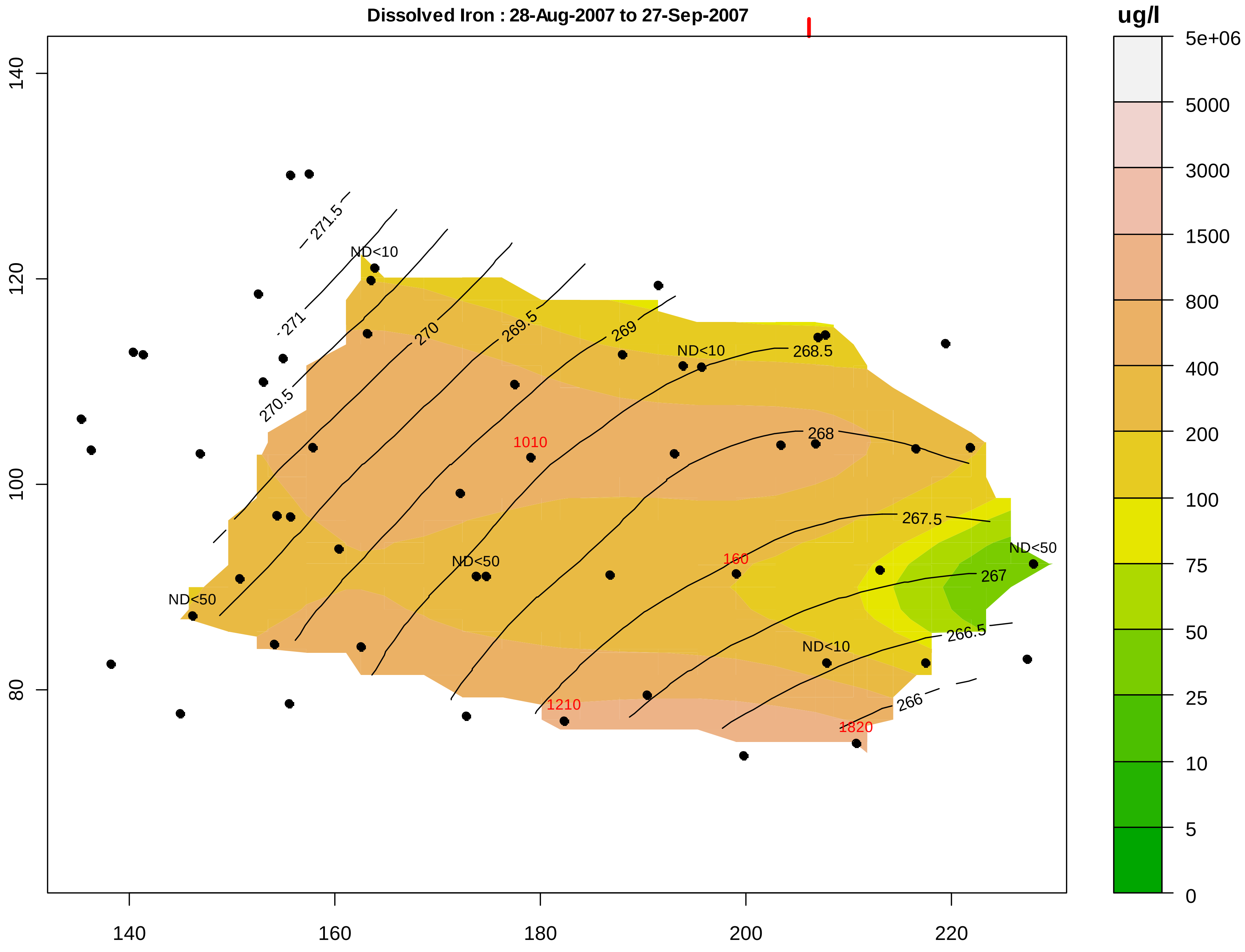
Dissolved Iron : 28-Sep-2004 to 27-Oct-2004

Dissolved Iron : 28-Jun-2005 to 27-Jul-2005

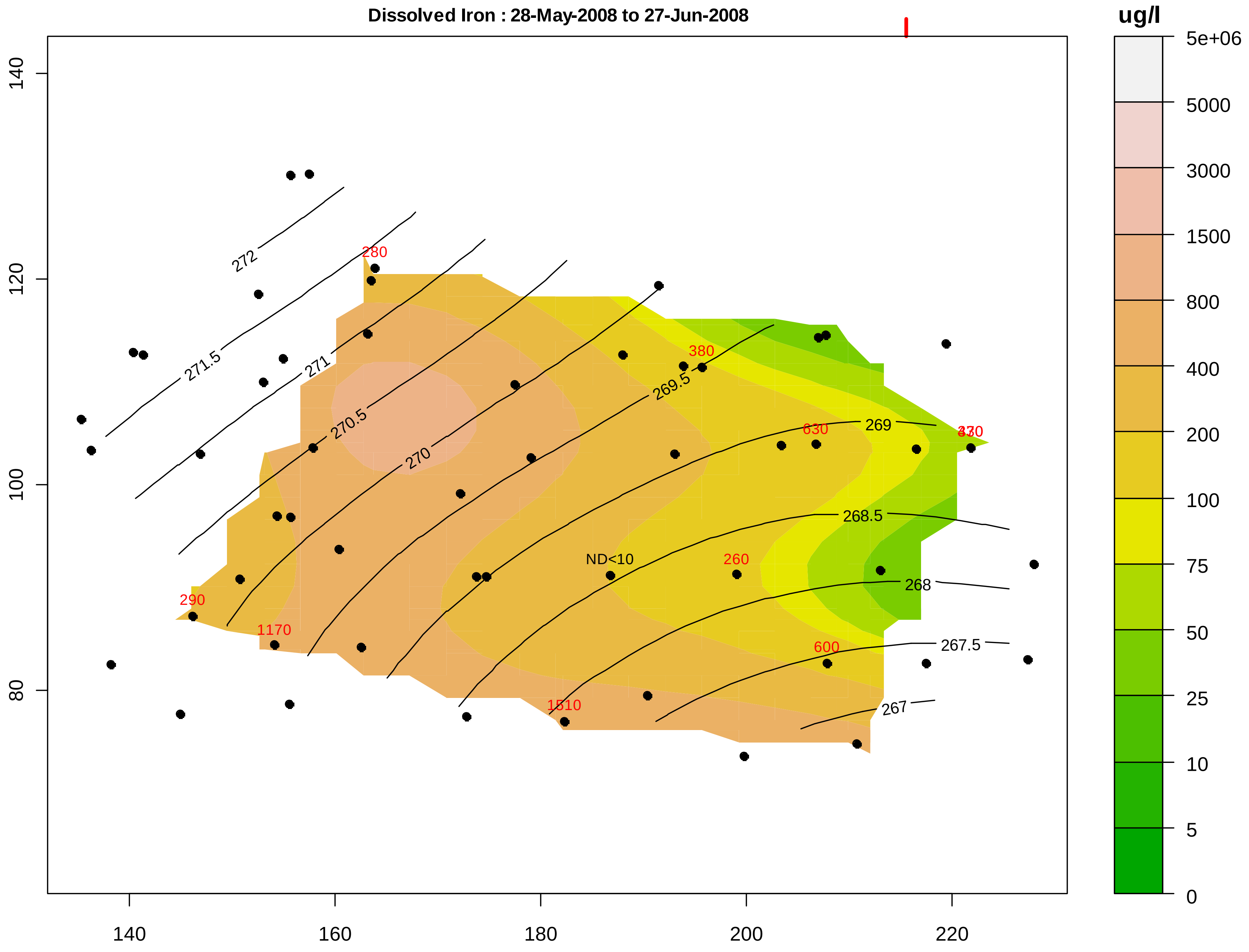


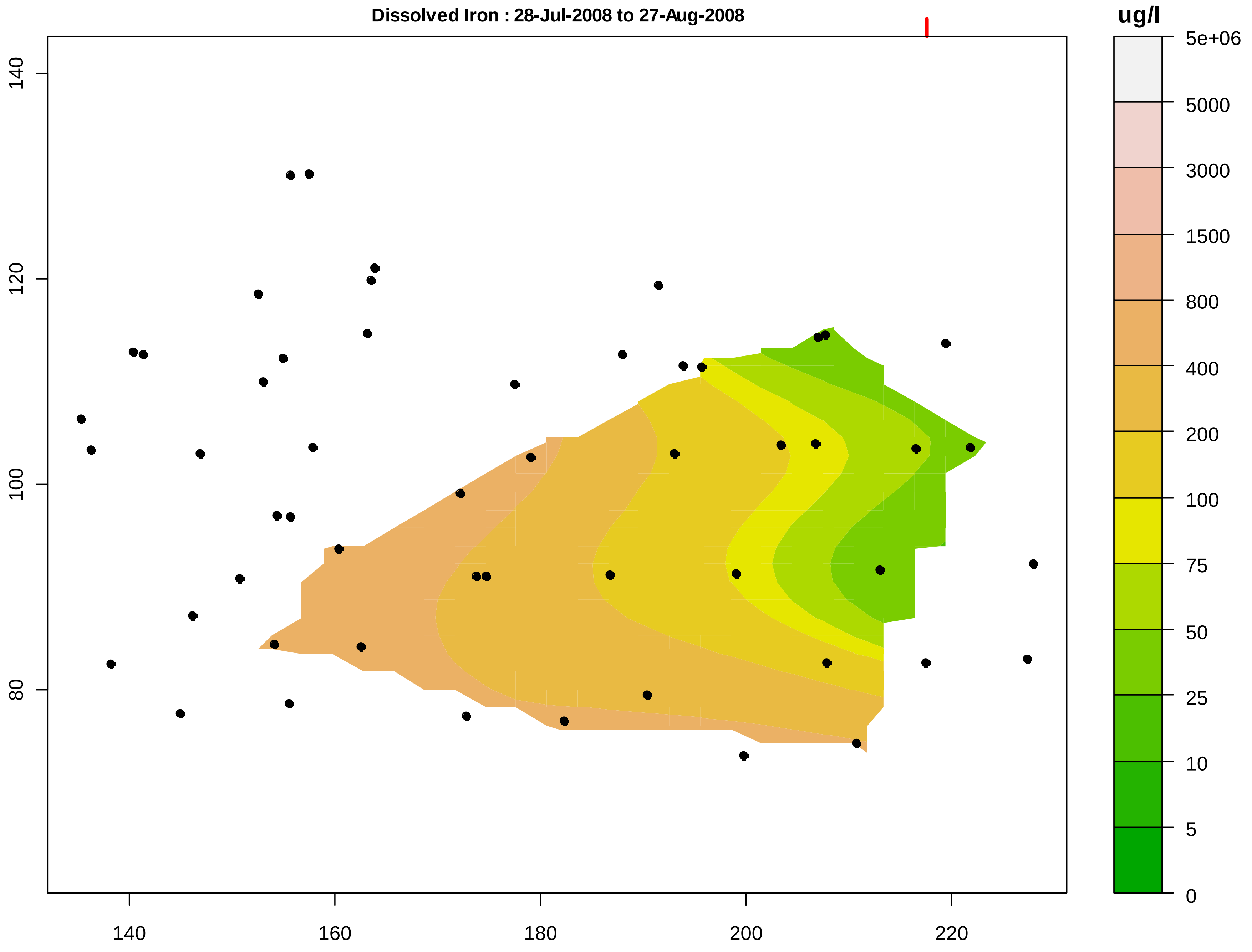

Dissolved Iron : 28-Jun-2006 to 27-Jul-2006
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
140
120
100
80
140
160
180
200
220
271
270.5
270
269.5
269
268.5
268
268
267.5
267
266.5
ND<50
ND<50
3380
2090
210
2720
3540

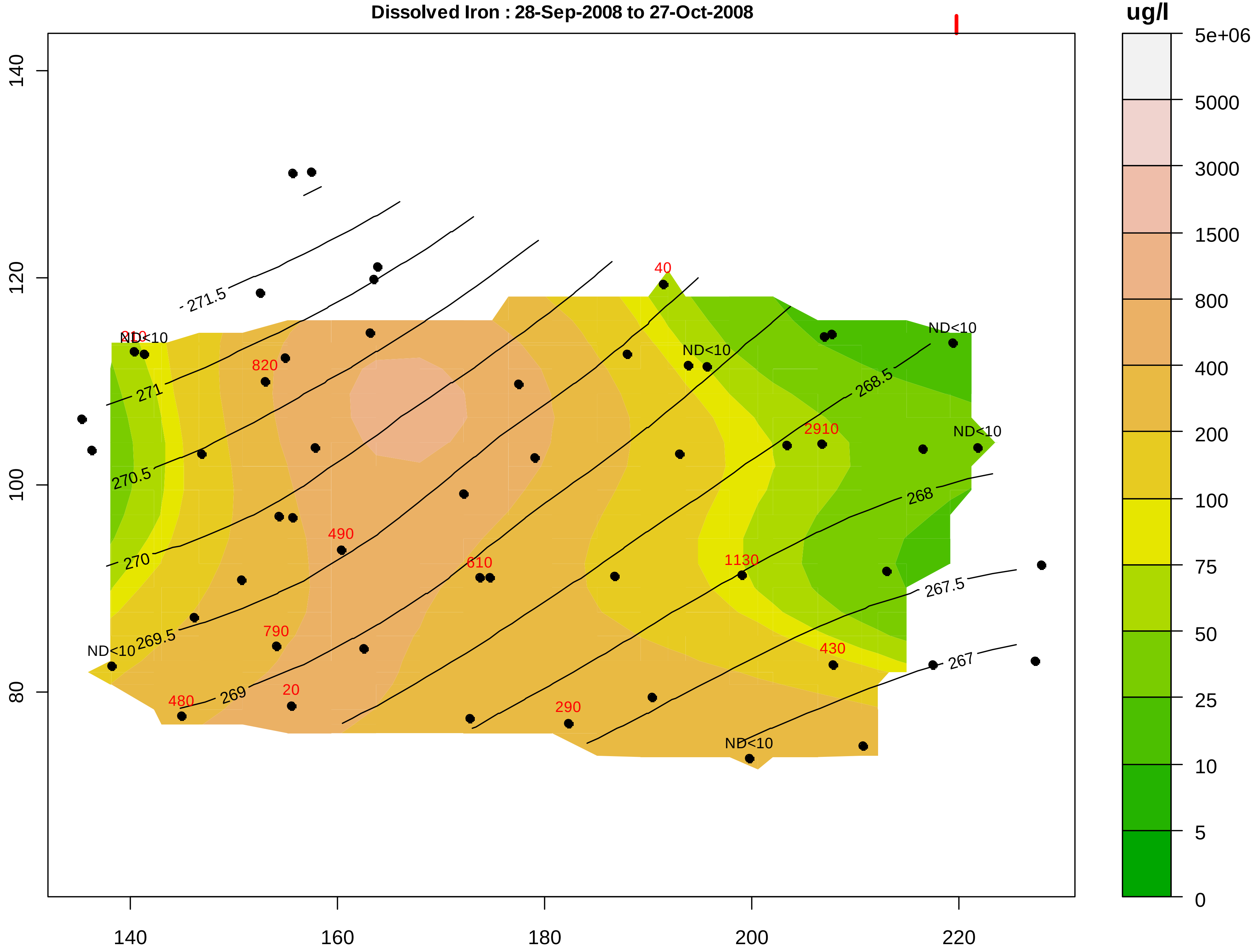

Dissolved Iron : 28-Sep-2006 to 27-Oct-2006
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
140
120
100
80
140
160
180
200
220
190
280
320
250
1190
310
300
690
2700



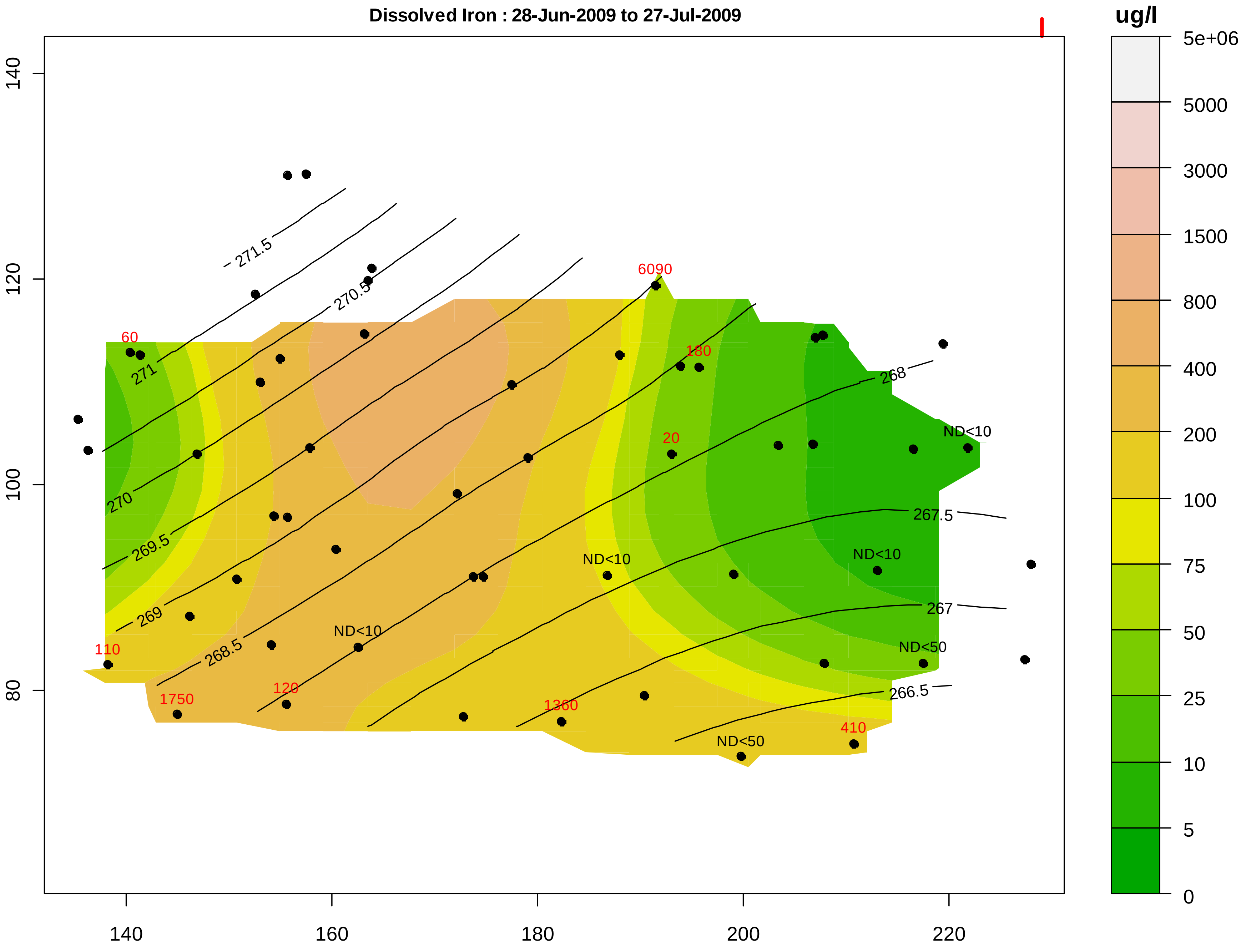
Dissolved Iron : 28-Aug-2007 to 27-Sep-2007


Dissolved Iron : 28-May-2008 to 27-Jun-2008
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
140
120
100
80
140
160
180
200
220
272
271.5
271
270.5
270
269.5
269
268.5
268
267.5
267
280
380
630
430
370
290
1170
1510
260
600
ND<10

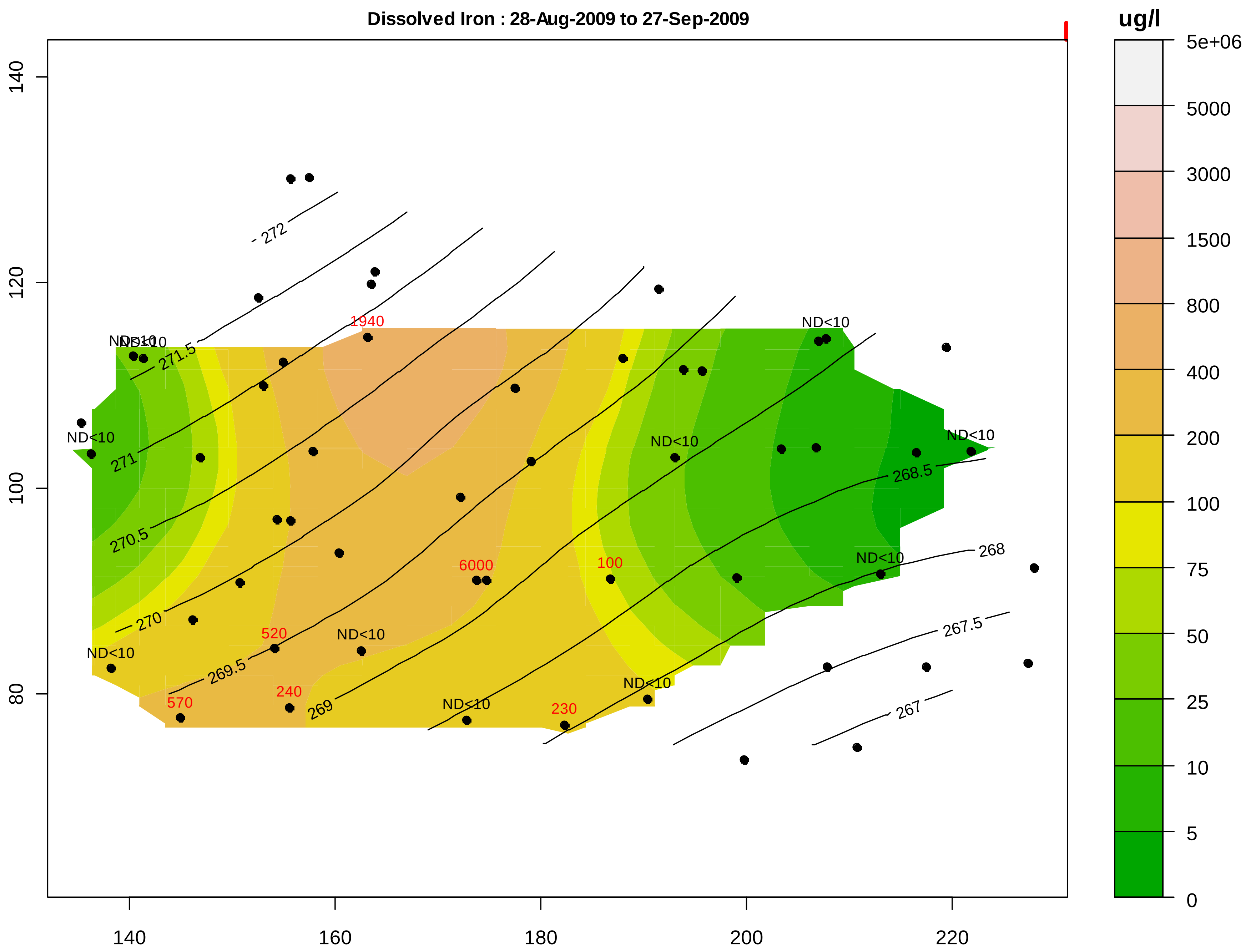

Dissolved Iron : 28-Jul-2008 to 27-Aug-2008
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
140
120
100
80
140
160
180
200
220



Dissolved Iron : 28-Sep-2008 to 27-Oct-2008



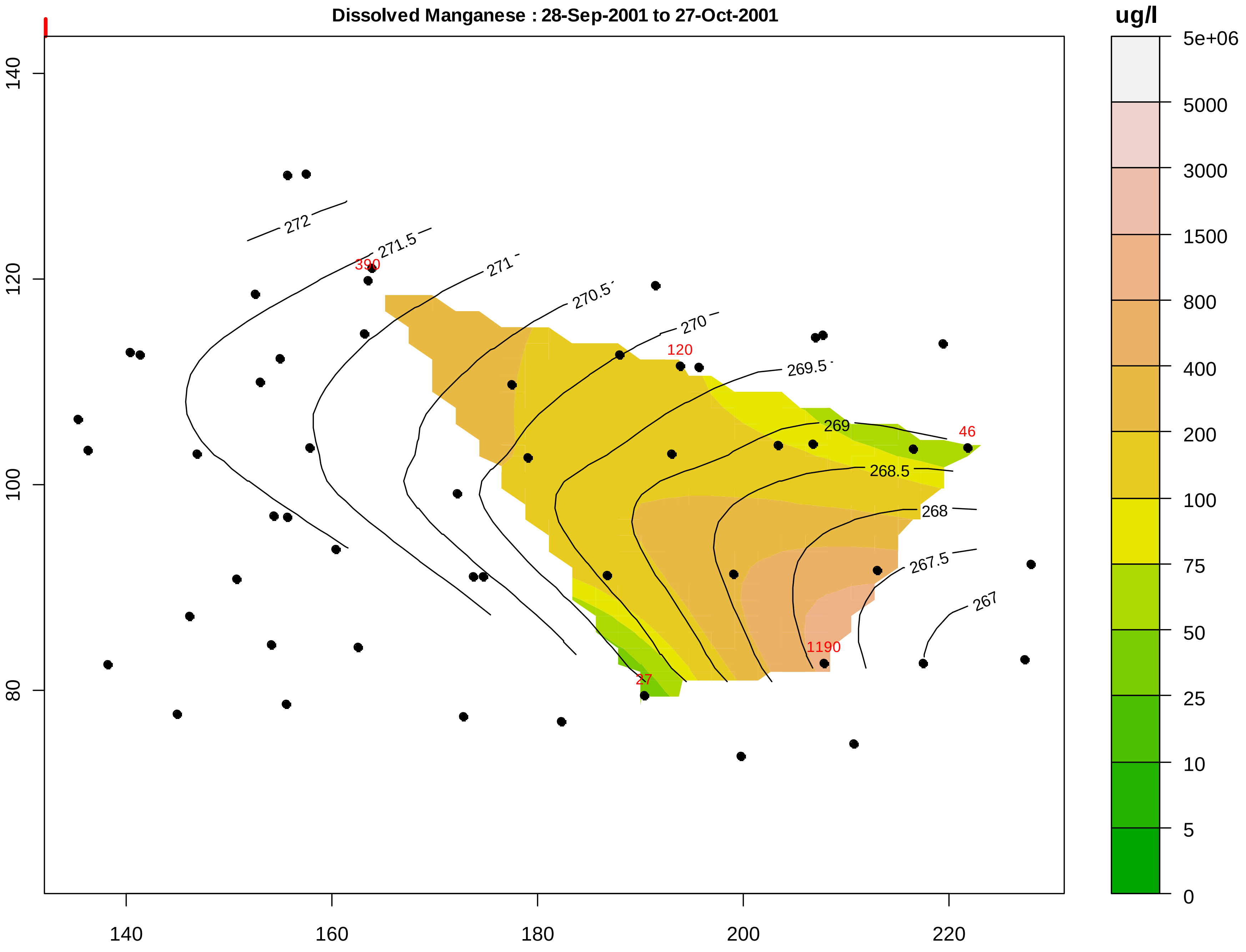
Dissolved Iron : 28-Jun-2009 to 27-Jul-2009



Dissolved Iron : 28-Aug-2009 to 27-Sep-2009

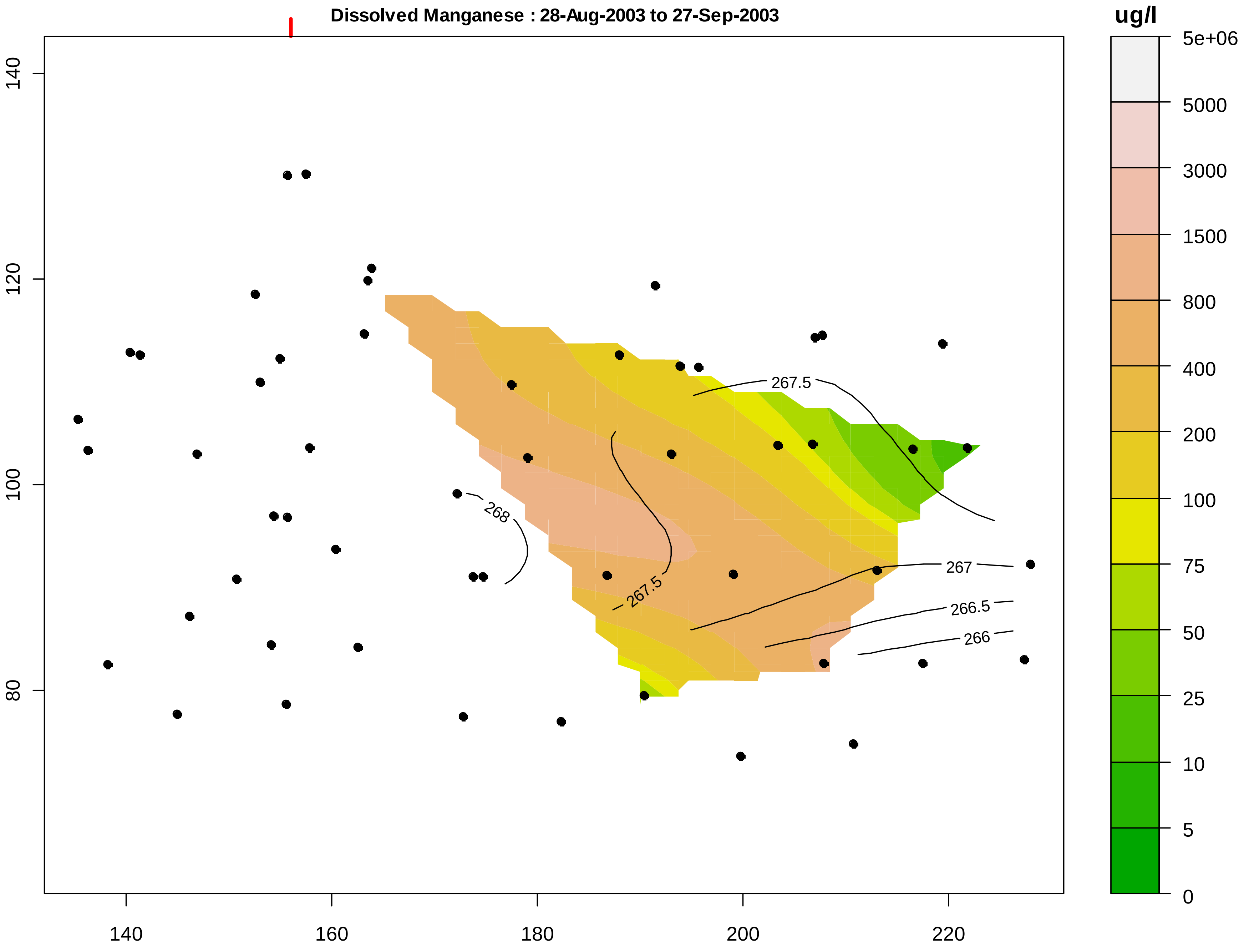
Manganese Distribution

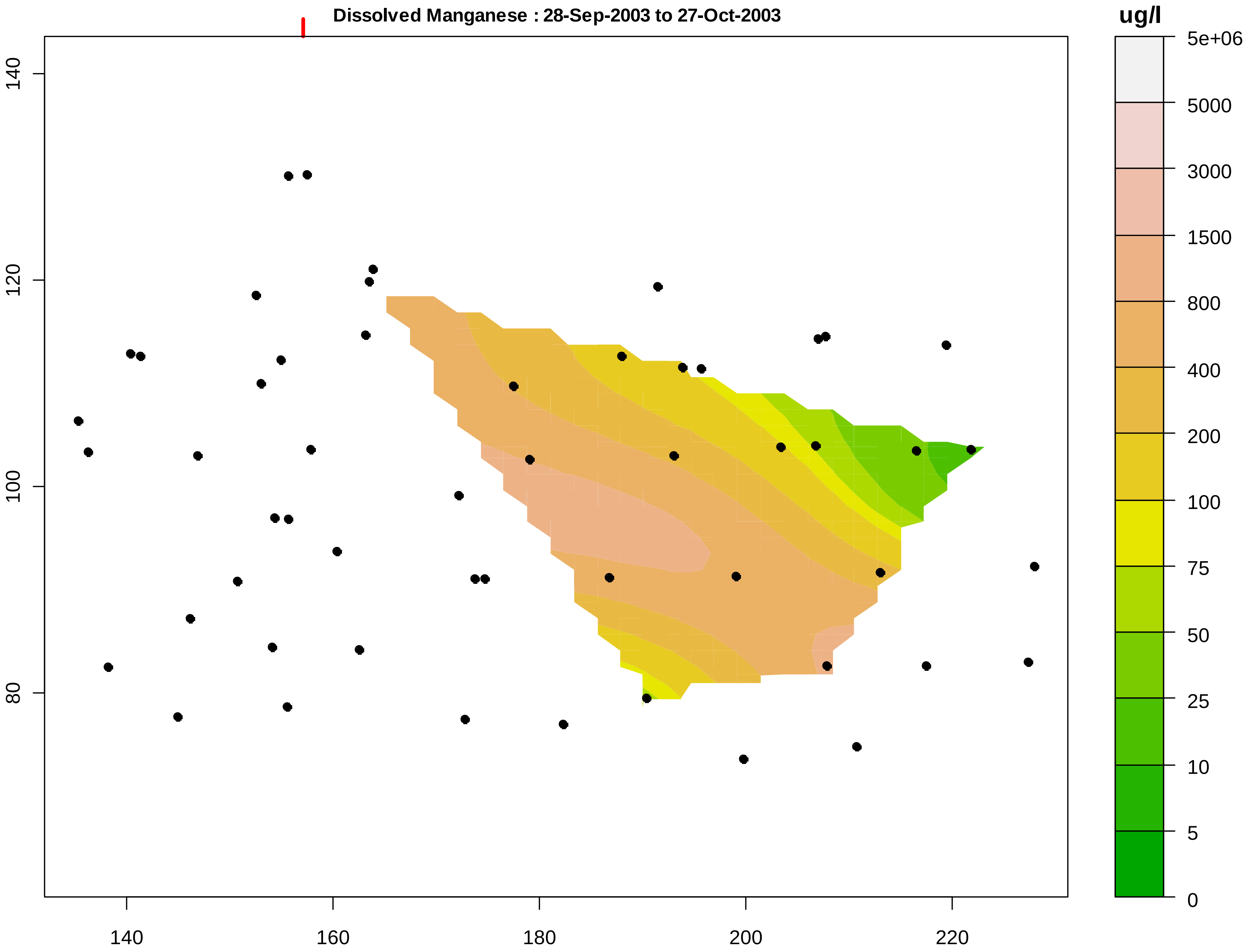
2001 to 2009



Dissolved Manganese : 28-Sep-2001 to 27-Oct-2001

Dissolved Manganese : 28-Aug-2003 to 27-Sep-2003




Dissolved Manganese : 28-Sep-2003 to 27-Oct-2003
ug/l
5e+06
5000
3000
1500
800
400
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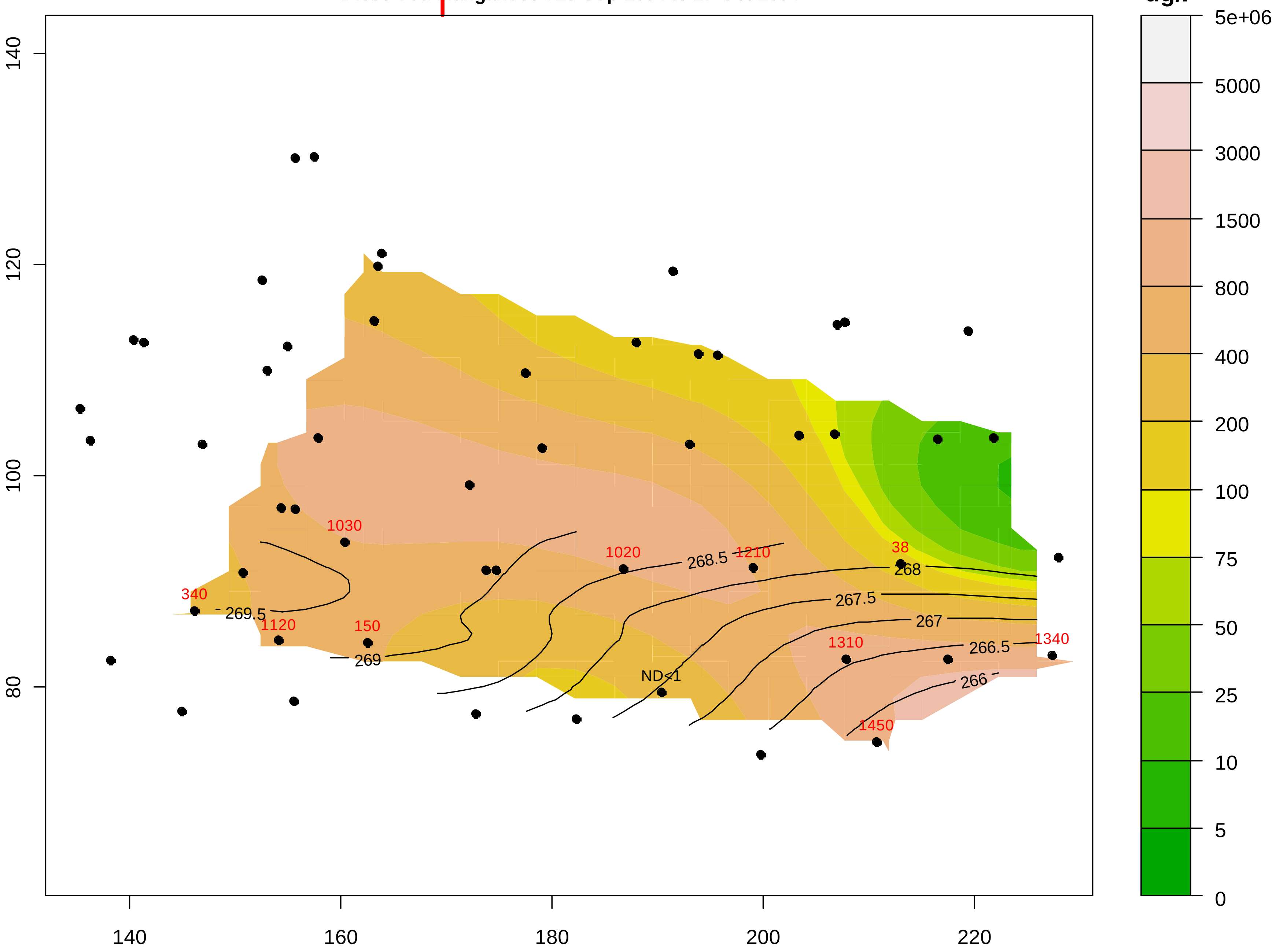
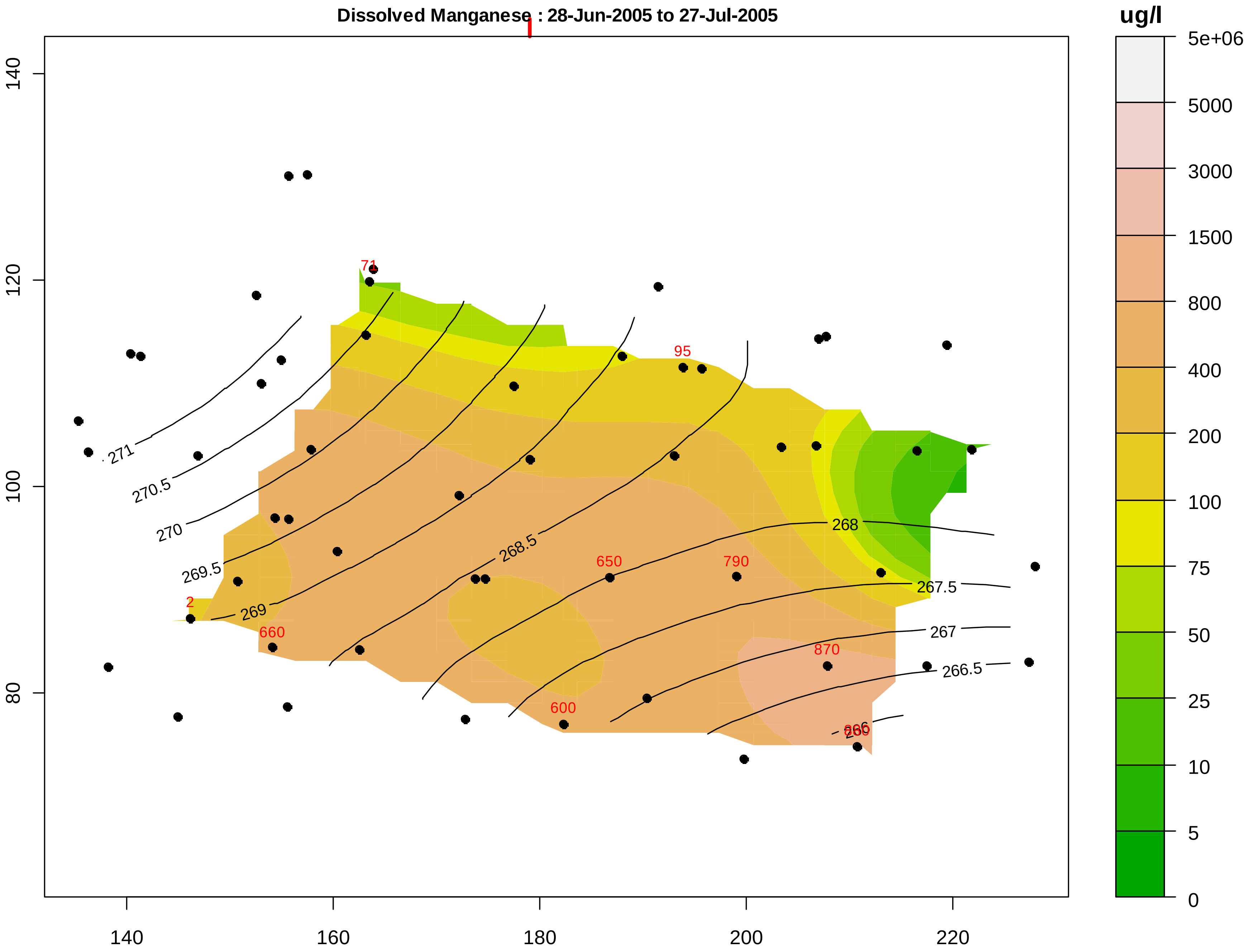
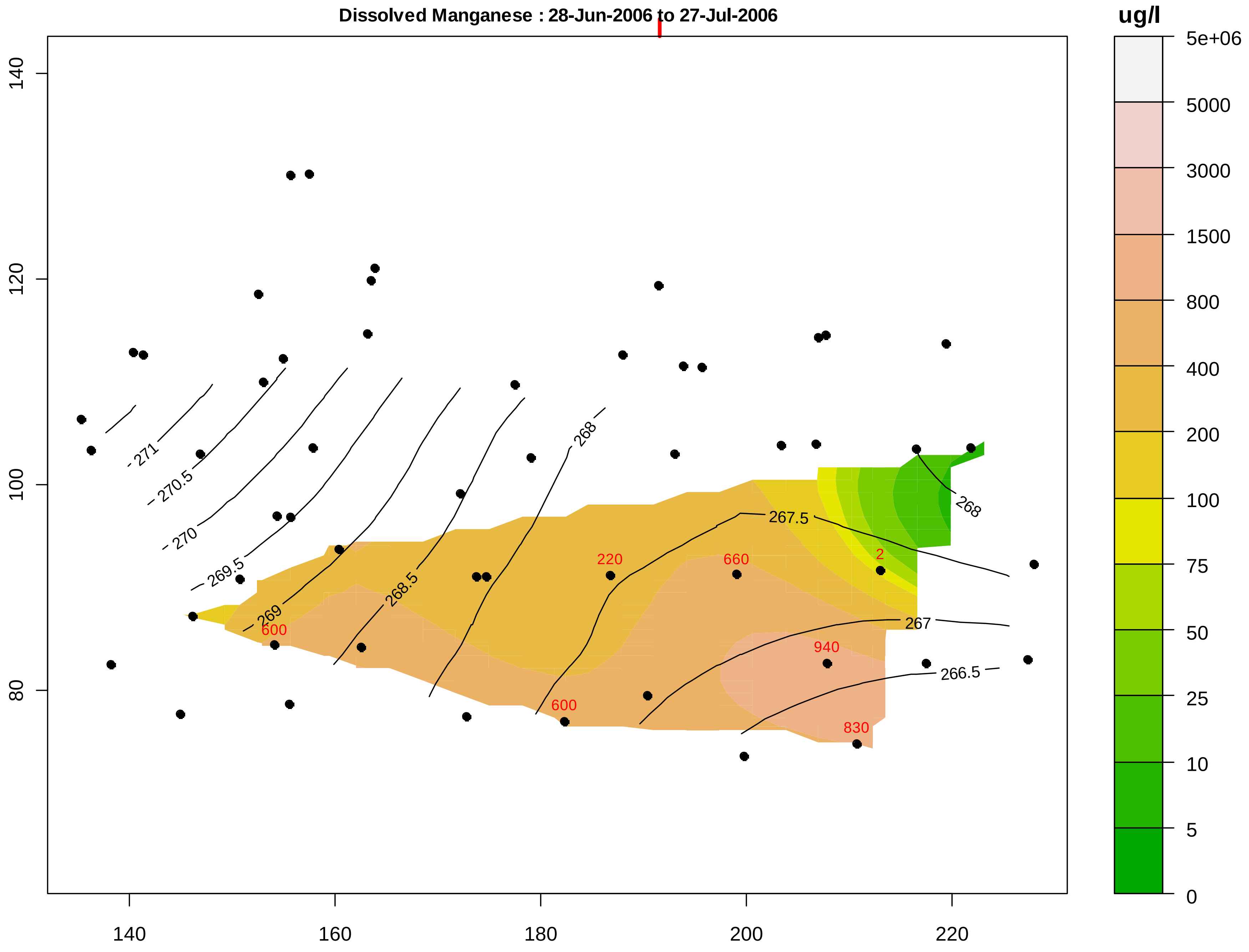
100
75
50
25
10
5
0
140
120
100
80
140
160
180
200
220

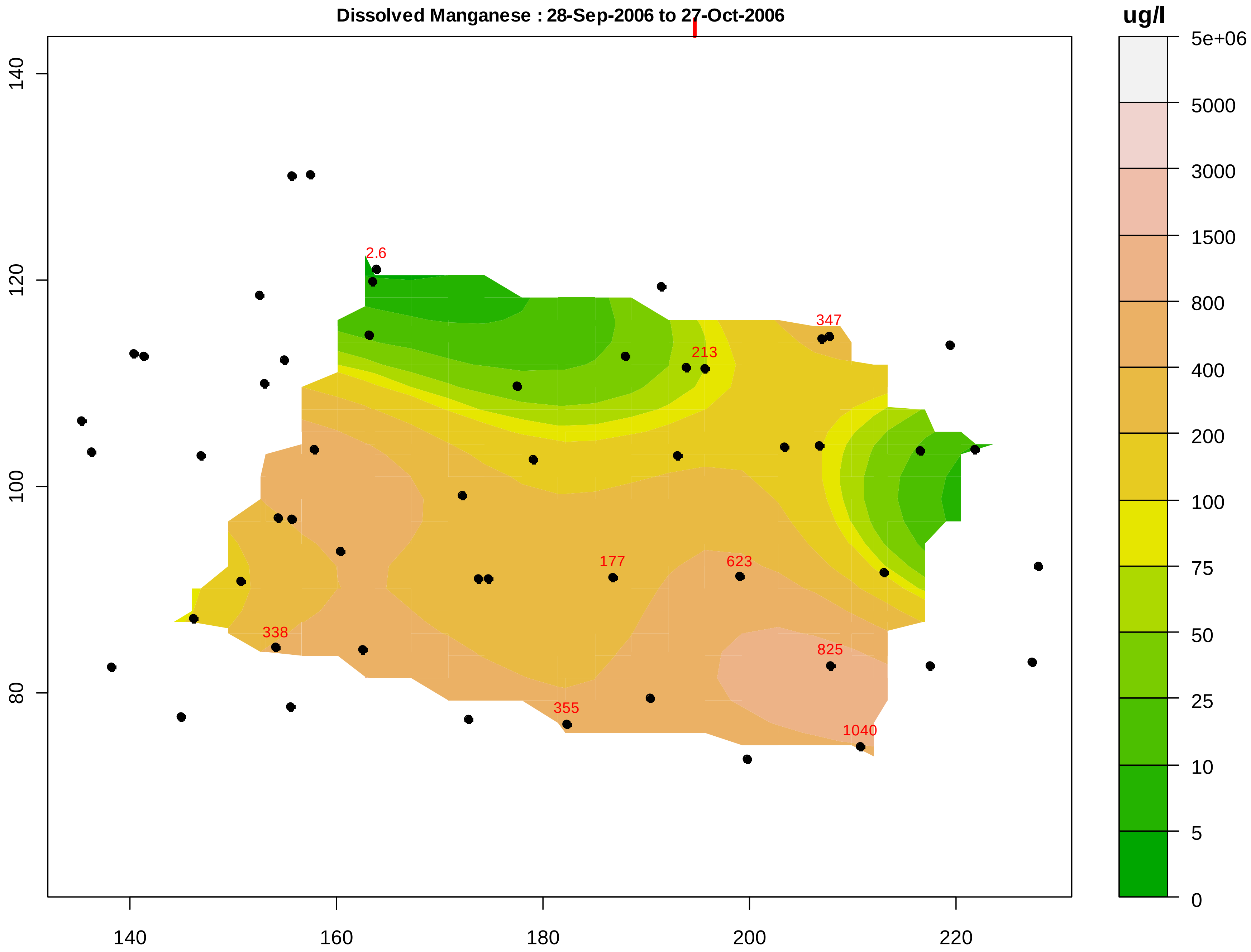


Dissolved Manganese : 28-Sep-2004 to 27-Oct-2004

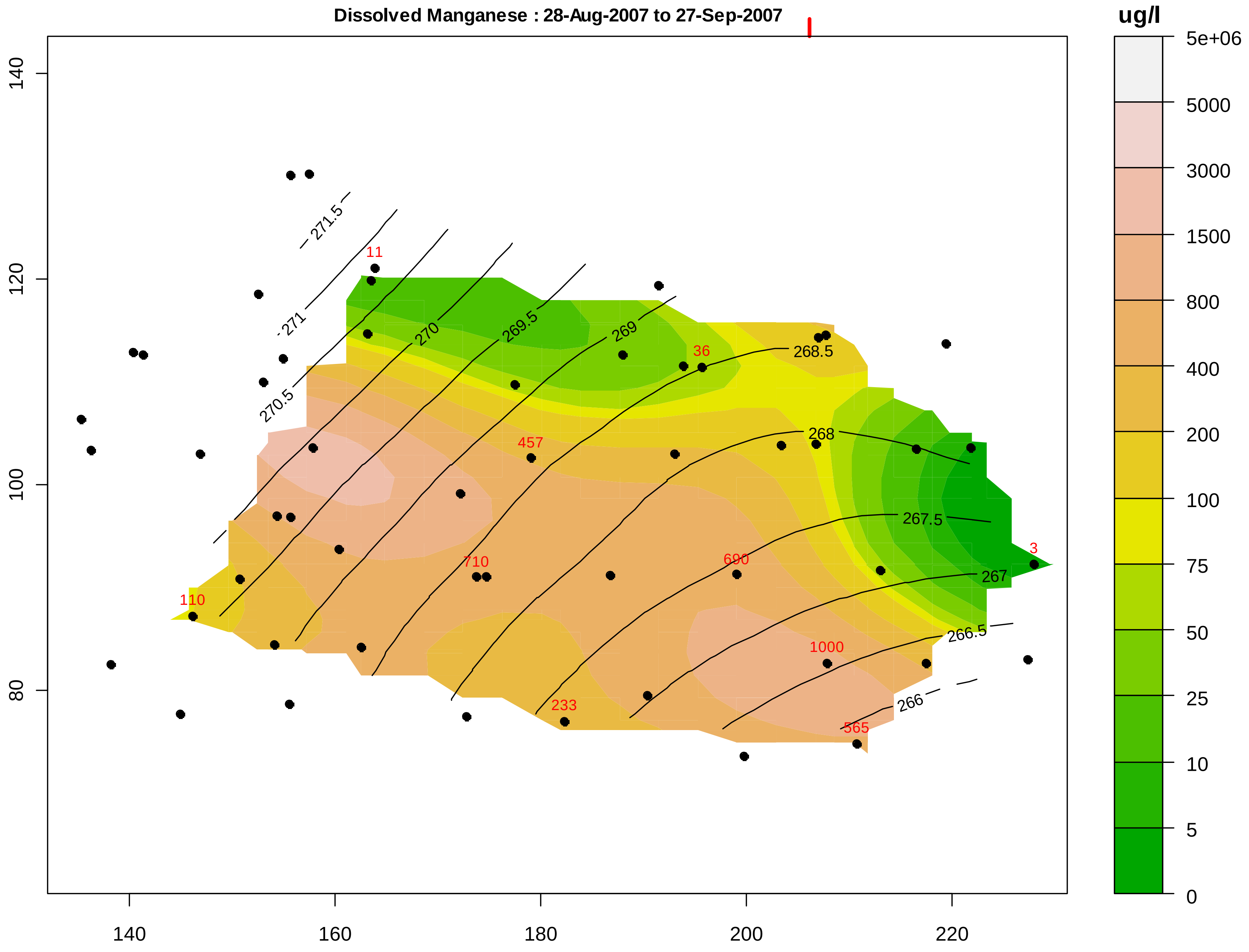

Dissolved Manganese : 28-Jun-2005 to 27-Jul-2005
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
140
120
100
80
140
160
180
200
220
71
95
650
790
2
660
870
600
880
271
270.5
270
269.5
269
268.5
268
267.5
267
266.5
266



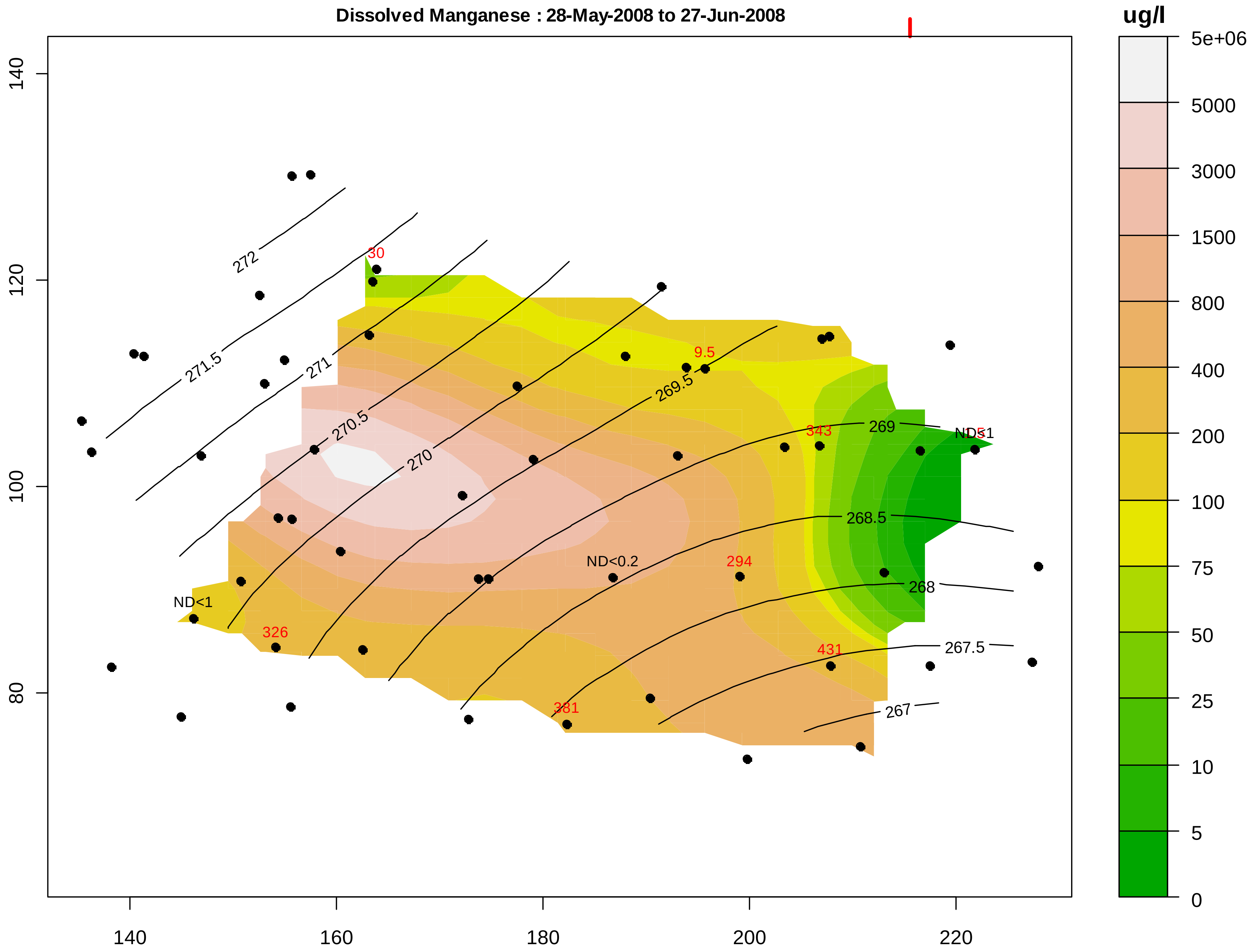
Dissolved Manganese : 28-Jun-2006 to 27-Jul-2006



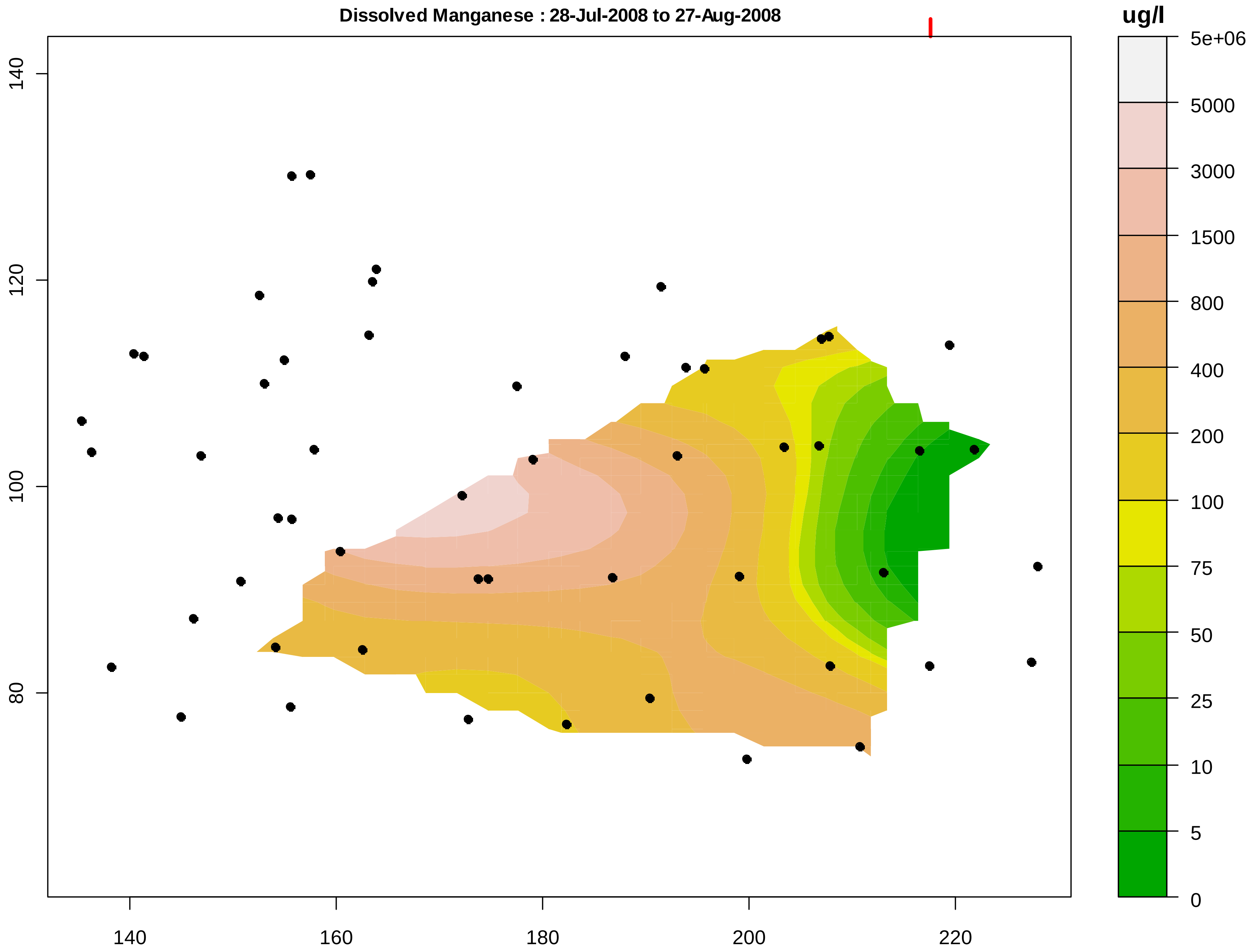
Dissolved Manganese : 28-Sep-2006 to 27-Oct-2006

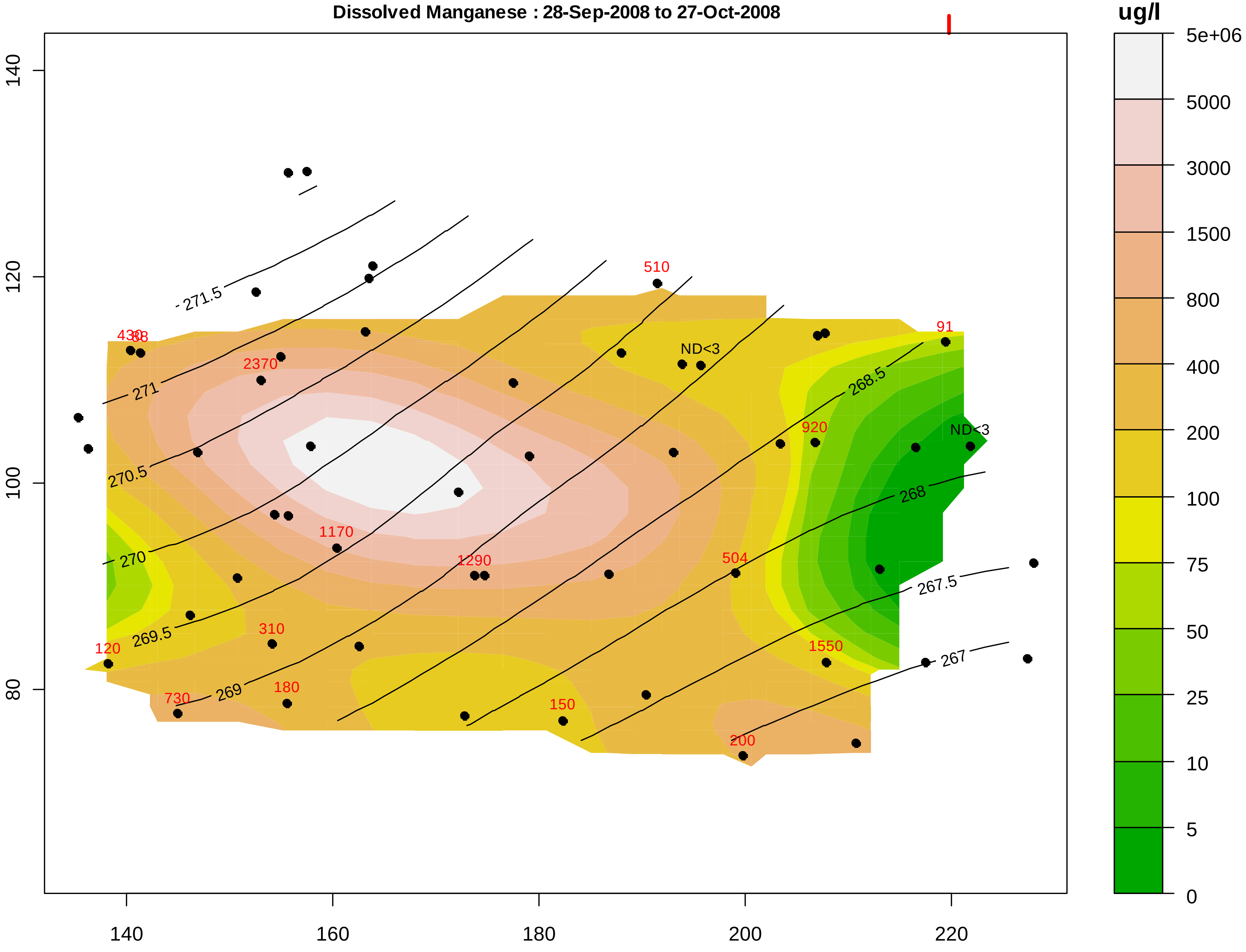


Dissolved Manganese : 28-Aug-2007 to 27-Sep-2007

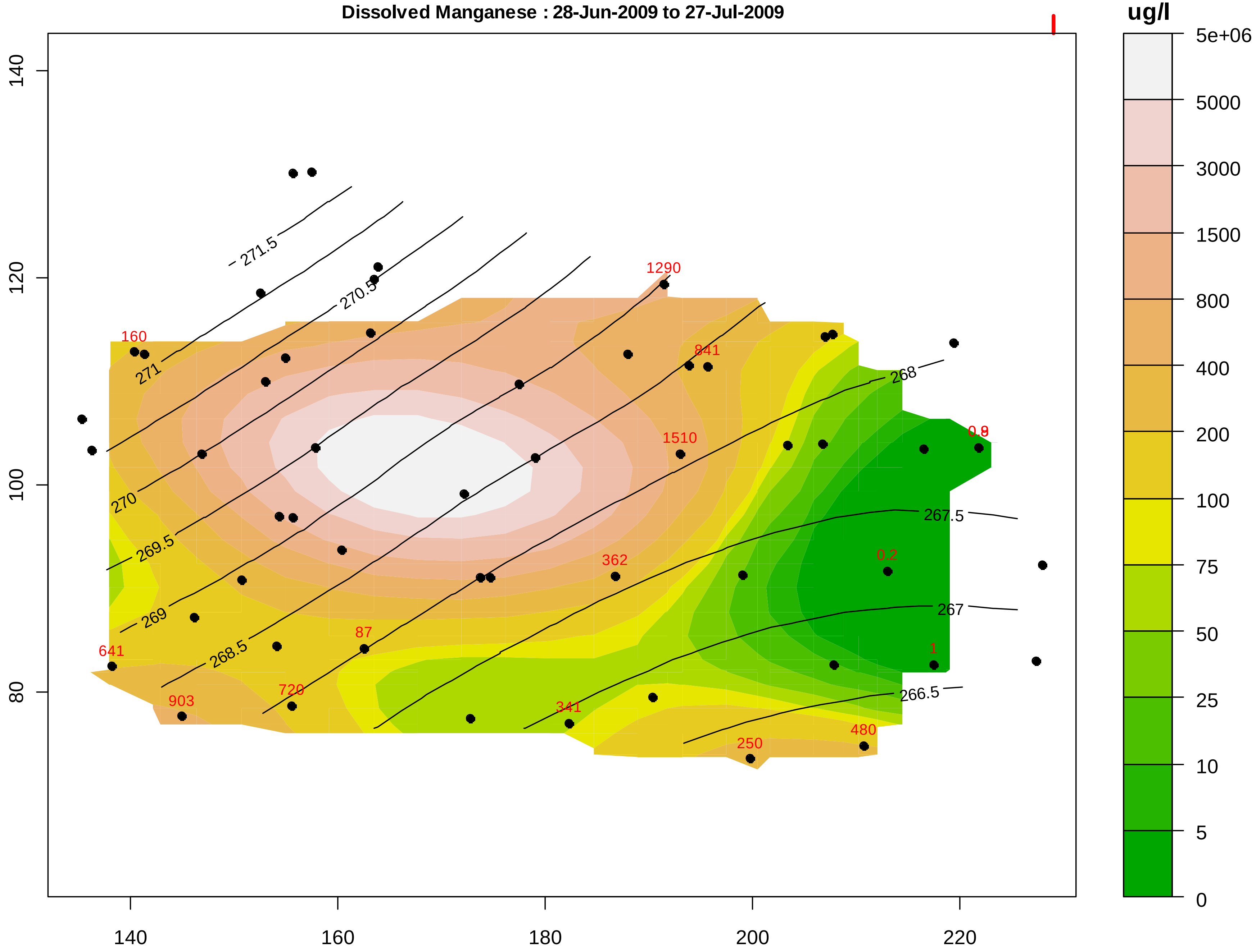


Dissolved Manganese : 28-May-2008 to 27-Jun-2008

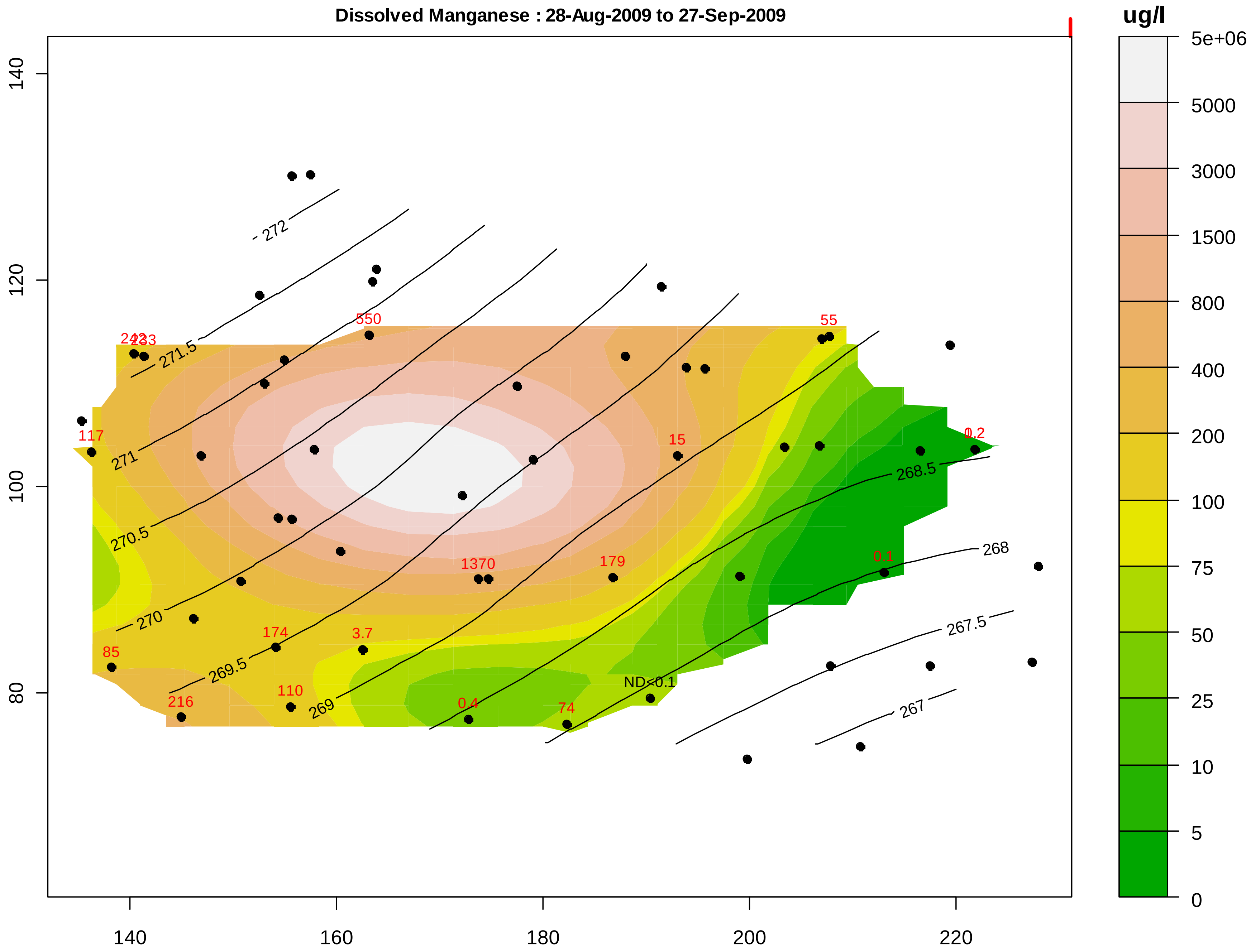

Dissolved Manganese : 28-Jul-2008 to 27-Aug-2008
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
140
120
100
80
140
160
180
200
220



Dissolved Manganese : 28-Sep-2008 to 27-Oct-2008

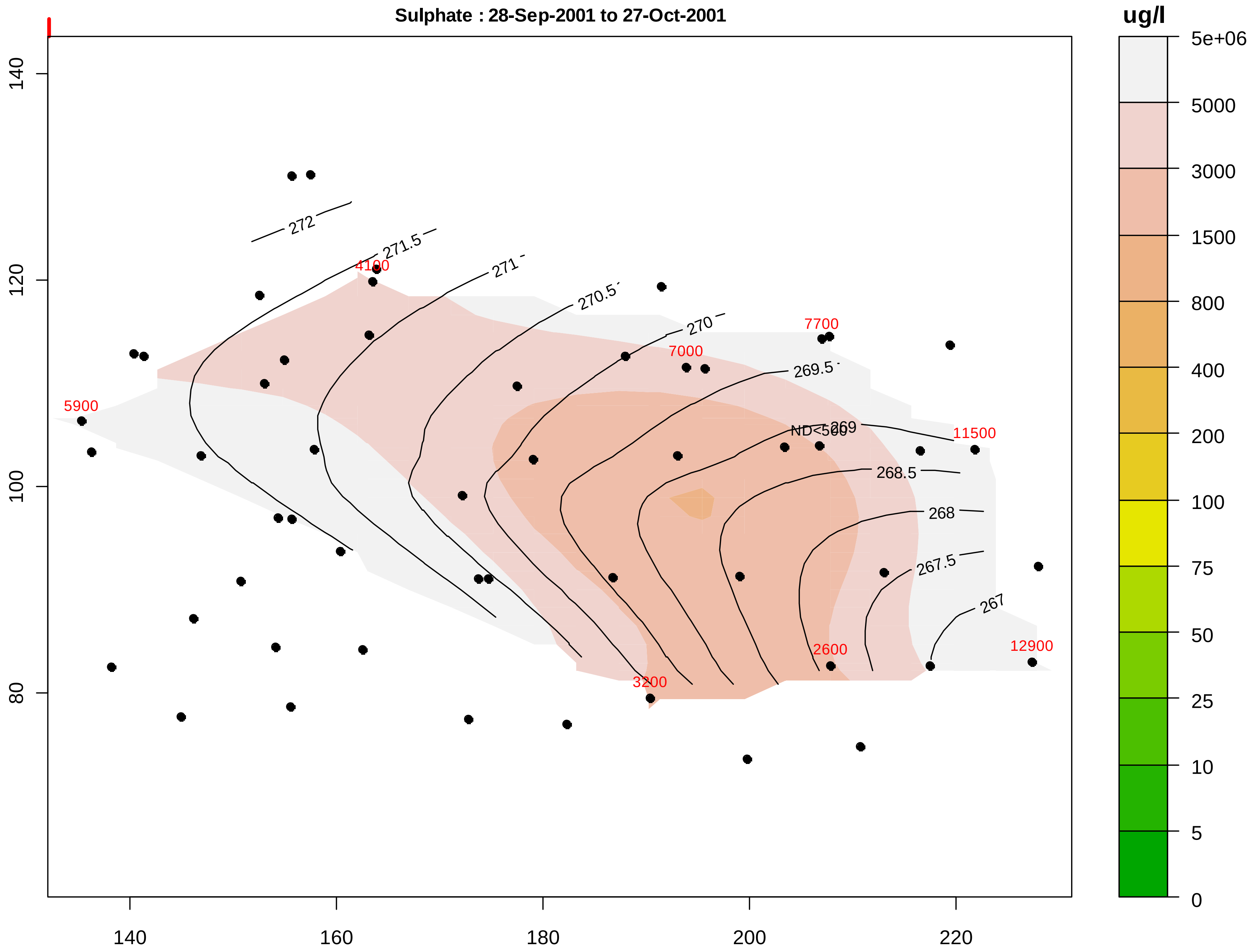

Dissolved Manganese : 28-Jun-2009 to 27-Jul-2009
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
140
120
100
80
140
160
180
200
220
271.5
271
270.5
270
269.5
269
268.5
268
267.5
267
266.5
160
1290
841
1510
0.8
362
0.2
87
641
1
903
720
341
480
250

Dissolved Manganese : 28-Aug-2009 to 27-Sep-2009

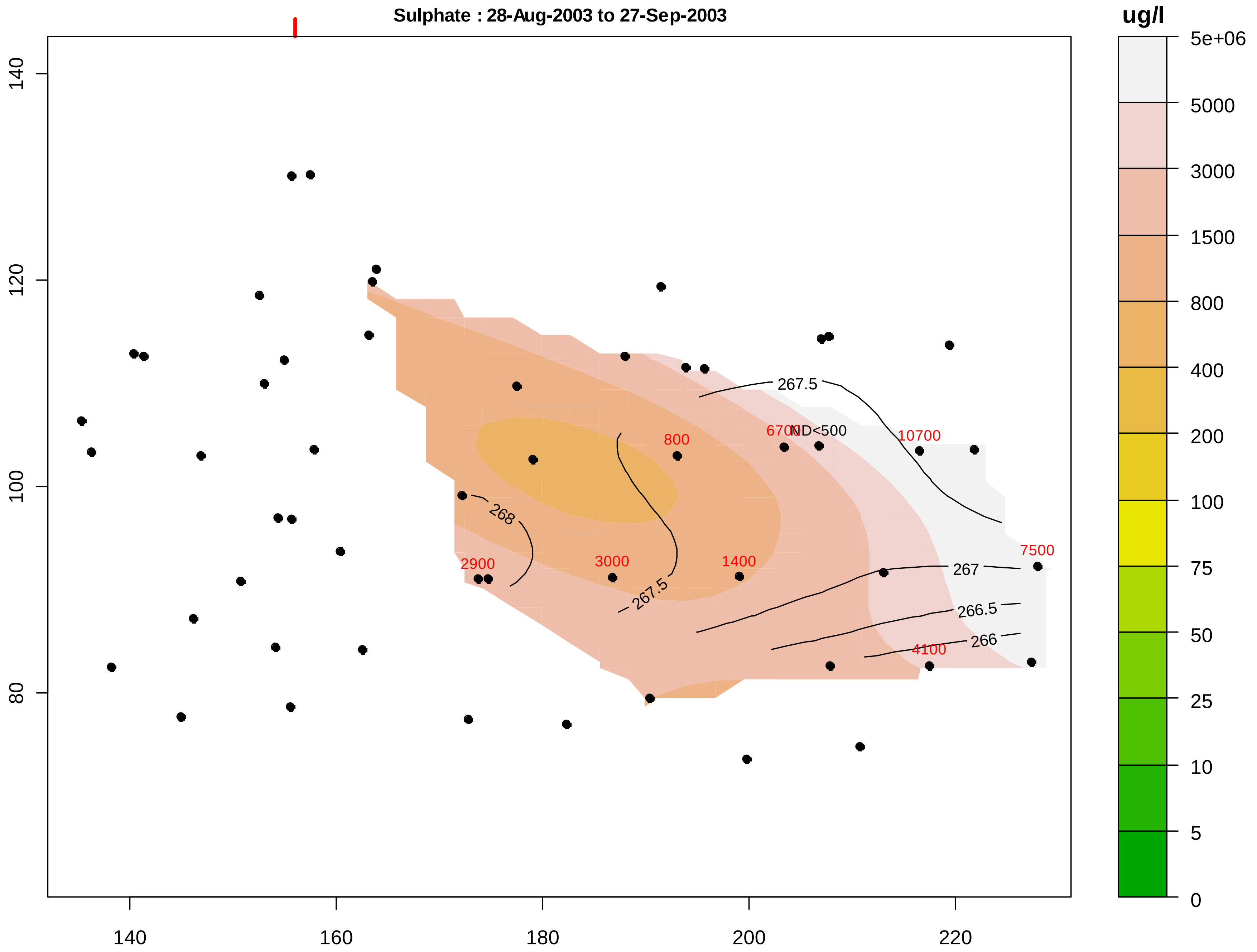


Sulphate Distribution

2001 to 2009



Sulphate : 28-Sep-2001 to 27-Oct-2001
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
140
120
100
80
140
160
180
200
220
272
271.5
271
270.5
270
269.5
269
268.5
268
267.5
267
4100
5900
7700
7000
ND<500
11500
3200
2600
12900


Sulphate : 28-Aug-2003 to 27-Sep-2003
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
140
120
100
80
140
160
180
200
220
267.5
268
267.5
267
266.5
266
800
6700
ND<500
10700
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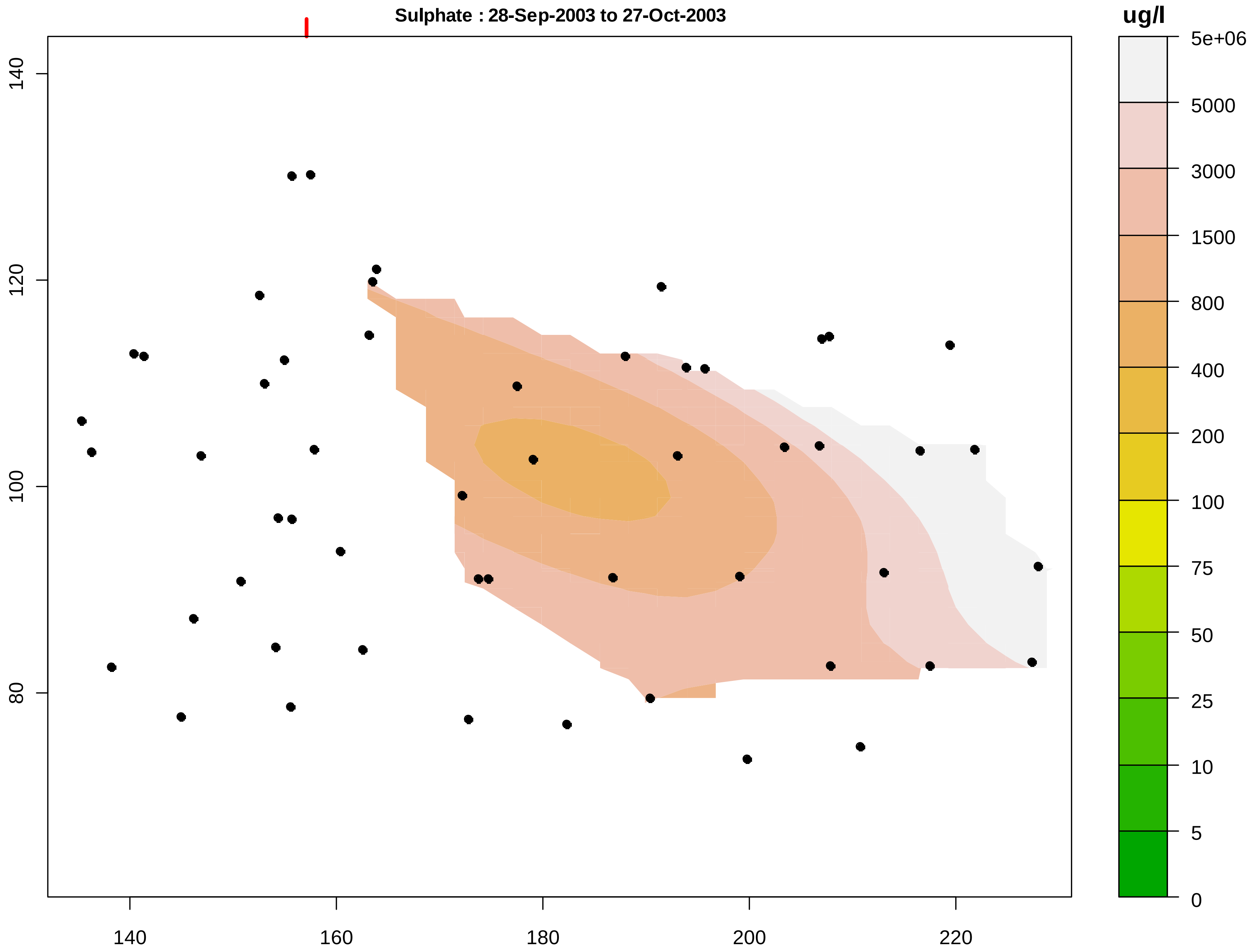
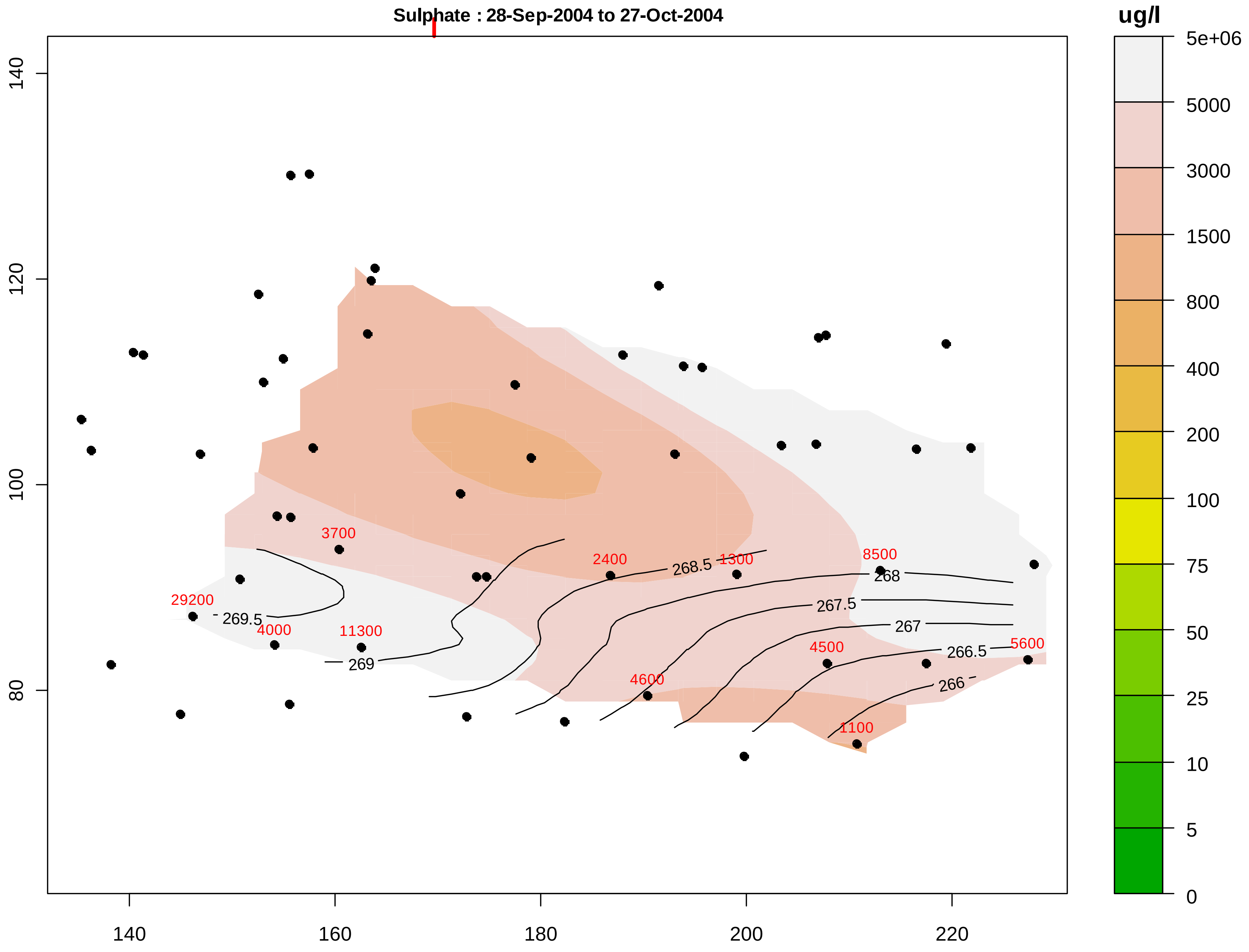
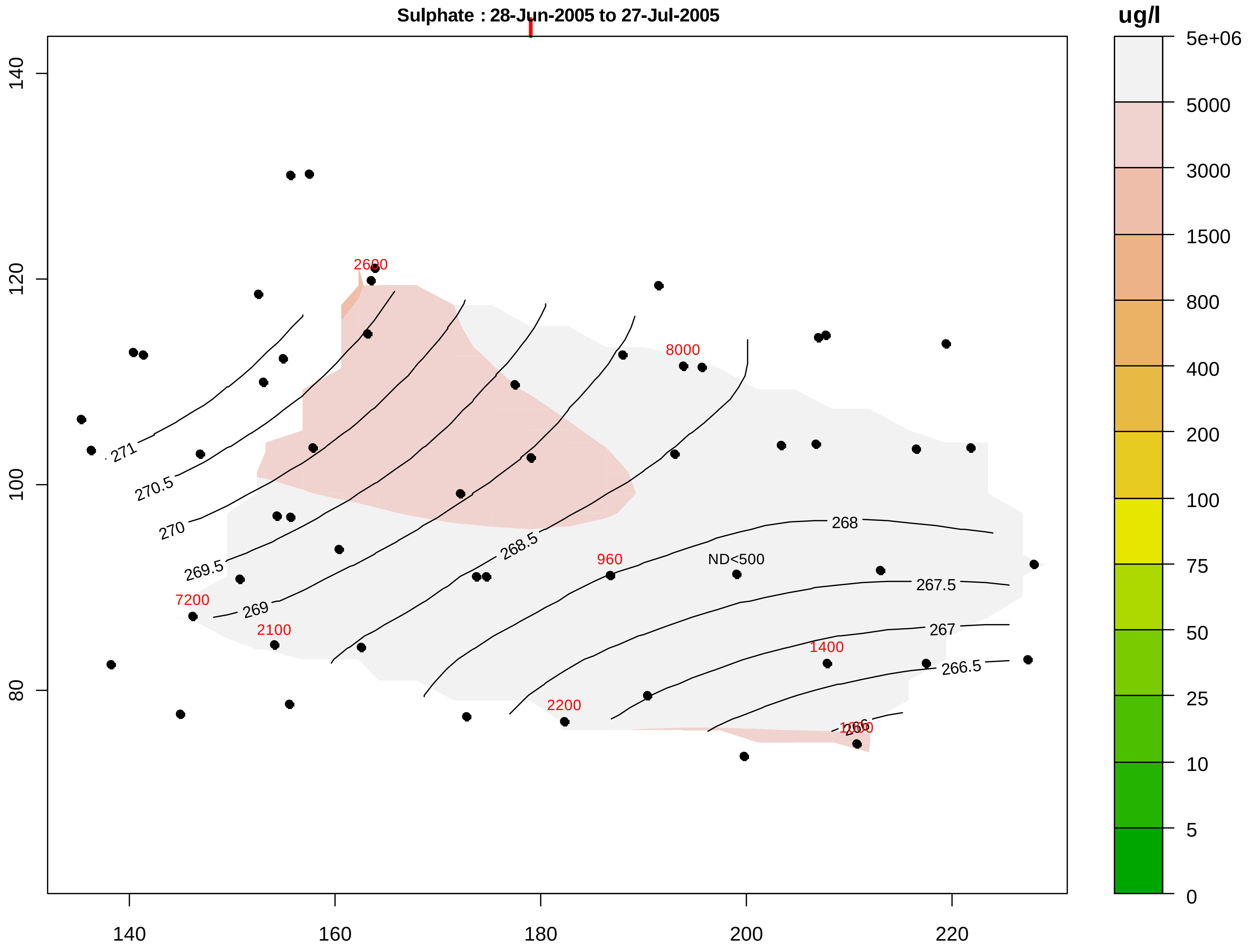
2900
3000
1400
4100

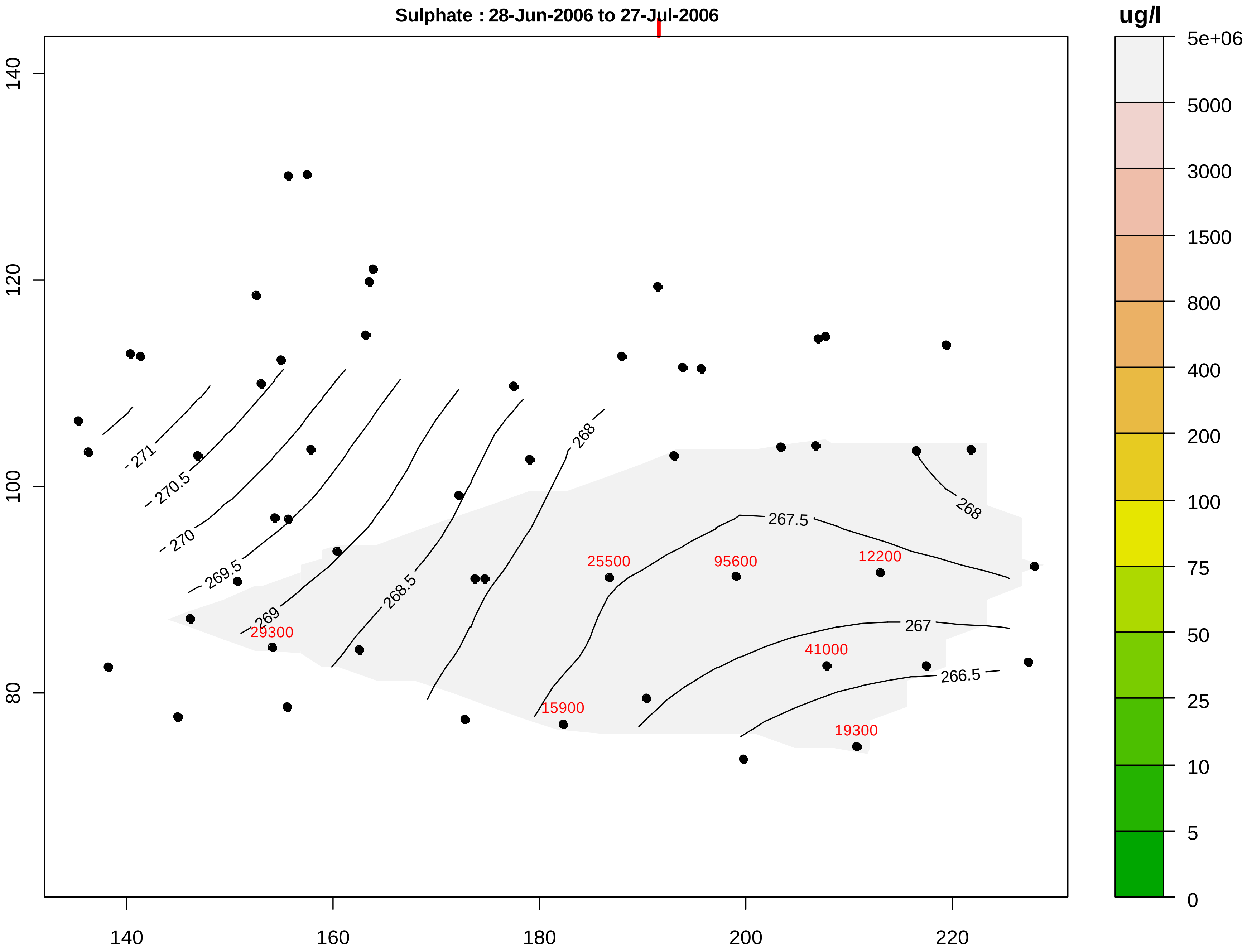

Sulphate : 28-Sep-2003 to 27-Oct-2003
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
140
120
100
80
140
160
180
200
220



Sulphate : 28-Sep-2004 to 27-Oct-2004



Sulphate : 28-Jun-2005 to 27-Jul-2005


Sulphate : 28-Jun-2006 to 27-Jul-2006
ug/l
5e+06
5000
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1500
800
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200
100
75
50
25
10
5
0
140
120
100
80
140
160
180
200
220
271
270.5
270
269.5
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268
267.5
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266.5
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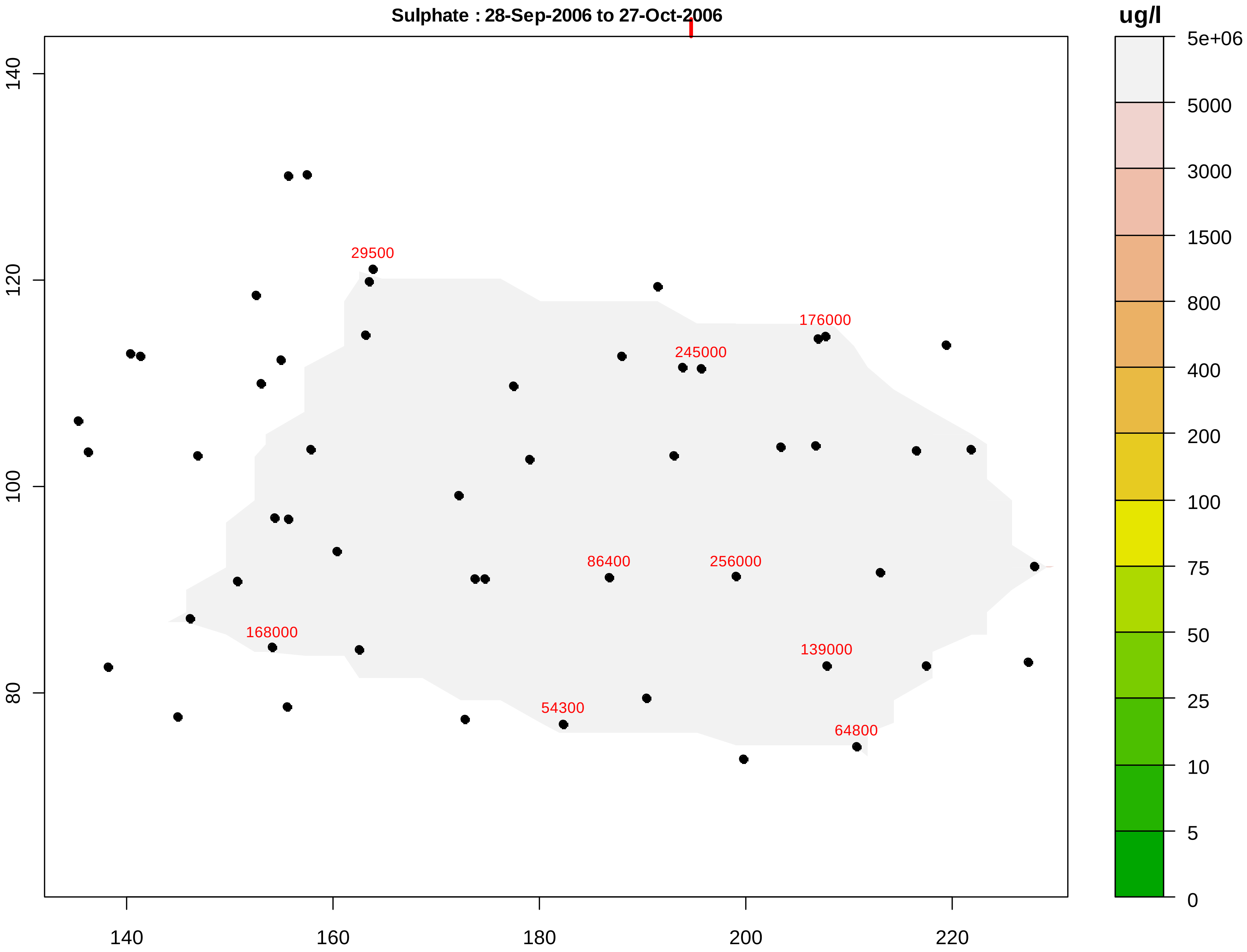
25500
95600
12200
41000
15900
19300


Sulphate : 28-Sep-2006 to 27-Oct-2006
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
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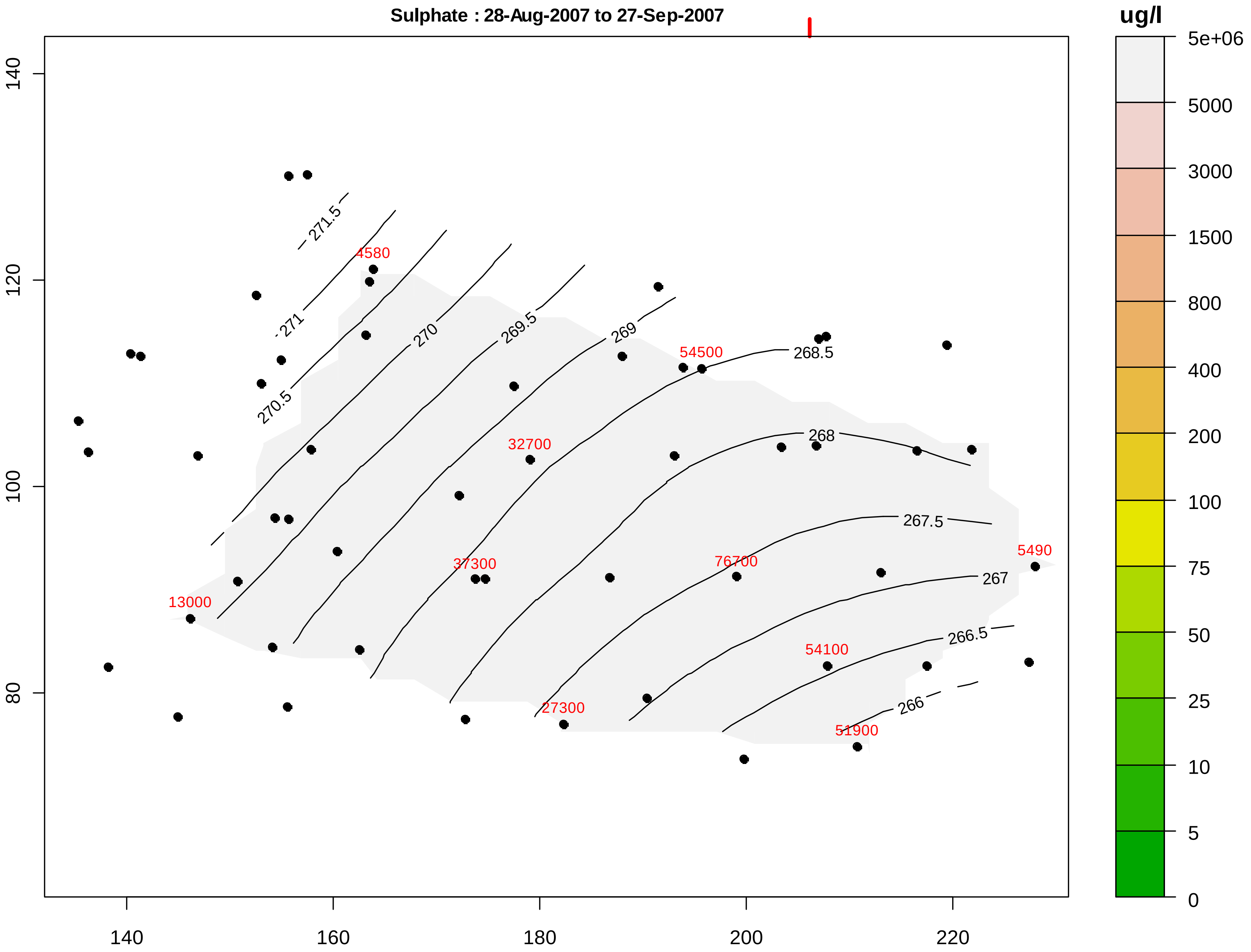
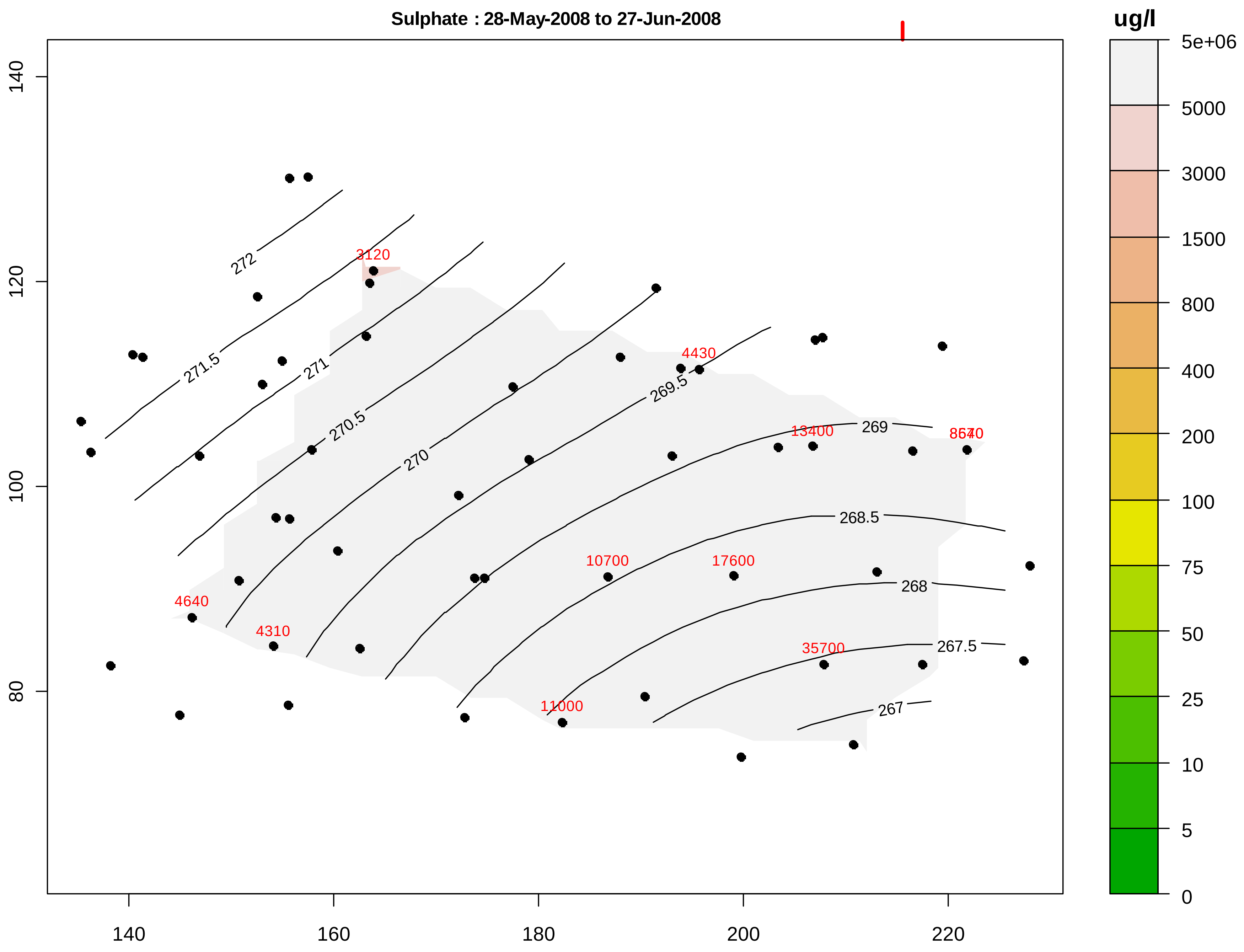
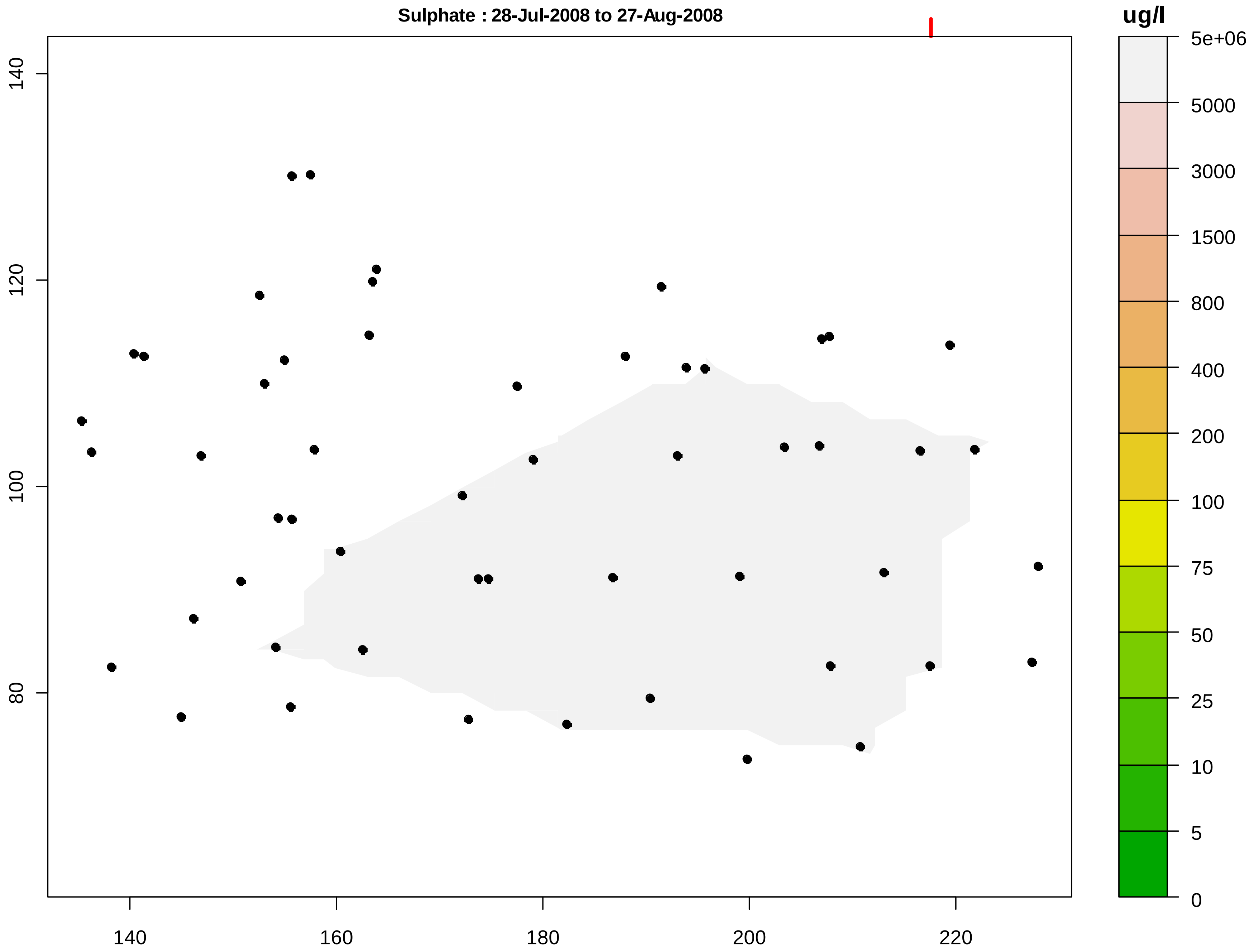
100
80
140
160
180
200
220
29500
176000
245000
86400
256000
168000
139000
54300
64800

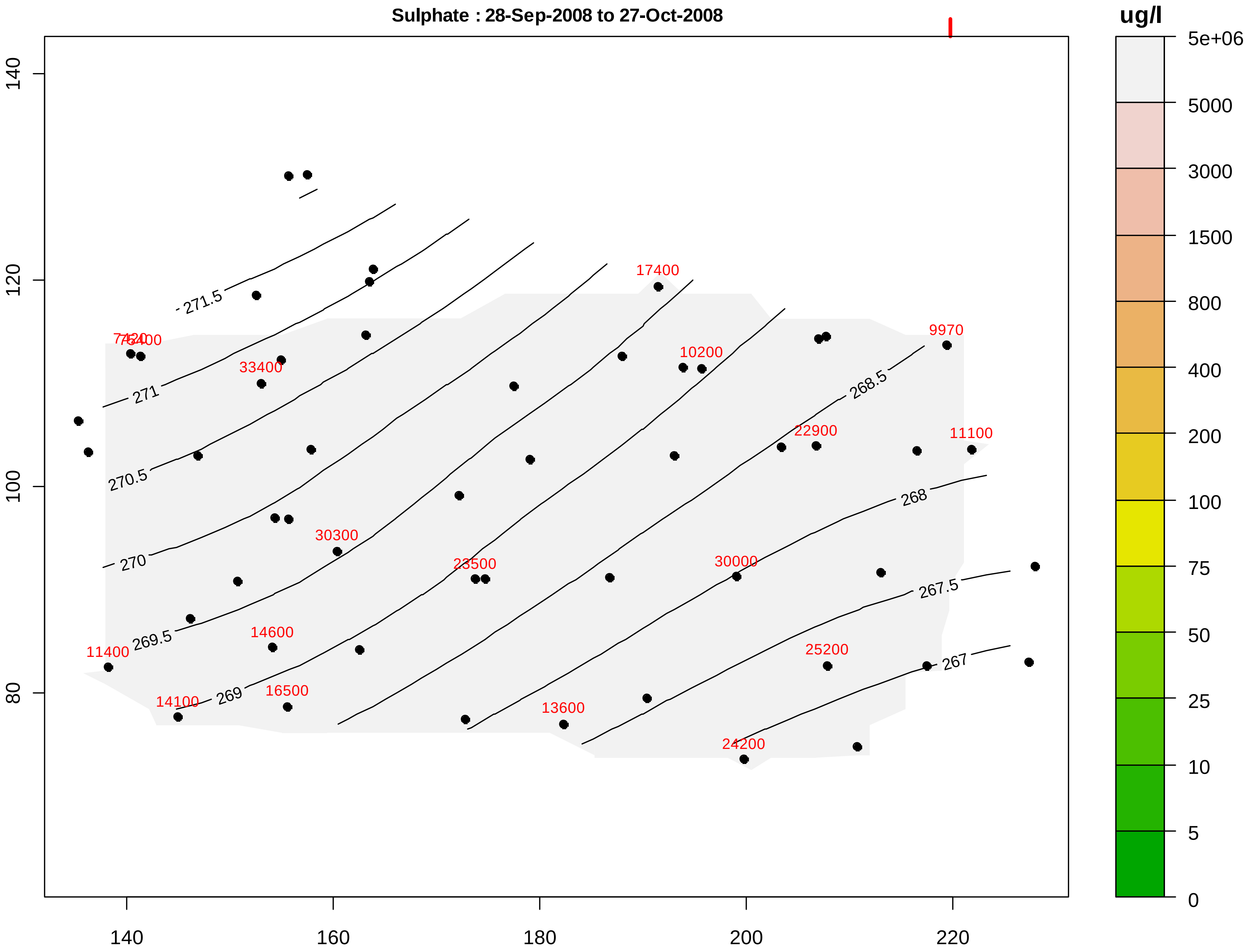


Sulphate : 28-Aug-2007 to 27-Sep-2007



Sulphate : 28-May-2008 to 27-Jun-2008


Sulphate : 28-Jul-2008 to 27-Aug-2008
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
140
120
100
80
140
160
180
200
220


Sulphate : 28-Sep-2008 to 27-Oct-2008
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
140
120
100
80
140
160
180
200
220
271.5
271
270.5
270
269.5
269
268.5
268
267.5
267
7420
75400
33400
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11100
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13600
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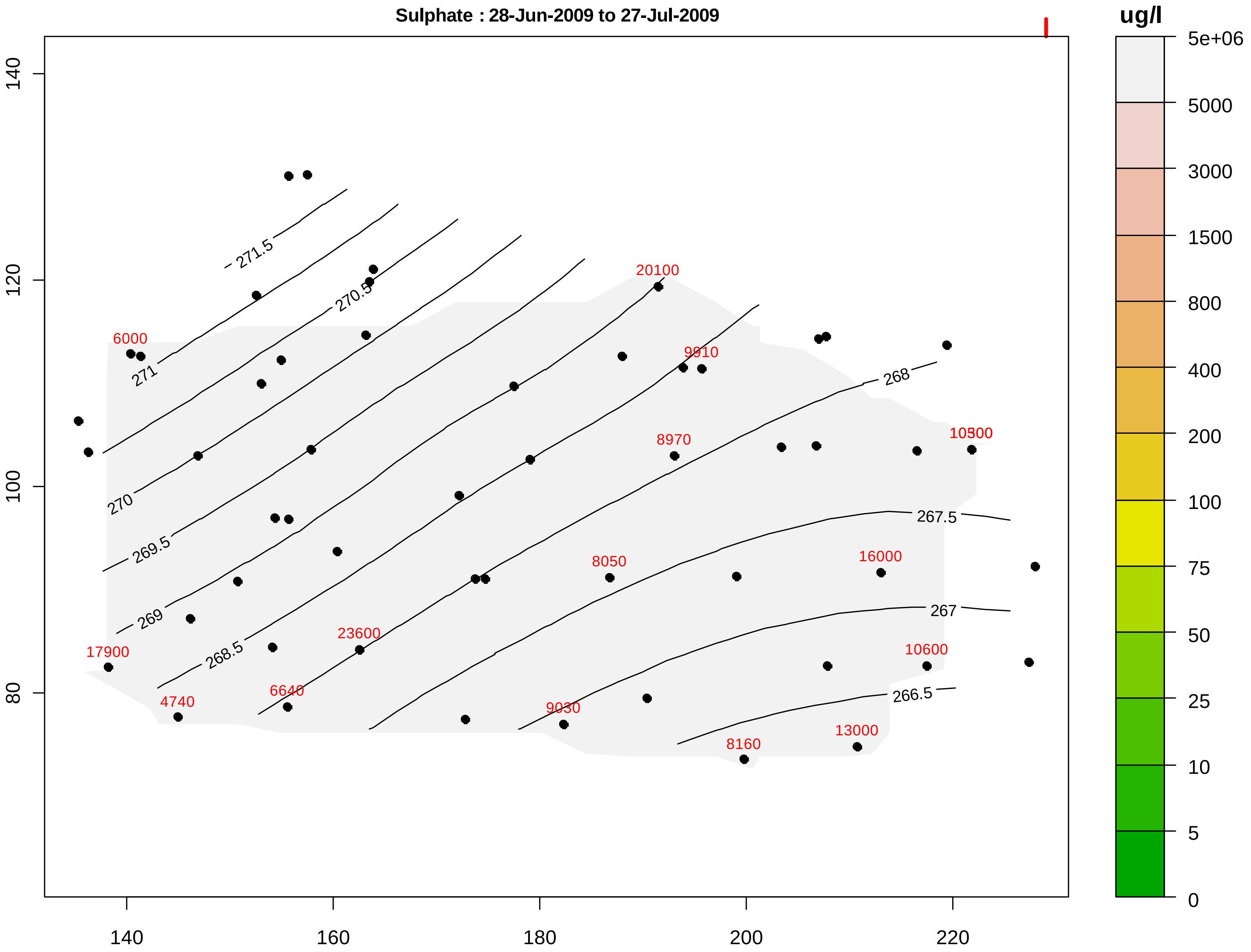
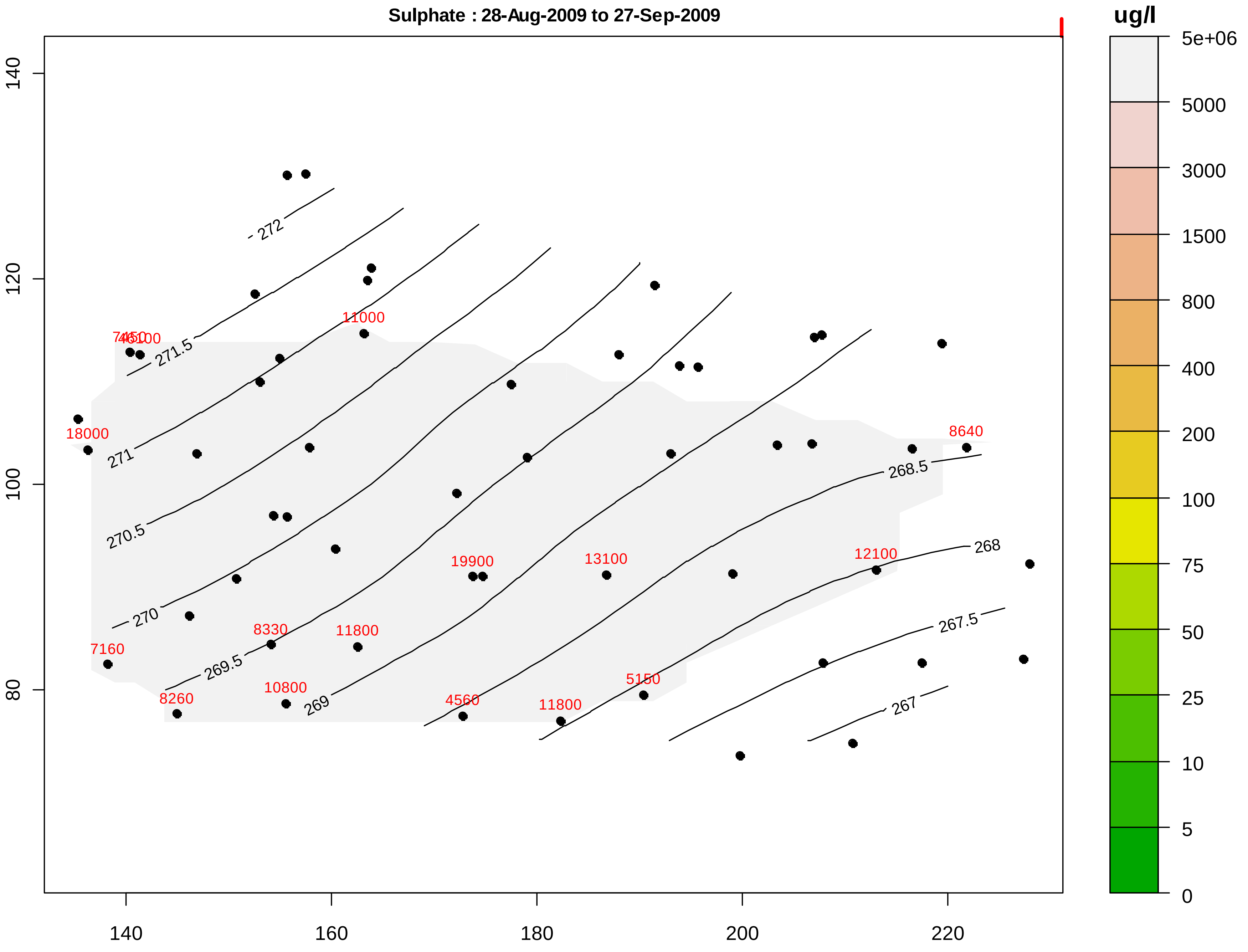
24200



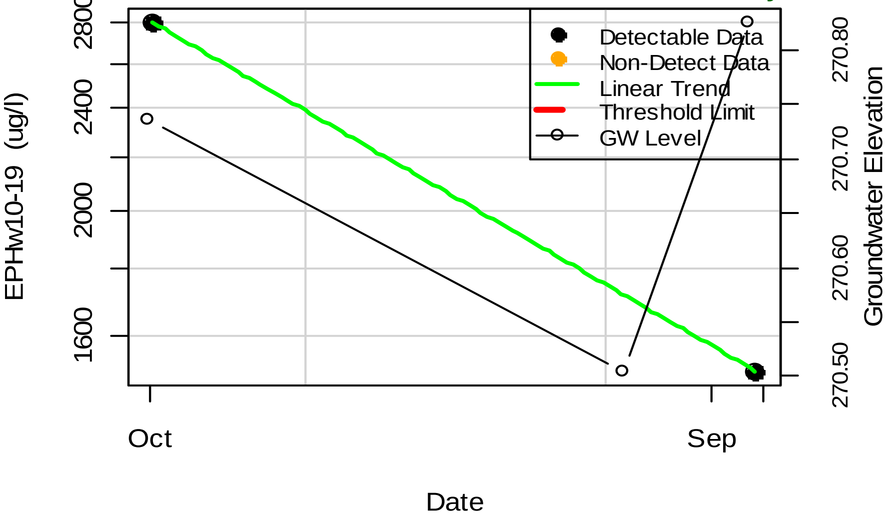
Sulphate : 28-Jun-2009 to 27-Jul-2009

Sulphate : 28-Aug-2009 to 27-Sep-2009
ug/l
5e+06
5000
3000
1500
800
400
200
100
75
50
25
10
5
0
140
120
100
80
140
160
180
200
220
272
271.5
271
270.5
270
269.5
269
268.5
268
267.5
267
7450
46100
11000
18000
8640
19900
13100
12100
8330
11800
7160
10800
8260
4560
11800
5150

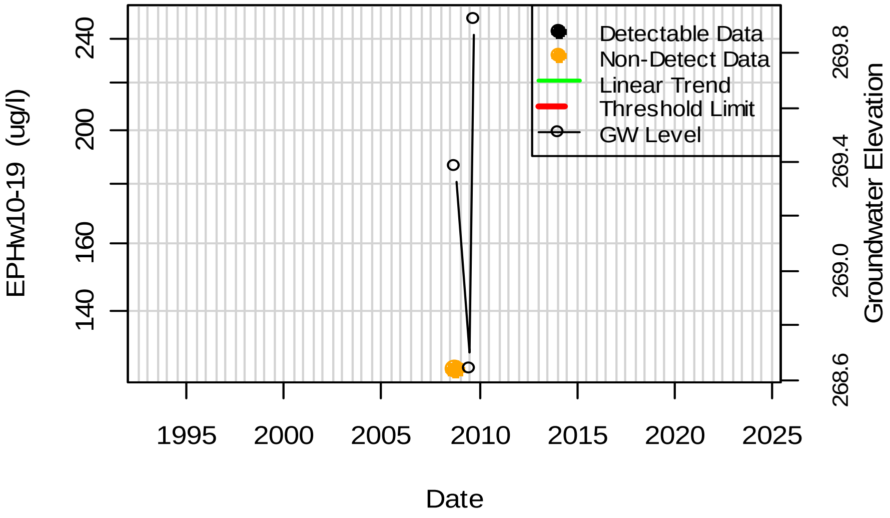
Groundwater Elevation and EPHw10-19 over Time

EPHw10-19 in MW-AS-11

Mann-Kendall P.Value= 1; Half-Life= 400 days

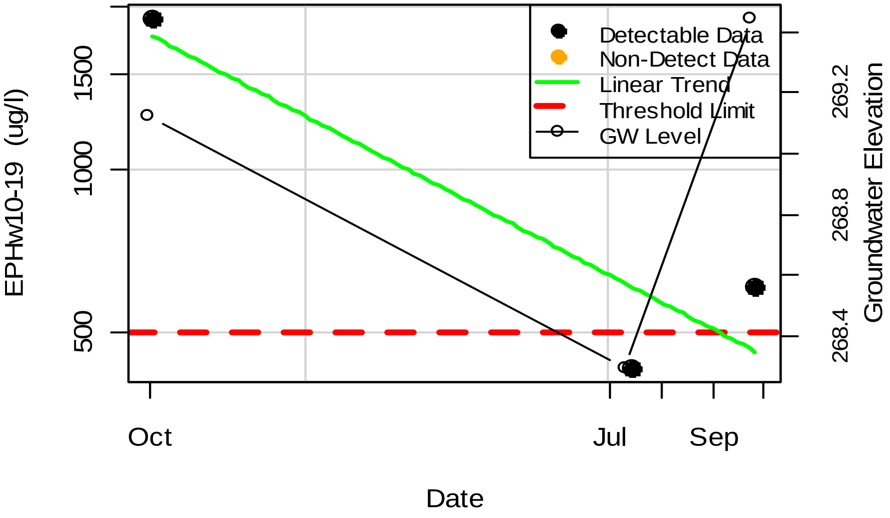


EPHw10-19 in MW-AS-12

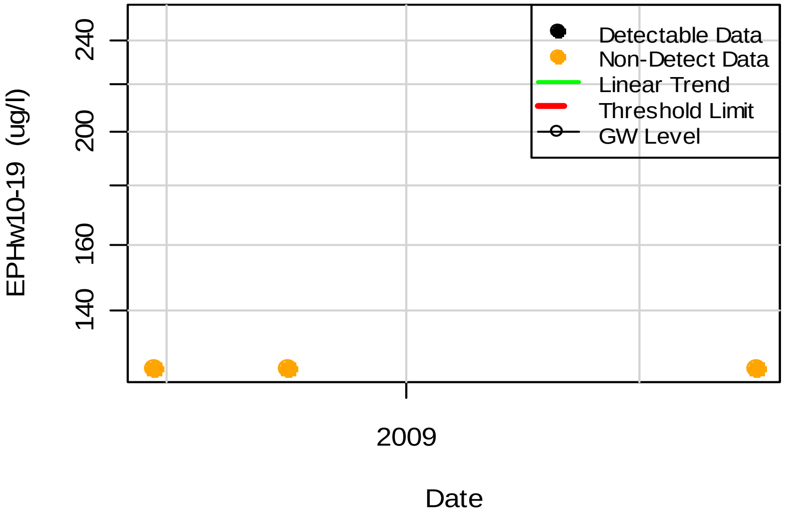


EPHw10-19 in MW-AS-13

Mann-Kendall P.Value= 1; Half-Life= 186 days

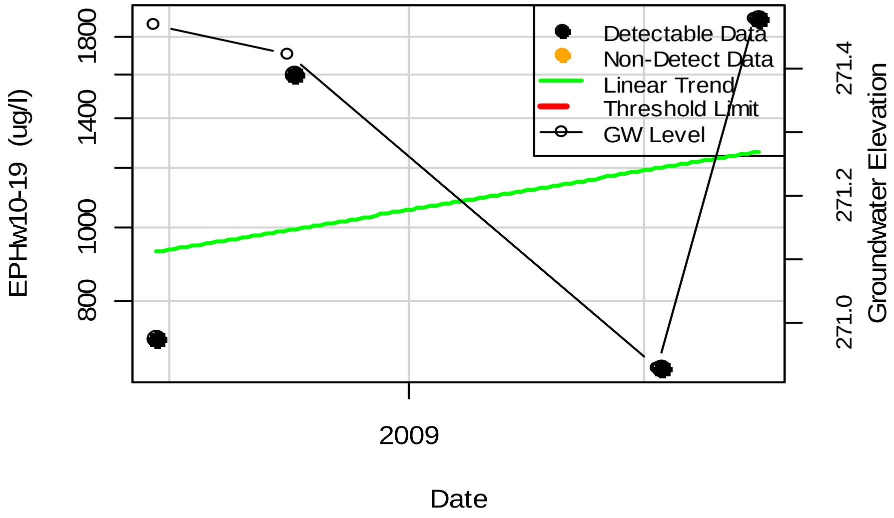


EPHw10-19 in MW-AS-15

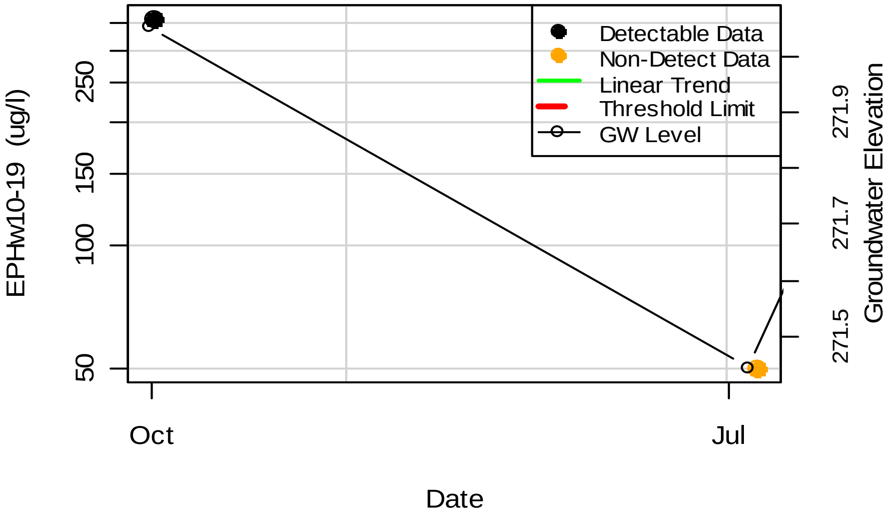


EPHw10-19 in MW-AS-22

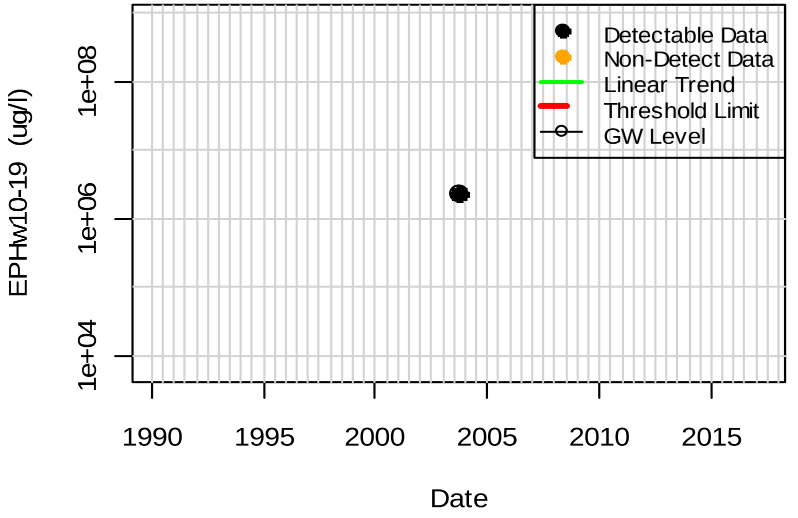
Mann-Kendall P.Value= 0.734; Half-Life= -1037 days



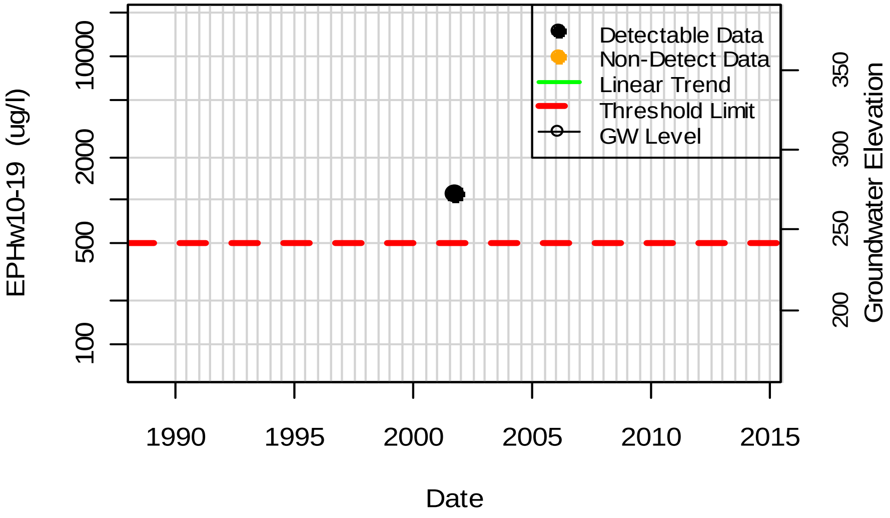
EPHw10-19 in MW-AS-23

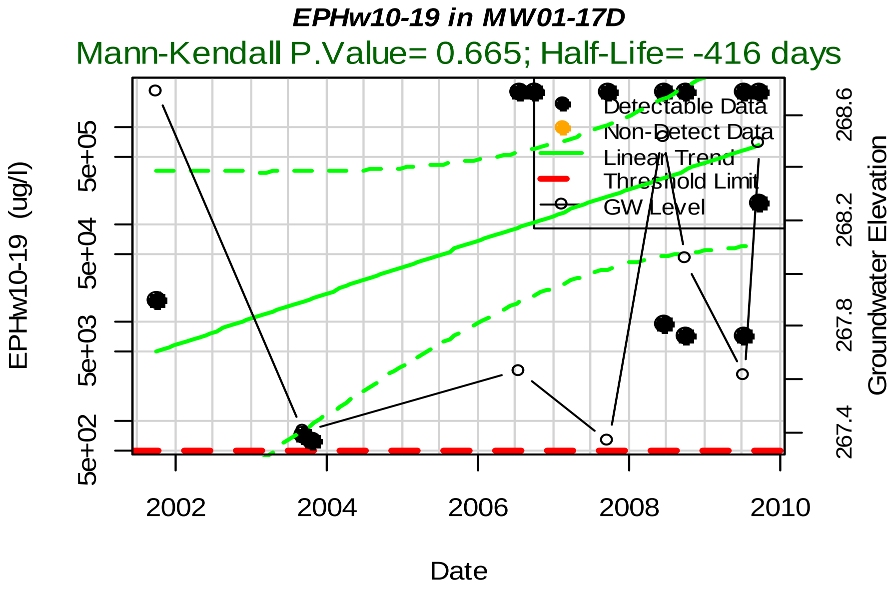


EPHw10-19 in MW01-14



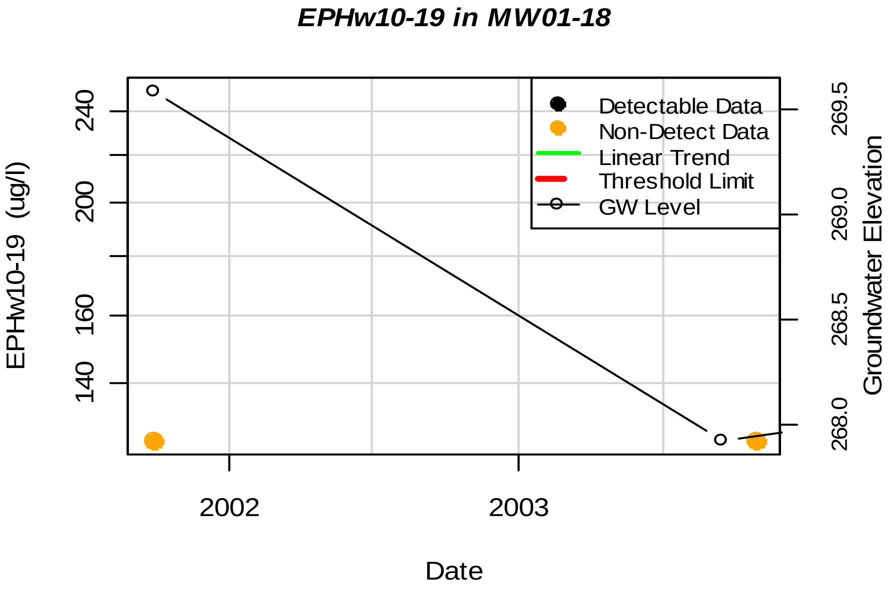
EPHw10-19 in MW01-16



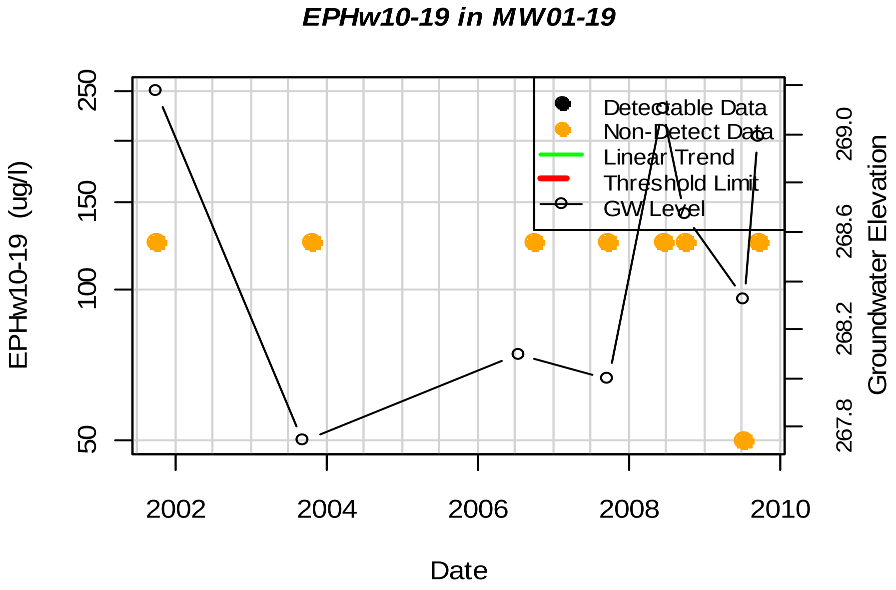


EPHw10-19 in MW01-17D

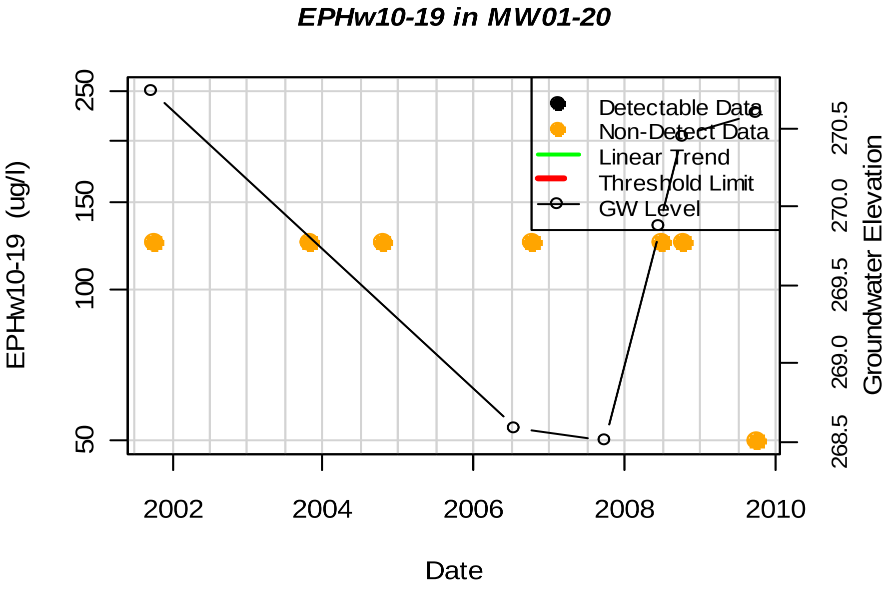
Mann-Kendall P.Value= 0.665; Half-Life= -416 days



EPHw10-19 in MW01-18



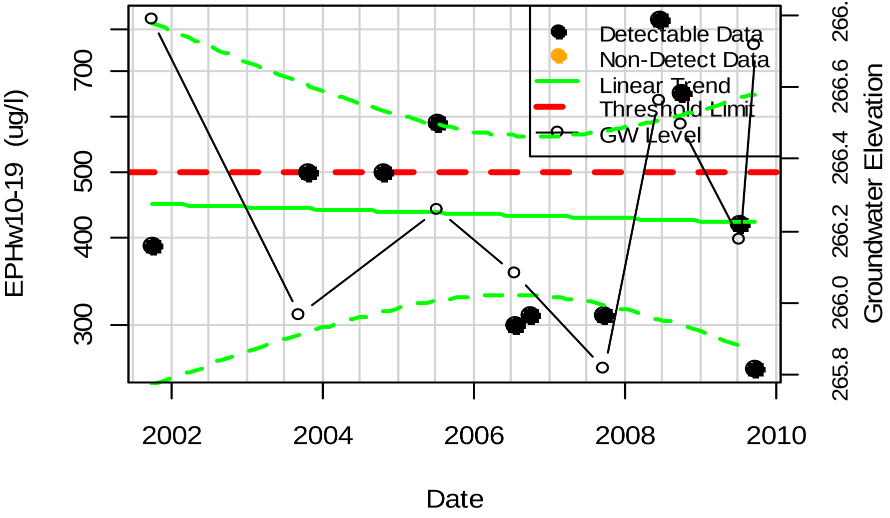
EPHw10-19 in MW01-19



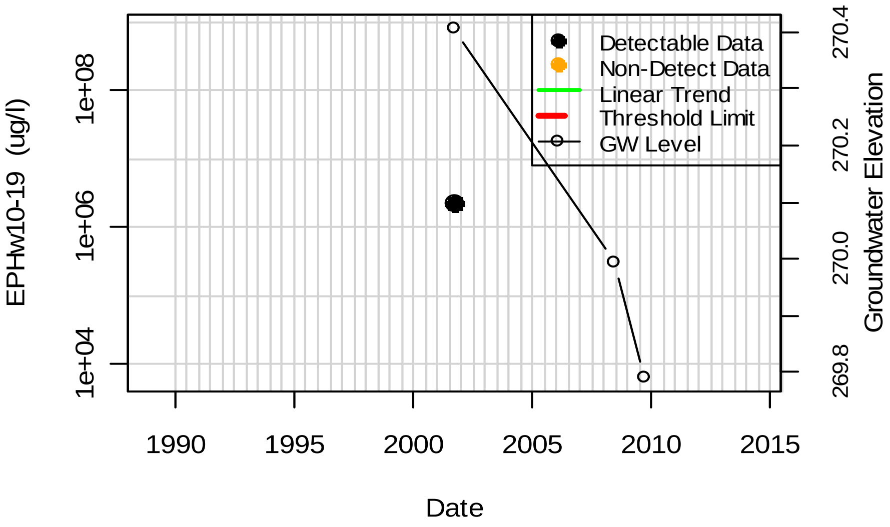
EPHw10-19 in MW01-20

EPHw10-19 in MW01-21

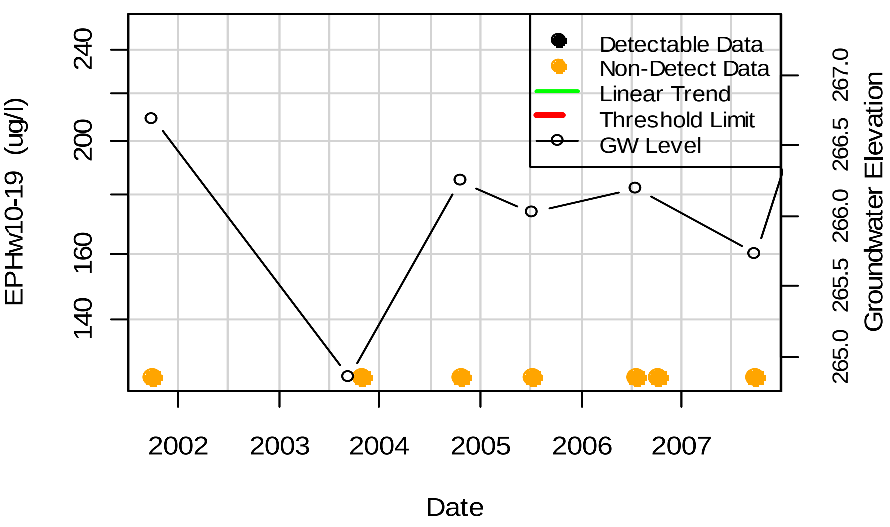
Mann-Kendall P.Value= 0.876; Half-Life> 5 Years



EPHw10-19 in MW01-22

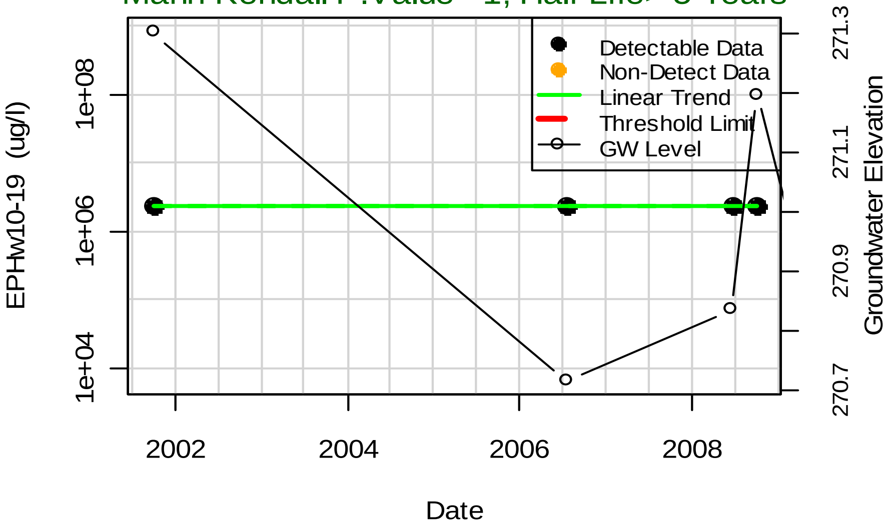


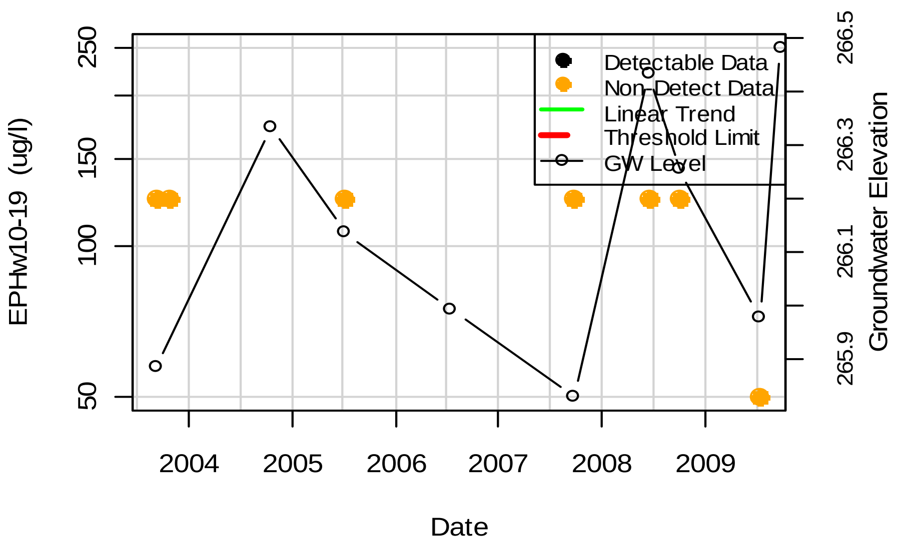
EPHw10-19 in MW01-23



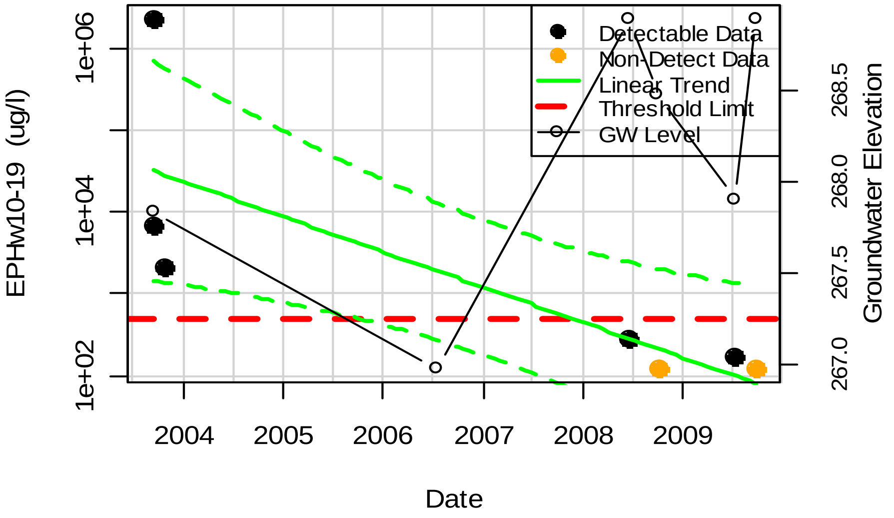
EPHw10-19 in MW01-24

Mann-Kendall P.Value= 1; Half-Life> 5 Years



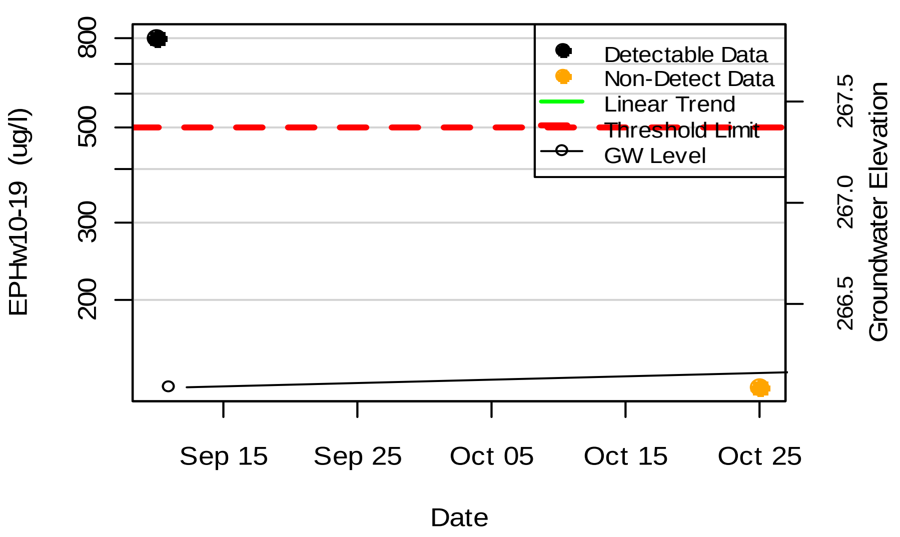


EPHw10-19 in MW03-01

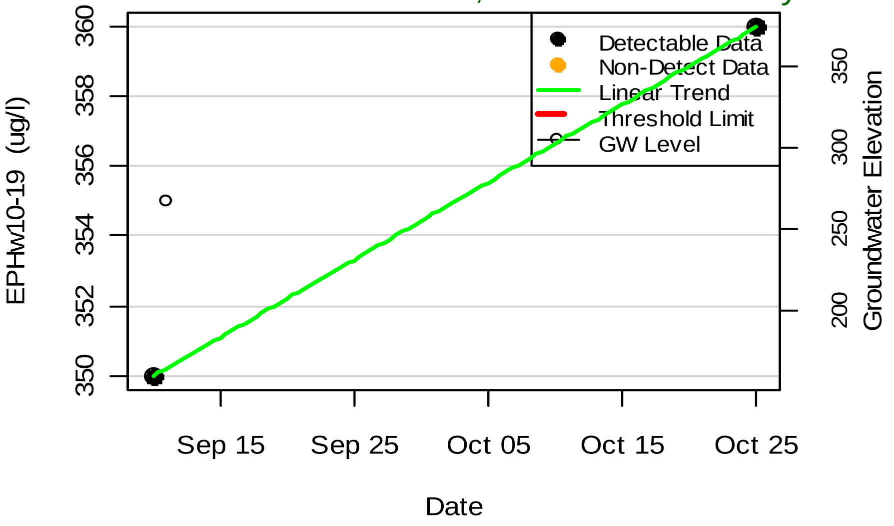


EPHw10-19 in MW03-03

Mann-Kendall P.Value= 0.0209; Half-Life= 256 days

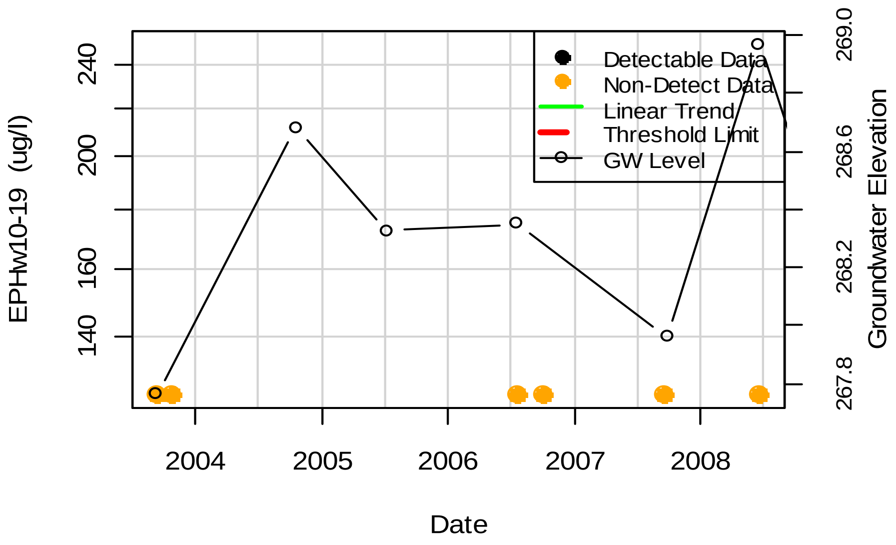


EPHw10-19 in MW03-04

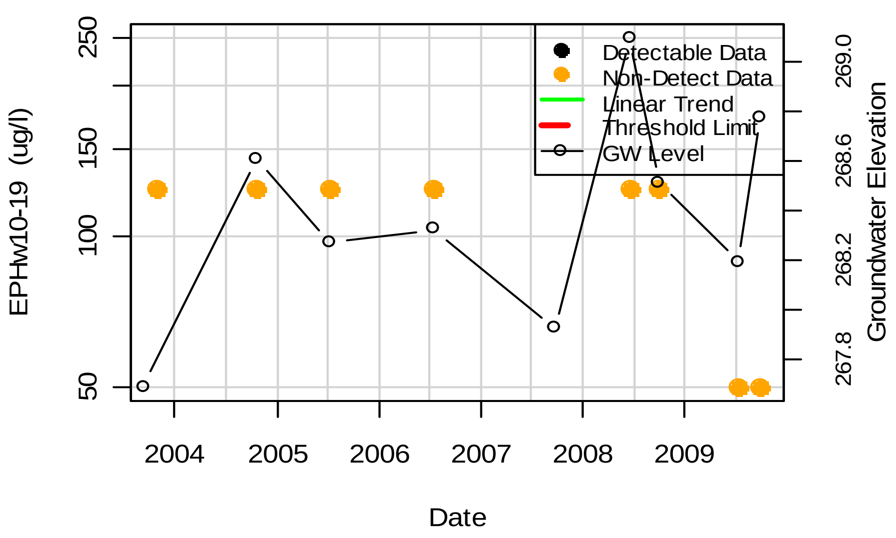


EPHw10-19 in MW03-05

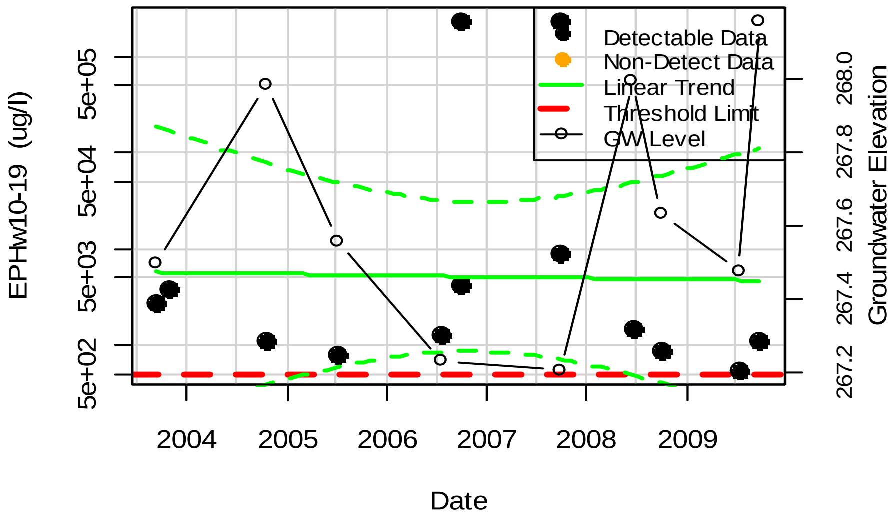
Mann-Kendall P.Value= 1; Half-Life= -1107 days



EPHw10-19 in MW03-06

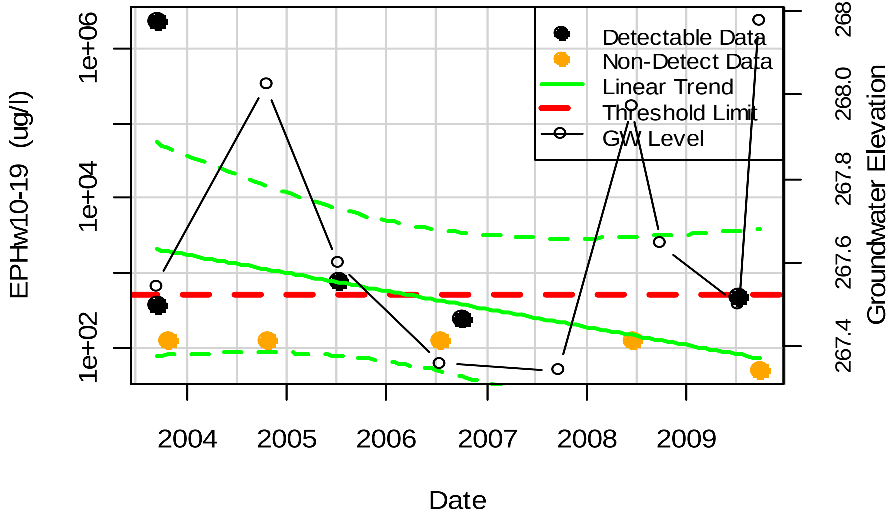


EPHw10-19 in MW03-07



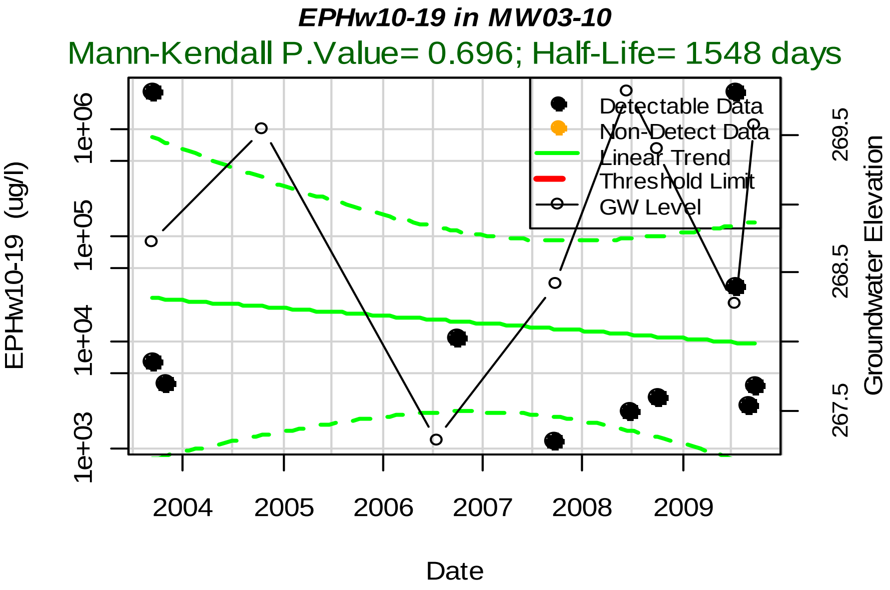
EPHw10-19 in MW03-08

Mann-Kendall P.Value= 0.501; Half-Life> 5 Years

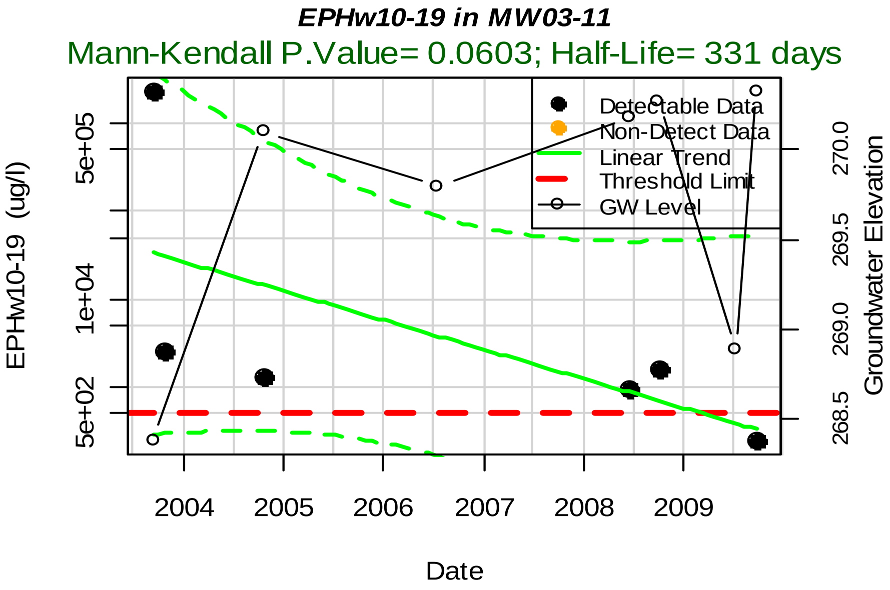


EPHw10-19 in MW03-09

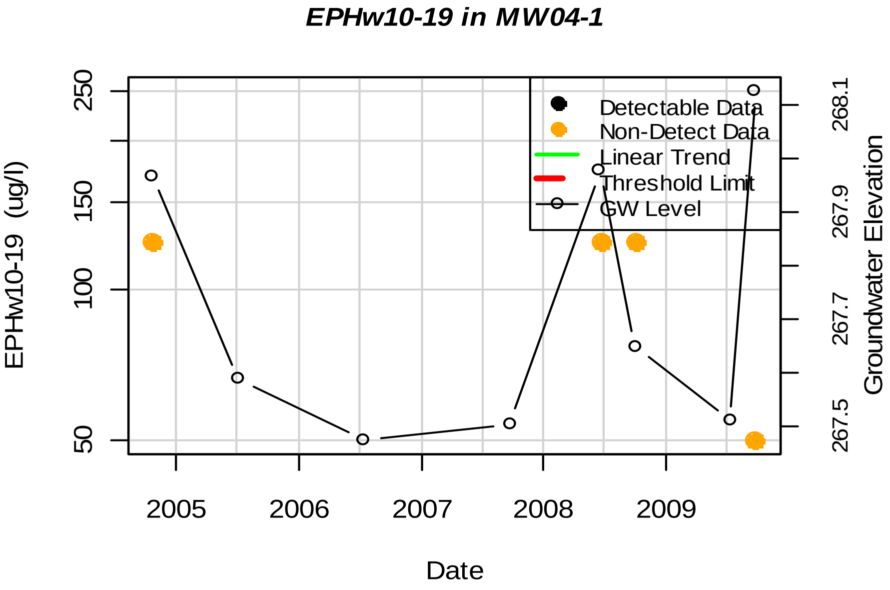
Mann-Kendall P.Value= 0.266; Half-Life= 456 days

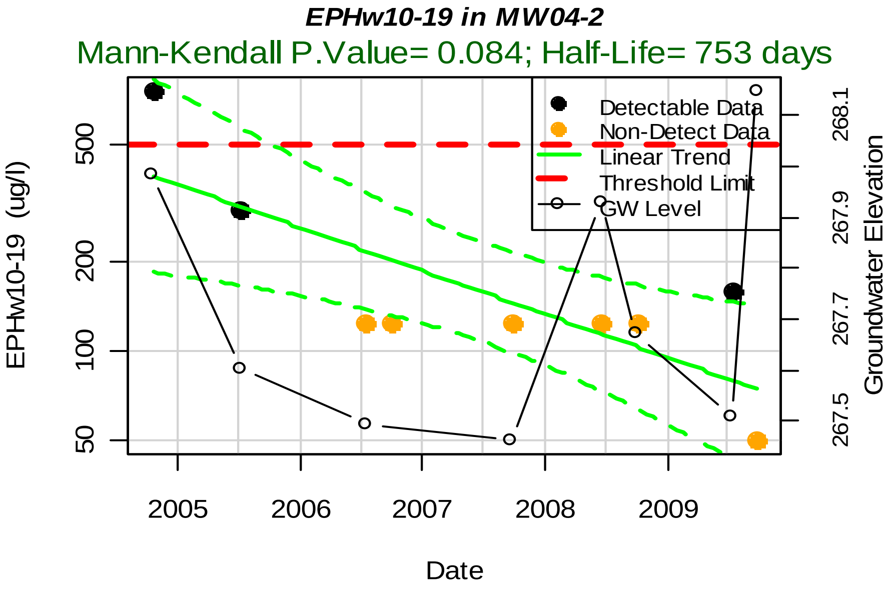

EPHw10-19 in MW03-10

Mann-Kendall P.Value= 0.696; Half-Life= 1548 days

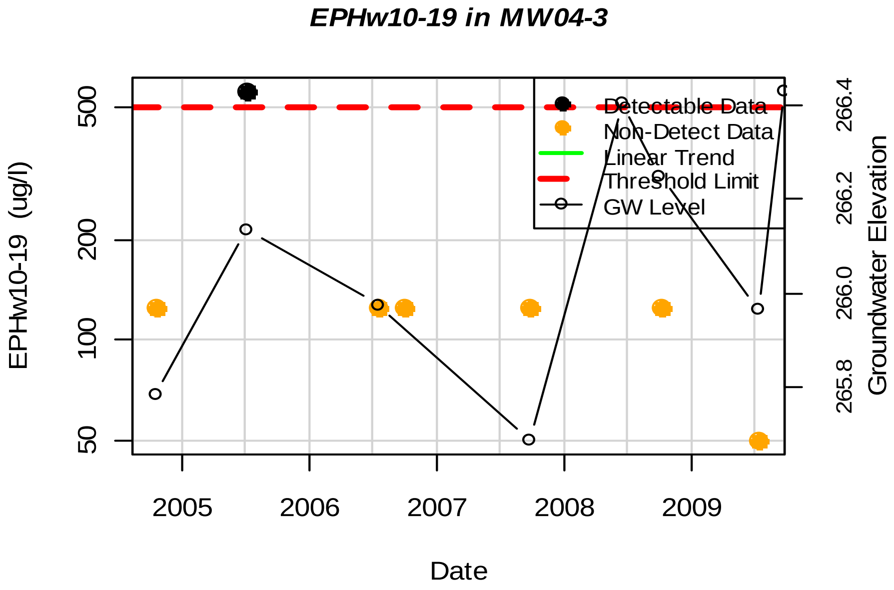

EPHw10-19 in MW03-11

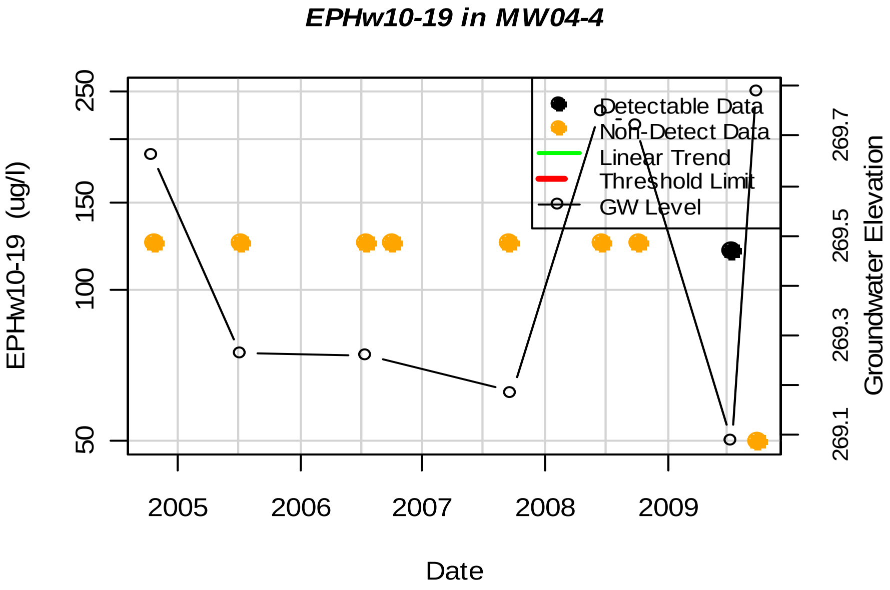
Mann-Kendall P.Value= 0.0603; Half-Life= 331 days

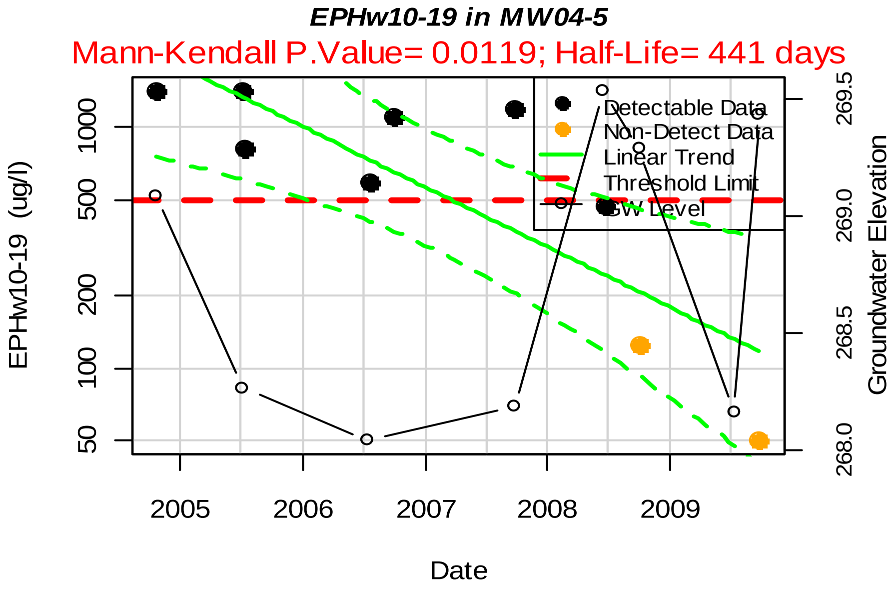

EPHw10-19 in MW04-1

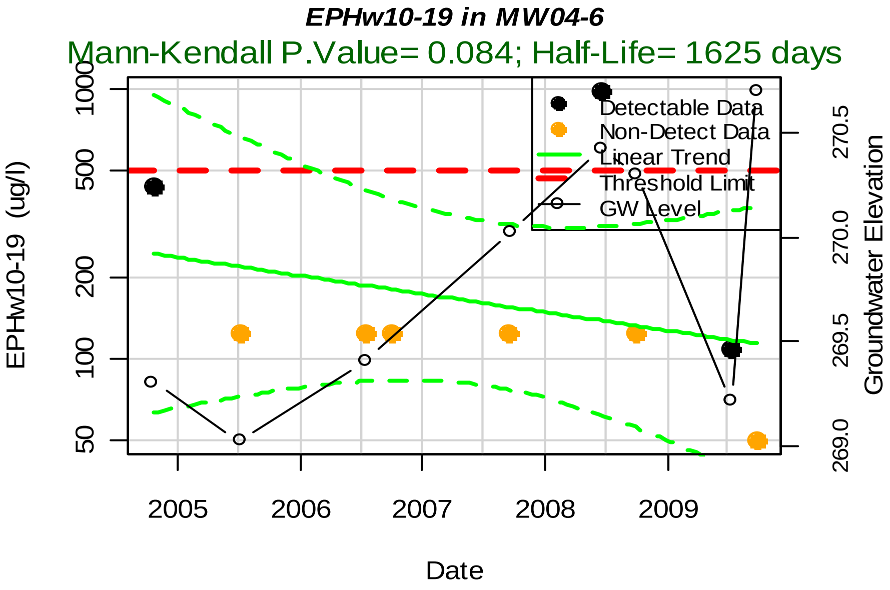

EPHw10-19 in MW04-2

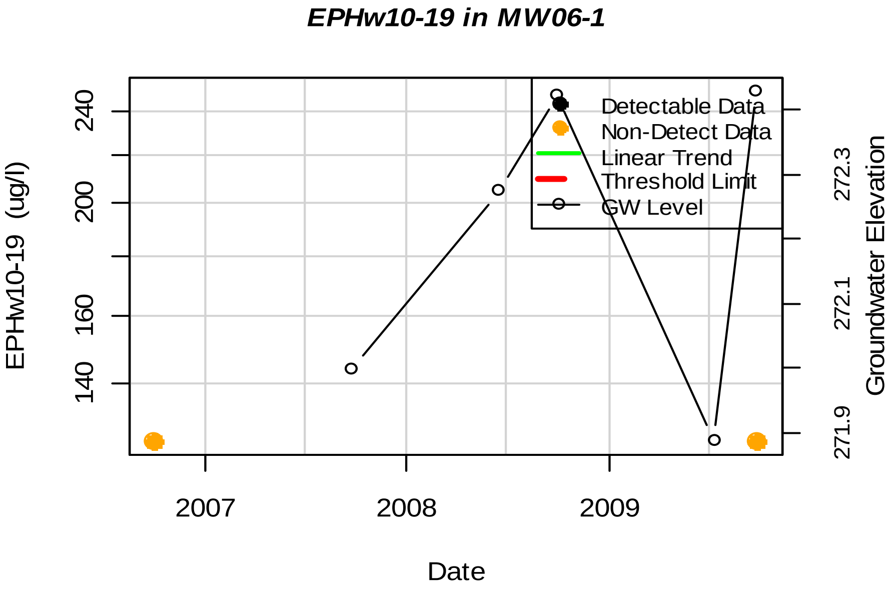
Mann-Kendall P.Value= 0.084; Half-Life= 753 days


EPHw10-19 in MW04-3
EPHw10-19 (ug/l)
500
200
100
50
Groundwater Elevation
266.4
266.2
266.0
265.8
2005
2006
2007
2008
2009
Date
● Detectable Data
● Non-Detect Data
Linear Trend
Threshold Limit
GW Level

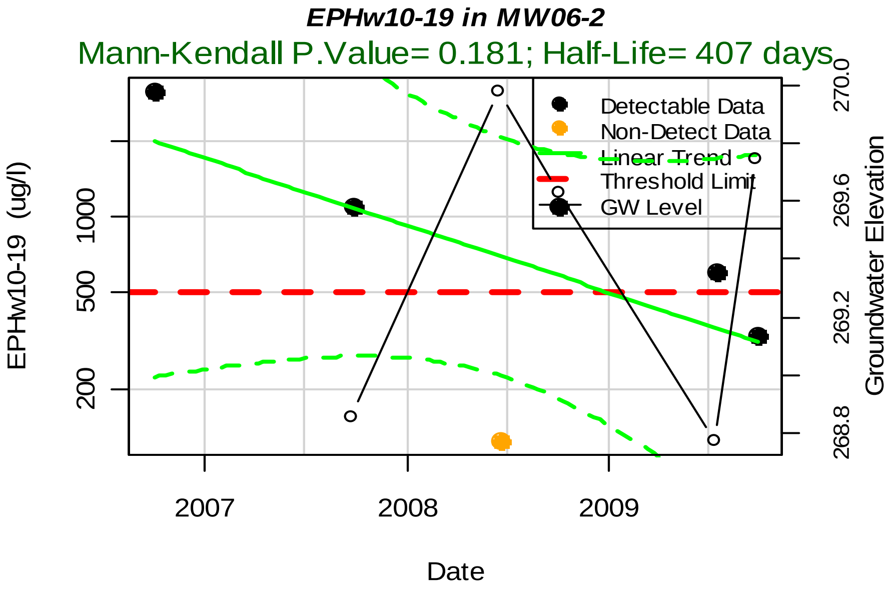

EPHw10-19 in MW04-4
EPHw10-19 (ug/l)
250
150
100
50
Groundwater Elevation
269.7
269.5
269.3
269.1
2005
2006
2007
2008
2009
Date
● Detectable Data
● Non-Detect Data
Linear Trend
Threshold Limit
GW Level


EPHw10-19 in MW04-5
Mann-Kendall P.Value= 0.0119; Half-Life= 441 days
EPHw10-19 (ug/l)
1000
500
200
100
50
Groundwater Elevation
269.5
269.0
268.5
268.0
2005
2006
2007
2008
2009
Date
● Detectable Data
● Non-Detect Data
Linear Trend
Threshold Limit
GW Level


EPHw10-19 in MW04-6
Mann-Kendall P.Value= 0.084; Half-Life= 1625 days
EPHw10-19 (ug/l)
1000
500
200
100
50
Groundwater Elevation
270.5
270.0
269.5
269.0
2005
2006
2007
2008
2009
Date
● Detectable Data
● Non-Detect Data
Linear Trend
Threshold Limit
GW Level

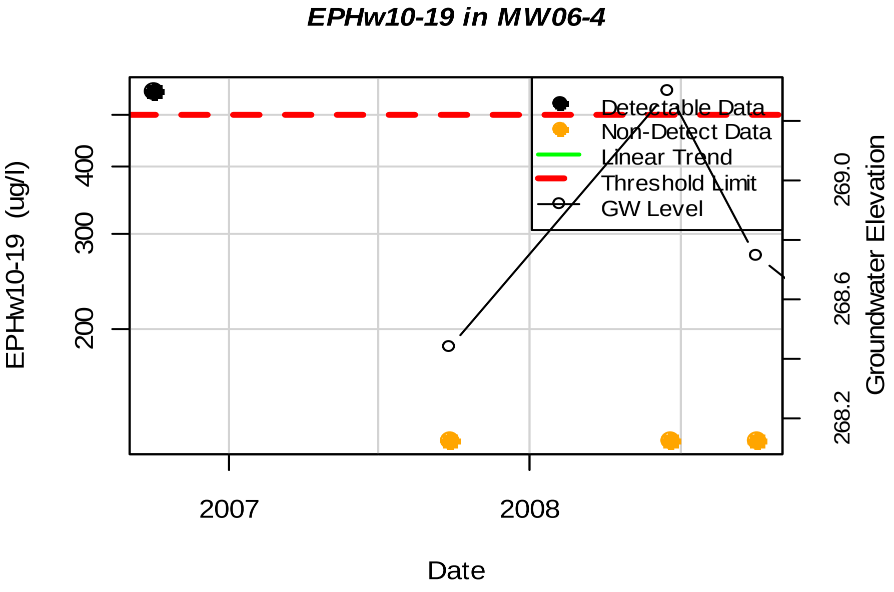


EPHw10-19 in MW06-1

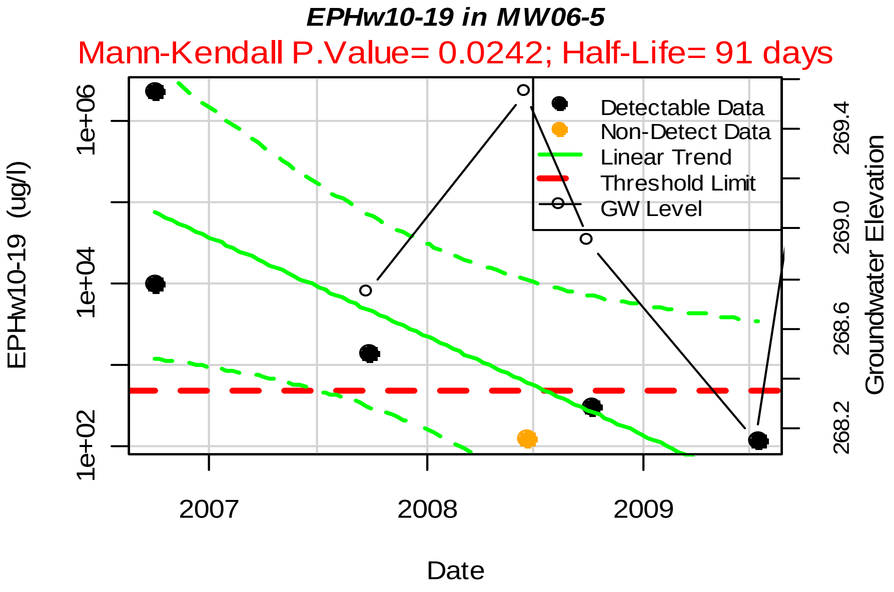


EPHw10-19 in MW06-2

Mann-Kendall P.Value= 0.181; Half-Life= 407 days

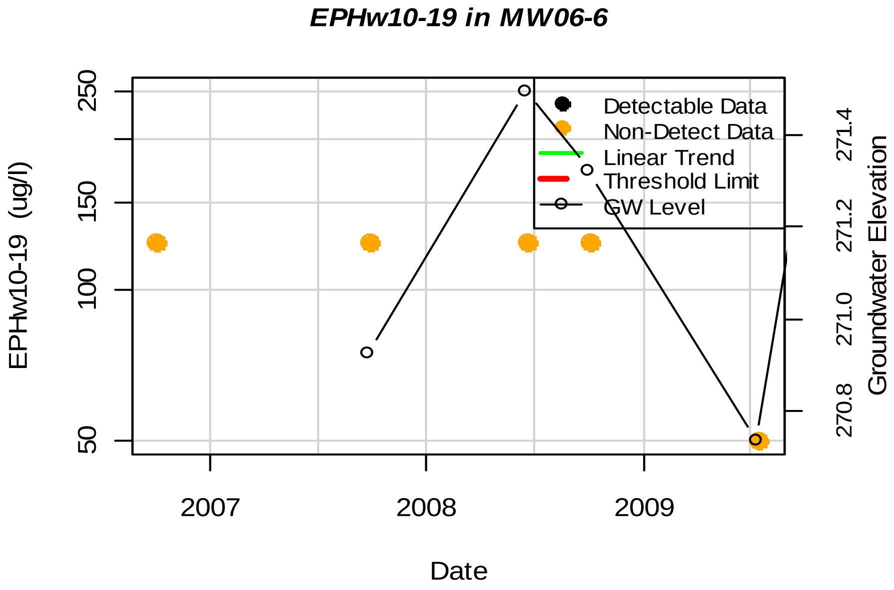


EPHw10-19 in MW06-4

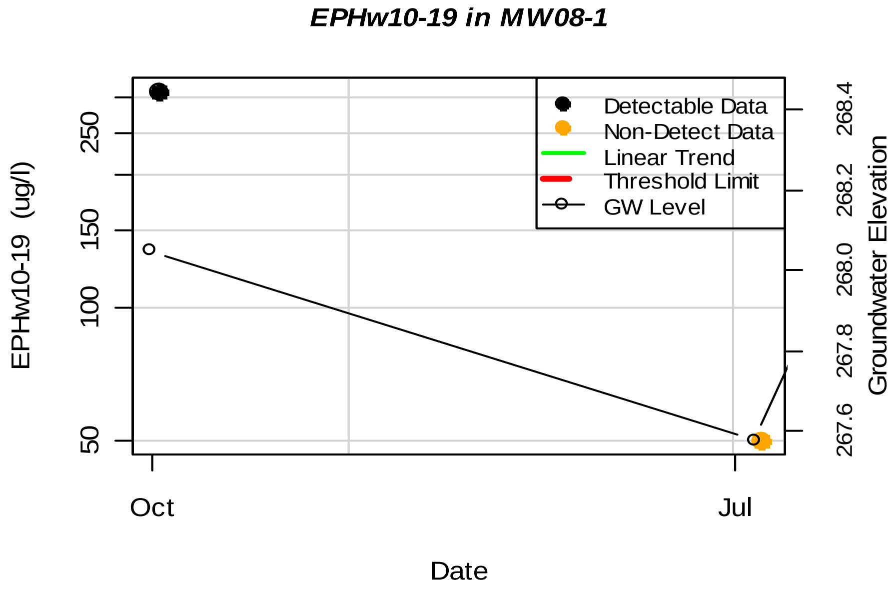


EPHw10-19 in MW06-5

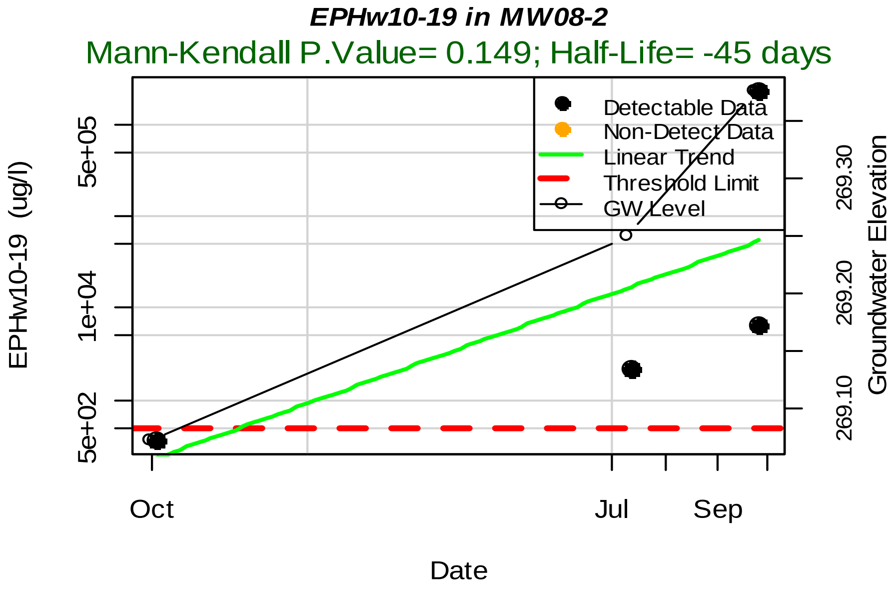
Mann-Kendall P.Value= 0.0242; Half-Life= 91 days



EPHw10-19 in MW06-6

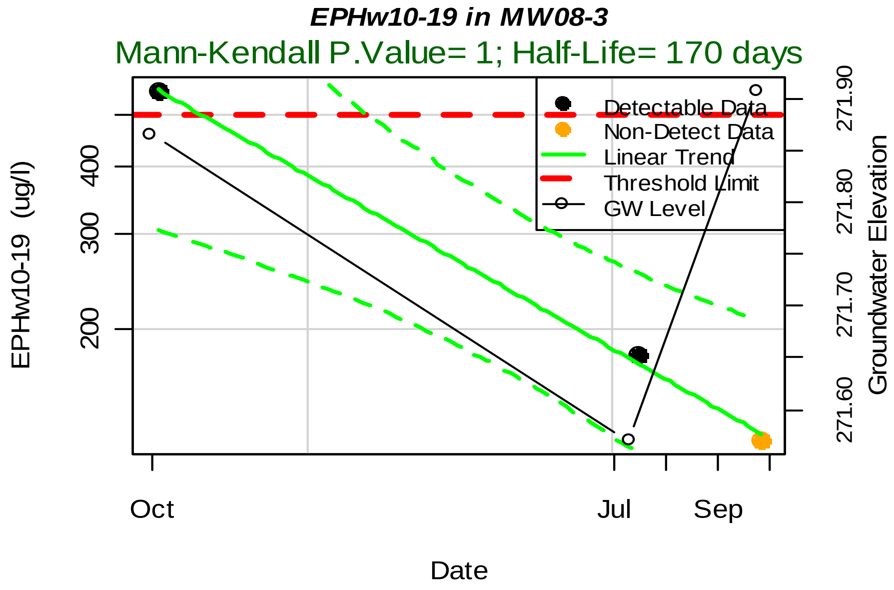


EPHw10-19 in MW08-1



EPHw10-19 in MW08-2

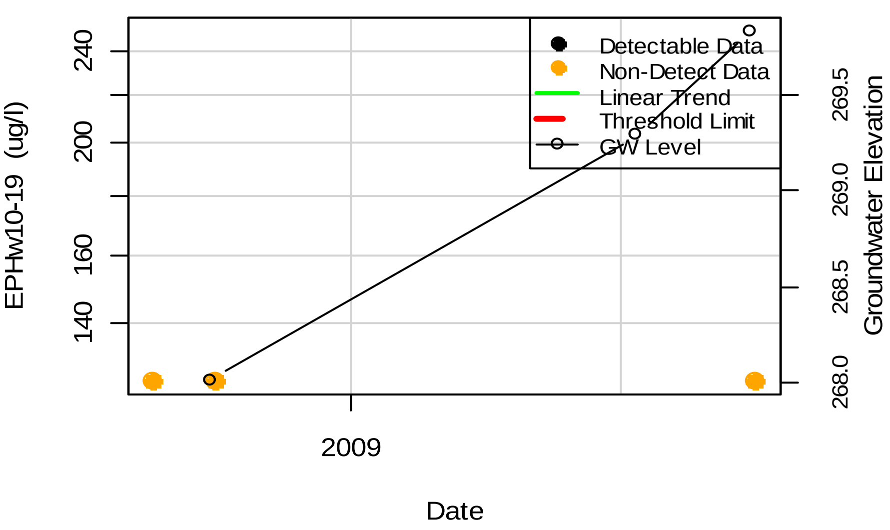
Mann-Kendall P.Value= 0.149; Half-Life= -45 days



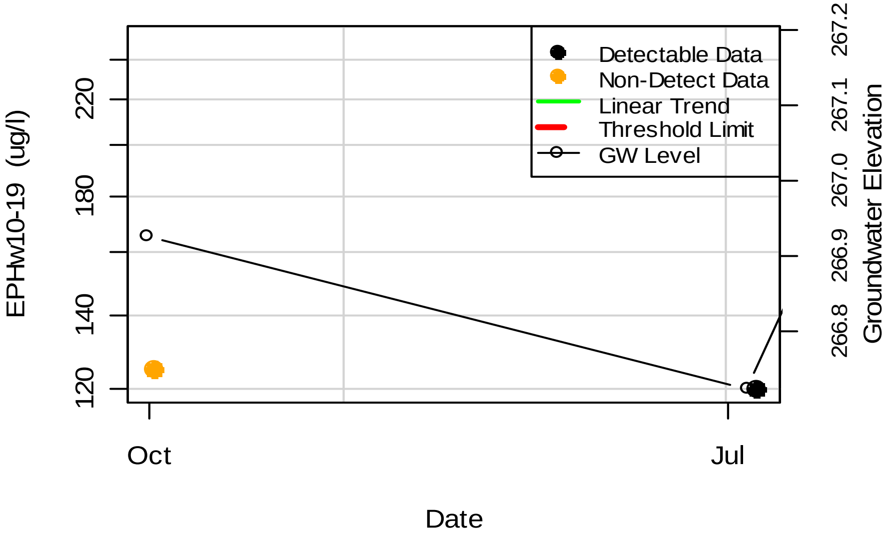
EPHw10-19 in MW08-3

Mann-Kendall P.Value= 1; Half-Life= 170 days

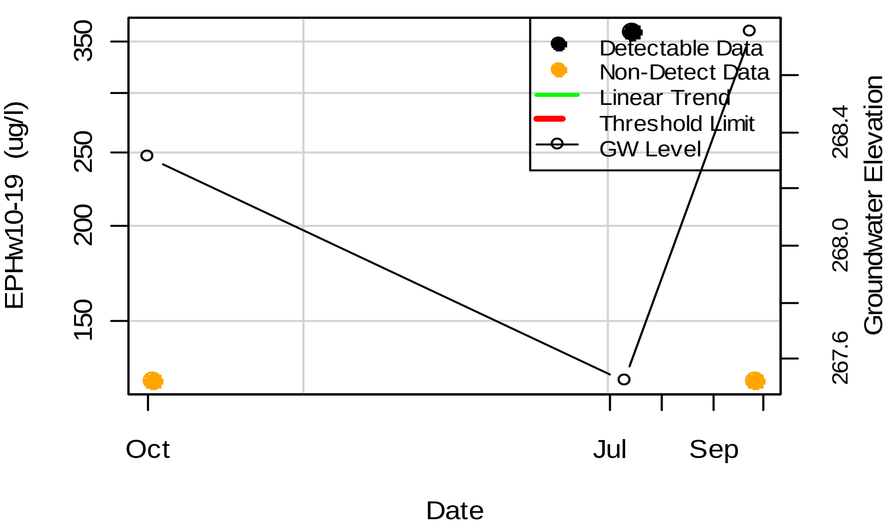
EPHw10-19 in MW08-4



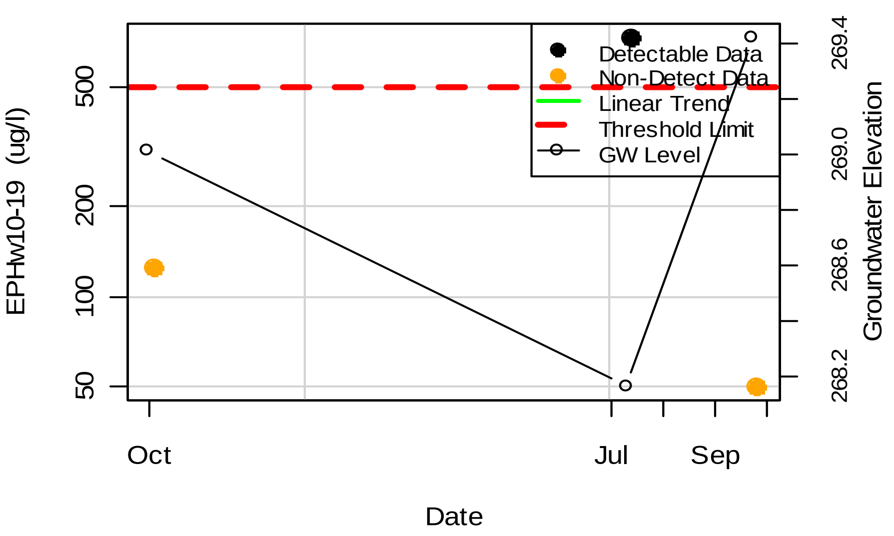
EPHw10-19 in MW08-5

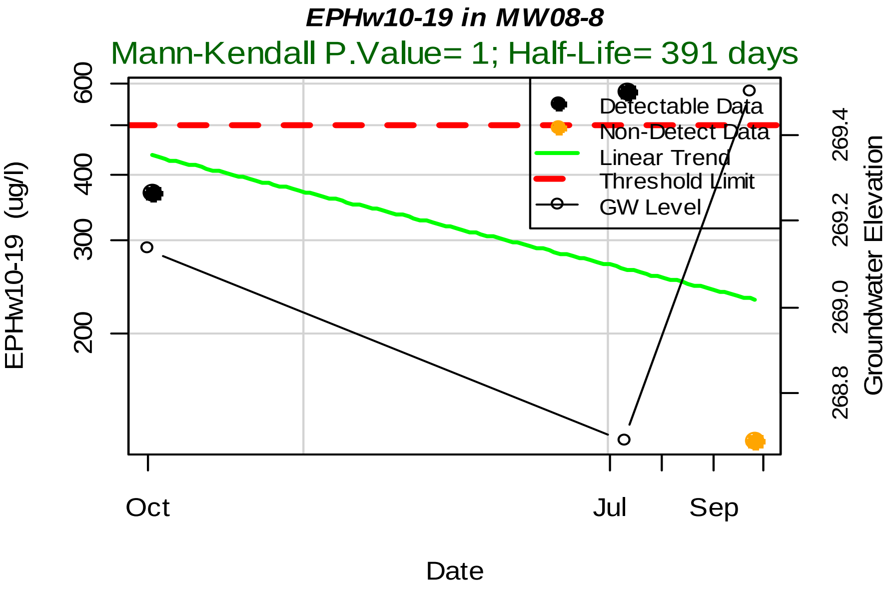


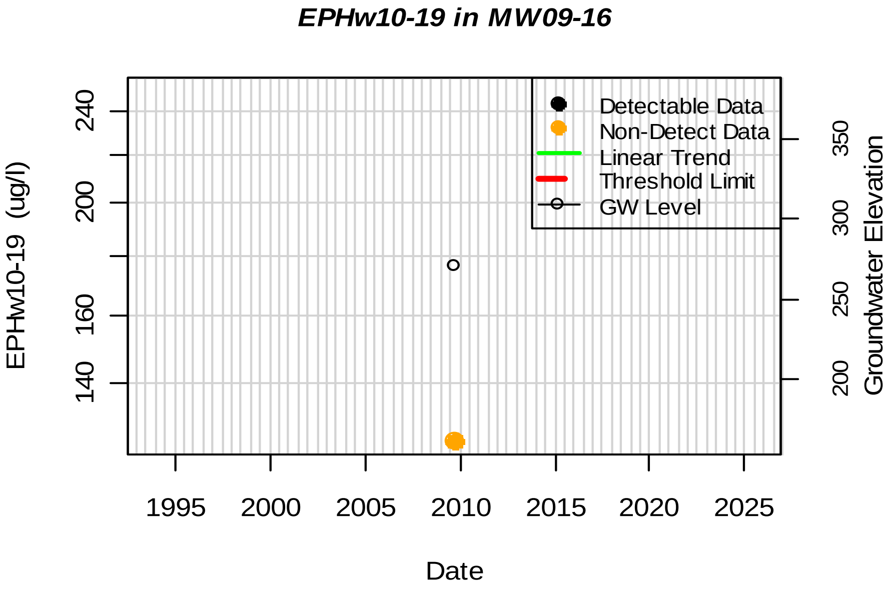
EPHw10-19 in MW08-6

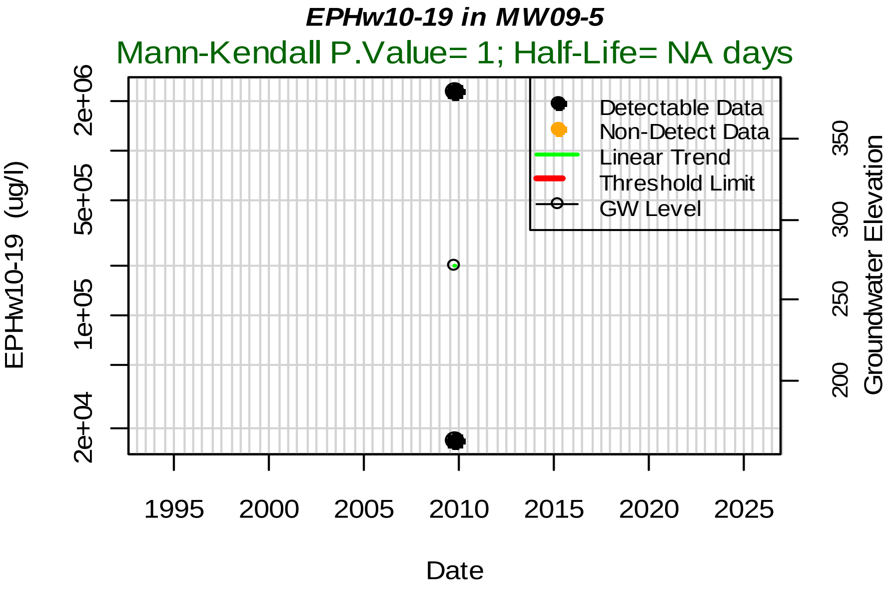


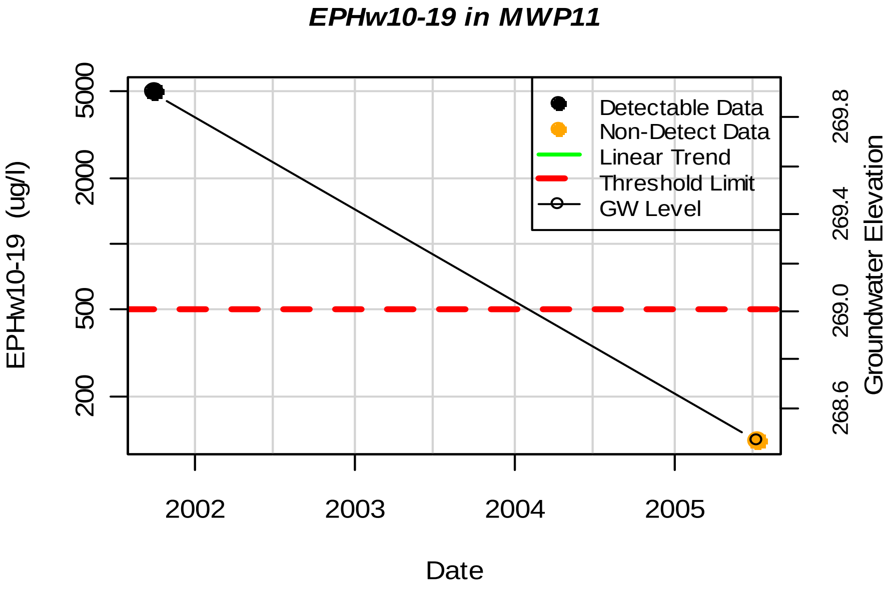
EPHw10-19 in MW08-7

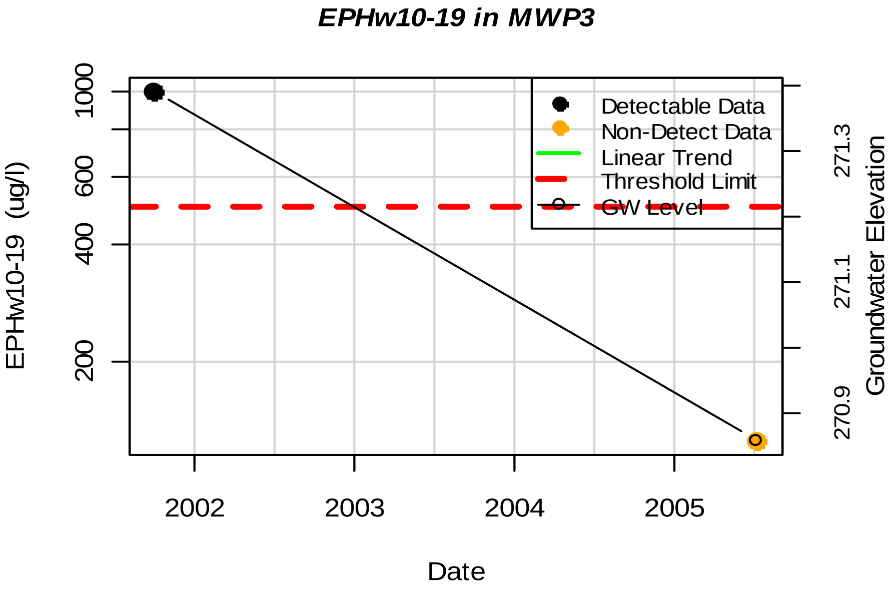


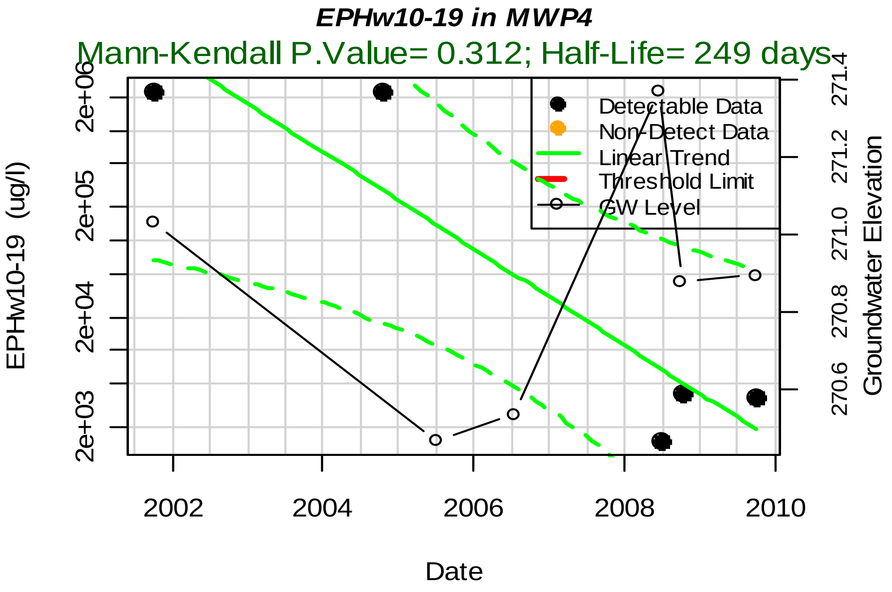

EPHw10-19 in MW08-8
Mann-Kendall P.Value= 1; Half-Life= 391 days
EPHw10-19 (ug/l)
600
400
300
200
Groundwater Elevation
269.4
269.2
269.0
268.8
Oct
Jul
Sep
Date
Detectable Data
Non-Detect Data
Linear Trend
Threshold Limit
GW Level


EPHw10-19 in MW09-16
EPHw10-19 (ug/l)
240
200
160
140
Groundwater Elevation
350
300
250
200
1995
2000
2005
2010
2015
2020
2025
Date
Detectable Data
Non-Detect Data
Linear Trend
Threshold Limit
GW Level


EPHw10-19 in MW09-5
Mann-Kendall P.Value= 1; Half-Life= NA days
EPHw10-19 (ug/l)
2e+06
5e+05
1e+05
2e+04
Groundwater Elevation
350
300
250
200
1995
2000
2005
2010
2015
2020
2025
Date
Detectable Data
Non-Detect Data
Linear Trend
Threshold Limit
GW Level


EPHw10-19 in MWP11
EPHw10-19 (ug/l)
5000
2000
500
200
Groundwater Elevation
269.8
269.4
269.0
268.6
2002
2003
2004
2005
Date
Detectable Data
Non-Detect Data
Linear Trend
Threshold Limit
GW Level


EPHw10-19 in MWP3
Detectable Data
Non-Detect Data
Linear Trend
Threshold Limit
GW Level
EPHw10-19 (ug/l)
1000
600
400
200
271.3
271.1
270.9
Groundwater Elevation
2002
2003
2004
2005
Date


EPHw10-19 in MWP4
Mann-Kendall P.Value= 0.312; Half-Life= 249 days
Detectable Data
Non-Detect Data
Linear Trend
Threshold Limit
GW Level
EPHw10-19 (ug/l)
2e+06
2e+05
2e+04
2e+03
271.4
271.2
271.0
270.8
270.6
Groundwater Elevation
2002
2004
2006
2008
2010
Date

APPENDIX VI

Ecological Monitoring Report (Azimuth)

Azimuth Consulting Group Inc.
218-2902 West Broadway
Vancouver, BC
Canada V6K 2G8

Phone: 604-730-1220
Fax: 604-739-8511
www.azimuthgroup.ca

Our File #: M1-10-01

May 25, 2010

David Bridger
SNC Lavalin Environment Inc.
8648 Commerce Court, Burnaby
BC V5A 4N6

Dear Mr. Bridger

Re: Port of Pleasant Camp, BC: Review of 2009 Monitoring Data – Update on Potential Ecological Risks

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Introduction and Objective

On behalf of Public Works and Government Services Canada (PWGSC), SNC - Lavalin Environment, Division of SNC-Lavalin Inc. (SLE) has asked Azimuth Consulting Group Inc. (Azimuth) to: 1) review the 2009 monitoring data from the above site with the aim of assessing potential for ecological risks to the terrestrial, but especially, the aquatic environment of Granite Creek; and 2) provide recommendations in support of ongoing risk management. We have conducted our review and this letter describes our findings and recommendations.

Approach

This 2010 assessment builds from the Azimuth April 23, 2009 letter report 'Review of 2008 Monitoring Data, Related to Potential Ecological Risks to Granite Creek', and is based on the SLEI report entitled "FY2009/2010 Monitoring and Remediation Closure Report, Port of Pleasant Camp; Canada Border Services Agency". We reviewed all relevant data within figures and tables of the report relating to hydrocarbons in soils, ground water and surface water with respect to their potential to affect terrestrial and the aquatic environment of Granite Creek. Trends in groundwater chemistry between wells nearest the historic contamination source and step-out or sentry wells towards Granite Creek were examined. Surface water chemistry of Granite Creek was also reviewed and contrasted with historic information collected since 2004. These data were evaluated in light of the 2006 Preliminary Quantitative Ecological Risk Assessment – Problem Formulation for the Port of Pleasant Camp Border Crossing Facility (Azimuth, 2006) to determine what historic changes have occurred.

As in 2008, this review was preceded by:

- Ongoing bi-annual contaminant monitoring by SLEI at the site, most recently data provided in SLEI's 2009/10 progress report. The 2009 data are the subject of this review.
- Two rounds of biological evaluation and monitoring by Azimuth for the site, including:
    - Azimuth, 2006 Preliminary Quantitative Ecological Risk Assessment – Problem Formulation, Port of Pleasant Camp Border Crossing Facility, Pleasant Camp, B.C. November 2006.
    - Granite Creek Monitoring Program 2007: Pleasant Camp, BC. February 2008. [referred to as Azimuth, 2008], that documents a second round of biological monitoring in Granite Creek in 2007

Findings from 2009 Data

The Port of Pleasant Camp has been subject of numerous investigations, remediation, problem formulation/risk assessment and ongoing monitoring. Recently, the air sparge (AS) system was halted in January 2009 while the soil vapour extraction (SVE) system was halted in July 2009. The objective of the AS/SVE was to 1) reduce hydrocarbon concentrations in ground water by volatilization of contaminants and enhancing biodegradation (through bioventing) and 2) use SVE to reduce impacts to House #5 from potential mobilization of vapors in soil and ambient air. This document examines the influence of this remedial action in the context of contaminants migration via groundwater and implications for environmental quality of Granite Creek, which lies about 45 m south of the site and presumably within the groundwater flow pathway from the site.

The main findings of our review of 2009 data are as follows:

Soils Chemistry – Installation of the AS/SVE system appears to have reduced hydrocarbon concentrations in soils and groundwater within the area of influence of the system. There is no apparent contamination of soils at depths shallower than 1 m. Depth of hydrocarbon contamination in soils appears to be restricted between 1.2 – 1.8 m to 3.2 – 5.5 m depth with an average thickness of 2.0 m (Table 2 of SLEI report). The spatial extent of surface (<1.5 m) contamination is relatively small and centered near the generator building and the ditch to the north. However, there is potential for movement of groundwater to intercept part of the ditch (SLE Drawing

131416-908) north of the generator building (see borehole MW01-16). Given that the ditch appears to be about 1 – 1.5 m below grade, there is an increased likelihood of interception with plant roots or burrows of small mammals in this area. Given the uncertainty of this flow pathway, monitoring of conditions within the ditch is warranted.

There is no apparent trending of the hydrocarbon plume towards surface or south towards Granite Creek. Contamination is sufficiently deep that risks to plants and burrowing animals, is negligible. Conditions have not changed or have improved since 2008.

Trends in Groundwater Quality from Sentry Wells – A series of new sentry wells added in 2008 provided a robust array of wells between the site and Granite Creek, intended to ensure that there were no open, unmonitored pathways south of the site, beneath the Haines highway towards the steep slope that leads down to Granite Creek. Based on Tables 4 – 6 of the SLEI report and Drawing 131416-911 that depicts spatial and temporal trends in hydrocarbons, we make the following conclusions/observations:

- Two monitoring wells south of the main area of contamination and beneath the Haines Highway contained groundwater with consistently detectable hydrocarbons in excess of Contaminated Sites Regulations (CSR) standards.
    - July and September concentrations of LEPHw from monitoring well MW-08-3 were 540 µg/L and 1,100 µg/L respectively, but were significantly lower than peak concentration observed in 2007 (8,900 µg/L).
    - Groundwater in monitoring well MW-03-10 also consistently exceeded CSR standards for LEPHw and occasionally for EPHw10-19. 2009 LEPHw concentrations were 3,400, 2,600 and 3,900 µ/L in July, August and September respectively.
    - PAHs were non-detectable in both of these wells.
- South and bounding MW-03-10, monitoring wells MW-04-1, MW-04-2 and MW-04-4 had non-detectable LEPHw concentrations; South and bounding MW-03-08, monitoring wells MW-01-20 and MW-08-5 had non-detectable LEPHw concentrations. LEPHw and EPHw10-19 concentrations in MW-01-21 were 420 µg/L and 260 µg/L and less than the CSR standard and have shown declining trends in both parameters since 2008.
- Moving from west to east across the site and bounding the site, monitoring wells MW-08-8, MW-08-7, MW-08-6, MW-04-1, MW-04-3, MW-03-1, MW-01-23 and MW-03-6 all have non-detectable LEPHw and EPHw10-19 concentrations.
- There is no evidence of downgradient, southwards migration or transport of hydrocarbons from MW-08-03 and MW-08-10 towards Granite Creek.

- Potentiometric elevations in the SLEI report indicate that groundwater flow is estimated to be southeast under a steep hydraulic gradient of 0.08 m/m becoming steeper (up to 0.13 m/m) to the south, closer to Granite Creek. This translates to an estimated average hydraulic conductivity within the sand and gravel lens of between 8 x 10^{-4} m/sec in MW01-18 and 7 x 10^{-5} m/sec in MWP3. This corresponds to an estimated groundwater velocity of between 2 m/day and 18 m/day from the site to the other side of Haines Highway. This is a relatively rapid rate of flow. Should the contamination not be contained, transport towards the creek will be (or has been) relatively rapid.
- Operation of the AS/SVE system may have exacerbated groundwater concentrations of breakdown by-products including iron, manganese, nitrate (NO_3) and sulphate (SO_4) within the vicinity of its influence. For example, iron is elevated in certain wells south of the highway that are unbounded. Iron is elevated in (i.e., but less than 10x the CCME guideline concentration for aquatic life protection of 300 µg/L) in groundwater from well MW-08-7 on the western boundary, MW-04-2 in the middle and MW-04-3 in the east; Iron is low at wells adjacent to the elevated wells from west to east including MW-08-6, MW-04-1, and MW-01-20. Concentrations of manganese are not necessarily correlated with iron, while nitrate appears to have similar 'fuzzy' boundaries to the south (Drawing 131416-913).

Trends in Surface Water Quality – Surface water quality data from upstream, mid-stream and downstream (i.e., relative to the presumed groundwater pathway) in 2009 are very similar to 2008 and not substantively different from data dating back to 2004. Main observations of surface water chemistry are:

- There were no detectable concentrations for any hydrocarbon species, nor for monocyclic aromatic hydrocarbons.
- PAHs were non-detectable except for pyrene at the detection limit (DL) at the upstream and midstream stations and may be related to proximity of the highway at these locations.
- Aluminum continues to exceed guideline concentrations at all stations and exceedences are related to background conditions (i.e., upstream reference site also exceeds the ambient criteria). The range in aluminum concentrations between up-, mid- and downstream stations was similar.
- Most other metals were below DLs except for common salts (Mg, Na), while Ba, Mg, Mo and Cu exceeded DLs and were well below CCME guideline concentrations.
- Concentrations of iron and manganese are well below CCME guidelines for the protection of aquatic life and there was no trend between upstream reference and downstream stations, nor between concentrations of these two metals between stations. This result suggests that there is no influence on

surface water quality of Granite Creek from petroleum breakdown by-products from the site.

2006 and 2007 Ecological Results – To reiterate results of ecological studies on Granite Creek in 2006 and follow-up work in 2007, it appeared that environmental quality of Granite Creek was high; small differences in benthic community structure did not appear to be associated with site-related contamination. Water and sediment quality showed no evidence of hydrocarbon contamination. Near-surface groundwater quality from pushpoint groundwater samples at the stream bank did not show evidence of contamination.

Summary

Based on results of 2009 soil and groundwater testing since cessation of the air sparging system, there does not appear to be an increase or upward trending of hydrocarbons or hydrocarbon by-products in groundwater wells south of the Haines Highway. Contamination appears to be contained north of the highway, as hydrocarbons were not detected in meaningful quantities in wells bounding east, south and west of the highway. Surface water quality is excellent and unchanged since 2004. Based on findings from the 2006 and 2007 biological monitoring (Azimuth, 2008), and 2009 ground and surface water quality data, there is nothing to suggest that receiving environment conditions have changed and it is likely that conditions in the aquatic receiving environment are stable under the current regime.

Recommendations

Hydrocarbons are elevated in several groundwater wells near the highway. However, no elevations have been detected in wells south of the highway and there does not appear to be any migration of hydrocarbons towards Granite Creek. Hydrocarbon degradation by-products generated by the sparging system are elevated in some wells within the hydraulic gradient trending towards the creek. Based on these findings, we recommend the following:

1. Continue monitoring groundwater well quality in the post-sparging system temporal regime at least once per year (at a minimum) to ensure that any breakout of hydrocarbons or their degradation by-projects do not go undetected.
2. Visual monitoring for evidence of hydrocarbon staining and/or impairment of vegetation growth in the ditch north of the generating station should be implemented. Soil sampling at the bottom of the ditch is warranted, given the uncertainty in movement and depth of hydrocarbons in soils just south of this ditch.

3. Once-annual monitoring of Granite Creek surface water quality for the same parameters as in previous years.
4. Conduct visual observations along the north creek bank for evidence of seeps, soil discoloration or other anomalies between upstream and downstream surface water quality monitoring locations.

Given the absence of contamination and apparent lack of contaminant mobility towards Granite Creek, we do not recommend further ecological work in the stream at this time, or until groundwater conditions change significantly in step out wells.

Please do not hesitate to contact us if you have any questions or require further information.

Sincerely,

Azimuth Consulting Group Inc.

Randy Baker, M.Sc., R.P.Bio.
Principal

APPENDIX VII

Remediation System Journal

Air Sparge / Soil Vapour Extraction System Journal
Canada Border Services Agency, Port of Pleasant Camp, B.C.

Date	Activity
2006-06-16	Equipment was commissioned. Hour meter for AS and SVE unit was at 24 hrs. AS headers were balanced to ensure all wells flowed (where possible) and that the pressure that each header developed did not exceed 15 psi. The pressure relief valve was set at 15 psi. At 15 psi the AS motor drew 37 amps which is the max. current draw for the motor. AS timer was set to switch between headers every 30 minutes. The system timer was set to shut down between 12:00 and 12:15 to allow for the SVE knockout to drain automatically.
2006-06-17	System monitoring checklist completed; SVE flows and recoverable vapour concentrations were evaluated. Inline rotameters did not allow for flow at low vacuum for most wells although SVE 3 and 1 were observed to flow at an applied vacuum of 0.4 "H2O. Extraction was form header #1. Header #2 was closed as was the inlet dilution valve. Header #2 is not connected to any wells. AS bleed valve was left open slightly to reduce pressure at blower. MW03-5 had no flow w/ an applied pressure of 18 psi. MW03-4 flowed @ 5.5 cfm at an applied pressure of 15.5 psi. AS 9 had not flow w/ an applied pressure of 18 psi.
2006-06-18	System monitoring checklist completed by Pam and Renaud Larose; Manholes on road were parged to prevent sluffing in of surrounding
2006-07-05	System monitoring checklist completed; cottonwood and dandelions being sucked in through vent
2006-07-06	System monitoring checklist completed
2006-07-13	System monitoring checklist completed; swept out enclosure (black flies and cottonwood fluff)
2006-07-15	SLE technician (RJD) on-site; Surged and purged AS wells 9, 03-4 and 03 5 on July 15, 2006. This work was successful at producing flow at AS 9 at the operating pressure of the AS system. Following surging and purging operations it was not possible to produce flow at AS wells 03-4 and 03 5.
2006-07-16	Site monitoring event; system shutdown
2006-07-19	Balanced AS headers
2006-07-25	System monitoring checklist completed
2006-07-31	System monitoring checklist completed
2006-08-08	System monitoring checklist completed
2006-09-08	**Monthly update for period June 16 to July 31 sent to PWGSC**
2006-08-15	System monitoring checklist completed; Issue with release valve on header #3
2006-08-29	System monitoring checklist completed and monthly Ground Effects equipment check completed; Header #3 at 1 psi at the same time that header #4 is at 9.0 psi. The solenoid on header #3 may be failing.
2006-09-06	System monitoring checklist completed; Gastech noted to not hold a charge.
2006-09-08	**Monthly update for period Aug 1 to Sept 6 sent to PWGSC**
2006-09-20	System monitoring checklist completed
2006-09-29	SLE technician (BSW) on-site to perform monitoring event; system shutdown for 4 days
2006-09-30	System monitoring checklist and monthly and 3 month Ground Effects equipment check completed; Gastech repaired. AS filter needs change as identified by Renaud. Oil level in rotary claw is at half as per normal.
2006-10-04	System monitoring checklist completed; Gauge on Header 3 needs replacing
2006-10-10	System monitoring checklist completed
2006-10-11	**Monthly update for period Sept 6 to Sept 30 sent to PWGSC**
2006-10-17	System monitoring checklist completed; Out of calibration gas
2006-10-25	System monitoring checklist completed
2006-10-31	System monitoring checklist and monthly and 3 month Ground Effects equipment check completed; Sparge air filter changed.
2006-11-07	System monitoring checklist completed
2006-11-10	**Monthly update for period Oct 1 to 31 sent to PWGSC**
2006-11-15	System monitoring checklist completed
2006-11-22	System monitoring checklist completed; Headers 1, 3 and 2 all reading 1.5 to 2 while header 2 was running; all back to zero on Nov 23
2006-11-30	System monitoring checklist and monthly Ground Effects equipment check completed
2006-12-06	System monitoring checklist completed
2006-12-12	**Monthly update for period Nov 1 to 30 sent to PWGSC**
2006-12-14	System monitoring checklist completed
2006-12-20	System monitoring checklist completed; cleared roof of enclosure and pipes due to 4 ft of snow followed by rain
2006-12-26	System monitoring checklist completed
2007-01-04	System monitoring checklist completed; 6 month inspection of remediation equipment completed as per Ground Effects checklist.
2007-01-12	System monitoring checklist completed; Gauge on Header 1 noted to not return to zero when turned off.
2007-01-16	System monitoring checklist completed
2007-01-24	System monitoring checklist completed
2007-01-30	System monitoring checklist completed; Inspection of remediation equipment and monthly Ground Effects equipment check completed
2007-02-06	System monitoring checklist completed; Power to site was off for approx. 2.5 hrs; shovelled out remediation shack
2007-02-06	**Monthly update for period Dec 27, 2006 to Jan 30, 2007 sent to PWGSC**
2007-02-14	System monitoring checklist completed
2007-02-22	System monitoring checklist completed; very cold weather (-40 degC) and system working ok
2007-02-28	System monitoring checklist and monthly Ground Effects equipment check completed
2007-03-06	**Monthly update for period Jan 31 to Feb 28 sent to PWGSC**
2007-03-07	System monitoring checklist completed; 100 cm of snow overnight
2007-03-15	System monitoring checklist completed
2007-03-29	System monitoring checklist and monthly inspection of remediation equipment completed as per Ground Effects checklist
2007-04-05	System monitoring checklist completed; 3" of wet snow
2007-04-11	**Monthly update for period Mar 1 to 29 sent to PWGSC**

Air Sparge / Soil Vapour Extraction System Journal

Canada Border Services Agency, Port of Pleasant Camp, B.C.

Date	Activity
2007-04-13	System monitoring checklist completed; System off for approximately 125 hrs due to shut downs caused by high level in the SVE knockout tank when the tank appeared to not have drained fully during prior monitoring events. The problem may have been associated with sediment/debris in the knockout tank and appears to have been corrected.
2007-04-19	System monitoring checklist completed; Drained SVE Tank (was 1/2 full). Tank was drained twice yesterday and day before. Could be due to rocks or debris in tank as it drained.
2007-04-30	System monitoring checklist and monthly Ground Effects equipment check completed
2007-05-07	System monitoring checklist completed
2007-05-14	System monitoring checklist completed
2007-05-22	System monitoring checklist completed; snow almost all melted
2007-05-24	**Monthly update for period Mar 30 to Apr 30 sent to PWGSC**
2007-05-28	System monitoring checklist and monthly and 3 month Ground Effects equipment check completed
2007-06-04	System monitoring checklist completed
2007-06-05	**Monthly update for period May 1 to May 28 sent to PWGSC**
2007-06-13	System monitoring checklist completed
2007-06-20	System monitoring checklist completed
2007-06-25	System monitoring checklist and monthly Ground Effects equipment check completed
2007-07-02	System monitoring checklist completed
2007-07-10	System monitoring checklist completed
2007-07-17	System monitoring checklist completed
2007-07-23	System monitoring checklist completed; Sparge air intake was clogged with cotton wood debris. Cleaned out debris. Screen is clear.
2007-07-30	System monitoring checklist and monthly Ground Effects equipment check completed
2007-08-06	System monitoring checklist completed; changed air filter on sparge
2007-08-15	System monitoring checklist completed
2007-08-19	System monitoring checklist completed
2007-08-27	System monitoring checklist and monthly Ground Effects equipment check completed; SVE hour log reported as not working.
2007-09-03	System monitoring checklist completed; SVE hour log reported as not working. As the AS and SVE systems operate in conjunction with one another the hourmeter for the AS blower provides the necessary information for evaluating the operational time of the SVE blower. Given the expense of repairing the SVE hourmeter at the remote Port of Pleasant Camp, it was recommended not to address this issue at this time.
2007-09-11	System monitoring checklist completed
2007-09-14	SLE technician on-site; Evaluated SVE well performance, and vapour/pressures at SVMW around House 5. Purged AS 03-4 and AS 03-5. Was unable to induce flow at these wells with a maximum applied pressure of 15 psi. Completed a system monitor.
2007-09-15	Drilled new AS wells to replace AS 03-4 and 03-5.
2007-09-16	Completed new AS wells 07-1 and 07-2. Reconnected piping and moved boxes to new AS wells. Surged and purged new AS wells. Significant silt was noted in the wells. Backfilled AS03-4 and 03-5 with bentonite pellets
2007-09-17	Checked flowrates on AS 07-1 and AS 07-2. Unable to develop flow to AS 07-1 with a maximum applied header pressure of 19 psi. Cycled pressure of 19 psi on well in attempt to induce flow, and was not successful. AS 07-2 was observed to flow with an applied header pressure as low as 10 psi. This was observed after cycling pressure to the well at a pressure of 19 psi. AS 9 and AS 15 were not observed to flow initially. AS 9 and 15 were purged however the effectiveness of this was limited as the wells were close to dry. Rebalancing the header allowed for the development of flow at AS 9. AS 15 was not observed to flow at a maximum applied pressure of 20 psi.
2007-09-18	System monitoring checklist completed (new form used)
2007-09-27	System monitoring checklist and monthly and 3 month Ground Effects equipment check completed
2007-10-01	System monitoring checklist completed (old form)
2007-10-08	System monitoring checklist completed; Power outage occurred Sunday Oct 7, system restarted at 3:43 pm on Oct 8.
2007-10-15	System monitoring checklist completed; Cleaned out leaves from sparge intake.
2007-10-22	System monitoring checklist completed; Air phase carbon changed out from vessels by Quantum
2007-10-31	System monitoring checklist and monthly Ground Effects equipment check completed; Changed AS air filter.
2007-11-05	System monitoring checklist completed (old form)
2007-06-05	**Quarterly update for period June through September 2007 (Q3) sent to PWGSC**
2007-11-14	System monitoring checklist completed (old form); A power brown out had occurred the previous night, system was restarted once power was restored. Noted that timer clock is one hour ahead of time due to time change (daylight savings).
2007-11-22	System monitoring checklist completed (old form);
2007-11-28	System monitoring checklist and monthly Ground Effects equipment check completed; 2 ft of snow, shovelled out system
2007-12-04	System monitoring checklist completed
2007-12-13	System monitoring checklist completed; Note still that timer clock is one hour ahead of time due to time change (from previous daylight savings). Shovelled snow from around system enclosure
2007-12-19	System monitoring checklist completed; Attempted to take systems readings on Dec 18 but control panel door was frozen shut.
2007-12-24	System monitoring checklist completed
2007-12-31	System monitoring checklist and monthly Ground Effects equipment check completed;
2008-01-07	System monitoring checklist completed
2008-01-13	System monitoring checklist completed
2008-01-22	System monitoring checklist completed
2008-01-28	**Quarterly update for period Oct through Dec 2007 (Q4) sent to PWGSC**
2008-01-29	System monitoring checklist and monthly Ground Effects equipment check completed;
2008-02-04	System monitoring checklist completed

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Date	Activity
2008-02-11	System monitoring checklist completed
2008-02-20	System monitoring checklist completed
2008-02-29	System monitoring checklist and monthly Ground Effects equipment check completed;
2008-03-05	System monitoring checklist completed; Blower discharge reading cannot be determined as dial is not functioning.
2008-03-12	System monitoring checklist completed; Blower discharge reading cannot be determined as dial is not functioning.
2008-03-13	Spoke w/ Renaud. Indicated failed gauge is a pressure gauge at or near discharge of SVE blower. Requested additional flexible tubing for the calibration of the Gastech. Tubing sent 03/14/08 SLE requested Renaud complete an evaluation of all of the air sparge well flowrates.
2008-03-17	System monitoring checklist completed; Site operators (Pam and Renaud) evaluated AS flowrates. Three (3) AS wells (AS-2, AS-5, and AS-10) that had been observed to flow during the previous evaluation, completed on September 17, 2007, were not observed to flow.
2008-03-31	System monitoring checklist and monthly, 3 month and 6 month Ground Effects equipment check completed
2008-04-14	System monitoring checklist completed; Power outage noted by operator. System noted to be off for at least 2 days.
2008-04-16	New site operator's name is Lloyd Barteaux ph# 907-767-5411 , fax# 907-767-5411, email closter@aptalaska.net
2008-04-22	Following quarterly review, CPL suggested looking into having the site operator look at the AS wells to determine if they are silted up. Following this some sort of well development (possible completed by adding water to the wells) will need to be planned for the next site visit. Air phase sampling of extracted stream should also be completed
2008-04-24	System monitoring checklist completed; System was off, restarted system and took readings at 11 AM
2008-04-28	System monitoring checklist and monthly Ground Effects equipment check completed
2008-04-30	**Quarterly update for period January to March 2008 (Q1) sent to PWGSC**
2008-05-07	System monitoring checklist completed by L. Barteaux; Blower discharge PG5 location. Changed pressure gauge and still does not function.
2008-05-14	System monitoring checklist completed by L. Barteaux
2008-05-22	System monitoring checklist completed by L. Barteaux
2008-05-30	System monitoring checklist completed by L. Barteaux
2008-06-08	System monitoring checklist completed by L. Barteaux
2008-06-11	L. Barteaux. turned system off in a.m. in preparation for ensuing full site well monitoring/sampling starting June 16.
2008-06-19	SLE technician (SRW) on-site; SRW/Erik (Arctic Backhoe) completed well head retrofits (to make accessible for monitoring/sampling purposes) of AS-1, AS-3, AS-4, AS-7, AS-8, AS-10, AS-12, AS-13, AS-14, AS-15, AS-16, AS-22, AS MW03-3. Fabbed parts are still on site to complete 2 more retrofits. NOTE, the following had already been converted previously; AS-2, AS-5, AS-07-1, AS07-2, AS-9, AS-15. Therefore, the wells which remain which may require a retrofit include AS-6, AS-11, AS-17, AS-18, AS-19, AS-20, AS-21, AS-23
2008-06-20	Erik (Arctic Backhoe) completed surge/purge of AS-2 and AS-10 to remove fine/silts from well bottom (wells no longer flowing) but both (which when later tested on 2008/06/21) were found to have decent flows. SRW purged (only) AS MW03-3, AS-4, AS-15 and AS-22 for the purposes of sampling. At 14:10, system was restarted. Then AS-5, AS-9 were thoroughly surged/purged to remove fine/silts from well bottom (wells no longer flowing). Could not induce air flow for either.
2008-06-21	Found that AS-15 had no flow because it was not receiving any air to the wellhead (possible break/plug in supply line). AS wells AS07-1, AS07-2 were thoroughly surged/purged to remove large volumes of fine/silts from well bottom (wells no longer flowing). Could not induce air flow for either. Completed SVE well wellhead air flow measurements (for all SVE wells). Started AS well wellhead air flow measurements (for 2 of 4 headers - 13 wells) as a check against header manifold readings.
2008-06-22	Completed AS well wellhead air flow measurements. SRW completed system monitoring checklist.
2008-06-26	System monitoring checklist completed by L. Barteaux; Last AS filter used on site. Quantum notified to supply an additional one.
2008-07-05	System monitoring checklist completed by L. Barteaux
2008-07-10	Quantum indicated a new filter was ordered for AS and will be sent up on receipt.
2008-07-11	System monitoring checklist completed by L. Barteaux
2008-07-22	New inlet filter was sent to Pleasant Camp by Quantum
2008-07-23	System monitoring checklist completed by L. Barteaux
2008-07-31	System monitoring checklist completed by L. Barteaux
2008-08-06	**Quarterly update for period April to June (Q2) sent to PWGSC**
2008-08-08	System monitoring checklist completed by L. Barteaux
2008-08-23	SLE technician (TDD) on-site; System monitoring checklist completed by TDD
2008-09-01	Inlet filter was installed by Lloyd
2008-09-09	System monitoring checklist completed by L. Barteaux
2008-09-18	System monitoring checklist completed by L. Barteaux
2008-09-19	Inquired w/ Busch re: supply of gear oil for required oil change on AS blower.
2008-09-24	System monitoring checklist completed by L. Barteaux
2008-09-27	SLE technician (TDD) on-site. Completed an evaluation of AS well performance and redeveloped AS wells to ensure flow is maintained. Arctic Backhoe repaired the piping to AS -15. The well was confirmed to flow and was incorporated into the regular AS cycle. The wellheads for AS-7 and AS-21 were replaced to allow for access.
2008-09-29	Quantum confirmed they would replace the gear oil on the AS blower by the end of the year.
2008-10-14	System monitoring checklist completed by L. Barteaux; Lloyd was unable to manually switch headers. Contacted him on 10/23 and asked him to play around with program to see if he can restore this function. Speaking with Tim Drozda, he indicated that this was working when he did the header rebalancing at the beginning of October.
2008-10-30	System monitoring checklist completed by L. Barteaux; cannot change headers manually

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Canada Border Services Agency, Port of Pleasant Camp, B.C.

Date	Activity
2008-11-03	**Quarterly update for period July to September (Q3) sent to PWGSC**
2008-12-03	System monitoring checklist completed by L. Barteaux; cannot change headers manually. Header reading #2 is zero
2008-12-22	Lloyd still unable to manually switch headers.
2009-01-14	**Quarterly update for period Sept to Dec 2007 sent to PWGSC**
2009-01-16	System monitoring checklist completed by L. Barteaux; cannot change headers manually
2009-01-23	Lloyd shut down AS system.
2009-02-06	System monitoring checklist completed by L. Barteaux; AS off as instructed
2009-02-26	System monitoring checklist completed by L. Barteaux; AS compressor oil was changed @ 21045 hrs.
2009-04-17	System monitoring checklist completed by L. Barteaux
2009-04-24	System monitoring checklist completed by L. Barteaux
2009-04-24	**Quarterly update for period Dec 2007 to April, 2008 sent to PWGSC**
2009-04-30	System monitoring checklist completed by L. Barteaux
2009-05-08	System monitoring checklist completed by L. Barteaux
2009-05-16	System monitoring checklist completed by L. Barteaux
2009-06-05	System monitoring checklist completed by L. Barteaux
2009-06-12	System monitoring checklist completed by L. Barteaux
2009-07-09	SLE technician (SRW) on site, completed system monitor at 12:30pm. Following monitor, completed full system shutdown (indefinetely) which included shutting OFF of the SVE system (AS system already OFF), switching the system control panel disconnect to OFF. Opened drain valves on AS air inlet tank, SVE knockout drum and carbon vessels (CV1 and CV2). Disconnected and removed SVE discharge stack and replaced with temporary wooden blind flange. Closed SVE header valves (gate valves). Closed all ball valves for each individual sparge well on all 4 headers.
2009-07-14	SRW and Marinka established the main disconnect for the metered system power supply in the "Generator Bldg". SRW put disconnect switch to OFF position and locked it out with a 3303 lock and tag.
2009-07-15	The electrical service for the AS and SVE equipment was disconnected and meter removed (by APT - Alaska Power & Telephone).
2009-08-05	**Quarterly update for period April to July 9 sent to PWGSC**

APPENDIX VIII

Revised NCSCS Scoring

CCME National Classification System for Contaminated Sites (2008)
Pre-Screening Checklist

	Question	Response (yes / no)	Comment
1.	Are **Radioactive material**, **Bacterial contamination** or **Biological hazards** likely to be present at the site?	No	If yes, do not proceed through the NCSCS. Contact applicable regulatory agency immediately.
2.	Are there **no contamination exceedances** (known or suspected)? Determination of exceedances may be based on: 1) CCME environmental quality guidelines; 2) equivalent provincial guidelines/standards if no CCME guideline exists for a specific chemical in a relevant medium; or 3) toxicity benchmarks derived from the literature for chemicals not covered by CCME or provincial guidelines/standards.	No	If yes (i.e., there are no exceedances), do not proceed through the NCSCS.
3.	Have **partial/incompleted or no environmental site investigations** been conducted for the Site?	No	If yes, do not proceed through the NCSCS.
4.	Is there direct and signficant evidence of **impacts to humans** at the site, or off-site due to migration of contaminants from the site?	No	If yes, automatically rate the site as Class 1, a priority for remediation or risk management, regardless of the total score obtained should one be calculated (e.g., for comparison with other Class 1 sites).
5.	Is there direct and significant evidence of **impacts to ecological receptors** at the site, or off-site due to migration of contaminants from the site?	No	Some low levels of impact to ecological receptors are considered acceptable, particularly on commercial and industrial land uses. However, if ecological effects are considered to be severe, the site may be categorized as Class 1, regardless of the numerical total NCSCS score. For the purpose of application of the NCSCS, effects that would be considered severe include observed effects on survival, growth or reproduction which could threaten the viability of a population of ecological receptors at the site. Other evidence that qualifies as severe adverse effects may be determined based on professional judgement and in consultation with the relevant jurisdiction.
6.	Are there indicators of significant **adverse effects in the exposure zone** (i.e., the zone in which receptors may come into contact with contaminants)? Some examples are as follows: -Hydrocarbon sheen or NAPL in the exposure zone -Severely stressed biota or devoid of biota; -Presence of material at ground surface or sediment with suspected high concentration of contaminants such as ore tailings, sandblasting grit, slag, and coal tar.	No	If yes, automatically rate the site as Class 1, a priority for remediation or risk management, regardless of the total score obtained should one be calculated (e.g., for comparison with other Class 1 sites).
7.	Do measured concentrations of volatiles or unexploded ordnances represent an **explosion hazard**?	No	If yes, automatically rate the site as Class 1, a priority for remediation or risk management, and do not continue until the safety risks have been addressed. Consult your jurisdiction's occupational health and safety guidance or legislation on exposive hazards and measurement of lower explosive limits.

If none of the above applies, proceed with the NCSCS scoring.

CCME National Classification System for Contaminated Sites (2008)
Summary of Site Conditions

Subject Site:	**CBSA Port of Pleasant Camp Border Crossing**	
Civic Address: *(or other description of location)*	Haines Highway (commonly referred to as Haines Road) in the northwestern corner of British Columbia, approximately 170 km south of Haines Junction, YT	
Site Common Name : *(if applicable)*	Pleasant Camp	
Site Owner or Custodian: *(Organization and Contact Person)*	Canada Border Services Agency	
Legal description *or* metes and bounds:	Cassiar District Lot 6350	
Approximate Site area:	~ 2 ha	
PID(s) : *(or Parcel Identification Numbers [PIN] if untitled Crown land)*	N/A	
Centre of site: *(provide latitude/longitude or UTM coordinates)*	Latitude: Longitude:	136°21'58.91"W 59°27'18.16"N
	UTM Coordinate:	82941E 6613861N - WGS 1984 UTM Zone 9
Site Land Use:	Current:	Border crossing facility
	Proposed:	N/A
Site Plan	**To delineate the bounds of the Site a site plan MUST be attached. The plan must be drawn to scale indicating the boundaries in relation to well-defined reference points and/or legal descriptions. Delineation of the contamination should also be indicated on the site plan.**	
Provide a brief description of the Site:	The site is located on a bench along the northeast side of Haines Highway at the base of a steep slope. The ground surface slopes gently from northwest to southeast and is either paved, gravel or grass covered. The surrounding area is heavily forested, with steep mountainous terrain descending to the Klehini River Valley. Granite Creek, a tributary of the Klehini River, is located 50 m southwest of the site, across Haines Highway, at the base of a steep bank as shown on the appended Site Plan. Granite Creek, and the areas beyond the west side of the Haines Highway right-of-way (ROW), are located within the Tatshenshini Alsek Provincial Park. The CBSA border crossing facility infrastructure consists of 13 structures including one (1) well house, one (1) maintenance building, three (3) garages, a customs office, a generator building and shed, and five (5) residences.	
Affected media and Contaminants of Potential Concern (COPC):	The potentially affected media is soil, groundwater, vapour, and surfacewater. Groundwater = LEPHw, PAH soil = F1, F2, F3, LEPH, PAH; vapour = none known; surface water = aluminum (naturally occurring). The site is classified based on both provincial CSR standards and CCME guidelines/standards for soil and groundwater and ambient water quality guidelines (BCWQG) for surface water, which, for the purposes of completing the NCSCS scoresheet, will be used where CCME guidelines are required, assuming equivalency.	

Please fill in the "letter" that best describes the level of information available for the site being assessed

Site Letter Grade **A**

If letter grade is F, do not continue, you must have a minimum of a Phase I Environmental Site Assessment or equivalent.

Scoring Completed By:	**Dave Bridger, P.Geo., Project Manager**
Date Scoring Completed:	**31-Mar-10**

CCME National Classification System for Contaminated Sites (2008)
User's Guide - Instructions

1) Please review the following overview of contents. The revised CCME National Classification System for Contaminated Sites (NCSCS) consists of a pre-screening checklist, summary of site conditions, summary score sheet, and three instruction/worksheet pages for the user to fill out: Contaminant Characteristics, Migration Potential and Exposure. For ease of printing, the method of evaluation for scoring each section of the worksheet is provided in a separate Instructions tab. Reference material is also provided to assist with the evaluation. A brief description of each sheet is as follows:

Pre-Screening Checklist - Used to determine if the Site can either be considered a Class 1 site (to be remediated immediately) or more information must be collected before the Site can be ranked, or other hazards exist at the Site that must be addressed first before the Site can be ranked using the revised NCSCS.

Site Description Sheet - Summarizes Site information. It also indicates the level of information available (Site Letter Grade) for the site to conduct the NCSCS scoring evaluation. The known/potential contaminants of concern and affected media will also be summarized here.

Contaminant Characteristics Instructions & Worksheet - Prompts the user for information related to the contaminants of potential concern (COPC) found at the site.

Migration Potential Instructions & Worksheet - Prompts the user for information related to physical transport processes which may move contamination to neighboring sites or re-distribute contamination within a site. Migration potential includes many of the exposure pathways, but is not limited to exposure pathways. Migration potential does not require clearly defined receptors.

Exposure Instructions & Worksheet - Prompts the user for information related to exposure pathways and receptors which may be located on the site.

Summary Score Sheet - Generates a total site score by adding up the scores generated on each of the three worksheets and provides the corresponding Site Classification. It also provides an estimate of certainty in the score provided (Certainty Percentage).

Reference Material - Additional information which may be useful to refer to when conducting the evaluation.
- Contaminant Hazard Ranking
- Examples of Persistent Substances
- Examples of Substances in the Various Chemical Classes
- Chemical-specific Properties
- Range of Values of Hydraulic Conductivity and Permeability

The worksheet titles and sub headings are as follows.

I. Contaminant Characteristics

1. Residency Media
2. Chemical Hazard
3. Contaminant Exceedance Factor
4. Contaminant Quantity
5. Modifying Factors

II. Migration Potential

1. Groundwater Movement
2. Surface water Movement
3. Soil
4. Vapour
5. Sediment Movement
6. Modifying Factors

III. Exposure

1. Human Receptors
   A. Known Impact
   B Potential
      a. Land Use
      b. Accessibility
      c. Exposure Route
2. Human Modifying Factors
3. Ecological Receptors
   A. Known Impact
   B. Potential
      a. Terrestrial
      b. Aquatic
4. Ecological Modifying Factors
   a. Species at Risk
   b. Aesthetics
5. Other Receptors
   a. Permafrost

CCME National Classification System for Contaminated Sites (2008)
User's Guide - Instructions

2) This is an electronic form which will prompt the user for information. Based on the answers provided, a score is calculated for the contaminated site in question. In most cases, the user will be asked to select amongst two or more choices in a drop down checklist. To access the drop down checklist, move the mouse towards the right side of the "action box". If a drop down is available, an arrow will appear, which must be selected to access the drop down choices. An "action box" requires input from the user. All action boxes have an amber background.

action box

3) When assigning scores for each factor, it is highly recommended to give a rationale (a column has been provided for this purpose in Worksheets I, II and III). Information that would be useful in justifying the scores assigned may include: a statement of any assumptions, a description of site-specific information, and references for any data sources (e.g., site visit, personal interview, site assessment reports, or other documents consulted).

4) The Site Letter Grade is related to the level of information available for the Site (as defined by the User) and provides an indication of completeness of information based on the level of investigation and remediation work that has been carried out at the site. More detailed descriptions of the various categories are provided below.

Site Letter Grade:	*Detailed Descriptions:*
F	***Pre Phase I ESA –*** No environmental investigations have been conducted or there are only partial or incomplete Phase I ESA for the Site. It is not recommended to continue through the NCSCS when insufficient data are available. In these cases, it will generally be necessary to conduct a Phase I ESA or other site investigation tasks in order to complete the NCSCS scoring.
E	***Phase I ESA –*** A preliminary desk-top type study has been conducted, involving non-intrusive data collection to determine whether there is a potential for the Site to be contaminated and to provide information to direct any intrusive investigations. Data collected may include a review of available information on current site conditions and history of the property, a site inspection and interviews with personnel familiar with the Site. [Note: This stage is similar to "Phase I: Site Information Assessment" as described in Guidance Document on the Management of Contaminated Sites in Canada (CCME 1997).]
D	***Limited Phase II ESA –*** An initial intrusive investigation and assessment of the property has been conducted, generally focusing on potential sources of contamination, to determine whether there is contamination present above the relevant screening guidelines or criteria, and to broadly define soil and groundwater conditions; samples have been collected and analyzed to identify, characterize and quantify contamination that may be present in air, soil, groundwater, surface water or building materials. [Note: This stage is similar to "Phase II: Reconnaissance Testing Program" as described in Guidance Document on the Management of Contaminated Sites in Canada (CCME 1997).]
C	***Detailed Phase II ESA –*** Further intrusive investigations have been conducted to characterize and delineate the contamination, to obtain detailed information on the soil and groundwater conditions, to identify the contaminant pathways, and to provide other information required to develop a remediation plan. [Note: This stage is similar to "Phase III: Detailed Testing Program" as described in Guidance Document on the Management of Contaminated Sites in Canada (CCME 1997).]
B	***Risk Assessment with or without Remedial Plan or Risk Management Strategy –*** A risk assessment has been completed, and if the risk was found to be unacceptable, a site-specific remedial action plan has been designed to mitigate environmental and health concerns associated with the Site, or a risk management strategy has been developed.
A	***Confirmation Sampling –*** Remedial work, monitoring, and/or compliance testing have been conducted and confirmatory sampling demonstrates whether contamination has been removed or stabilized effectively and whether cleanup or risk management objectives have been attained.

5) A few terms are used throughout which require definition, they are as follows:

Known - refers to scores that are assigned based on documented scientific and/or technical observations

Potential - refers to scores that are assigned when something is not known, though it may be suspected

Allowed Potential - If, in a given category, known and potential scores are provided by the user, the checklist will typically default to the "known" score. If a "known" score is provided, the "allowed potential" score will equal zero. Exceptions can be found within the Modifying Factors categories in each worksheet where there are often several independent questions. Therefore, "known" and "potential" scores are allowed to contribute to the total modifying factor score.

Raw - refers to score totals which have not been adjusted down to the total maximum score for the given category. In most cases the possible total raw score is greater than the maximum allowed

Note: For some questions in the worksheets, the option selected will determine whether a "known" or "potential" score is assigned. In these cases, if "Do Not Know" is selected, a score will automatically be listed as "potential", whereas all of the other options in the list will provide a "known" score.

6) Certainty Percentage: The ratio of “Known” to “Potential” responses reflects the relative certainty, or confidence, of the resulting final score and the classification. The NCSCS system defines this ratio as the “Certainty Percentage”. The Certainty Percentage is generated from the number of sections assigned scores based on “known” information divided by the total number of sections. A high percentage indicates that more is known about the Site, and therefore there is more confidence in the ranking, whereas a low percentage suggests that the ranking should be treated with caution.

7) Site Classification Categories: Sites should not be ranked relative to one another. Sites must be classifed on their individual characteristics in order to determine the appropriate classification (Class 1, 2, 3, or N) according to their priority for action, or Class INS (Insufficient Information) for sites that require further information before they can be classifed. The classification groupings are as follows:

Class 1 - High Priority for Action (Total NCSCS Score greater than 70)

The available information indicates that action (e.g., futher site characterization, risk management, remediation, etc.) is required to address existing concerns. Typically, Class 1 sites indicate high concern for several factors, and measured or observed impacts have been documented.

Class 2 - Medium Priority for Action (Total NCSCS Score between 50 and 69.9)

The available information indicates that there is high potential for adverse impacts, although the threat to human health and the environment is generally not imminent. There will tend not to be indication of off-site contamination, however, the potential for this was rated high and therefore some action is likely required.

Class 3 - Low Priority for Action (Total NCSCS Score between 37 and 49.9)

The available information indicates that this site is currently not a high concern. However, additional investigation may be carried out to confirm the site classification, and some degree of action may be required.

Class N - Not a Priority for Action (Total NCSCS Score less than 37)

The available information indicates there is probably no significant environmental impact or human health threats. There is likely no need for action unless new information becomes available indicating greater concerns, in which case the site should be re-examined.

Class INS - Insufficient Information (>15% of Responses are "Do Not Know")

There is insufficient information to classify the site. In this event, additional information is required to address data gaps.

8) Additional Complementary Tools to the NCSCS

The CCME Soil Quality Index (SoQI) is a complementary tool that focuses more on evaluating the relative hazard, by comparing contaminant concentrations with their respective soil quality guidelines. The SoQI uses three factors for its calculations, namely: 1) scope (% of contaminants that do not meet their respective guidelines), 2) frequency (% of individual tests of contaminants that do not meet their respective guidelines), and 3) amplitude (the amount by which the contaminants do not meet their respective guidelines). The soil quality index can be used to compare different contaminated sites with similar types of contamination as well as to see if the jurisdictional requirements have been met after remediation of a particular site.

The NCSCS was not developed for and is not readily applicable for the assessment of sites with a significant marine or aquatic component. Environmental conditions at marine and aquatic sites are best measured in the bed sediments as they act as long-term reservoirs of chemicals to the aquatic environment and to organisms living in or having direct contact with sediments. The CCME Sediment Quality Index (SeQI) provides a convenient means of summarizing sediment quality data and can complement the NCSCS. The SeQI provides a mathematical framework for assessing sediment quality conditions by comparing contaminant concentrations with their respective sediment quality guidelines.

CCME National Classification System (2008)

(I) Contaminant Characteristics

CBSA Port of Pleasant Camp Border Crossing

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method of Evaluation	Notes
1. Residency Media (replaces physical state)				
Which of the following residency media are known (or strongly suspected) to have one or more exceedances of the applicable CCME guidelines? **yes** = has an exceedance or strongly suspected to have an exceedance **no** = does not have an exceedance or strongly suspected not to have an exceedance		Soil and groundwater exceedances measured based on 2009 additional investigation and biannual sampling work. No surface water exceedances measured for PCOC	The overall score is calculated by adding the individual scores from each residency media (having one or more exceedance of the most conservative media specific and land-use appropriate CCME guideline). Summary tables of the Canadian Environmental Quality Guidelines for soil, water (aquatic life, non-potable groundwater environments, and agricultural water uses) and sediment are available on the CCME website at http://www.ccme.ca/publications/ceqg_rcqe.html?category_id=124 . For potable groundwater environments, guidelines for Canadian Drinking Water Quality (for comparison with groundwater monitoring data) are available on the Health Canada website at http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/doc_sup-appui/sum_guide-res_recom/index_e.html.	An increasing number of residency media containing chemical exceedances often equates to a greater potential risk due to an increase in the number of potential exposure pathways.
A. Soil	Yes			
Yes No Do Not Know				
B. Groundwater	Yes			
Yes No Do Not Know				
C. Surface water	No			
Yes No Do Not Know				
D. Sediment	No			
Yes No Do Not Know				
"Known" -score	4			
"Potential" - score	---			
2. Chemical Hazard				
What is the relative degree of chemical hazard of the contaminant in the list of hazard rankings proposed by the Federal Contaminated Sites Action Plan (FCSAP)?	Medium	LEPH and F2 fraction is medium. PAHs that exceed for soil and groundwater all are considered medium hazard. F1 is present in soil but not frequently encountered. Overall considered medium hazard.	The relative degree of chemical hazard should be selected based on the most hazardous contaminant known or suspected to be present at the site. The degree of hazard has been defined by the Federal Contaminated Sites Action Plan (FCSAP) and a list of substances with their associated hazard (Low, Medium and High) has been provided as a separate sheet in this file. *See Attached Reference Material for Contaminant Hazard Rankings.*	Hazard as defined in the revised NCS pertains to the physical properties of a chemical which can cause harm. Properties can include toxic potency, propensity to biomagnify, persistence in the environment, etc. Although there is some overlap between hazard and contaminant exceedance factor below, it will not be possible to derive contaminant exceedance factors for many substances which have a designated chemical hazard designation, but don't have a CCME guideline. The purpose of this category is to avoid missing a measure of toxic potential.
High Medium Low Do Not Know				
"Known" -score	4			
"Potential" - score	---			
3. Contaminant Exceedence Factor				
What is the ratio between the measured contaminant concentration and the applicable CCME guidelines (or other "standards")?	Mobile NAPL	LEPHw concentration measured in groundwater from MW01-17D is >100x the CSR AW standard. Naphthalene in soil is greater than 100x the CCME guideline in BH01-16. All other soil and groundwater results with detectable concentrations either low or medium. LNAPL meaured in some wells but not observed to be mobile (i.e., plume has not increased in size).	Ranking of contaminant "exceedance" is determined by comparing contaminant concentrations with the *most conservative media-specific and land-use appropriate CCME* environmental quality guidelines. **Ranking should be based on contaminant with greatest exceedance of CCME guidelines.** Ranking of contaminant hazard as high, medium and low is as follows: High = One or more measured contaminant concentration is greater than 100 X appropriate CCME guidelines Medium = One or more measured contaminant concentration is 10 - 99.99 X appropriate CCME guidelines Low = One or more measured contaminant concentration is 1 - 9.99 X appropriate CCME guidelines Mobile NAPL = Contaminant is a non-aqueous phase liquid (i.e., due to its low solubility, it does not dissolve in water, but remains as a separate liquid) and is present at a sufficiently high saturation (i.e., greater than residual NAPL saturation) such that there is significant potential for mobility either downwards or laterally. Other standards may include local background concentration or published toxicity benchmarks. Results of toxicity testing with site samples can be used as an alternative. This approach is only relevant for contaminants that do not biomagnify in the food web, since toxicity tests would not indicate potential effects at higher trophic levels. High = lethality observed. Medium = no lethality, but sub lethal effects observed. Low = neither lethal nor sub lethal effects observed.	In the event that elevated levels of a material with no associated CCME guidelines are present, check provincial and USEPA environmental criteria. Hazard Quotients (sometimes referred to as a screening quotient in risk assessments) refer to the ratio of measured concentration to the concentration believed to be the threshold for toxicity. A similar calculation is used here to determine the contaminant exceedance factor (CEF). Concentrations greater than one times the applicable CCME guideline (i.e., CEF=>1) indicate that risks are possible. Mobile NAPL has the highest associated score (8) because of its highly concentrated nature and potential for increase in the size of the impacted zone.
Mobile NAPL High (>100x) Medium (10x to 100x) Low (1x to 10x) Do Not Know				
"Known" -score	8			
"Potential" - score	---			

CCME National Classification System (2008)

(I) Contaminant Characteristics

CBSA Port of Pleasant Camp Border Crossing

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method of Evaluation	Notes
4. Contaminant Quantity (known or strongly suspected)				
What is the known or strongly suspected quantity of all contaminants? >10 hectare (ha) or 5000 m^3 2 to 10 ha or 1000 to 5000 m^3 <2 ha or 1000 m^3 Do Not Know	2 to 10 ha or 1000 to 5000 m3	Based on 2009 delineation of soil impacted area and groundwater	Measure or estimate the area or quantity of total contamination (i.e, all contaminants known or strongly suspected to be present on the site). The "Area of Contamination" is defined as the area or volume of contaminated media (soil, sediment, groundwater, surface water) exceeding appropriate environmental criteria.	A larger quantity of a potentially toxic substance can result in a larger frequency of exposure as well as a greater probability of migration, therefore, larger quantities of these substances earn a higher score.
"Known" -score	6			
"Potential" - score	---			
5. Modifying Factors				
Does the chemical fall in the class of persistent chemicals based on its behavior in the environment? Yes No Do Not Know	No		Persistent chemicals, e.g., PCBs, chlorinated pesticides etc. either do not degrade or take longer to degrade, and therefore may be available to cause effects for a longer period of time. Canadian Environmental Protection Act (CEPA) classifies a chemical as persistent when it has at least one of the following characteristics: (a) in air, (i) its half-life is equal to or greater than 2 days, or (ii) it is subject to atmospheric transport from its source to a remote area; (b) in water, its half-life is equal to or greater than 182 days; (c) in sediments, its half-life is equal to or greater than 365 days; or (d) in soil, its half-life is equal to or greater than 182 days. This list does not include metals or metalloids, which in their elemental form do not degrade. However metals and metalloids form chemical species in the environment, many of which are not readily bioavailable.	*Examples of Persistent Substances are provided in attached Reference Materials*
Are there contaminants present that could cause damage to utilities and infrastructure, either now or in the future, given their location? Yes No Do Not Know	No			Some contaminants may react or absorb into underground utilities and infrastructure. For example, organic solvents may degrade some plastics, and salts could cause corrosion of metal.
How many different contaminant classes have representative CCME guideline exceedances? one two to four five or more Do Not Know	two to four	inorganic substances (total iron) and light extractable petroleum hydrocarbons.	For the purposes of the revised NCS ranking system, the following chemicals represent distinct chemical "classes": inorganic substances (including metals), volatile petroleum hydrocarbons, light extractable petroleum hydrocarbons, heavy extractable petroleum hydrocarbons, PAHs, phenolic substances, chlorinated hydrocarbons, halogenated methanes, phthalate esters, pesticides.	*Refer to the Reference Material sheet for a list of example substances that fall under the various chemical classes.*
"Known" - Score	2			
"Potential" - Score	---			

Contaminant Characteristic Total

Raw Total Scores- "Known"	24
Raw Total Scores- "Potential"	0
Raw Combined Total Scores	24
Total Score (Raw Combined / 40 * 33)	**19.8**

CCME National Classification System (2008)

(II) Migration Potential (Evaluation of contaminant migration pathways)

CBSA Port of Pleasant Camp Border Crossing

Definition	**Score**	**Rationale for Score** (document any assumptions, reports, or site-specific information; provide references)	**Method Of Evaluation**	**Notes**
1. Groundwater Movement				
A. Known COPC exceedances and an operable groundwater pathway within and/or beyond the property boundary.				
i) For **potable groundwater environments**, 1) groundwater concentrations exceed background concentrations and 1X the Guideline for Canadian Drinking Water Quality (GCDWQ) or 2) there is known contact of contaminants with groundwater, based on physical evidence of groundwater contamination. For **non-potable environments** (typically urban environments with municipal services), 1) groundwater concentrations exceed 1X the applicable non potable guidelines or modified generic guidelines (which exclude ingestion of drinking water pathway) or 2) there is known contact of contaminants with groundwater, based on physical evidence of groundwater impacts.	12	Post-remedial groundwater sampling	Review chemical data and evaluate groundwater quality. The evaluation method concentrates on 1) a potable or non-potable groundwater environment; 2) the groundwater flow system and its potential to be an exposure pathway to known or potential receptors An aquifer is defined as a geologic unit that yields groundwater in usable quantities and drinking water quality. The aquifer can currently be used as a potable water supply or could have the potential for use in the future. Non-potable groundwater environments are defined as areas that are serviced with a reliable alternative water supply (most commonly provided in urban areas). The evaluation of a non-potable environment will be based on a site specific basis. Physical evidence includes significant sheens, liquid phase contamination, or contaminant saturated soils. Seeps and springs are considered part of the groundwater pathway. In Arctic environments, the potability and evaluation of the seasonal active layer (above the permafrost) as a groundwater exposure pathway will be considered on a site-specific basis.	The 1992 NCS rationale evaluated the off-site migration as a regulatory issue. The exposure assessment and classification of hazards should be evaluated regardless of the property boundaries. Someone experienced must provide a thorough description of the sources researched to determine the presence/absence of a groundwater supply source in the vicinity of the contaminated site. This information must be documented in the NCS Site Classification Worksheet including contact names, phone numbers, e-mail correspondence and/or reference maps/reports and other resources such as internet links. Note that for potable groundwater that also daylights into a nearby surface water body, the more stringent guidelines for both drinking water and protection of aquatic life should be considered. **Selected References** Potable Environments Guidelines for Canadian Drinking Water Quality www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/doc_sup-appui/sum_guide-res_recom/index_e.html Non-Potable Environments Canadian Water Quality Guidelines for Protection of Aquatic Life. CCME. 1999 www.ccme.ca Compilation and Review of Canadian Remediation Guidelines, Standards and Regulations. Science Applications International Corporation (SAIC Canada), report to Environment Canada, January 4, 2002.
ii) Same as (i) except the information is not known but strongly suspected based on indirect observations.	9			
iii) Meets GCDWQ for **potable environments**; meets non-potable criteria or modified generic criteria (excludes ingestion of drinking water pathway) for **non-potable environments** **or** Absence of groundwater exposure pathway (i.e., there is no aquifer (see definition at right) at the site or there is an adequate isolating layer between the aquifer and the contamination, and within 5 km of the site there are no aquatic receiving environments and the groundwater does not daylight).	0			
	12			
Score	12			
NOTE: If a score is assigned here for Known COPC Exceedances, then you can skip Part B (Potential for groundwater pathway) and go to Section 2 (Surface Water Pathway)				
B. Potential for groundwater pathway.				
a. Relative Mobility High Moderate Low Insignificant Do Not Know	Moderate	Heating oil fuel	Organics Koc (L/kg) / Metals with higher mobility at acidic conditions / Metals with higher mobility at alkaline conditions Koc < 500 (i.e., log Koc < 2.7) / pH < 5 / pH > 8.5 Koc = 500 to 5000 (i.e., log Koc = 2.7 to 3.7) / pH = 5 to 6 / pH = 7.5 to 8.5 Koc = 5,000 to 100,000 (i.e., log Koc = 3.7 to 5) / pH > 6 / pH < 7.5 Koc > 100,000 (i.e., log Koc > 5)	Reference: US EPA Soil Screening Guidance (Part 5 - Table 39) If a score of zero is assigned for relative mobility, it is still recommended that the following sections on potential for groundwater pathway be evaluated and scored. Although the Koc of an individual contaminant may suggest that it will be relatively immobile, it is possible that, with complex mixtures, there could be enhanced mobility due to co-solvent effects. Therefore, the Koc cannot be relied on solely as a measure of mobility. An evaluation of other factors such as containment, thickness of confining layer, hydraulic conductivities and precipitation infiltration rate are still useful in predicting potential for groundwater migration, even if a contaminant is expected to have insignificant mobility based on its chemistry alone.
Score	2			
b. Presence of engineered sub-surface containment? No containment Partial containment Full containment Do Not Know	Partial containme	Natural attenuation is known to be occurring - refer to SLE's 2009/2010 Closure report	Review the existing engineered systems or natural attenuation processes for the site and determi if full or partial containment is achieved. Full containment is defined as an engineered system or natural attenuation processes, monitored being effective, which provide for full capture and/or treatment of contaminants. All chemicals of concern must be contained for “Full Containment” scoring. Natural attenuation must have sufficient data, and reports cited with monitoring data to support steady state conditions and the attenuation processes. If there is no containment or insufficient natural attenuation process, this category is evaluated as high. If there is less than full containment or if uncertain, then evaluate as medium. In Arctic environments, permafrost will be evaluated, as appropriate, based on detailed evaluations, effectiveness and reliability to contain/control contaminant migration.	Someone experienced must provide a thorough description of the sources researched to determine the containment of the source at the contaminated site. This information must documented in the NCS Site Classification Worksheet including contact names, phone numbers, e-mail correspondence and/or reference maps, geotechnical reports or natural attenuation studies and other resources such as internet links. **Selected Resources:** United States Environmental Protection Agency (USEPA) 1998. Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater. EPA/600/R-98/128. Environment Canada – Ontario Region – Natural Attenuation Technical Assistance Bulletins (TABS) Number 19 –21.
Score	1.5			
c. Thickness of confining layer over aquifer of concern o groundwater exposure pathway 3 m or less including no confining layer or discontinuous confining layer 3 to 10 m > 10 m Do Not Know	3 m or less		The term "confining layer" refers to geologic material with little or no permeability or hydraulic conductivity (such as unfractured clay); water does not pass through this layer or the rate of movement is extremely slow. Measure the thickness and extent of materials that will impede the migration of contaminants to the groundwater exposure pathway. The evaluation of this category is based on: 1) The presence and thickness of saturated subsurface materials that impede the vertical migration of contaminants to lower aquifer units which can or are used as drinking water sources or 2) The presence and thickness of unsaturated subsurface materials that impede the vertical migration of contaminants from the source location to the saturated zone (e.g., water table aquifer, first hydrostratigraphic unit or other groundwater pathway).	
Score	1			
d. Hydraulic conductivity of confining layer $>10^{-4}$ cm/s or no confining layer 10^{-4} to 10^{-6} cm/s $<10^{-6}$ cm/s Do Not Know	>10-4 cm/s		Determine the nature of geologic materials and estimate hydraulic conductivity from published material (or use "Range of Values of Hydraulic Conductivity and Permeability" figure in the Reference Material sheet). Unfractured clays should be scored low. Silts should be scored medium. Sand, gravel should be scored high. The evaluation of this category is based on: 1) The presence and hydraulic conductivity (“K”) of saturated subsurface materials that impede the vertical migration of contaminants to lower aquifer units which can or are used as a drinking water source, groundwater exposure pathway or 2) The presence and permeability (“k”) of unsaturated subsurface materials that impede the vertical migration of contaminants from the source location to the saturated water table aquifer, first hydrostratigraphic unit or other groundwater pathway.	
Score	1			

CCME National Classification System (2008)

(II) Migration Potential (Evaluation of contaminant migration pathways)

CBSA Port of Pleasant Camp Border Crossing

Definition	**Score**	**Rationale for Score** (document any assumptions, reports, or site-specific information; provide references)	**Method Of Evaluation**	**Notes**
B. Potential for groundwater pathway.				
e. Precipitation infiltration rate (Annual precipitation factor x surface soil relative permeability factor) High Moderate Low Very Low None Do Not Know Score	High 1		Precipitation Refer to Environment Canada precipitation records for relevant areas. Divide annual precipitation by 1000 and round to nearest tenth (e.g., 667 mm = 0.7 score). Permeability For surface soil relative permeability (i.e., infiltration) assume: gravel (1), sand (0.6), loam (0.3) and pavement or clay (0). Multiply the surface soil relative permeability factor with precipitation factor to obtain the score for precipitation infiltration rate.	
f. Hydraulic conductivity of aquifer $>10^{-2}$ cm/s 10^{-2} to 10^{-4} cm/s $<10^{-4}$ cm/s Do Not Know Score	>10-2 cm/s 2		Determine the nature of geologic materials and estimate hydraulic conductivity of all aquifers of concern from published material (refer to "Range of Values of Hydraulic Conductivity and Permeability" in the Reference Material sheet).	
Potential groundwater pathway total	8.5			
Allowed Potential score	---	Note: If a "known" score is provided, the "potential" score is disallowed.		
Groundwater pathway total	**12**			
2. Surface Water Movement				
A. Demonstrated migration of COPC in surface water above background conditions				
Known concentrations of surface water: i) Concentrations exceed background concentrations and exceed CCME CWQG for protection of aquatic life, irrigation, livestock water, and/or recreation (whichever uses are applicable at the site) by >1 X; or There is known contact of contaminants with surface water based on site observations. or In the absence of CWQG, chemicals have been proven to be toxic based on site specific testing (e.g. toxicity testing; or other indicator testing of exposure).	12	Biannual surface water sampling from 2006 to 2009 has shown no impacts	Collect all available information on quality of surface water near to site. Evaluate available data against Canadian Water Quality Guidelines (select appropriate guidelines based on local water us e.g., recreation, irrigation, aquatic life, livestock watering, etc.). The evaluation method concentrates on the surface water flow system and its potential to be an exposure pathway. Contamination is present on the surface (above ground) and has the potential to impact surface water bodies. Surface water is defined as a water body that supports one of the following uses: recreation, irrigation, livestock watering, aquatic life.	General Notes: Someone experienced must provide a thorough description of the sources researched to classify the surface water body in the vicinity of the contaminated site. This information must be documented in the NCS Site Classification Worksheet including contact names, phone numbers, e-mail correspondence and/or reference maps/reports and other resource such as internet links. Selected References: CCME. 1999. Canadian Water Quality Guidelines for the Protection of Aquatic Life www.ccme.ca CCME. 1999. Canadian Water Quality Guidelines for the Protection of Agricultural Water Uses (Irrigation and Livestock Water) www.ccme.ca Health and Welfare Canada. 1992. Guidelines for Canadian Recreational Water Quality.
ii) Same as (i) except the information is not known but strongly suspected based on indirect observations.	8			
iii) Meets CWQG or absence of surface water exposure pathway (i.e., Distance to nearest surface water is > 5 km.)	0			
Score	0 0			
NOTE: If a score is assigned here for Demonstrated Migration in Surface Water, then you can skip Part B (Potential for migration of COPCs in surface water) and go to Section 3 (Surface Soils)				
B. Potential for migration of COPCs in surface water				
a. Presence of containmen No containmen Partial containmen Full containmen Do Not Know Score	Do Not Know 3		Review the existing engineered systems and relate these structures to site conditions and proximity to surface water and determine if full containment is achieved: score low if there is full containment such as capping, berms, dikes; score medium if there is partial containment such as natural barriers, trees, ditches, sedimentation ponds; score high if there are no intervening barriers betwe the site and nearby surface water. Full containment must include containment of all chemicals.	
b. Distance to Surface Water 0 to <100 m 100 - 300 m >300 m Do Not Know Score	Do Not Know 2		Review available mapping and survey data to determine distance to nearest surface water bodies.	

CCME National Classification System (2008)

(II) Migration Potential (Evaluation of contaminant migration pathways)

CBSA Port of Pleasant Camp Border Crossing

Definition	**Score**	**Rationale for Score** (document any assumptions, reports, or site-specific information; provide references)	**Method Of Evaluation**	**Notes**
c. Topography Contaminants above ground level and slope is stee Contaminants at or below ground level and slope is stee Contaminants above ground level and slope is intermedia Contaminants at or below ground level and slope is intermedia Contaminants above ground level and slope is fl Contaminants at or below ground level and slope is fl Do Not Know	Do Not Know		Review engineering documents on the topography of the site and the slope of surrounding terrain. Steep slope = >50% Intermediate slope = between 5 and 50% Flat slope = < 5% Note: Type of fill placement (e.g., trench, above ground, etc.).	
Score	1			
d. Run-off potential High (rainfall run-off score > 0.6) Moderate (0.4 < rainfall run-off score <0.6) Low (0.2 < rainfall run-off score <0.4) Very Low (0 < rainfall run-off score < 0.2) None (rainfall run-off score = 0) Do Not Know	Do Not Know		Rainfall Refer to Environment Canada precipitation records for relevant areas. Divide rainfall by 1000 and round to nearest tenth (e.g., 667 mm = 0.7 score). The former definition of "annual rainfall" did not include the precipitation as snow. This minor adjustment has been made. The second modification was the inclusion of permeability of surface materials as an evaluation factor. Permeability For infiltration assume: gravel (0), sand (0.3), loam (0.6) and pavement or clay (1). Multiply the infiltration factor with precipitation factor to obtain rainfall run off score.	Selected Sources: Environment Canada web page linkwww.msc.ec.gc.ca Snow to rainfall conversion apply ratio of 15 (snow):1(water)
Score	0.4			
e. Flood potentia 1 in 2 years 1 in 10 years 1 in 50 years Do Not Know	Do Not Know		Review published data such as flood plain mapping or flood potential (e.g., spring or mountain run-off) and Conservation Authority records to evaluate flood potential of nearby water courses both up and down gradient. Rate zero if site not in flood plain.	
Score	0.5			
Potential surface water pathway total	6.9			
Allowed Potential score	---	Note: If a "known" score is provided, the "potential" score is disallowed.		
Surface water pathway total	**0**			
3. Surface Soils (potential for dust, dermal and ingestion exposure)				
A. Demonstrated concentrations of COPC in surface soils (top 1.5 m)				
COPCs measured in surface soils exceed the CCME soil quality guideline.	12		Collect all available information on quality of surface soils (i.e., top 1.5 metres) at the site. Evaluate available data against Canadian Soil Quality Guidelines. Select appropriate guidelines based on current (or proposed future) land use (i.e, agricultural, residential/parkland, commercial, or industrial), and soil texture if applicable (i.e., coarse or fine).	Selected References: CCME. 1999. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health www.ccme.ca
Strongly suspected that soils exceed guidelines	9	Surface contamination above 1.5 m not dorectly measured by considered likley based on results from BH01-16		
COPCs in surface soils does not exceed the CCME soil quality guideline or is not present (i.e., bedrock).	0			
	Go to Potential			
Score	---			
NOTE: If a score is assigned here for Demonstrated Concentrations in Surface Soils, then you can skip Part B (Potential for a surface soils migration pathway) and go to Section 4 (Vapour)				
B. Potential for a surface soils (top 1.5 m) migration pathway				
a. Are the soils in question covered? Exposed Vegetatec Landscaped Paved Do Not Know	Exposed		Consult engineering or risk assessment reports for the site. Alternatively, review photographs or perform a site visit. Landscaped surface soils must include a minimum of 0.5 m of topsoil.	The possibility of contaminants in blowing snow have not been included in the revised NC as it is difficult to assess what constitutes an unacceptable concentration and secondly, spills to snow or ice are most efficiently mitigated while freezing conditions remain.
Score	6			
b. For what proportion of the year does the site remain covered t snow? 0 to 10% of the yea 10 to 30% of the yea More than 30% of the yea Do Not Know	10-30% of year		Consult climatic information for the site. The increments represent the full span from soils which are always wet or covered with snow (and therefore less likely to generate dust) to those soils which are predominantly dry and not covered by snow (and therefore are more likely to generate dust).	
Score	3			
Potential surface soil pathway total	9			
Allowed Potential score	9	**Note: If a "known" score is provided, the "potential" score is disallowed.**		
Soil pathway total	**9**			

CCME National Classification System (2008)

(II) Migration Potential (Evaluation of contaminant migration pathways)

CBSA Port of Pleasant Camp Border Crossing

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
4. Vapour				
A. Demonstrated COPCs in vapour.				
Vapour has been measured (indoor or outdoor) in concentrations exceeding risk based concentrations.	12	Soil vapour measured beneath building slab (built on bedrock), no risks identified however elevated soil vapours expected based on resdual groundwater and soil concentrations.	Consult previous investigations, including human health risk assessments, for reports of vapours detected.	
Strongly suspected (based on observations and/or modelling)	9			
Vapour has not been measured and volatile hydrocarbons have not been found in site soils or groundwater.	0			
	Go to Potential			
Score	---			
NOTE: If a score is assigned here for Demonstrated COPCs in Vapour, then you can skip Part B (Potential for COPCs in vapour) and go to Section 5 (Sediment)				
B. Potential for COPCs in vapour				
a. Relative Volatility based on Henry's Law Constant, H (dimensionless) High (H' > 1.0E-1) Moderate (H' = 1.0E-1 to 1.0E-3 Low (H' < 1.0E-3) Not Volatile Do Not Know	Moderate	Heating fuel	Reference: US EPA Soil Screening Guidance (Part 5 - Table 36) *Provided in Attached Reference Materials*	If the Henry's Law Constant for a substance indicates that it is not volatile, and a score of zero is assigned here for relative volatility, then the other three questions in this section on Potential for COPCs will be automatically assigned scores of zero and you can skip to section 5.
Score	2.5			
b. What is the soil grain size? Fine Coarse Do Not Know	Coarse	Both fine and coarse grained soil prevalent	Review soil permeability data in engineering reports. The greater the permeability of soils, the greater the possible movement of vapours. Fine-grained soils are defined as those which contain greater than 50% by mass particles less than 75 µm mean diameter (D50 < 75 µm). Coarse-grained soils are defined as those which contain greater than 50% by mass particles greater than 75 µm mean diameter (D50 > 75 µm).	
Score	4			
c. Is the depth to the source less than 10m? Yes No Do Not Know	Yes		Review groundwater depths below grade for the site.	
Score	2			
d. Are there any preferential pathways? Yes No Do Not Know	Do Not Know		Visit the site during dry summer conditions and/or review available photographs. Where bedrock is present, fractures would likely act as preferential pathyways.	Preferential pathways refer to areas where vapour migration is more likely to occur becau there is lower resistance to flow than in the surrounding materials. For example, underground conduits such as sewer and utility lines, drains, or septic systems may serve as preferential pathways. Features of the building itself that may also be preferential pathways include earthen floors, expansion joints, wall cracks, or foundation perforations for subsurface features such as utility pipes, sumps, and drains.
Score	1			
Potential vapour pathway total	9.5			
Allowed Potential score	9.5	Note: If a "known" score is provided, the "potential" score is disallowed.		
Vapour pathway total	**9.5**			
5. Sediment Movement				
A. Demonstrated migration of sediments containing COPCs				
There is evidence to suggest that sediments originally deposited to the site (exceeding the CCME sediment quality guidelines) have migrated.	12		Review sediment assessment reports. Evidence of migration of contaminants in sediments must be reported by someone experienced in this area.	Usually not considered a significant concern in lakes/marine environments, but could be very important in rivers where transport downstream could be significant.
Strongly suspected (based on observations and/or modelling)	9			
Sediments have been contained and there is no indication that sediments will migrate in future. **or** Absence of sediment exposure pathway (i.e., within 5 km of the site there are no aquatic receiving environments, and therefore no sediments).	0	Sediment samples collected 1998 did not exceed applicable sediment criteria and sediment is not suspected of being contaminated.		
	0			
Score	0			
NOTE: If a score is assigned here for Demonstrated Migration of Sediments, then you can skip Part B (Potential for Sediment Migration) and go to Section 6 (Modifying Factors)				

CCME National Classification System (2008)

(II) Migration Potential (Evaluation of contaminant migration pathways)

CBSA Port of Pleasant Camp Border Crossing

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
B. Potential for sediment migration				
a. Are the sediments having COPC exceedances capped with sediments having no exceedances ("clean sediments")?	Do Not Know		Review existing sediment assessments. If sediment coring has been completed, it may indicate th historically contaminated sediments have been covered over by newer "clean" sediments. This assessment will require that cores collected demonstrate a low concentration near the top and higher concentration with sediment depth.	
Yes No Do Not Know	2			
b. For lakes and marine habitats, are the contaminated sediments in shallow water and therefore likely to be affected by tidal action, wave action or propeller wash?	Do Not Know		Review existing sediment assessments. If the sediments present at the site are in a river, select "no" for this question.	
Yes No Do Not Know	2			
c. For rivers, are the contaminated sediments in an area prone t sediment scouring?	Do Not Know		Review existing sediment assessments. It is important that the assessment is made under worst case flows (high yearly flows). Under high yearly flows, areas which are commonly depositional m	
Yes No Do Not Know	2			
Potential sediment pathway total	6			
Allowed Potential score	---	Note: If a "known" score is provided, the "potential" score is disallowed.		
Sediment pathway total	**0**			
6. Modifying Factors				
Are there subsurface utility conduits in the area affected b contamination?	No	Contaminated soil was removed from around the existing utilities.	Consult existing engineering reports. Subsurface utilities can act as conduits for contaminant migration.	
Yes No Do Not Know				
Known	0			
Potentia	0			

Migration Potential Total

Raw "known" total	12	
Raw "potential" tota	18.5	
Raw combined tota	30.5	Note: If "Known" and "Potential" scores are provided, the checklist defaults to known. Therefore, the total "Potential" Score may not reflect the sum of the individual "Potential" scores.
Total (max 33)	**15.7**	

CCME National Classification System (2008)

(III) Exposure (Demonstrates the presence of an exposure pathway and receptors)

CBSA Port of Pleasant Camp Border Crossing

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
1. Human				
A. Known exposure				
Documented adverse impact or high quantified exposure which has or will result in an adverse effect, injury or harm or impairment of the safety to humans as a result of the contaminated site. (Class 1 Site*)	22	No human impacts/exposure are known/suspected.	*Where adverse effects on humans are documented, the site should be automatically designated as a Class 1 site (i.e., action required). There is no need to proceed through the NCS in this case. However, a scoring guideline (22) is provided in case a numerical score for the site is still desired (e.g., for comparison with other Class 1 sites). This category can be based on the outcomes of risk assessments and applies to studies which have reported Hazard Quotients >1 for noncarcinogenic chemicals and incremental cancer risks that exceed acceptable levels defined by the jurisdiction for carcinogenic chemicals (for most jurisdictions this is typically either $>10^{5}$ or $>10^{-6}$). Known impacts can also be evaluated based on blood testing (e.g. blood lead >10 ug/dL) or other health based testing. This category can be based on the outcomes of risk assessments and applies to studies which have reported Hazard Quotients of less than 0.2 for non-carcinogenic chemicals and incremental lifetime cancer risks for carcinogenic chemicals that are within acceptable levels as defined by the jurisdiction (for most jurisdictions this is less than either 10^{6} or 10^{-5}).	Known adverse impact includes domestic and traditional food sources. Adverse effects based on food chain transfer to humans and/or animals can be scored in this category. However, the weight of evidence must show a direct link of a contaminated food source/supply and subsequent ingestion/transfer to humans. Any associated adverse effects to the environment are scored separately later in this worksheet. Someone experienced must provide a thorough description of the sources researched to evaluate and determine the quantified exposure/impact (adverse effect) in the vicinity of the contaminated site. **Selected References:** Health Canada – Federal Contaminated Site Risk Assessment in Canada Parts 1 and 2 Guidance on Human Heath Screening Level Risk Assessments (www.hc-sc.gc.ca/ewh-semt/pubs/contamsite/index_e.html United States Environmental Protection Agency, Integrated Risk Information System (IRIS) - http://toxnet.nml.nih.gov
Same as above, but "Strongly Suspected" based on observations or indirect evidence.	10			
No quantified or suspected exposures/impacts in humans.	0			
	Go to Potential			
Score	---			
NOTE: If a score is assigned here for Known Exposure, then you can skip Part B (Potential for Human Exposure) and go to Section 2 (Human Exposure Modifying Factors)				
B. Potential for human exposure				
a) Land use (provides an indication of potential human exposure scenarios) Agricultural Residential / Parkland Commercial Industrial Do Not Know	Res / Parkland		Review zoning and land use maps over the distances indicated. If the proposed future land use is more "sensitive" than the current land use, evaluate this factor assuming the proposed future use is in place. Agricultural land use is defined as uses of land where the activities are related to the productive capability of the land or facility (e.g., greenhouse) and are agricultural in nature, or activities related to the feeding and housing of animals as livestock. Residential/Parkland land uses are defined as uses of land on which dwelling on a permanent, temporary, or seasonal basis is the activity (residential), as well as uses on which the activities are recreational in nature and require the natural or human designed capability of the land to sustain that activity (parkland). Commercial/Industrial land uses are defined as land on which the activities are related to the buying, selling, or trading of merchandise or services (commercial), as well as land uses which are related to the production, manufacture, or storage of materials (industrial).	This is the main "receptor" factor used in site scoring. A higher score implies a greater exposure and/or exposure of m sensitive human receptors (e.g., children).
Score	2			
b. Indicate the level of accessibility to the contaminated portion of the si (e.g., the potential for coming in contact with contamination) Limited barriers to prevent site access; contamination not covered Moderate access or no intervening barriers, contaminants are covered. Remote locations in which contaminants not covered. Controlled access or remote location and contaminants are covered Do Not Know	Controlled or remote		Review location and structures and contaminants at the site and determine if there are intervening barriers between the site and humans. A low rating should be assigned to a (covered) site surrounded by a fence or in a remote location, whereas a high score should be assigned to a site that has no cover, fence, natural barriers or buffer.	
Score	0			
B. Potential for human exposure				
c) Potential for intake of contaminated soil, water, sediment or foods for operable or potentially operable pathways, as identified in Worksheet II (Migration Potential). i) direct contact Is dermal contact with contaminated surface water, groundwater, sediments or soils anticipated? Yes No Do Not Know	Do Not Know		If soils or potable groundwater are present exceeding their respective CCME guidelines, dermal contact is assumed. Exposure to surface water, non-potable groundwater or sediments exceeding their respective CCME guidelines will depend on the site. Select "Yes" if dermal exposure to surface water, non-potable groundwater or sediments is expected. For instance, dermal contact with sediments would not be expected in an active port. Only soils in the top 1.5 m are defined by CCME (2003) as surface soils. If contaminated soils are only located deeper than 1.5 m, direct contact with soils is not anticipated to be an operable contaminant exposure pathway.	Exposure via the skin is generally believed to be a minor exposure route. However for some organic contaminants, skin exposure can play a very important component of overall exposure. Dermal exposure can occur while swimming in contaminated waters, bathing with contaminated surface water/groundwater and digging in contaminated dirt, etc.
Score	1.5			
ii) inhalation (i.e., inhalation of dust, vapour) Vapour - Are there inhabitable buildings on the site within 30 m of soils or groundwater with volatile contamination as determined in Worksheet II (Migration Potential)? Yes No Do Not Know	No		If inhabitable buildings are on the site within 30 m of soils or groundwater exceeding their respective guidelines for volatile chemicals, there is a potential of risk to human health (Health Canada, 2004). Review site investigations for location of soil samples (having exceedances of volatile substances) relative to buildings. Refer to (II) Migration Potential worksheet, 4B.a); *Potential for COPCs in Vapour* for a definition of volatility.	Exposure via the lungs (inhalation) can be a very important exposure pathway. Inhalation can be via both particulates (dust) and gas (vapours). Vapours can be a problem where buildings have been built on former industrial sites or where volatile contaminants have migrated below buildings resulting in the potential for vapour intrusion. Assesses the potential for humans to be exposed to vapours originating from site soils. The closer the receptor is to a source of volatile chemicals in soil, the greater the potential of exposure. Also, coarser-grained soil will convey vapour much more efficiently in the soil than finer grained material such as clays and silts. General Notes; Someone experienced must provide a thorough description of the sources researched to determine the presence/absence of a vapour migration and/or dust generation in the vicinity of the contaminated site. This information must be documented in the NCS Site Classification Worksheet including contact names, phone numbers, e-mail correspondence and/or reference maps/reports and other resource such as internet links. Selected References; Canadian Council of Ministers of the Environment (CCME). 2006. Protocol for the Derivation of Environmental and Human Health Soil Quality Guidelines. PN 1332 www.ccme.ca Golder, 2004. Soil Vapour Intrusion Guidance for Health Canada Screening Level Risk Assessment (SLRA) Submitted to Health Canada, Burnaby, BC
Score	0			
Dust - If there is contaminated surface soil (e.g. top 1.5 m) , indicate whether the soil is fine or coarse textured. If it is known that surface soil is not contaminated, enter a score of zero. Fine Coarse Surface soil is not contaminated or absent (bedrock) Do Not Know Texture			Consult grain size data for the site. If soils (containing exceedances of the CCME soil quality guidelines) predominantly consist of fine material (having a median grain size of 75 microns; as defined by CCME (2006)) then these soils are more likely to generate dusts.	
Score	Do Not Know			
	2			
inhalation total	2			

(III) Exposure (Demonstrates the presence of an exposure pathway and receptors)

CBSA Port of Pleasant Camp Border Crossing

Definition	**Score**	**Rationale for Score** (document any assumptions, reports, or site-specific information; provide references)	**Method Of Evaluation**	**Notes**
B. Potential for human exposure				
iii) Ingestion (i.e., ingestion of food items, water and soils [for children] including traditional foods. Drinking Water: Choose a score based on the proximity to a drinking water supply, to indicate the potential for contamination (present or future). 0 to 100 m 100 to 300 m 300 m to 1 km 1 to 5 km No drinking water present Do Not Know	No drinking water preser		Review available site data to determine if drinking water (groundwater, surface water, private, commercial or municipal supply) is known or suspected to be contaminated above Guidelines for Canadian Drinking Water Quality. If drinking water supply is known to be contaminated, some immediate action (e.g., provision of alternate drinking water supply) should be initiated to reduce or eliminate exposure. The evaluation of significant potential for exceedances of the water supply in the future may be based on the capture zones of the drinking water wells; contaminant travel times; computer modelling of flow and contaminant transport.	**Selected References:** Guidelines for Canadian Drinking Water Quality www.hc-sc.gc.ca/hecs-sesc/water/publications/drinking_water_quality_guidelines/toc.htm Drinking water can be an extremely important exposure pathway to humans. If site groundwater or surface water is not used for drinking, then this pathway is considered to be inoperable. Consider both wild foods such as salmon, venison, caribou, as well as agricultural sources of food items if the contaminated site is on or adjacent to agricultural land uses.
Score	0			
Is an alternative water supply readily available? Yes No Do Not Know	Yes			
Score	0			
Is human ingestion of contaminated soils possible? Yes No Do Not Know	Do Not Know		If contaminated soils are located within the top 1.5 m, it is assumed that ingestion of soils is an operable exposure pathway. Exposure to soils deeper than 1.5 m is possible, but less likely, and the duration is shorter. Refer to human health risk assessment reports for the site in question.	
Score	1.5			
Are food items consumed by people, such as plants, domestic animals or wildlife harvested from the contaminated land and its surroundings? Yes No Do Not Know	No		Use human health risk assessment reports (or others) to determine if there is significant reliance on traditional food sources associated with the site. Is the food item in question going to spend a large proportion of its time at the site (e.g., large mammals may spend a very small amount of time at a small contaminated site)? Human health risk assessment reports for the site in question will also provide information on potential bioaccumulation of the COPC in question.	
Score	0			
Ingestion total	1.5			
Human Health Total "Potential" Score	7	Note if a "Known" Human Health score is provided, the "Potential" score is disallowed.		
Allowed "Potential" Score	7			
2. Human Exposure Modifying Factors				
a) Strong reliance of local people on natural resources for survival (i.e., food, water, shelter, etc.) Yes No Do Not Know	No	Considered low as airport does not rely on groundwwater for source of potable water		
Known	0			
Potential	---			
Raw Human "known" total	0			
Raw Human "potential" total	7			
Raw Human Exposure Total Score	7			
Human Health Total (max 22)	**7.0**			
3. Ecological				
A. Known exposure				
Documented adverse impact or high quantified exposure which has or will result in an adverse effect, injury or harm or impairment of the safety to terrestrial or aquatic organisms as a result of the contaminated site.	18		Some low levels of impact to ecological receptors are considered acceptable, particularly on commercial and industrial land uses. However, if ecological effects are deemed to be severe, the site may be categorized as class one (i.e., a priority for remediation or risk management), regardless of t numerical total NCS score. For the purpose of application of the NCS, effects that would be considered severe include observed effects on survival, growth or reproduction which could threaten the viability of a population of ecological receptors at the site. Other evidence that qualifies as severe adverse effects may be determined based on professional judgement and in consultation with the relevant jurisdiction. If ecological effects are determined to be severe and an automatic Class 1 is assigned, there is no need to proceed through the NCS. However, a scoring guideline (18) is provid in case a numerical score for the site is still desired (e.g., for comparison with other Class 1 sites).	CCME, 1999: Canadian Water Quality Guidelines for the Protection of Aquatic Life www.ccme.ca CCME, 1999: Canadian Water Quality Guidelines for the Protection of Agricultural Water Uses www.ccme.ca Sensitive receptors- review: Canadian Council on Ecological Areas www.ccea.org Ecological effects should be evaluated at a population or community level, as opposed to at the level of individuals. For example, population-level effects could include reduced reproduction, growth or survival in a species. Community-level effects could include reduced species diversity or relative abundances. Further discussion of ecological assessment endpoints is provided in *A Framework for Ecological Risk Assessment: General Guidance* (CCME 1996). Notes: Someone experienced must provide a thorough description of the sources researched to classify the environmental receptors in the vicinity of the contaminated site. This information must be documented in the NCS Site Classification Worksheet including contact names, phone numbers, e-mail correspondence and/or reference maps/reports and other resource such as internet links.
Same as above, but "Strongly Suspected" based on observations or indirect evidence.	12		This category can be based on the outcomes of risk assessments and applies to studies which have reported Hazard Quotients >1. Alternatively, known impacts can also be evaluated based on a weight of evidence assessment involving a combination of site observations, tissue testing, toxicity testing and quantitative community assessments. Scoring of adverse effects on individual rare or endangered species will be completed on a case-by-case basis with full scientific justification.	
No quantified or suspected exposures/impacts in terrestrial or aquatic organisms	0		This category can be based on the outcomes of risk assessments and applies to studies which have reported Hazard Quotients of less than 1 and no other observable or measurable sign of impacts. Alternatively, it can be based on a combination of other lines of evidence showing no adverse effects, such as site observations, tissue testing, toxicity testing and quantitative community assessments.	
	Go to Potential			
Score	---			

NOTE: If a score is assigned here for Known Exposure, then you can skip Part B (Potential for Ecological Exposure) and go to Section 4 (Ecological Exposure Modifying Factors)

CCME National Classification System (2008)

(III) Exposure (Demonstrates the presence of an exposure pathway and receptors)

CBSA Port of Pleasant Camp Border Crossing

Definition	Score	Rationale for Score (document any assumptions, reports, or site-specific information; provide references)	Method Of Evaluation	Notes
B. Potential for ecological exposure (for the contaminated portion of the site)				
a) Terrestrial i) Land use Agricultural (or Wild lands) Residential/Parkland Commercial Industrial Do Not Know Score	Residential/Parkland 2		Review zoning and land use maps. If the proposed future land use is more "sensitive" than the current land use, evaluate this factor assuming the proposed future use is in place (indicate in the worksheet that future land use is the consideration). Agricultural land use is defined as uses of land where the activities are related to the productive capability of the land or facility (e.g., greenhouse) and are agricultural in nature, or activities related to the feeding and housing of animals as livestock. Wild lands are grouped with agricultural land due to the similarities in receptors that would be expected to occur there (e.g., herbivorous mammals and birds) and the similar need for a high level of protection to ensure ecological functioning. Residential/Parkland land uses are defined as uses of land on which dwelling on a permanent, temporary, or seasonal basis is the activity (residential), as well as uses on which the activities are recreational in nature and require the natural or human designed capability of the land to sustain that activity (parkland). Commercial/Industrial land uses are defined as land on which the activities are related to the buying, selling, or trading of merchandise or services (commercial), as well as land uses which are related to the production, manufacture, or storage of materials (industrial).	
ii) Uptake potential Direct Contact - Are plants and/or soil invertebrates likely exposed to contaminated soils at the site? Yes No Do Not Know Score	Do Not Know 0.5		If contaminated soils are located within the top 1.5 m, it is assumed that direct contact of soils with plants and soil invertebrates is an operable exposure pathway. Exposure to soils deeper than 1.5 m is possible, but less likely.	
iii) Ingestion (i.e., wildlife or domestic animals ingesting contaminated food items, soils or water) Are terrestrial animals likely to be ingesting contaminated water at the site? Yes No Do Not Know Score	No 0		Refer to an Ecological Risk Assessment for the site. If there is contaminated surface water at the site, assume that terrestrial organisms will ingest it.	
Are terrestrial animals likely to be ingesting contaminated soils at the site? Yes No Do Not Know Score	Do Not Know 0.5		Refer to an Ecological Risk Assessment report. Most animals will co-ingest some soil while eating plant matter or soil invertebrates.	
Can the contamination identified bioaccumulate? Yes No Do Not Know Score	No 0		Bioaccumulation of contaminants within food items is considered possible if: 1) The Log(Kow) of the contaminant is greater than 4 (as per the chemical characteristics work sheet) and concentrations in soils exceed the most conservative CCME soil quality guideline for the intended land use, or 2) The contaminant in collected tissue samples exceeds the Canadian Tissue Residue Guidelines.	
Distance to sensitive terrestrial ecological area 0 to 300 m 300 m to 1 km 1 to 5 km > 5 km Do Not Know Score	0 to 300 m 3		It is considered that within 300 m of a site, there is a concern for contamination. Therefore an environmental receptor located within this area of the site will be subject to further evaluations. It is also considered that any environmental receptor located greater than 5 km will not be a concern for evaluation. Review Conservation Authority mapping and literature including Canadian Council on Ecological Areas link:www.ccea.org	Environmental receptors include: local, regional or provincial species of interest or significance; arctic environments (on a site specific basis); nature preserves, habitats for species at risk, sensitive forests, natural parks or forests.
Raw Terrestrial Total Potential	6	Note if a "Known" Ecological Effects score is provided, the "Potential" score is disallowed.		
Allowed Terrestrial Total Potential	6			

CCME National Classification System (2008)

(III) Exposure (Demonstrates the presence of an exposure pathway and receptors)

CBSA Port of Pleasant Camp Border Crossing

Definition	**Score**	**Rationale for Score** (document any assumptions, reports, or site-specific information; provide references)	**Method Of Evaluation**	**Notes**
B. Potential for ecological exposure (for the contaminated portion of the site)				
b) Aquatic i) Classification of aquatic environment Sensitive Typical Not Applicable (no aquatic environment present) Do Not Know	Sensitive		"Sensitive aquatic environments" include those in or adjacent to shellfish or fish harvesting areas, marine parks, ecological reserves and fish migration paths. Also includes those areas deemed to have ecological significance such as for fish food resources, spawning areas or having rare or endangered species. "Typical aquatic environments" include those in areas other than those listed above.	
Score	3			
ii) Uptake potential Does groundwater daylighting to an aquatic environment exceed th CCME water quality guidelines for the protection of aquatic life at the point of contact? Yes No (or Not Applicable) Do Not Know	No		Groundwater concentrations of contaminants at the point of contact with an aquatic receiving environment can be estimated in three ways: 1) by comparing collected nearshore groundwater concentrations to the CCME water quality guidelines (this will be a conservative comparison, as contaminant concentrations in groundwater often decrease between nearshore wells and the point of discharge). 2) by conducting groundwater modeling to estimate the concentration of groundwater immediately before discharge. 3) by installing water samplers, "peepers", in the sediments in the area of daylighting groundwater.	
Score	0			
Distance from the contaminated site to an important surface water resource 0 to 300 m 300 m to 1 km 1 to 5 km > 5 km Do Not Know	0 to 300 m		It is considered that within 300 m of a site, there is a concern for contamination. Therefore an environmental receptor or important water resource located within this area of the site will be subjec further evaluation. It is also considered that any environmental receptor located greater than 5 km away will not be a concern for evaluation. Review Conservation Authority mapping and literature including Canadian Council on Ecological Areas link www.ccea.org	Environmental receptors include: local, regional or provincial species of interest or significance, sensitive wetlands and fens and other aquatic environments
Score	3			
Are aquatic species (i.e., forage fish, invertebrates or plants) that are consumed by predatory fish or wildlife consumers, such as mammal and birds, likely to accumulate contaminants in their tissues? Yes No Do Not Know	No		Bioaccumulation of food items is possible if: 1) The Log(Kow) of the contaminant is greater than 4 (as per the chemical characteristics work sheet) and concentrations in sediments exceed the CCME ISQGs. 2) The contaminant in collected tissue samples exceeds the CCME tissue quality guidelines.	
Score	0			
Raw Aquatic Total Potential	6	Note if a "Known" Ecological Effects score is provided, the "Potential" score is disallowed.		
Allowed Aquatic Total Potential	6			
4. Ecological Exposure Modifying Factors				
a) Known occurrence of a species at risk. Is there a potential for a species at risk to be present at the site? Yes No Do Not Know	Do Not Know		Consult any ecological risk assessment reports. If information is not present, utilize on-line databases such as Eco Explorer. Regional, Provincial (Environment Ministries), or Federal staff (Fisheries and Oceans or Environment Canada) should be able to provide some guidance.	Species at risk include those that are extirpated, endangered, threatened, or of special concern. For a list of species at risk, consult Schedule 1 of the federal Species at Risk Act (http://www.sararegistry.gc.ca/species/schedules_e.cfm?id=1). Many provincial governments may also provide regiona applicable lists of species at risk. For example, in British Columbia, consult: BCMWLAP. 2005. Endangered Species and Ecosystems in British Columbia. Provincial red and blue lists. Ministry of Sustainable Resource Management and Water, Land and Air Protection http://srmwww.gov.bc.ca/atrisk/red-blue.htm
	---			
Score	1			
b) Potential impact of aesthetics (e.g., enrichment of a lake or tainting of food flavor).				
Is there evidence of aesthetic impact to receiving water bodies?	No		Documentation may consist of environmental investigation reports, press articles, petitions or other records.	This Item will require some level of documentation by user, including contact names, addresses, phone numbers, e-mail addresses. Evidence of changes must be documented, please attach copy of report containing relevant information.
Yes No Do Not Know	 0 ---			
Is there evidence of olfactory impact (i.e., unpleasant smell)? Yes No Do Not Know	No 0 ---		Examples of olfactory change can include the smell of a COPC or an increase in the rate of decay in an aquatic habitat.	
Is there evidence of increase in plant growth in the lake or water body? Yes No Do Not Know	No 0 ---		A distinct increase of plant growth in an aquatic environment may suggest enrichment. Nutrients e.g., nitrogen or phosphorous releases to an aquatic body can act as a fertilizer.	
Is there evidence that fish or meat taken from or adjacent to the site smells or tastes different? Yes No Do Not Know	No 0 ---		Some contaminants can result in a distinctive change in the way food gathered from the site tastes or smells.	
Ecological Modifying Factors Total - Known	**0**			
Ecological Modifying Factors Total - Potential	**1**			
Raw Ecological Total - Known	0			
Raw Ecological Total - Potential	13			
Raw Ecological Total	13			
Ecological Total (Max 18)	**13.0**			

CCME National Classification System (2008)

(III) Exposure (Demonstrates the presence of an exposure pathway and receptors)

CBSA Port of Pleasant Camp Border Crossing

Definition	**Score**	**Rationale for Score** (document any assumptions, reports, or site-specific information; provide references)	**Method Of Evaluation**	**Notes**
5. Other Potential Contaminant Receptors				
a) Exposure of permafrost (leading to erosion and structural concerns)				Plants and lichens provide a natural insulating layer which will help prevent thawing of the permafrost during the summ Plants and lichens may also absorb less solar radiation. Solar radiation is turned into heat which can also cause underlying permafrost to melt.
Are there improvements (roads, buildings) at the site dependant upon the permafrost for structural integrity?	No		Consult engineering reports, site plans or air photos of the site. When permafrost melts, the stability the soil decreases, leading to erosion. Human structures, such as roads and/or buildings are often dependent on the stability that the permafrost provides.	
Yes				
No	0			
Do Not Know	---			
Is there a physical pathway which can transport soils released by damaged permafrost to a nearby aquatic environment?	No		Melting permafrost leads to a decreased stability of underlying soils. Wind or surface run-off erosion can carry soils into nearby aquatic habitats. The increased soil loadings into a river can cause an increase in total dissolved solids and a resulting decrease in aquatic habitat quality. In addition, the erosion can bring contaminants from soils to aquatic environments.	
Yes				
No	0			
Do Not Know	---			
Other Potential Receptors Total - Known	**0**			
Other Potential Receptors Total - Potential	**0**			

Exposure Total		
Raw Human Health + Ecological Total - Known	0	
Raw Human Health + Ecological Total - Potential	20	Only includes "Allowed potential" - if a "Known" score was supplied under a given category then the "Potential" score was not included.
Raw Total	20	
Exposure Total (max 34)	**14.8**	

CCME National Classification System (2008)
Score Summary

Scores from individual worksheets are tallied in this worksheet.
Refer to this sheet after filling out the revised NCS completely.

I. Contaminant Characteristics	Known	Potential
1. Residency Media	4	---
2. Chemical Hazard	4	---
3. Contaminant Exceedance Factor	8	---
4. Contaminant Quantity	6	---
5. Modifying Factors	2	---
Raw Total Score	24	0
Raw Total Score (Known + Potential)	24	
Adjusted Total Score (Raw Total / 40 *33)	**19.8**	(max 33)

II. Migration Potential	Known	Potential
1. Groundwater Movement	12	---
2. Surface Water Movement	0	---
3. Soil	---	9
4. Vapour	---	9.5
5. Sediment Movement	0	---
6. Modifying Factors	0	0
Raw Total Score	12	18.5
Raw Total Score (Known + Potential)	30.5	
Adjusted Total Score (Raw Total / 64 * 33)	**15.7**	(max 33)

III. Exposure	Known	Potential
1. Human Receptors		
A. Known Impact	---	
B Potential		
a. Land Use		2
b. Accessibility		0
c. Exposure Route		
i. Direct Contact		1.5
ii. Inhalation		2
iii. Ingestion		1.5
2. Human Receptors Modifying Factors	0	---
Raw Total Human Score	0	7
Raw Total Human Score (Known + Potential)	7	
Adjusted Total Human Score	7.0	(maximum 22)
3. Ecological Receptors		
A. Known Impact	---	
B. Potential		
a. Terrestrial		6
b. Aquatic		6
4. Ecological Receptors Modifying Factors	0	1
Raw Total Ecological Score	0	13
Raw Total Ecological Score (Known + Potential)	13	
Adjusted Total Ecological Score	13.0	(maximum 18)
5. Other Receptors	0	0
Total Other Receptors Score (Known + Potential)	0	
Total Exposure Score (Human + Ecological + Other)	**20.0**	
Adjusted Total Exposure Score (Total Exposure / 46 * 34)	**14.8**	(max 34)

Site Score

CBSA Port of Pleasant Camp Border Crossing

Site Letter Grade	**A**
Certainty Percentage	**75%**
% Responses that are "Do Not Know"	**2%**
Total NCSCS Score for site	**50.3**
Site Classification Category	**2**

Site Classification Categories*:

Class 1 - High Priority for Action (Total NCS Score >70)
Class 2 - Medium Priority for Action (Total NCS Score 50 - 69.9)
Class 3 - Low Priority for Action (Total NCS Score 37 - 49.9)
Class N - Not a Priority for Action (Total NCS Score <37)
Class INS - Insufficient Information (>15% of responses are "Do Not Know")

* NOTE: The term "action" in the above categories does not necessarily refer to remediation, but could also include risk assessment, risk management or further site characterization and data collection.

CCME National Classification System (2008)

Contaminant Hazard Ranking

(Based on the Proposed Hazard Ranking developed for the FCSAP Contaminated Sites Classification System)

This information is used in Sheet I (Contaminant Characteristics), section 2 (Chemical Hazard).

Chemical/Parameter	Hazard	CEPA	Carcinogenicity	Notes
Acetaldehyde	H	*	PHC	
Acetone	L			
Acrolein	H	*		
Acrylonitrile	H	*	PHC	
Alachlor	M			
Aldicarb	H			
Aldrin	H			
Allyl Alcohol	H			
Aluminum	L			
Ammonia	L	*		
Antimony	H			
Arsenic	H	*		
Atrazine	M			
Azinphos-Methyl	H			
Barium	L			
Bendiocarb	H			
Benzene	H	*	CHC	BTEX
Benzidine	H	*	CHC	
Beryllium	H		CHC	
Biphenyl, 1,1-	M			
2,3,4,5-Bis(2-Butylene)tetrahydro-2-furfural	H			
Bis(Chloromethyl)Ether	H	*	CHC	
Bis(2-Chloroethyl)Ether	H		CHC	
Bis(2-Chloroisopropyl)Ether	H			
Bis(2-Ethylhexyl)Phthalate	H	*		PH
Boron	L			
Bromacil	M			
Bromate	M			
Bromochlorodifluoromethane	M	*		HM
Bromochloromethane	H	*		HM
Bromodichloromethane	H			HM
Bromoform (Tribromomethane)	H		PHC	HM
Bromomethane	M			HM
Bromotrifluoromethane	M	*		HM
Bromoxynil	H			
Butadiene, 1,3-	H	*	CHC	
Cadmium	H	*	CHC	
Carbofuran	M			
Carbon Tetrachloride (Tetrachloromethane)	H		PHC	HM
Captafol	M			
Chloramines	M	*		
Chloride	L			

Chemical/Parameter	Hazard	CEPA	Carcinogenicity	Notes
Chloroaniline, P-	H			
Chlorobenzene (mono)	M			
Chlorobenzilate	M			
Chlorodimeform	M			
Chloroform	H		PHC	HM
Chloromethane	M			
Chloromethyl Methyl Ether	M	*		
(4-Chlorophenyl)Cyclopropylmethanone, O-((4-Nitrophenyl)Methyl)Oxime	H			
Chlorinated Benzenes				
Monochlorobenzene	M			
Dichlorobenzene, 1,2- (O-DCB)	M			
Dichlorobenzene, 1,3- (M-DCB)	M			
Dichlorobenzene, 1,4- (P-DCB)	H			
Trichlorobenzene, 1,2,3-	M			
Trichlorobenzene, 1,2,4-	M			
Trichlorobenzene, 1,3,5-	M			
Tetrachlorobenzene, 1,2,3,4-	M			
Tetrachlorobenzene, 1,2,3,5-	M			
Tetrachlorobenzene, 1,2,4,5-	M			
Pentachlorobenzene	M			
Hexachlorobenzene	H			
Chlorinated Ethanes				
Dichloroethane, 1,1-	M			
Dichloroethane, 1,2- (Ethylene Dichloride (EDC))	H		PHC	
Trichloroethane, 1,1,1-	H	*		
Trichloroethane, 1,1,2-	M			
Tetrachloroethane, 1,1,1,2-	M			
Tetrachloroethane, 1,1,2,2-	M			
Chlorinated Ethenes				
Monochloroethene (Vinyl Chloride)	H	*	CHC	
Dichloroeth(yl)ene, 1,1-	H			
Dichloroeth(yl)ene, 1,2- (cis or trans)	M			
Trichloroeth(yl)ene (TCE)	H	*		
Tetrachloroeth(yl)ene (PCE)	H	*		
Chlorinated Phenols		*		
Monochlorophenols	M			
Chlorophenol, 2-	M			
Dichlorophenols				
Dichlorophenol, 2,4-	M			
Trichlorophenols				
Trichlorophenol, 2,4,5-	H			
Trichlorophenol, 2,4,6-	H		PHC	
Tetrachlorophenols				
Tetrachlorophenol, 2,3,4,6-	H			
Pentachlorophenol (PCP)	H			
Chloromethane	M			HM
Chlorophenol, 2-	M			CP
Chlorothalonil	H			

Chemical/Parameter	Hazard	CEPA	Carcinogenicity	Notes
Chlorpyrifos	H			
Chromium (Total)	M	*		
Chromium (III)	L	*		
Chromium (VI)	H	*	CHC	
Coal Tar	H		CHC	Refer to PAHs
Cobalt	L			
Copper	L			
Creosote	M	*		Refer to PAHs
Crocidolite	L			
Cyanide (Free)	H			
Cyanazine	M			
Dibenzofuran	H	*		DF
Dibromoethane, 1,2- (Ethylene Dibromide (EDB))	H		PHC	
1,2-Dibromo-3-Chloropropane	H		PHC	
Dibromochloromethane	M	*		HM
Dibromotetrafluoroethane	M			
Dichlorobenzene, 1,2- (O-DCB)	M			CB
Dichlorobenzene, 1,3- (M-DCB)	M			CB
Dichlorobenzene, 1,4- (P-DCB)	H			CB
Dichlorobenzidine, 3,3'-	H		PHC	
DDD	H			
DDE	H			
DDT	H		PHC	
Deltamethrin	M			
Diazinon	M			
Dicamba	H			
Dichloroethane, 1,1-	H			CEA
Dichloroethane, 1,2- (EDC)	H		PHC	CEA
Dichloroeth(yl)ene, 1,1-	H			CEE
Dichloroeth(yl)ene, Cis-1,2-	M			CEE
Dichloroeth(yl)ene, Trans-1,2-	M			CEE
Dichloromethane (Methylene Chloride)	H		PHC	HM
Dichlorophenol, 2,4-	M			CP
Dichloropropane, 1,2-	H			
Dichloropropene, 1,3-	H		PHC	
Diclofop-Methyl	H			
Didecyl Dimethyl Ammonium Chloride	H			
Dieldrin	H			
Dimethoate	H			
Diethyl Phthalate	M			PH
Diethylene Glycol	L			GL
Dimethyl Phthalate	M			PH
Dimethylphenol, 2,4-	L			
Dinitrophenol, 2,4-	M			
Dinitrotoluene, 2,4-	H			
Dinoseb	H			
Di-n-octyl Phthalate	H			
Dioxane, 1,4-	H		PHC	
Dioxins/Furans	H			
Diquat	M			

Chemical/Parameter	**Hazard**	**CEPA**	**Carcinogenicity**	**Notes**
Diuron	M			
Endosulfan	H			
Endrin	H			
Ethylbenzene	M			BTEX
Ethylene Dibromide (EDB)	H		PHC	
Ethylene Glycol	L			GL
Ethylene Oxide	H		CHC	
Fluoroacetamide	M			
Fluorides	L	*		
Glycols				
Ethylene Glycol	L			
Diethylene Glycol	L			
Propylene Glycol	L			
Glyphosate	M			
Halogenated Methanes				
Bromochlorodifluoromethane	M	*		
Bromochloromethane	M	*		
Bromodichloromethane	H		PHC	
Bromomethane	M			
Bromotrifluoromethane	M	*		
Chloroform	M		PHC	HM
Chloromethane	M			
Dibromochloromethane	M			
Dichloromethane (Methylene Chloride)	H		PHC	
Methyl Bromide	M	*		
Tetrachloromethane (Carbon Tetrachloride)	H			
Tribromomethane (Bromoform)	H			
Trihalomethanes (THM)	M			
Heptachlor	H			
Heptachlor Epoxide	H			
Hexachlorobenzene	H		PHC	
Hexachlorobutadiene	H			
Hexachlorocyclohexane, Gamma	H		PHC	
Hexachloroethane	H		PHC	
Hydrobromofluorocarbons (HBFCS)	M	*		
Hydrochlorofluorocarbons (HCFCS)	M	*		
3-Iodo-2-propynyl Butyl Carbamate	H			
Iron	L			
Lead	H	*		neurotoxins / teratogens
Lead Arsenate	H			
Leptophos	H			
Lindane	H			
Linuron	H			
Lithium	L			
Malathion	M			
Manganese	L			

Chemical/Parameter	Hazard	CEPA	Carcinogenicity	Notes
Mercury	H	*		
Methamidophos	H			
Methoxylchlor	H			
Methyl Bromide (Bromomethane)	M	*		
2-Methyl-4-chloro-phenoxy Acetic Acid	M			
Methyl Ethyl Ketone	L			
Methyl Isobutyl Ketone	L			
Methyl Mercury	H			
Methyl-Parathion	H			
Methyl Tert Butyl Ether (MTBE)	M			
Metolachlor	M			
Metribuzin	H			
Molybdenum	L			
Monochloramine	M			
Monocrotophos	H			
Nickel	H	*		CEPA - inhalation
Nitrilotriacetic Acid	H		PHC	
Nitrate	L			
Nitrite	M			
Nonylphenol + Ethoxylates	H	*		
Organotins				
Tributyltin	H			
Tricyclohexyltin	H			
Triphenyltin	H			
Parathion	H			
Paraquat (as Dichloride)	H			
Pentachlorobenzene	M			CB
Pentachlorophenol (PCP)	H			CP
Petroleum Hydrocarbons				Ranking based upon fraction of toxic and mobile components in product. Lighter compounds such as benzene are more toxic and mobile.
Petroleum Hydrocarbons (Gasoline)	H			
Petroleum Hydrocarbons (Kerosene incl. Jet Fuels)	H			
Petroleum Hydrocarbons (Diesel incl Heating Oil)	M			
Petroleum Hydrocarbons (Heavy Oils)	L			
Petroleum Hydrocarbons (CCME F1)	H			
Petroleum Hydrocarbons (CCME F2)	M			
Petroleum Hydrocarbons (CCME F3)	L			
Petroleum Hydrocarbons (CCME F4)	L			
Phenol	L			
Phenoxy Herbicides	M			
Phorate	H			
Phosphamidon	H			
Phthalate Esters				
Bis(2-Ethylhexyl)Phthalate	H	*		
Diethyl Phthalate	H			
Dimethyl Phthalate	H			
Di-n-octyl Phthalate	H			
Polybrominated Biphenyls (PBB)	H	*		
Polychlorinated Biphenyls (PCB)	H			

Chemical/Parameter	Hazard	CEPA	Carcinogenicity	Notes
Polychlorinated Terphenyls	H	*		
Polycyclic Aromatic Hydrocarbons	H	*	PHC	
Acenaphthene	M			
Acenaphthylene	M			
Acridine	H			
Anthracene	M			
Benzo(a)anthracene	H		PHC	
Benzo(a)pyrene	H		PHC	
Benzo(b)fluoranthene	H		PHC	
Benzo(g,h,i)perylene	H			
Benzo(k)fluoranthene	H		PHC	
Chrysene	M			
Dibenzo(a,h)anthracene	H		PHC	
Fluoranthene	M			
Fluorene	M			
Indeno(1,2,3-c,d)pyrene	H		PHC	
Methylnaphthalenes	M			
Naphthalene	M			
Phenanthrene	M			
Pyrene	M			
Quinoline	H			
Propylene Glycol	L			GL
Radium	H			
Radon	H			
Selenium	M			
Silver	L			
Simazine	M			
Sodium	L			
Strontium-90	H			
Strychnine	H			
Styrene	H			
Sulphate	L			
Sulphide	L			
2,3,7,8-Tetrachlorodibenzo-p-dioxins (TCDD)	H	*		DF
Tebuthiuron	H			
Tetrachloroeth(yl)ene (PCE)	H	*		CEE
Tetraethyl Lead	H			
Tetrachlorobenzene, 1,2,3,4-	H			CB
Tetrachlorobenzene, 1,2,3,5-	H			CB
Tetrachlorobenzene, 1,2,4,5-	H			CB
Tetrachloroethane, 1,1,1,2-	M			CEA
Tetrachloroethane, 1,1,2,2-	M			CEA
Tetrachlorophenol, 2,3,4,6-	H			CP
Tetramethyl Lead	H	*		
Thallium	M			
Thiophene	M			
Tin	L			
Toluene	M			BTEX
Toxaphene	H			

Chemical/Parameter	Hazard	CEPA	Carcinogenicity	Notes
Triallate	M			
Tribromomethane (Bromoform)	H			HM
Tributyltetradecylphosphonium Chloride	H	*		
Trichlorobenzene, 1,2,3-	H			CB
Trichlorobenzene, 1,2,4-	H			CB
Trichlorobenzene, 1,3,5-	H			CB
Trichloroethane, 1,1,1-	H	*		CEA
Trichloroethane, 1,1,2-	M			CEA
Trichloroeth(yl)ene (TCE)	H	*		CEE
Tricyclohexyltin Hydroxide	H			
Trichlorophenol, 2,4,5-	H			CP
Trichlorophenol, 2,4,6-	H		PHC	CP
Trifluralin	H			
Trihalomethanes (THM)	M			
Tris(2,3-Dibromopropyl)phosphate	H			
Tritium	L			
Uranium (Non-radioactive) / (Radioactive)	M/H			
Vanadium	M			
Vinyl Chloride	H	*	CHC	CEE
Xylenes	M			BTEX
Zinc	L			

H = High Hazard
M = Medium Hazard
L = Low Hazard
Hazard ratings based on a number of factors including potential human and ecological health effects.

PHC = Potential Human Carcinogen
CHC = Confirmed Human Carcinogen

BTEX = benzene, toluene, ethylbenzene, and xylenes
CB = chlorobenzenes
CEA = chlorinated ethanes
CEE = chlorinated ethenes
CP = chlorophenols
DF = dioxins and furans
GL = glycols
HM = halomethanes
PAH = polycyclic aromatic hydrocarbons
PH = phthalate esters

CCME National Classification System (2008)

Reference Material (Information to assist in scoring)

Examples of Persistent Substances

This information is used in Sheet I (Chemical Characteristics), section 5 (Modifying Factors).

aldrin
benzo(a)pyrene
chlordane
DDT
DDE
dieldrin
hexachlorobenzene
methylmercury
mirex
octachlorostyrene
PCBs
PCDDs/PCDFs (dioxins and furans)
toxaphene
alkylated lead

Examples of Substances in the Various Chemical Classes

This information is used in Sheet I (Chemical Characteristics), section 5 (Modifying Factors).

Chemical Class	Examples *
inorganic substances (including metals)	arsenic, barium, cadmium, hexavalent chromium, copper, cyanide, fluoride, lead, mercury, nickel, selenium, sulphur, zinc; brines or salts
volatile petroleum hydrocarbons	benzene, toluene, ethylbenzene, xylenes, PHC F1
light extractable petroleum hydrocarbons	PHC F2
heavy extractable petroleum hydrocarbons	PHC F3
PAHs	Benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, dibenz(a,h0anthracene, indeno(1,2,3-c,d)pyrene, naphthalene, phenanthrene, pyrene
phenolic substances	phenol, pentachlorophenol, chlorophenols, nonchlorinated phenols (e.g., 2,4-dinitrophenol, cresol, etc.)
chlorinated hydrocarbons	PCBs, tetrachloroethylene, trichloroethylene, dioxins and furans, trichlorobenzene, tetrachlorobenzene, pentachlorobenzene, hexachlorobenzene
halogenated methanes	carbon tetrachloride, chloroform, dichloromethane
phthalate esters	di-isononyl phthalate (DINP), di-isodecyl phthalate (DIDP), di-2-ethylhexyl phthalate (DEHP)
pesticides	DDT, hexachlorocyclohexane

* Note: Specific chemicals that belong to the various classes are not limited to those listed in this table. These lists are not exhaustive and are meant just to provide examples of substances that are typically encountered.

Chemical-specific Properties
(Adapted from USEPA Soil Screening Criteria)

The information on Koc is used in Sheet II (Migration Potential), section 1,B,a (Relative Mobility).
The information on the dimensionless Henry's law constant is used in Sheet II (Migration Potential), section 4,B,a (Relative Volatility).
The information on log Kow is used in Sheet III (Exposure), section 3,B,a,iii (Potential for Ecological Exposure - terrestrial ingestion), and section 3,B,b,ii (Potential for Ecological Exposure - aquatic uptake potential).

CAS No.	Compound	Solubility in Water @ 20-25°C (mg/L)	Henry's Law Constant (atm-m3/mol)	Dimensionless Henry's law constant (HLC [atm-m3/mol] * 41) (25 °C).	log Kow	Log Koc (L/kg)
83-32-9	Acenaphthene	4.24E+00	1.55E-04	6.36E-03	3.92	3.85
67-64-1	Acetone	1.00E+06	3.88E-05	1.59E-03	-0.24	-0.24
309-00-2	Aldrin	1.80E-01	1.70E-04	6.97E-03	6.5	6.39
120-12-7	Anthracene	4.34E-02	6.50E-05	2.67E-03	4.55	4.47
56-55-3	Benz(a)anthracene	9.40E-03	3.35E-06	1.37E-04	5.7	5.6
71-43-2	Benzene	1.75E+03	5.55E-03	2.28E-01	2.13	1.77
205-99-2	Benzo(b)fluoranthene	1.50E-03	1.11E-04	4.55E-03	6.2	6.09
207-08-9	Benzo(k)fluoranthene	8.00E-04	8.29E-07	3.40E-05	6.2	6.09
65-85-0	Benzoic acid	3.50E+03	1.54E-06	6.31E-05	1.86	—
50-32-8	Benzo(a)pyrene	1.62E-03	1.13E-06	4.63E-05	6.11	6.01
111-44-4	Bis(2-chloroethyl)ether	1.72E+04	1.80E-05	7.38E-04	1.21	1.19
117-81-7	Bis(2-ethylhexyl)phthalate	3.40E-01	1.02E-07	4.18E-06	7.3	7.18
75-27-4	Bromodichloromethane	6.74E+03	1.60E-03	6.56E-02	2.1	1.74
75-25-2	Bromoform	3.10E+03	5.35E-04	2.19E-02	2.35	1.94
71-36-3	Butanol	7.40E+04	8.81E-06	3.61E-04	0.85	0.84
85-68-7	Butyl benzyl phthalate	2.69E+00	1.26E-06	5.17E-05	4.84	4.76
86-74-8	Carbazole	7.48E+00	1.53E-08	6.26E-07	3.59	3.53
75-15-0	Carbon disulfide	1.19E+03	3.03E-02	1.24E+00	2	1.66
56-23-5	Carbon tetrachloride	7.93E+02	3.04E-02	1.25E+00	2.73	2.24
57-74-9	Chlordane	5.60E-02	4.86E-05	1.99E-03	6.32	5.08
106-47-8	*p-Chloroaniline*	5.30E+03	3.31E-07	1.36E-05	1.85	1.82
108-90-7	Chlorobenzene	4.72E+02	3.70E-03	1.52E-01	2.86	2.34
124-48-1	Chlorodibromomethane	2.60E+03	7.83E-04	3.21E-02	2.17	1.8
67-66-3	Chloroform	7.92E+03	3.67E-03	1.50E-01	1.92	1.6
95-57-8	2-Chlorophenol	2.20E+04	3.91E-04	1.60E-02	2.15	—
218-01-9	Chrysene	1.60E-03	9.46E-05	3.88E-03	5.7	5.6
72-54-8	DDD	9.00E-02	4.00E-06	1.64E-04	6.1	6
72-55-9	DDE	1.20E-01	2.10E-05	8.61E-04	6.76	6.65
50-29-3	DDT	2.50E-02	8.10E-06	3.32E-04	6.53	6.42
53-70-3	Dibenz(a,h)anthracene	2.49E-03	1.47E-08	6.03E-07	6.69	6.58
84-74-2	Di-n-butyl phthalate	1.12E+01	9.38E-10	3.85E-08	4.61	4.53
95-50-1	1,2-Dichlorobenzene	1.56E+02	1.90E-03	7.79E-02	3.43	2.79

CAS No.	Compound	Solubility in Water @ 20-25°C (mg/L)	Henry's Law Constant (atm-m3/mol)	Dimensionless Henry's law constant (HLC [atm-m3/mol] * 41) (25 °C).	log Kow	Log Koc (L/kg)
106-46-7	1,4-Dichlorobenzene	7.38E+01	2.43E-03	9.96E-02	3.42	2.79
91-94-1	3,3-Dichlorobenzidine	3.11E+00	4.00E-09	1.64E-07	3.51	2.86
75-34-3	1,1-Dichloroethane	5.06E+03	5.62E-03	2.30E-01	1.79	1.5
107-06-2	1,2-Dichloroethane	8.52E+03	9.79E-04	4.01E-02	1.47	1.24
75-35-4	1,1-Dichloroethylene	2.25E+03	2.61E-02	1.07E+00	2.13	1.77
156-59-2	cis-1,2-Dichloroethylene	3.50E+03	4.08E-03	1.67E-01	1.86	1.55
156-60-5	trans-1,2-Dichloroethylene	6.30E+03	9.38E-03	3.85E-01	2.07	1.72
120-83-2	2,4-Dichlorophenol	4.50E+03	3.16E-06	1.30E-04	3.08	—
78-87-5	1,2-Dichloropropane	2.80E+03	2.80E-03	1.15E-01	1.97	1.64
542-75-6	1,3-Dichloropropene	2.80E+03	1.77E-02	7.26E-01	2	1.66
60-57-1	Dieldrin	1.95E-01	1.51E-05	6.19E-04	5.37	4.33
84-66-2	Diethylphthalate	1.08E+03	4.50E-07	1.85E-05	2.5	2.46
105-67-9	2,4-Dimethylphenol	7.87E+03	2.00E-06	8.20E-05	2.36	2.32
51-28-5	2,4-Dinitrophenol	2.79E+03	4.43E-07	1.82E-05	1.55	—
121-14-2	2,4-Dinitrotoluene	2.70E+02	9.26E-08	3.80E-06	2.01	1.98
606-20-2	2,6-Dinitrotoluene	1.82E+02	7.47E-07	3.06E-05	1.87	1.84
117-84-0	Di-n-octyl phthalate	2.00E-02	6.68E-05	2.74E-03	8.06	7.92
115-29-7	Endosulfan	5.10E-01	1.12E-05	4.59E-04	4.1	3.33
72-20-8	Endrin	2.50E-01	7.52E-06	3.08E-04	5.06	4.09
100-41-4	Ethylbenzene	1.69E+02	7.88E-03	3.23E-01	3.14	2.56
206-44-0	Fluoranthene	2.06E-01	1.61E-05	6.60E-04	5.12	5.03
86-73-7	Fluorene	1.98E+00	6.36E-05	2.61E-03	4.21	4.14
76-44-8	Heptachlor	1.80E-01	1.09E-03	4.47E-02	6.26	6.15
1024-57-3	Heptachlor epoxide	2.00E-01	9.50E-06	3.90E-04	5	4.92
118-74-1	Hexachlorobenzene	6.20E+00	1.32E-03	5.41E-02	5.89	4.74
87-68-3	Hexachloro-1,3-butadiene	3.23E+00	8.15E-03	3.34E-01	4.81	4.73
319-84-6	a-HCH (a-BHC)	2.00E+00	1.06E-05	4.35E-04	3.8	3.09
319-85-7	b-HCH (b-BHC)	2.40E-01	7.43E-07	3.05E-05	3.81	3.1
58-89-9	g -HCH (Lindane)	6.80E+00	1.40E-05	5.74E-04	3.73	3.03
77-47-4	Hexachlorocyclopentadiene	1.80E+00	2.70E-02	1.11E+00	5.39	5.3
67-72-1	Hexachloroethane	5.00E+01	3.89E-03	1.59E-01	4	3.25
193-39-5	Indeno(1,2,3-cd)pyrene	2.20E-05	1.60E-06	6.56E-05	6.65	6.54
78-59-1	Isophorone	1.20E+04	6.64E-06	2.72E-04	1.7	1.67
7439-97-6	Mercury	—	1.14E-02	4.67E-01	—	—
72-43-5	Methoxychlor	4.50E-02	1.58E-05	6.48E-04	5.08	4.99
74-83-9	Methyl bromide	1.52E+04	6.24E-03	2.56E-01	1.19	1.02
75-09-2	Methylene chloride	1.30E+04	2.19E-03	8.98E-02	1.25	1.07
95-48-7	2-Methylphenol	2.60E+04	1.20E-06	4.92E-05	1.99	1.96
91-20-3	Naphthalene	3.10E+01	4.83E-04	1.98E-02	3.36	3.3
98-95-3	Nitrobenzene	2.09E+03	2.40E-05	9.84E-04	1.84	1.81

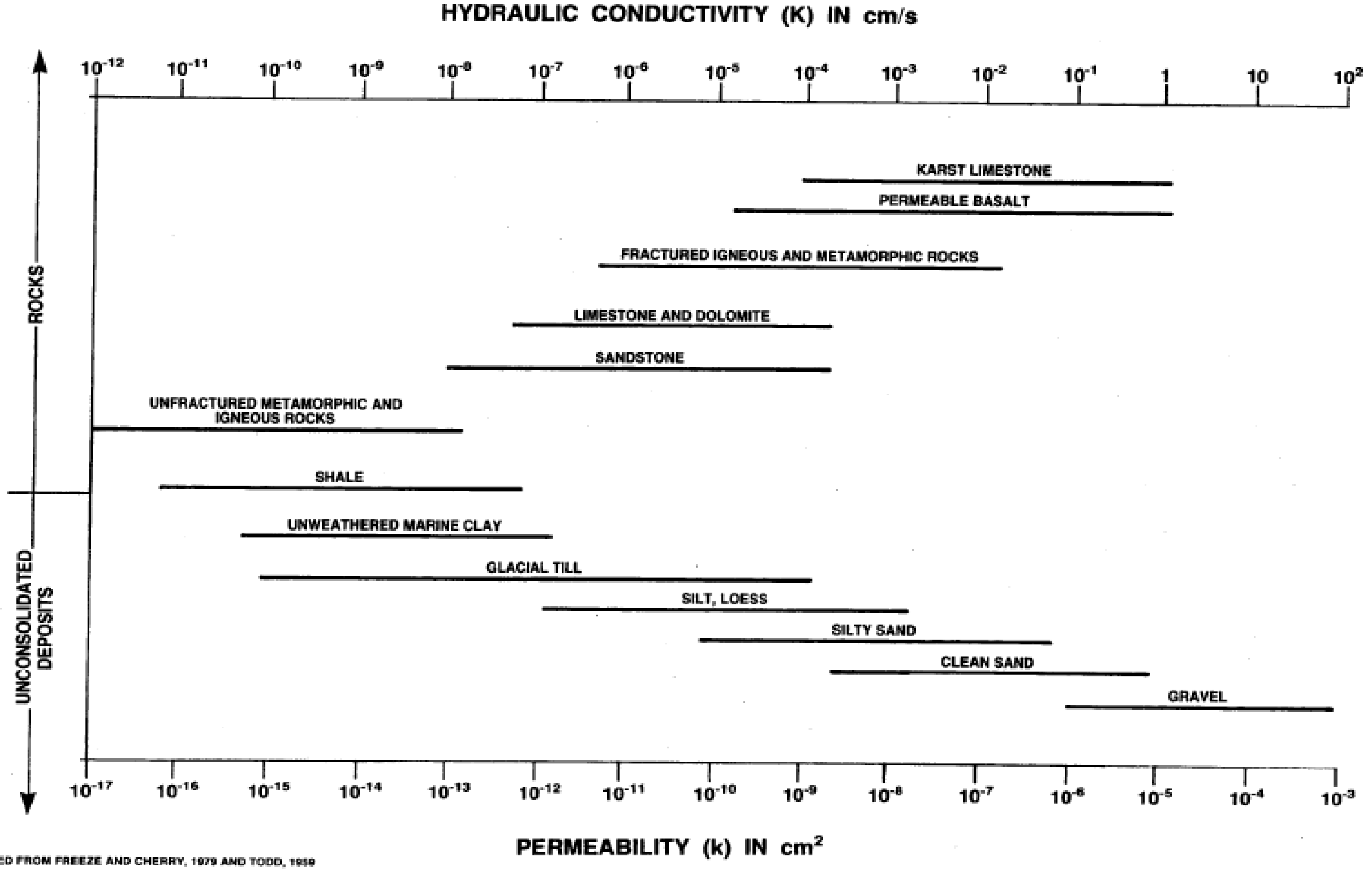
CAS No.	Compound	Solubility in Water @ 20-25°C (mg/L)	Henry's Law Constant (atm-m3/mol)	Dimensionless Henry's law constant (HLC [atm-m3/mol] * 41) (25 °C).	log Kow	Log Koc (L/kg)
86-30-6	N-Nitrosodiphenylamine	3.51E+01	5.00E-06	2.05E-04	3.16	3.11
621-64-7	N-Nitrosodi-n-propylamine	9.89E+03	2.25E-06	9.23E-05	1.4	1.38
1336-36-3	PCBs	—	—	—	5.58	5.49
87-86-5	Pentachlorophenol	1.95E+03	2.44E-08	1.00E-06	5.09	—
108-95-2	Phenol	8.28E+04	3.97E-07	1.63E-05	1.48	1.46
129-00-0	Pyrene	1.35E-01	1.10E-05	4.51E-04	5.11	5.02
100-42-5	Styrene	3.10E+02	2.75E-03	1.13E-01	2.94	2.89
79-34-5	1,1,2,2-Tetrachloroethane	2.97E+03	3.45E-04	1.41E-02	2.39	1.97
127-18-4	Tetrachloroethylene	2.00E+02	1.84E-02	7.54E-01	2.67	2.19
108-88-3	Toluene	5.26E+02	6.64E-03	2.72E-01	2.75	2.26
8001-35-2	Toxaphene	7.40E-01	6.00E-06	2.46E-04	5.5	5.41
120-82-1	1,2,4-Trichlorobenzene	3.00E+02	1.42E-03	5.82E-02	4.01	3.25
71-55-6	1,1,1-Trichloroethane	1.33E+03	1.72E-02	7.05E-01	2.48	2.04
79-00-5	1,1,2-Trichloroethane	4.42E+03	9.13E-04	3.74E-02	2.05	1.7
79-01-6	Trichloroethylene	1.10E+03	1.03E-02	4.22E-01	2.71	2.22
95-95-4	2,4,5-Trichlorophenol	1.20E+03	4.33E-06	1.78E-04	3.9	—
88-06-2	2,4,6-Trichlorophenol	8.00E+02	7.79E-06	3.19E-04	3.7	—
108-05-4	Vinyl acetate	2.00E+04	5.11E-04	2.10E-02	0.73	0.72
75-01-4	Vinyl chloride	2.76E+03	2.70E-02	1.11E+00	1.5	1.27
108-38-3	m-Xylene	1.61E+02	7.34E-03	3.01E-01	3.2	2.61
95-47-6	o-Xylene	1.78E+02	5.19E-03	2.13E-01	3.13	2.56
106-42-3	p-Xylene	1.85E+02	7.66E-03	3.14E-01	3.17	2.59

Source: United States Environmental Protection Agency. 1996. Soil Screening Guidance: Technical Background Document. EPA/540/R-95/128 (http://www.epa.gov/superfund/resources/soil/toc.htm#p5)

CAS = Chemical Abstracts Service
Kow = Octanol/water partition coefficient

RANGE OF VALUES OF HYDRAULIC CONDUCTIVITY AND PERMEABILITY

The information on Koc is used in Sheet II (Migration Potential), section 1,B,f (Hydraulic Conductivity)



ODIFIED FROM FREEZE AND CHERRY, 1979 AND TODD, 1959

APPENDIX IX

Laboratory Certificates of Analysis

AIR

Analysis Report

CANTEST LTD.

Professional
Analytical
Services

4606 Canada Way
Burnaby, B.C.
V5G 1K5

FAX: 604 731 2386

TEL: 604 734 7276

1 800 665 8566

REPORT ON: Analysis of Air Samples

REPORTED TO:
SNC-Lavalin Inc, Environment Division
8648 Commerce Court
Burnaby, BC
V5A 4N6

Att'n: Dave Bridger

CHAIN OF CUSTODY: 2140931, 2140932
PROJECT NAME: Pleasant Camp
PROJECT NUMBER: 131416

NUMBER OF SAMPLES: 12

REPORT DATE: February 8, 2010

DATE SUBMITTED: February 1, 2010

GROUP NUMBER: 110201018

SAMPLE TYPE: Air

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

TEST METHODS:

C10-C12 Aliphatic Hydrocarbons - was determined by taking the total area calculated from >C10 to C12 from the Flame Ionization Detector, quantified against C10 (Decane).

C10-C19 Hydrocarbons - was determined by summing the results from >C10-C12, >C12-C16 and >C16-C19 off the Flame Ionization Detector in order to obtain a total number.

C12-C16 Aliphatic Hydrocarbons - was determined by taking the total area calculated from >C12 to C16 from the Flame Ionization Detector, quantified against C10 (Decane).

C16-C19 Aliphatic Hydrocarbons - was determined by taking the total area calculated from >C16 to C19 from the Flame Ionization Detector, quantified against C10 (Decane).

C6-C8 Aliphatic Hydrocarbons - was determined by taking the C6-C8 total range, calibrated against C10 (Decane), from the Flame Ionization Detector and subracting the most common mono-cyclic compounds that are found in the C6-C8 range, ie, Benzene, Toluene, and etc. found on the Mass Selective Detector from that total number.

C6-C8 Aromatic Hydrocarbons - were calculated by looking at the most common mono-cyclic compounds eluted from the Gas Chromatograph equipped with a Mass Selective Detector and summing them all together to get a total number.

C8-C10 Aromatic Hydrocarbons - was determined by adding the total numbers obtained from all the >C8-C10

(Continued)

Alex Jang
Coordinator, Industrial Hygiene

C8-C10 Aromatic Hydrocarbons

Aromatics found on the GCMS such as Ethylbenzene, m, and o-Xylene, etc.

C8-C10 Aliphatic Hydrocarbons - was determined by taking the total area calculated from >C8 to C10 from the Flame Ionization Detector, quantified against C10 (Decane), and subracting total Aromatics found in the >C8-C10 range, ie, Ethylbenzene, m and o-Xylene, etc.

Organic Vapours in Air - analysis was performed using procedures based on NIOSH 1500 and/or 1501 methods. The procedure involves sampling using activated charcoal, desorption using carbon disulphide and analysis using GCFID. All samples are analyzed in duplicate, on two separate columns. If morethan 10% of the contaminant is found in the back section, the result should be given careful consideration as breakthrough may have occured. Note: Unless otherwise noted, a lab blank correction is performed on all sample results. CANTEST method reference 67-C-021.

Volatile Hydrocarbons (C6-C13) in Air - analysis was performed using procedures based on NIOSH Method 1500. The procedure involves sampling using charcoal tubes, desorption of analytes using carbon disulphide, and analysis using gas chromatography with flame ionization detection.

Volatile Petroleum Hydrocarbons (C6-C13) in Air - analysis was performed using procedures based on NIOSH Method 1500. The procedure involves sampling using charcoal tubes, desorption of analytes using carbon disulphide, and analysis using gas chromatography with flame ionization detection. VPH is calculated by subtraction of BTEX, Decane, and Hexane from the VH concentrations.

C10-C12 Aromatic Hydrocarbons - were calculated by looking at the most common compounds eluted from the Gas Chromatograph equipped with a Mass Selective Detector from >C10-C12 and summing them together to get a total number.

C12-C16 Aromatic Hydrocarbons - were calculated by looking at the most common compounds eluted from the Gas Chromatograph equipped with a Mass Selective Detector from >C12-C16 and summing them together to get a total number (Acenaphthylene, Acenaphthene and Fluorene).

C16-C19 Aromatic Hydrocarbons - were calculated by looking at the most common compounds eluted (Phenanthrene and Anthracene) from the Gas Chromatograph equipped with a Mass Selective Detector from >C16-C19 a summing them together to get a total number.

Polynuclear Aromatic Hydrocarbons in Air - analysis was performed using procedures based on NIOSH Method 5515 involving desorption of PAH compounds from the filter or sorbent tube, followed by analysis using gas chromatography/mass spectrometry (GC/MS).

TEST RESULTS:

(See following pages)

Polycyclic Aromatic Hydrocarbons (ug) in Air

CLIENT SAMPLE IDENTIFICATION:	H5-Basement-100127 (PAH)	H5-Main-100127 (PAH)	H5-A-100127 (PAH)	SVW09-1-100128 (PAH)	
DATE SAMPLED:	Jan 27/10	Jan 27/10	Jan 27/10	Jan 28/10	REPORTING LIMIT
CANTEST ID:	1002010059	1002010068	1002010072	1002010076	
Naphthalene	<	<	<	<	0.1
Acenaphthylene	<	<	<	<	0.1
Acenaphthene	<	<	<	<	0.1
Fluorene	<	<	<	<	0.05
Phenanthrene	<	<	<	<	0.05
Anthracene	<	<	<	<	0.05
Total LMW-PAH's					
Fluoranthene	<	<	<	<	0.05
Pyrene	<	<	<	<	0.02
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					
Total PAH's					
>C10-C12 Aromatics	<	<	<	<	0.2
>C12-C16 Aromatics	<	<	<	<	2
>C16-C19 Aromatics	<	<	<	<	2

Results expressed as total micrograms (ug)
< = Less than reporting limit

Polycyclic Aromatic Hydrocarbons (ug) in Air

CLIENT SAMPLE IDENTIFICATION:	SVW09-2-10 0128 (PAH)	SVW09-3-10 0128 (PAH)	
DATE SAMPLED:	Jan 28/10	Jan 28/10	
CANTEST ID:	1002010080	1002010082	REPORTING LIMIT
Naphthalene	<	<	0.1
Acenaphthylene	<	<	0.1
Acenaphthene	<	<	0.1
Fluorene	<	<	0.05
Phenanthrene	<	<	0.05
Anthracene	<	<	0.05
Total LMW-PAH's			
Fluoranthene	<	<	0.05
Pyrene	<	<	0.02
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			
Total PAH's			
>C10-C12 Aromatics	<	<	0.2
>C12-C16 Aromatics	<	<	2
>C16-C19 Aromatics	<	<	2

Results expressed as total micrograms (ug)
< = Less than reporting limit

Polycyclic Aromatic Hydrocarbons (mg/m3) in Air

CLIENT SAMPLE IDENTIFICATION:	H5-Basement-100127 (PAH)	H5-Main-100127 (PAH)	H5-A-100127 (PAH)	SVW09-1-100128 (PAH)	
DATE SAMPLED:	Jan 27/10	Jan 27/10	Jan 27/10	Jan 28/10	REPORTING LIMIT
CANTEST ID:	1002010059	1002010068	1002010072	1002010076	
Naphthalene	<	<	<	< 0.0041667	0.002083
Acenaphthylene	<	<	<	< 0.0041667	0.002083
Acenaphthene	<	<	<	< 0.0041667	0.002083
Fluorene	<	<	<	< 0.0020833	0.001042
Phenanthrene	<	<	<	< 0.0020833	0.001042
Anthracene	<	<	<	< 0.0020833	0.001042
Total LMW-PAH's					
Fluoranthene	<	<	<	< 0.0020833	0.001042
Pyrene	<	<	<	< 0.0008333	0.000417
Benzo(a)anthracene	<	<	<	< 0.0004167	0.000208
Chrysene	<	<	<	< 0.0004167	0.000208
Benzo(b)fluoranthene	<	<	<	< 0.0004167	0.000208
Benzo(k)fluoranthene	<	<	<	< 0.0004167	0.000208
Benzo(a)pyrene	<	<	<	< 0.0004167	0.000208
Indeno(1,2,3-cd)pyrene	<	<	<	< 0.0004167	0.000208
Dibenz(a,h)anthracene	<	<	<	< 0.0004167	0.000208
Benzo(g,h,i)perylene	<	<	<	< 0.0004167	0.000208
Total HMW-PAH's	<	<	<	< 0.0004167	0.000208
Total PAH's					
>C10-C12 Aromatics	<	<	<	< 0.00833	0.00417
>C12-C16 Aromatics	<	<	<	< 0.00833	0.00417
>C16-C19 Aromatics	<	<	<	< 0.0833	0.0417
Surrogate Recovery					
Naphthalene-d8	94	95	89	91	-
Acenaphthene-d10	89	89	83	86	-
Phenanthrene-d10	88	89	83	89	-
Chrysene-d12	90	90	85	84	-
Perylene-d12	121	123	117	119	-

Results expressed as milligrams per cubic meter (mg/cu. m)
Surrogate recoveries expressed as percent (%)
< = Less than reporting limit

Polycyclic Aromatic Hydrocarbons (mg/m3) in Air

CLIENT SAMPLE IDENTIFICATION:	SVW09-2-10 0128 (PAH)	SVW09-3-10 0128 (PAH)	
DATE SAMPLED:	Jan 28/10	Jan 28/10	REPORTING LIMIT
CANTEST ID:	1002010080	1002010082	
Naphthalene	<	<	0.004167
Acenaphthylene	<	<	0.004167
Acenaphthene	<	<	0.004167
Fluorene	<	<	0.002083
Phenanthrene	<	<	0.002083
Anthracene	<	<	0.002083
Total LMW-PAH's			
Fluoranthene	<	<	0.002083
Pyrene	<	<	0.000833
Benzo(a)anthracene	<	<	0.000417
Chrysene	<	<	0.000417
Benzo(b)fluoranthene	<	<	0.000417
Benzo(k)fluoranthene	<	<	0.000417
Benzo(a)pyrene	<	<	0.000417
Indeno(1,2,3-cd)pyrene	<	<	0.000417
Dibenz(a,h)anthracene	<	<	0.000417
Benzo(g,h,i)perylene	<	<	0.000417
Total HMW-PAH's	<	<	0.000417
Total PAH's			
>C10-C12 Aromatics	<	<	0.00833
>C12-C16 Aromatics	<	<	0.00833
>C16-C19 Aromatics	<	<	0.0833
Surrogate Recovery			
Naphthalene-d8	98	95	-
Acenaphthene-d10	92	89	-
Phenanthrene-d10	90	89	-
Chrysene-d12	89	89	-
Perylene-d12	126	127	-

Results expressed as milligrams per cubic meter (mg/cu. m)
Surrogate recoveries expressed as percent (%)
< = Less than reporting limit

Volatile Organics in Air

CLIENT SAMPLE IDENTIFICATION:	H5-Basement-100127 (A/A)	H5-Main-100127 (A/A)	H5-B-100127 (A/A)	SVW09-1-100128 (A/A)	
DATE SAMPLED:	Jan 27/10	Jan 27/10	Jan 27/10	Jan 28/10	REPORTING LIMIT
CANTEST ID:	1002010062	1002010070	1002010074	1002010079	
Benzene	<	<	<	< 0.007	0.002
Toluene	<	<	<	< 0.006	0.001
Ethylbenzene	<	<	<	< 0.005	0.001
Total Xylenes	<	<	<	< 0.005	0.001

Results expressed as mL/cubic meter or ppm (v/v) (mL/cu. m)
< = Less than reporting limit

Volatile Organics in Air

CLIENT SAMPLE IDENTIFICATION:	SVW09-2-10 0128 (A/A)	SVW09-3-10 0128 (A/A)	
DATE SAMPLED:	Jan 28/10	Jan 28/10	REPORTING LIMIT
CANTEST ID:	1002010081	1002010083	
Benzene	<	<	0.007
Toluene	<	<	0.006
Ethylbenzene	<	<	0.005
Total Xylenes	<	<	0.005

Results expressed as mL/cubic meter or ppm (v/v) (mL/cu. m)
< = Less than reporting limit

Volatile Organics (ug) in Air

CLIENT SAMPLE IDENTIFICATION:	H5-Basement-100127 (A/A)	H5-Main-100127 (A/A)	H5-B-100127 (A/A)	SVW09-1-100128 (A/A)		
DATE SAMPLED:	Jan 27/10	Jan 27/10	Jan 27/10	Jan 28/10	REPORTING LIMIT	UNITS
CANTEST ID:	1002010062	1002010070	1002010074	1002010079		
C6-C13 Hydrocarbons (VHv)	<	<	<	<	5	ug
C6-C13 Hydrocarbons (VHv)	<	<	<	< 0.2	0.05	mg/cu. m
C6-C13 Hydrocarbons (VPHv)	<	<	<	<	5	ug
C6-C13 Hydrocarbons (VPHv)	<	<	<	< 0.2	0.05	mg/cu. m
1,2,4-Trimethylbenzene	<	<	<	<	0.5	ug
Methyl-cyclohexane	<	<	<	<	0.5	ug
Benzene	<	<	<	<	0.5	ug
Toluene	<	<	<	<	0.5	ug
Ethylbenzene	<	<	<	<	0.5	ug
Total Xylenes	<	<	<	<	0.5	ug
Naphthalene	<	<	<	<	0.5	ug
n-Hexane	<	<	<	<	0.5	ug
1,2,3-Trimethylbenzene	<	<	<	<	0.5	ug
1,3,5-Trimethylbenzene	<	<	<	<	0.5	ug
Cumene	<	<	<	<	0.5	ug

ug = total micrograms

< = Less than reporting limit

mg/cu. m = milligrams per cubic meter

REPORTED TO: SNC-Lavalin Inc, Environment Division

REPORT DATE: February 8, 2010

GROUP NUMBER: 110201018

Volatile Organics (ug) in Air

CLIENT SAMPLE IDENTIFICATION:	SVW09-2-10 0128 (A/A)	SVW09-3-10 0128 (A/A)		
DATE SAMPLED:	Jan 28/10	Jan 28/10	REPORTING LIMIT	UNITS
CANTEST ID:	1002010081	1002010083		
C6-C13 Hydrocarbons (VHv)	<	<	5	ug
C6-C13 Hydrocarbons (VHv)	<	<	0.2	mg/cu. m
C6-C13 Hydrocarbons (VPHv)	<	<	5	ug
C6-C13 Hydrocarbons (VPHv)	<	<	0.2	mg/cu. m
1,2,4-Trimethylbenzene	<	<	0.5	ug
Methyl-cyclohexane	<	<	0.5	ug
Benzene	<	<	0.5	ug
Toluene	<	<	0.5	ug
Ethylbenzene	<	<	0.5	ug
Total Xylenes	<	<	0.5	ug
Naphthalene	<	<	0.5	ug
n-Hexane	<	<	0.5	ug
1,2,3-Trimethylbenzene	<	<	0.5	ug
1,3,5-Trimethylbenzene	<	<	0.5	ug
Cumene	<	<	0.5	ug

ug = total micrograms

< = Less than reporting limit

mg/cu. m = milligrams per cubic meter

Volatile Organics (mg/m3) in Air

CLIENT SAMPLE IDENTIFICATION:	H5-Basement-100127 (A/A)	H5-Main-100127 (A/A)	H5-B-100127 (A/A)	SVW09-1-100128 (A/A)	
DATE SAMPLED:	Jan 27/10	Jan 27/10	Jan 27/10	Jan 28/10	REPORTING LIMIT
CANTEST ID:	1002010062	1002010070	1002010074	1002010079	
1,2,4-Trimethylbenzene	<	<	<	< 0.02	0.005
Methyl-cyclohexane	<	<	<	< 0.02	0.005
Benzene	<	<	<	< 0.02	0.005
Toluene	<	<	<	< 0.02	0.005
Ethylbenzene	<	<	<	< 0.02	0.005
Total Xylenes	<	<	<	< 0.02	0.005
Naphthalene	<	<	<	< 0.02	0.005
n-Hexane	<	<	<	< 0.02	0.005
1,2,3-Trimethylbenzene	<	<	<	< 0.02	0.005
1,3,5-Trimethylbenzene	<	<	<	< 0.02	0.005
Cumene	<	<	<	< 0.02	0.005

Results expressed as milligrams per cubic meter (mg/cu. m)
< = Less than reporting limit

Volatile Organics (mg/m3) in Air

CLIENT SAMPLE IDENTIFICATION:	SVW09-2-10 0128 (A/A)	SVW09-3-10 0128 (A/A)	
DATE SAMPLED:	Jan 28/10	Jan 28/10	REPORTING LIMIT
CANTEST ID:	1002010081	1002010083	
1,2,4-Trimethylbenzene	<	<	0.02
Methyl-cyclohexane	<	<	0.02
Benzene	<	<	0.02
Toluene	<	<	0.02
Ethylbenzene	<	<	0.02
Total Xylenes	<	<	0.02
Naphthalene	<	<	0.02
n-Hexane	<	<	0.02
1,2,3-Trimethylbenzene	<	<	0.02
1,3,5-Trimethylbenzene	<	<	0.02
Cumene	<	<	0.02

Results expressed as milligrams per cubic meter (mg/cu. m)
< = Less than reporting limit

Aromatic and Aliphatic Hydrocarbons (ug) in Air

CLIENT SAMPLE IDENTIFICATION:	H5-Basement-100127 (A/A)	H5-Main-100127 (A/A)	H5-B-100127 (A/A)	SVW09-1-100128 (A/A)	REPORTING LIMIT
DATE SAMPLED:	Jan 27/10	Jan 27/10	Jan 27/10	Jan 28/10	
CANTEST ID:	1002010062	1002010070	1002010074	1002010079	
C6-C8 Aromatics	<	<	<	<	0.2
C6-C8 Aliphatics	<	<	<	<	0.4
>C8-C10 Aromatics	<	<	<	<	0.2
>C8-C10 Aliphatics	2.1	2.1	1.6	<	0.4
>C10-C12 Aliphatics	2.3	1.0	2.7	<	0.2
>C12-C16 Aliphatics	2.0	<	<	<	2
>C16-C19 Aliphatics	3.4	2.7	5.3	<	2
>C10-C19 Hydrocarbons (Total)	7.8	4.6	9.9	<	2

Results expressed as total micrograms (ug)
< = Less than reporting limit

Aromatic and Aliphatic Hydrocarbons (ug) in Air

CLIENT SAMPLE IDENTIFICATION:	SVW09-2-10 0128 (A/A)	SVW09-3-10 0128 (A/A)	
DATE SAMPLED:	Jan 28/10	Jan 28/10	REPORTING LIMIT
CANTEST ID:	1002010081	1002010083	
C6-C8 Aromatics	<	<	0.2
C6-C8 Aliphatics	<	<	0.4
>C8-C10 Aromatics	<	<	0.2
>C8-C10 Aliphatics	<	<	0.4
>C10-C12 Aliphatics	2.2	<	0.2
>C12-C16 Aliphatics	<	<	2
>C16-C19 Aliphatics	<	<	2
>C10-C19 Hydrocarbons (Total)	2.2	<	2

Results expressed as total micrograms (ug)
< = Less than reporting limit

Aromatic and Aliphatic Hydrocarbons (mg/m3) in Air

CLIENT SAMPLE IDENTIFICATION:	H5-Basement-100127 (A/A)	H5-Main-100127 (A/A)	H5-B-100127 (A/A)	SVW09-1-100128 (A/A)	
DATE SAMPLED:	Jan 27/10	Jan 27/10	Jan 27/10	Jan 28/10	REPORTING LIMIT
CANTEST ID:	1002010062	1002010070	1002010074	1002010079	
C6-C8 Aromatics	<	<	<	< 0.00833	0.00208
C6-C8 Aliphatics	<	<	<	< 0.0167	0.00417
>C8-C10 Aromatics	<	<	<	< 0.00833	0.00208
>C8-C10 Aliphatics	0.022	0.022	0.017	< 0.0167	0.00417
>C10-C12 Aliphatics	0.024	0.010	0.028	< 0.00833	0.00208
>C12-C16 Aliphatics	0.021	<	<	< 0.0833	0.0208
>C16-C19 Aliphatics	0.04	0.03	0.06	< 0.0833	0.0208
>C10-C19 Hydrocarbons (Total)	0.08	0.05	0.10	< 0.0833	0.0208

Results expressed as milligrams per cubic meter (mg/cu. m)
< = Less than reporting limit

Aromatic and Aliphatic Hydrocarbons (mg/m3) in Air

CLIENT SAMPLE IDENTIFICATION:	SVW09-2-10 0128 (A/A)	SVW09-3-10 0128 (A/A)	
DATE SAMPLED:	Jan 28/10	Jan 28/10	
CANTEST ID:	1002010081	1002010083	REPORTING LIMIT
C6-C8 Aromatics	<	<	0.00833
C6-C8 Aliphatics	<	<	0.0167
>C8-C10 Aromatics	<	<	0.00833
>C8-C10 Aliphatics	<	<	0.0167
>C10-C12 Aliphatics	0.093	<	0.00833
>C12-C16 Aliphatics	<	<	0.0833
>C16-C19 Aliphatics	<	<	0.0833
>C10-C19 Hydrocarbons (Total)	0.09	<	0.0833

Results expressed as milligrams per cubic meter (mg/cu. m)
< = Less than reporting limit

Analysis Report

CANTEST®

CANTEST LTD.

Professional
Analytical
Services

4606 Canada Way
Burnaby, B.C.
V5G 1K5

FAX: 604 731 2386

TEL: 604 734 7276

1 800 665 8566

REPORT ON: Analysis of Air Samples

REPORTED TO:
Morrow Environmental Consultants Inc.
8648 Commerce Court
Burnaby, BC
V5A 4N6

Att'n: Dave Bridger

CHAIN OF CUSTODY: 2174569, 2174570
PROJECT NAME: Pleasant Camp
PROJECT NUMBER: 131416 E000

NUMBER OF SAMPLES: 12

REPORT DATE: July 27, 2009

DATE SUBMITTED: July 18, 2009

GROUP NUMBER: 100720007

SAMPLE TYPE: Air, CTAIR

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

TEST METHODS:

C10-C12 Aliphatic Hydrocarbons - was determined by taking the total area calculated from >C10 to C12 from the Flame Ionization Detector, quantified against C10 (Decane).

C10-C19 Hydrocarbons - was determined by summing the results from >C10-C12, >C12-C16 and >C16-C19 off the Flame Ionization Detector in order to obtain a total number.

C12-C16 Aliphatic Hydrocarbons - was determined by taking the total area calculated from >C12 to C16 from the Flame Ionization Detector, quantified against C10 (Decane).

C16-C19 Aliphatic Hydrocarbons - was determined by taking the total area calculated from >C16 to C19 from the Flame Ionization Detector, quantified against C10 (Decane).

C6-C8 Aliphatic Hydrocarbons - was determined by taking the C6-C8 total range, calibrated against C10 (Decane), from the Flame Ionization Detector and subracting the most common mono-cyclic compounds that are found in the C6-C8 range, ie, Benzene, Toluene, and etc. found on the Mass Selective Detector from that total number.

C6-C8 Aromatic Hydrocarbons - were calculated by looking at the most common mono-cyclic compounds eluted from the Gas Chromatograph equipped with a Mass Selective Detector and summing them all together to get a total number.

C8-C10 Aromatic Hydrocarbons - was determined by adding the total numbers obtained from all the >C8-C10

(Continued)

CANTEST LTD.

Zhenyong Gao, M.Sc.
Coordinator, Trace Organics

C8-C10 Aromatic Hydrocarbons

Aromatics found on the GCMS such as Ethylbenzene, m, and o-Xylene, etc.

C8-C10 Aliphatic Hydrocarbons - was determined by taking the total area calculated from >C8 to C10 from the Flame Ionization Detector, quantified against C10 (Decane), and subracting total Aromatics found in the >C8-C10 range, ie, Ethylbenzene, m and o-Xylene, etc.

Organic Vapours in Air - analysis was performed using procedures based on NIOSH 1500 and/or 1501 methods. The procedure involves sampling using activated charcoal, desorption using carbon disulphide and analysis using GCFID. All samples are analyzed in duplicate, on two separate columns. If morethan 10% of the contaminant is found in the back section, the result should be given careful consideration as breakthrough may have occured. Note: Unless otherwise noted, a lab blank correction is performed on all sample results. CANTEST method reference 67-C-021.

Volatile Hydrocarbons (C6-C13) in Air - analysis was performed using procedures based on NIOSH Method 1500. The procedure involves sampling using charcoal tubes, desorption of analytes using carbon disulphide, and analysis using gas chromatography with flame ionization detection.

Volatile Petroleum Hydrocarbons (C6-C13) in Air - analysis was performed using procedures based on NIOSH Method 1500. The procedure involves sampling using charcoal tubes, desorption of analytes using carbon disulphide, and analysis using gas chromatography with flame ionization detection. VPH is calculated by subtraction of BTEX, Decane, and Hexane from the VH concentrations.

C10-C12 Aromatic Hydrocarbons - were calculated by looking at the most common compounds eluted from the Gas Chromatograph equipped with a Mass Selective Detector from >C10-C12 and summing them together to get a total number.

C12-C16 Aromatic Hydrocarbons - were calculated by looking at the most common compounds eluted from the Gas Chromatograph equipped with a Mass Selective Detector from >C12-C16 and summing them together to get a total number (Acenaphthylene, Acenaphthene and Fluorene).

C16-C19 Aromatic Hydrocarbons - were calculated by looking at the most common compounds eluted (Phenanthrene and Anthracene) from the Gas Chromatograph equipped with a Mass Selective Detector from >C16-C19 a summing them together to get a total number.

Polynuclear Aromatic Hydrocarbons in Air - analysis was performed using procedures based on NIOSH Method 5515 involving desorption of PAH compounds from the filter or sorbent tube, followed by analysis using gas chromatography/mass spectrometry (GC/MS).

TEST RESULTS:

(See following pages)

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 27, 2009

GROUP NUMBER: 100720007

Polycyclic Aromatic Hydrocarbons (ug) in Air

CLIENT SAMPLE IDENTIFICATION:	SVW09-1-090715 (PAH)	SVW09-2-090715 (PAH)	SVW09-3-090715 (PAH)	H5-Basement-090716 (PAH)	
DATE SAMPLED:	Jul 15/09	Jul 15/09	Jul 15/09	Jul 16/09	
CANTEST ID:	907200013	907200018	907200022	907200026	REPORTED DETECTION LIMIT
Naphthalene	<	<	<	<	0.1
Acenaphthylene	<	<	<	<	0.1
Acenaphthene	<	<	<	<	0.1
Fluorene	<	<	<	<	0.05
Phenanthrene	<	<	<	<	0.05
Anthracene	<	<	<	<	0.05
Total LMW-PAH's					
Fluoranthene	<	<	<	<	0.05
Pyrene	<	<	<	<	0.02
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					
Total PAH's					
>C10-C12 Aromatics	<	<	<	<	0.2
>C12-C16 Aromatics	<	<	<	<	2
>C16-C19 Aromatics	<	<	<	<	2

Results expressed as total micrograms (ug)
< = Less than reported detection limit

Polycyclic Aromatic Hydrocarbons (ug) in Air

CLIENT SAMPLE IDENTIFICATION:	H5-Main-090716 (PAH)	H5-A-090716 (PAH)	REPORTED DETECTION LIMIT
DATE SAMPLED:	Jul 16/09	Jul 16/09	
CANTEST ID:	907200028	907200030	
Naphthalene	<	<	0.1
Acenaphthylene	<	<	0.1
Acenaphthene	<	<	0.1
Fluorene	<	<	0.05
Phenanthrene	<	<	0.05
Anthracene	<	<	0.05
Total LMW-PAH's			
Fluoranthene	<	<	0.05
Pyrene	<	<	0.02
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			
Total PAH's			
>C10-C12 Aromatics	<	<	0.2
>C12-C16 Aromatics	<	<	2
>C16-C19 Aromatics	<	<	2

Results expressed as total micrograms (ug)
< = Less than reported detection limit

Polycyclic Aromatic Hydrocarbons (mg/m3) in Air

CLIENT SAMPLE IDENTIFICATION:	SVW09-1-090715 (PAH)	SVW09-2-090715 (PAH)	SVW09-3-090715 (PAH)	H5-Basement-090716 (PAH)	REPORTED DETECTION LIMIT
DATE SAMPLED:	Jul 15/09	Jul 15/09	Jul 15/09	Jul 16/09	
CANTEST ID:	907200013	907200018	907200022	907200026	
Naphthalene	< 0.0041667	< 0.004	< 0.0041667	<	0.002083
Acenaphthylene	< 0.0041667	< 0.004	< 0.0041667	<	0.002083
Acenaphthene	< 0.0041667	< 0.004	< 0.0041667	<	0.002083
Fluorene	< 0.0020833	< 0.002	< 0.0020833	<	0.001042
Phenanthrene	< 0.0020833	< 0.002	< 0.0020833	<	0.001042
Anthracene	< 0.0020833	< 0.002	< 0.0020833	<	0.001042
Total LMW-PAH's					
Fluoranthene	< 0.0020833	< 0.002	< 0.0020833	<	0.001042
Pyrene	< 0.0008333	< 0.0008	< 0.0008333	<	0.000417
Benzo(a)anthracene	< 0.0004167	< 0.0004	< 0.0004167	<	0.000208
Chrysene	< 0.0004167	< 0.0004	< 0.0004167	<	0.000208
Benzo(b)fluoranthene	< 0.0004167	< 0.0004	< 0.0004167	<	0.000208
Benzo(k)fluoranthene	< 0.0004167	< 0.0004	< 0.0004167	<	0.000208
Benzo(a)pyrene	< 0.0004167	< 0.0004	< 0.0004167	<	0.000208
Indeno(1,2,3-cd)pyrene	< 0.0004167	< 0.0004	< 0.0004167	<	0.000208
Dibenz(a,h)anthracene	< 0.0004167	< 0.0004	< 0.0004167	<	0.000208
Benzo(g,h,i)perylene	< 0.0004167	< 0.0004	< 0.0004167	<	0.000208
Total HMW-PAH's	< 0.0004167	< 0.0004	< 0.0004167	<	0.000208
Total PAH's					
>C10-C12 Aromatics	< 0.00833	< 0.008	< 0.00833	<	0.00417
>C12-C16 Aromatics	< 0.00833	< 0.008	< 0.00833	<	0.00417
>C16-C19 Aromatics	< 0.0833	< 0.08	< 0.0833	<	0.0417
Surrogate Recovery					
Naphthalene-d8	81	74	84	82	-
Acenaphthene-d10	78	72	82	81	-
Phenanthrene-d10	78	73	81	81	-
Chrysene-d12	66	68	72	74	-
Perylene-d12	96	89	97	97	-

Results expressed as milligrams per cubic meter (mg/cu. m)
Surrogate recoveries expressed as percent (%)
< = Less than reported detection limit

Polycyclic Aromatic Hydrocarbons (mg/m3) in Air

CLIENT SAMPLE IDENTIFICATION:	H5-Main-090716 (PAH)	H5-A-090716 (PAH)	
DATE SAMPLED:	Jul 16/09	Jul 16/09	REPORTED DETECTION LIMIT
CANTEST ID:	907200028	907200030	
Naphthalene	<	< 0.0021277	0.002083
Acenaphthylene	<	< 0.0021277	0.002083
Acenaphthene	<	< 0.0021277	0.002083
Fluorene	<	< 0.0010638	0.001042
Phenanthrene	<	< 0.0010638	0.001042
Anthracene	<	< 0.0010638	0.001042
Total LMW-PAH's			
Fluoranthene	<	< 0.0010638	0.001042
Pyrene	<	< 0.0004255	0.000417
Benzo(a)anthracene	<	< 0.0002128	0.000208
Chrysene	<	< 0.0002128	0.000208
Benzo(b)fluoranthene	<	< 0.0002128	0.000208
Benzo(k)fluoranthene	<	< 0.0002128	0.000208
Benzo(a)pyrene	<	< 0.0002128	0.000208
Indeno(1,2,3-cd)pyrene	<	< 0.0002128	0.000208
Dibenz(a,h)anthracene	<	< 0.0002128	0.000208
Benzo(g,h,i)perylene	<	< 0.0002128	0.000208
Total HMW-PAH's	<	< 0.0002128	0.000208
Total PAH's			
>C10-C12 Aromatics	<	< 0.00426	0.00417
>C12-C16 Aromatics	<	< 0.00426	0.00417
>C16-C19 Aromatics	<	< 0.0426	0.0417
Surrogate Recovery			
Naphthalene-d8	90	89	-
Acenaphthene-d10	88	87	-
Phenanthrene-d10	88	84	-
Chrysene-d12	79	77	-
Perylene-d12	103	101	-

Results expressed as milligrams per cubic meter (mg/cu. m)
Surrogate recoveries expressed as percent (%)
< = Less than reported detection limit

Volatile Organics in Air

CLIENT SAMPLE IDENTIFICATION:	SVW09-1-090715 (A/A)	SVW09-2-090715 (A/A)	SVW09-3-090715 (A/A)	H5-Basement-090716 (A/A)	REPORTED DETECTION LIMIT
DATE SAMPLED:	Jul 15/09	Jul 15/09	Jul 15/09	Jul 16/09	
CANTEST ID:	907200014	907200021	907200024	907200027	
Benzene	< 0.007	< 0.007	< 0.007	<	0.002
Toluene	< 0.006	< 0.006	< 0.006	<	0.001
Ethylbenzene	< 0.005	< 0.005	< 0.005	<	0.001
Total Xylenes	< 0.005	< 0.005	< 0.005	<	0.001

Results expressed as mL/cubic meter or ppm (v/v) (mL/cu. m)
< = Less than reported detection limit

Volatile Organics in Air

CLIENT SAMPLE IDENTIFICATION:	H5-Main-090716 (A/A)	H5-B-090716 (A/A)	
DATE SAMPLED:	Jul 16/09	Jul 16/09	
CANTEST ID:	907200029	907200031	REPORTED DETECTION LIMIT
Benzene	<	<	0.002
Toluene	<	<	0.001
Ethylbenzene	<	<	0.001
Total Xylenes	<	<	0.001

Results expressed as mL/cubic meter or ppm (v/v) (mL/cu. m)
< = Less than reported detection limit

Volatile Organics (ug) in Air

CLIENT SAMPLE IDENTIFICATION:	SVW09-1-090715 (A/A)	SVW09-2-090715 (A/A)	SVW09-3-090715 (A/A)	H5-Basement-090716 (A/A)	REPORTED DETECTION LIMIT	UNITS
DATE SAMPLED:	Jul 15/09	Jul 15/09	Jul 15/09	Jul 16/09		
CANTEST ID:	907200014	907200021	907200024	907200027		
C6-C13 Hydrocarbons (VHv)	<	<	<	18.0	5	ug
C6-C13 Hydrocarbons (VHv)	< 0.2	< 0.2	< 0.2	0.19	0.05	mg/cu. m
C6-C13 Hydrocarbons (VPHv)	<	<	<	18.0	5	ug
C6-C13 Hydrocarbons (VPHv)	< 0.2	< 0.2	< 0.2	0.19	0.05	mg/cu. m
Benzene	<	<	<	<	0.5	ug
Toluene	<	<	<	<	0.5	ug
Ethylbenzene	<	<	<	<	0.5	ug
Total Xylenes	<	<	<	<	0.5	ug
Naphthalene	<	<	<	<	0.5	ug
n-Hexane	<	<	<	<	0.5	ug

ug = total micrograms

mg/cu. m = milligrams per cubic meter

< = Less than reported detection limit

Volatile Organics (ug) in Air

CLIENT SAMPLE IDENTIFICATION:	H5-Main-090716 (A/A)	H5-B-090716 (A/A)		
DATE SAMPLED:	Jul 16/09	Jul 16/09	**REPORTED DETECTION LIMIT**	**UNITS**
CANTEST ID:	907200029	907200031		
C6-C13 Hydrocarbons (VHv)	<	14.5	5	ug
C6-C13 Hydrocarbons (VHv)	<	0.15	0.05	mg/cu. m
C6-C13 Hydrocarbons (VPHv)	<	14.5	5	ug
C6-C13 Hydrocarbons (VPHv)	<	0.15	0.05	mg/cu. m
Benzene	<	<	0.5	ug
Toluene	<	<	0.5	ug
Ethylbenzene	<	<	0.5	ug
Total Xylenes	<	<	0.5	ug
Naphthalene	<	<	0.5	ug
n-Hexane	<	<	0.5	ug

ug = total micrograms

mg/cu. m = milligrams per cubic meter

< = Less than reported detection limit

Volatile Organics (mg/m3) in Air

CLIENT SAMPLE IDENTIFICATION:	SVW09-1-090715 (A/A)	SVW09-2-090715 (A/A)	SVW09-3-090715 (A/A)	H5-Basement-090716 (A/A)	REPORTED DETECTION LIMIT
DATE SAMPLED:	Jul 15/09	Jul 15/09	Jul 15/09	Jul 16/09	
CANTEST ID:	907200014	907200021	907200024	907200027	
Benzene	< 0.02	< 0.02	< 0.02	<	0.005
Toluene	< 0.02	< 0.02	< 0.02	<	0.005
Ethylbenzene	< 0.02	< 0.02	< 0.02	<	0.005
Total Xylenes	< 0.02	< 0.02	< 0.02	<	0.005
Naphthalene	< 0.02	< 0.02	< 0.02	<	0.005
n-Hexane	< 0.02	< 0.02	< 0.02	<	0.005

Results expressed as milligrams per cubic meter (mg/cu. m)
< = Less than reported detection limit

Volatile Organics (mg/m3) in Air

CLIENT SAMPLE IDENTIFICATION:	H5-Main-090716 (A/A)	H5-B-090716 (A/A)	
DATE SAMPLED:	Jul 16/09	Jul 16/09	
CANTEST ID:	907200029	907200031	REPORTED DETECTION LIMIT
Benzene	<	<	0.005
Toluene	<	<	0.005
Ethylbenzene	<	<	0.005
Total Xylenes	<	<	0.005
Naphthalene	<	<	0.005
n-Hexane	<	<	0.005

Results expressed as milligrams per cubic meter (mg/cu. m)
< = Less than reported detection limit

Aromatic and Aliphatic Hydrocarbons (ug) in Air

CLIENT SAMPLE IDENTIFICATION:	SVW09-1-090715 (A/A)	SVW09-2-090715 (A/A)	SVW09-3-090715 (A/A)	H5-Basement-090716 (A/A)	
DATE SAMPLED:	Jul 15/09	Jul 15/09	Jul 15/09	Jul 16/09	
CANTEST ID:	907200014	907200021	907200024	907200027	REPORTED DETECTION LIMIT
C6-C8 Aromatics	<	<	<	<	0.2
C6-C8 Aliphatics	<	<	<	0.67	0.4
>C8-C10 Aromatics	<	<	<	<	0.2
>C8-C10 Aliphatics	<	<	<	2.0	0.4
>C10-C12 Aliphatics	<	<	<	10.7	0.2
>C12-C16 Aliphatics	<	<	<	24	2
>C16-C19 Aliphatics	<	<	<	<	2
>C10-C19 Hydrocarbons (Total)	<	<	<	36	2

Results expressed as total micrograms (ug)
< = Less than reported detection limit

Aromatic and Aliphatic Hydrocarbons (ug) in Air

CLIENT SAMPLE IDENTIFICATION:	H5-Main-090716 (A/A)	H5-B-090716 (A/A)	
DATE SAMPLED:	Jul 16/09	Jul 16/09	
CANTEST ID:	907200029	907200031	REPORTED DETECTION LIMIT
C6-C8 Aromatics	<	<	0.2
C6-C8 Aliphatics	0.67	<	0.4
>C8-C10 Aromatics	<	<	0.2
>C8-C10 Aliphatics	1.4	0.6	0.4
>C10-C12 Aliphatics	1.07	8.1	0.2
>C12-C16 Aliphatics	2.3	24	2
>C16-C19 Aliphatics	<	<	2
>C10-C19 Hydrocarbons (Total)	3.3	33	2

Results expressed as total micrograms (ug)
< = Less than reported detection limit

REPORTED TO: Morrow Environmental Consultants Inc.

CANTEST

REPORT DATE: July 27, 2009

GROUP NUMBER: 100720007

Aromatic and Aliphatic Hydrocarbons (mg/m3) in Air

CLIENT SAMPLE IDENTIFICATION:	SVW09-1-09 0715 (A/A)	SVW09-2-09 0715 (A/A)	SVW09-3-09 0715 (A/A)	H5-Basement-090716 (A/A)	
DATE SAMPLED:	Jul 15/09	Jul 15/09	Jul 15/09	Jul 16/09	REPORTED DETECTION LIMIT
CANTEST ID:	907200014	907200021	907200024	907200027	
C6-C8 Aromatics	< 0.00833	< 0.00833	< 0.00833	<	0.00208
C6-C8 Aliphatics	< 0.0167	< 0.0167	< 0.0167	0.007	0.00417
>C8-C10 Aromatics	< 0.00833	< 0.00833	< 0.00833	<	0.00208
>C8-C10 Aliphatics	< 0.0167	< 0.0167	< 0.0167	0.02	0.00417
>C10-C12 Aliphatics	< 0.00833	< 0.00833	< 0.00833	0.11	0.00208
>C12-C16 Aliphatics	< 0.0833	< 0.0833	< 0.0833	0.25	0.0208
>C16-C19 Aliphatics	< 0.0833	< 0.0833	< 0.0833	<	0.0208
>C10-C19 Hydrocarbons (Total)	< 0.0833	< 0.0833	< 0.0833	0.37	0.0208

Results expressed as milligrams per cubic meter (mg/cu. m)
< = Less than reported detection limit

Aromatic and Aliphatic Hydrocarbons (mg/m3) in Air

CLIENT SAMPLE IDENTIFICATION:	H5-Main-090716 (A/A)	H5-B-090716 (A/A)	
DATE SAMPLED:	Jul 16/09	Jul 16/09	REPORTED DETECTION LIMIT
CANTEST ID:	907200029	907200031	
C6-C8 Aromatics	<	<	0.00208
C6-C8 Aliphatics	0.007	<	0.00417
>C8-C10 Aromatics	<	<	0.00208
>C8-C10 Aliphatics	0.014	0.006	0.00417
>C10-C12 Aliphatics	0.011	0.084	0.00208
>C12-C16 Aliphatics	0.023	0.25	0.0208
>C16-C19 Aliphatics	<	<	0.0208
>C10-C19 Hydrocarbons (Total)	0.04	0.35	0.0208

Results expressed as milligrams per cubic meter (mg/cu. m)
< = Less than reported detection limit

Analysis Report

CANTEST LTD.

Professional
Analytical
Services

4606 Canada Way
Burnaby, B.C.
V5G 1K5

FAX: 604 731 2386

TEL: 604 734 7276

1 800 665 8566

REPORT ON: **Analysis of Air Samples**

REPORTED TO:
Morrow Environmental Consultants Inc.
8648 Commerce Court
Burnaby, BC
V5A 4N6

Att'n: Tim Drozda

CHAIN OF CUSTODY: 2182127, 185010
PROJECT NAME: Pleasant Camp
PROJECT NUMBER: 131416

NUMBER OF SAMPLES: 14

REPORT DATE: September 8, 2009

DATE SUBMITTED: August 31, 2009

GROUP NUMBER: 100831013

SAMPLE TYPE: Air, CTAir

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

TEST METHODS:

C10-C12 Aliphatic Hydrocarbons - was determined by taking the total area calculated from >C10 to C12 from the Flame Ionization Detector, quantified against C10 (Decane).

C10-C19 Hydrocarbons - was determined by summing the results from >C10-C12, >C12-C16 and >C16-C19 off the Flame Ionization Detector in order to obtain a total number.

C12-C16 Aliphatic Hydrocarbons - was determined by taking the total area calculated from >C12 to C16 from the Flame Ionization Detector, quantified against C10 (Decane).

C16-C19 Aliphatic Hydrocarbons - was determined by taking the total area calculated from >C16 to C19 from the Flame Ionization Detector, quantified against C10 (Decane).

C6-C8 Aliphatic Hydrocarbons - was determined by taking the C6-C8 total range, calibrated against C10 (Decane), from the Flame Ionization Detector and subracting the most common mono-cyclic compounds that are found in the C6-C8 range, ie, Benzene, Toluene, and etc. found on the Mass Selective Detector from that total number.

C6-C8 Aromatic Hydrocarbons - were calculated by looking at the most common mono-cyclic compounds eluted from the Gas Chromatograph equipped with a Mass Selective Detector and summing them all together to get a total number.

C8-C10 Aromatic Hydrocarbons - was determined by adding the total numbers obtained from all the >C8-C10

(Continued)

CANTEST LTD.

Zhenyong Gao, M.Sc.
Coordinator, Trace Organics

C8-C10 Aromatic Hydrocarbons

Aromatics found on the GCMS such as Ethylbenzene, m, and o-Xylene, etc.

C8-C10 Aliphatic Hydrocarbons - was determined by taking the total area calculated from >C8 to C10 from the Flame Ionization Detector, quantified against C10 (Decane), and subracting total Aromatics found in the >C8-C10 range, ie, Ethylbenzene, m and o-Xylene, etc.

Organic Vapours in Air - analysis was performed using procedures based on NIOSH 1500 and/or 1501 methods. The procedure involves sampling using activated charcoal, desorption using carbon disulphide and analysis using GCFID. All samples are analyzed in duplicate, on two separate columns. If morethan 10% of the contaminant is found in the back section, the result should be given careful consideration as breakthrough may have occured. Note: Unless otherwise noted, a lab blank correction is performed on all sample results. CANTEST method reference 67-C-021.

Volatile Hydrocarbons (C6-C13) in Air - analysis was performed using procedures based on NIOSH Method 1500. The procedure involves sampling using charcoal tubes, desorption of analytes using carbon disulphide, and analysis using gas chromatography with flame ionization detection.

Volatile Petroleum Hydrocarbons (C6-C13) in Air - analysis was performed using procedures based on NIOSH Method 1500. The procedure involves sampling using charcoal tubes, desorption of analytes using carbon disulphide, and analysis using gas chromatography with flame ionization detection. VPH is calculated by subtraction of BTEX, Decane, and Hexane from the VH concentrations.

C10-C12 Aromatic Hydrocarbons - were calculated by looking at the most common compounds eluted from the Gas Chromatograph equipped with a Mass Selective Detector from >C10-C12 and summing them together to get a total number.

C12-C16 Aromatic Hydrocarbons - were calculated by looking at the most common compounds eluted from the Gas Chromatograph equipped with a Mass Selective Detector from >C12-C16 and summing them together to get a total number (Acenaphthylene, Acenaphthene and Fluorene).

C16-C19 Aromatic Hydrocarbons - were calculated by looking at the most common compounds eluted (Phenanthrene and Anthracene) from the Gas Chromatograph equipped with a Mass Selective Detector from >C16-C19 a summing them together to get a total number.

Polynuclear Aromatic Hydrocarbons in Air - analysis was performed using procedures based on NIOSH Method 5515 involving desorption of PAH compounds from the filter or sorbent tube, followed by analysis using gas chromatography/mass spectrometry (GC/MS).

TEST RESULTS:

(See following pages)

Polycyclic Aromatic Hydrocarbons (ug) in Air

CLIENT SAMPLE IDENTIFICATION:	H5-MAIN-090826 (PAH)	H5-BASEMENT-090826 (PAH)	H5-A-090826 (PAH)	SVW09-1-090826 (PAH)	
DATE SAMPLED:	Aug 26/09	Aug 26/09	Aug 26/09	Aug 26/09	REPORTING LIMIT
CANTEST ID:	908310044	908310046	908310048	908310051	
Naphthalene	<	<	<	<	0.1
Acenaphthylene	<	<	<	<	0.1
Acenaphthene	<	<	<	<	0.1
Fluorene	<	<	<	<	0.05
Phenanthrene	<	<	<	<	0.05
Anthracene	<	<	<	<	0.05
Total LMW-PAH's					
Fluoranthene	<	<	<	<	0.05
Pyrene	<	<	<	<	0.02
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					
Total PAH's					
>C10-C12 Aromatics	<	<	<	<	0.2
>C12-C16 Aromatics	<	<	<	<	2
>C16-C19 Aromatics	<	<	<	<	2

Results expressed as total micrograms (ug)
< = Less than reporting limit

Polycyclic Aromatic Hydrocarbons (ug) in Air

CLIENT SAMPLE IDENTIFICATION:	SVW09-2-09 0826 (PAH)	SVW09-3-09 0826 (PAH)	SVW09-A-09 0826 (PAH)	
DATE SAMPLED:	Aug 26/09	Aug 26/09	Aug 26/09	REPORTING LIMIT
CANTEST ID:	908310054	908310059	908310066	
Naphthalene	<	<	<	0.1
Acenaphthylene	<	<	<	0.1
Acenaphthene	<	<	<	0.1
Fluorene	<	<	<	0.05
Phenanthrene	<	<	<	0.05
Anthracene	<	<	<	0.05
Total LMW-PAH's				
Fluoranthene	<	<	<	0.05
Pyrene	<	<	<	0.02
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				
Total PAH's				
>C10-C12 Aromatics	<	<	<	0.2
>C12-C16 Aromatics	<	<	<	2
>C16-C19 Aromatics	<	<	<	2

Results expressed as total micrograms (ug)
< = Less than reporting limit

Polycyclic Aromatic Hydrocarbons (mg/m3) in Air

CLIENT SAMPLE IDENTIFICATION:	H5-MAIN-090826 (PAH)	H5-BASEMENT-090826 (PAH)	H5-A-090826 (PAH)	SVW09-1-090826 (PAH)	
DATE SAMPLED:	Aug 26/09	Aug 26/09	Aug 26/09	Aug 26/09	REPORTING LIMIT
CANTEST ID:	908310044	908310046	908310048	908310051	
Naphthalene	<	<	<	< 0.0041667	0.002083
Acenaphthylene	<	<	<	< 0.0041667	0.002083
Acenaphthene	<	<	<	< 0.0041667	0.002083
Fluorene	<	<	<	< 0.0020833	0.001042
Phenanthrene	<	<	<	< 0.0020833	0.001042
Anthracene	<	<	<	< 0.0020833	0.001042
Total LMW-PAH's					
Fluoranthene	<	<	<	< 0.0020833	0.001042
Pyrene	<	<	<	< 0.0008333	0.000417
Benzo(a)anthracene	<	<	<	< 0.0004167	0.000208
Chrysene	<	<	<	< 0.0004167	0.000208
Benzo(b)fluoranthene	<	<	<	< 0.0004167	0.000208
Benzo(k)fluoranthene	<	<	<	< 0.0004167	0.000208
Benzo(a)pyrene	<	<	<	< 0.0004167	0.000208
Indeno(1,2,3-cd)pyrene	<	<	<	< 0.0004167	0.000208
Dibenz(a,h)anthracene	<	<	<	< 0.0004167	0.000208
Benzo(g,h,i)perylene	<	<	<	< 0.0004167	0.000208
Total HMW-PAH's	<	<	<	< 0.0004167	0.000208
Total PAH's					
>C10-C12 Aromatics	<	<	<	< 0.00833	0.00417
>C12-C16 Aromatics	<	<	<	< 0.00833	0.00417
>C16-C19 Aromatics	<	<	<	< 0.0833	0.0417
Surrogate Recovery					
Naphthalene-d8	96	92	94	69	-
Acenaphthene-d10	94	88	90	67	-
Phenanthrene-d10	92	87	87	66	-
Chrysene-d12	84	81	82	61	-
Perylene-d12	118	110	113	85	-

Results expressed as milligrams per cubic meter (mg/cu. m)
Surrogate recoveries expressed as percent (%)
< = Less than reporting limit

Polycyclic Aromatic Hydrocarbons (mg/m3) in Air

CLIENT SAMPLE IDENTIFICATION:	SVW09-2-09 0826 (PAH)	SVW09-3-09 0826 (PAH)	SVW09-A-09 0826 (PAH)	
DATE SAMPLED:	Aug 26/09	Aug 26/09	Aug 26/09	REPORTING LIMIT
CANTEST ID:	908310054	908310059	908310066	
Naphthalene	<	<	<	0.004167
Acenaphthylene	<	<	<	0.004167
Acenaphthene	<	<	<	0.004167
Fluorene	<	<	<	0.002083
Phenanthrene	<	<	<	0.002083
Anthracene	<	<	<	0.002083
Total LMW-PAH’s				
Fluoranthene	<	<	<	0.002083
Pyrene	<	<	<	0.000833
Benzo(a)anthracene	<	<	<	0.000417
Chrysene	<	<	<	0.000417
Benzo(b)fluoranthene	<	<	<	0.000417
Benzo(k)fluoranthene	<	<	<	0.000417
Benzo(a)pyrene	<	<	<	0.000417
Indeno(1,2,3-cd)pyrene	<	<	<	0.000417
Dibenz(a,h)anthracene	<	<	<	0.000417
Benzo(g,h,i)perylene	<	<	<	0.000417
Total HMW-PAH’s	<	<	<	0.000417
Total PAH’s				
>C10-C12 Aromatics	<	<	<	0.00833
>C12-C16 Aromatics	<	<	<	0.00833
>C16-C19 Aromatics	<	<	<	0.0833
Surrogate Recovery				
Naphthalene-d8	95	91	87	-
Acenaphthene-d10	91	87	87	-
Phenanthrene-d10	90	84	89	-
Chrysene-d12	85	79	84	-
Perylene-d12	117	107	117	-

Results expressed as milligrams per cubic meter (mg/cu. m)
Surrogate recoveries expressed as percent (%)
< = Less than reporting limit

Volatile Organics in Air

CLIENT SAMPLE IDENTIFICATION:	H5-MAIN-090826 (A/A)	H5-BASEMENT-090826 (A/A)	H5-A-090826 (A/A)	SVW09-1-090826 (A/A)	
DATE SAMPLED:	Aug 26/09	Aug 26/09	Aug 26/09	Aug 26/09	REPORTING LIMIT
CANTEST ID:	908310042	908310045	908310047	908310050	
Benzene	<	<	<	< 0.006	0.002
Toluene	<	<	<	< 0.005	0.001
Ethylbenzene	<	<	<	< 0.005	0.001
Total Xylenes	<	<	<	< 0.005	0.001

Results expressed as mL/cubic meter or ppm (v/v) (mL/cu. m)
< = Less than reporting limit

Volatile Organics in Air

CLIENT SAMPLE IDENTIFICATION:	SVW09-2-09 0826 (A/A)	SVW09-3-09 0826 (A/A)	SVW09-A-09 0826 (A/A)	
DATE SAMPLED:	Aug 26/09	Aug 26/09	Aug 26/09	REPORTING LIMIT
CANTEST ID:	908310053	908310056	908310060	
Benzene	<	<	<	0.007
Toluene	<	<	<	0.006
Ethylbenzene	<	<	<	0.005
Total Xylenes	<	<	<	0.005

Results expressed as mL/cubic meter or ppm (v/v) (mL/cu. m)
< = Less than reporting limit

Volatile Organics (ug) in Air

CLIENT SAMPLE IDENTIFICATION:	H5-MAIN-090826 (A/A)	H5-BASEMENT-090826 (A/A)	H5-A-090826 (A/A)	SVW09-1-090826 (A/A)	REPORTING LIMIT	UNITS
DATE SAMPLED:	Aug 26/09	Aug 26/09	Aug 26/09	Aug 26/09		
CANTEST ID:	908310042	908310045	908310047	908310050		
C6-C13 Hydrocarbons (VHv)	<	6.5	5.3	<	5	ug
C6-C13 Hydrocarbons (VHv)	<	0.07	0.06	< 0.2	0.05	mg/cu. m
C6-C13 Hydrocarbons (VPHv)	<	6.5	5.3	<	5	ug
C6-C13 Hydrocarbons (VPHv)	<	0.07	0.06	< 0.2	0.05	mg/cu. m
Benzene	<	<	<	<	0.5	ug
Toluene	<	<	<	<	0.5	ug
Ethylbenzene	<	<	<	<	0.5	ug
Total Xylenes	<	<	<	<	0.5	ug
Naphthalene	<	<	<	<	0.5	ug
n-Hexane	<	<	<	<	0.5	ug

ug = total micrograms

< = Less than reporting limit

mg/cu. m = milligrams per cubic meter

Volatile Organics (ug) in Air

CLIENT SAMPLE IDENTIFICATION:	SVW09-2-09 0826 (A/A)	SVW09-3-09 0826 (A/A)	SVW09-A-09 0826 (A/A)		
DATE SAMPLED:	Aug 26/09	Aug 26/09	Aug 26/09		
CANTEST ID:	908310053	908310056	908310060	REPORTING LIMIT	UNITS
C6-C13 Hydrocarbons (VHv)	<	<	<	5	ug
C6-C13 Hydrocarbons (VHv)	<	<	<	0.2	mg/cu. m
C6-C13 Hydrocarbons (VPHv)	<	<	<	5	ug
C6-C13 Hydrocarbons (VPHv)	<	<	<	0.2	mg/cu. m
Benzene	<	<	<	0.5	ug
Toluene	<	<	<	0.5	ug
Ethylbenzene	<	<	<	0.5	ug
Total Xylenes	<	<	<	0.5	ug
Naphthalene	<	<	<	0.5	ug
n-Hexane	<	<	<	0.5	ug

ug = total micrograms

mg/cu. m = milligrams per cubic meter

< = Less than reporting limit

Volatile Organics (mg/m3) in Air

CLIENT SAMPLE IDENTIFICATION:	H5-MAIN-090826 (A/A)	H5-BASEMENT-090826 (A/A)	H5-A-090826 (A/A)	SVW09-1-090826 (A/A)	
DATE SAMPLED:	Aug 26/09	Aug 26/09	Aug 26/09	Aug 26/09	REPORTING LIMIT
CANTEST ID:	908310042	908310045	908310047	908310050	
Benzene	<	<	<	< 0.02	0.005
Toluene	<	<	<	< 0.02	0.005
Ethylbenzene	<	<	<	< 0.02	0.005
Total Xylenes	<	<	<	< 0.02	0.005
Naphthalene	<	<	<	< 0.02	0.005
n-Hexane	<	<	<	< 0.02	0.005

Results expressed as milligrams per cubic meter (mg/cu. m)
< = Less than reporting limit

Volatile Organics (mg/m3) in Air

CLIENT SAMPLE IDENTIFICATION:	SVW09-2-09 0826 (A/A)	SVW09-3-09 0826 (A/A)	SVW09-A-09 0826 (A/A)	
DATE SAMPLED:	Aug 26/09	Aug 26/09	Aug 26/09	REPORTING LIMIT
CANTEST ID:	908310053	908310056	908310060	
Benzene	<	<	<	0.02
Toluene	<	<	<	0.02
Ethylbenzene	<	<	<	0.02
Total Xylenes	<	<	<	0.02
Naphthalene	<	<	<	0.02
n-Hexane	<	<	<	0.02

Results expressed as milligrams per cubic meter (mg/cu. m)
< = Less than reporting limit

Aromatic and Aliphatic Hydrocarbons (ug) in Air

CLIENT SAMPLE IDENTIFICATION:	H5-MAIN-090826 (A/A)	H5-BASEMENT-090826 (A/A)	H5-A-090826 (A/A)	SVW09-1-090826 (A/A)	
DATE SAMPLED:	Aug 26/09	Aug 26/09	Aug 26/09	Aug 26/09	REPORTING LIMIT
CANTEST ID:	908310042	908310045	908310047	908310050	
C6-C8 Aromatics	<	<	<	<	0.2
C6-C8 Aliphatics	<	<	<	<	0.4
>C8-C10 Aromatics	<	<	<	<	0.2
>C8-C10 Aliphatics	<	<	<	<	0.4
>C10-C12 Aliphatics	<	4.7	3.3	<	0.2
>C12-C16 Aliphatics	<	13.7	15.3	<	2
>C16-C19 Aliphatics	<	<	<	<	2
>C10-C19 Hydrocarbons (Total)	<	18.4	18.6	<	2

Results expressed as total micrograms (ug)
< = Less than reporting limit

Aromatic and Aliphatic Hydrocarbons (ug) in Air

CLIENT SAMPLE IDENTIFICATION:	SVW09-2-09 0826 (A/A)	SVW09-3-09 0826 (A/A)	SVW09-A-09 0826 (A/A)	REPORTING LIMIT
DATE SAMPLED:	Aug 26/09	Aug 26/09	Aug 26/09	
CANTEST ID:	908310053	908310056	908310060	
C6-C8 Aromatics	<	<	<	0.2
C6-C8 Aliphatics	<	<	<	0.4
>C8-C10 Aromatics	<	<	<	0.2
>C8-C10 Aliphatics	<	<	<	0.4
>C10-C12 Aliphatics	<	<	<	0.2
>C12-C16 Aliphatics	<	<	<	2
>C16-C19 Aliphatics	<	<	<	2
>C10-C19 Hydrocarbons (Total)	<	<	<	2

Results expressed as total micrograms (ug)
< = Less than reporting limit

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: September 8, 2009

GROUP NUMBER: 100831013

Aromatic and Aliphatic Hydrocarbons (mg/m3) in Air

CLIENT SAMPLE IDENTIFICATION:	H5-MAIN-090826 (A/A)	H5-BASEMENT-090826 (A/A)	H5-A-090826 (A/A)	SVW09-1-090826 (A/A)	
DATE SAMPLED:	Aug 26/09	Aug 26/09	Aug 26/09	Aug 26/09	REPORTING LIMIT
CANTEST ID:	908310042	908310045	908310047	908310050	
C6-C8 Aromatics	< 0.00208	< 0.00208	<	< 0.00806	0.00207
C6-C8 Aliphatics	< 0.00417	< 0.00417	<	< 0.0161	0.00415
>C8-C10 Aromatics	< 0.00208	< 0.00208	<	< 0.00806	0.00207
>C8-C10 Aliphatics	< 0.00417	< 0.00417	<	< 0.0161	0.00415
>C10-C12 Aliphatics	< 0.00208	0.049	0.034	< 0.00806	0.00207
>C12-C16 Aliphatics	< 0.0208	0.14	0.16	< 0.0806	0.0207
>C16-C19 Aliphatics	< 0.0208	< 0.0208	<	< 0.0806	0.0207
>C10-C19 Hydrocarbons (Total)	< 0.0208	0.19	0.19	< 0.0806	0.0207

Results expressed as milligrams per cubic meter (mg/cu. m)
< = Less than reporting limit

Aromatic and Aliphatic Hydrocarbons (mg/m3) in Air

CLIENT SAMPLE IDENTIFICATION:	SVW09-2-09 0826 (A/A)	SVW09-3-09 0826 (A/A)	SVW09-A-09 0826 (A/A)	
DATE SAMPLED:	Aug 26/09	Aug 26/09	Aug 26/09	REPORTING LIMIT
CANTEST ID:	908310053	908310056	908310060	
C6-C8 Aromatics	<	< 0.00837	<	0.0083
C6-C8 Aliphatics	<	< 0.0167	<	0.0166
>C8-C10 Aromatics	<	< 0.00837	<	0.0083
>C8-C10 Aliphatics	<	< 0.0167	<	0.0166
>C10-C12 Aliphatics	<	< 0.00837	<	0.0083
>C12-C16 Aliphatics	<	< 0.0837	<	0.083
>C16-C19 Aliphatics	<	< 0.0837	<	0.083
>C10-C19 Hydrocarbons (Total)	<	< 0.0837	<	0.083

Results expressed as milligrams per cubic meter (mg/cu. m)
< = Less than reporting limit

Analysis Report

CANTEST LTD.

Professional
Analytical
Services

4606 Canada Way
Burnaby, B.C.
V5G 1K5

FAX: 604 731 2386

TEL: 604 734 7276

1 800 665 8566

REPORT ON: Analysis of Air Samples

REPORTED TO: Morrow Environmental Consultants Inc.
8648 Commerce Court
Burnaby, BC
V5A 4N6

Att'n: Dave Bridger

CHAIN OF CUSTODY: 185149
PROJECT NAME: Pleasant Camp
PROJECT NUMBER: 131416 E000

NUMBER OF SAMPLES: 12

REPORT DATE: October 5, 2009

DATE SUBMITTED: September 26, 2009

GROUP NUMBER: 100929015

SAMPLE TYPE: Air

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

TEST METHODS:

C10-C12 Aliphatic Hydrocarbons - was determined by taking the total area calculated from >C10 to C12 from the Flame Ionization Detector, quantified against C10 (Decane).

C10-C19 Hydrocarbons - was determined by summing the results from >C10-C12, >C12-C16 and >C16-C19 off the Flame Ionization Detector in order to obtain a total number.

C12-C16 Aliphatic Hydrocarbons - was determined by taking the total area calculated from >C12 to C16 from the Flame Ionization Detector, quantified against C10 (Decane).

C16-C19 Aliphatic Hydrocarbons - was determined by taking the total area calculated from >C16 to C19 from the Flame Ionization Detector, quantified against C10 (Decane).

C6-C8 Aliphatic Hydrocarbons - was determined by taking the C6-C8 total range, calibrated against C10 (Decane), from the Flame Ionization Detector and subracting the most common mono-cyclic compounds that are found in the C6-C8 range, ie, Benzene, Toluene, and etc. found on the Mass Selective Detector from that total number.

C6-C8 Aromatic Hydrocarbons - were calculated by looking at the most common mono-cyclic compounds eluted from the Gas Chromatograph equipped with a Mass Selective Detector and summing them all together to get a total number.

C8-C10 Aromatic Hydrocarbons - was determined by adding the total numbers obtained from all the >C8-C10

(Continued)

CANTEST LTD.

Zhenyong Gao, M.Sc.
Coordinator, Trace Organics

C8-C10 Aromatic Hydrocarbons

Aromatics found on the GCMS such as Ethylbenzene, m, and o-Xylene, etc.

C8-C10 Aliphatic Hydrocarbons - was determined by taking the total area calculated from >C8 to C10 from the Flame Ionization Detector, quantified against C10 (Decane), and subracting total Aromatics found in the >C8-C10 range, ie, Ethylbenzene, m and o-Xylene, etc.

Organic Vapours in Air - analysis was performed using procedures based on NIOSH 1500 and/or 1501 methods. The procedure involves sampling using activated charcoal, desorption using carbon disulphide and analysis using GCFID. All samples are analyzed in duplicate, on two separate columns. If morethan 10% of the contaminant is found in the back section, the result should be given careful consideration as breakthrough may have occured. Note: Unless otherwise noted, a lab blank correction is performed on all sample results. CANTEST method reference 67-C-021.

Volatile Hydrocarbons (C6-C13) in Air - analysis was performed using procedures based on NIOSH Method 1500. The procedure involves sampling using charcoal tubes, desorption of analytes using carbon disulphide, and analysis using gas chromatography with flame ionization detection.

Volatile Petroleum Hydrocarbons (C6-C13) in Air - analysis was performed using procedures based on NIOSH Method 1500. The procedure involves sampling using charcoal tubes, desorption of analytes using carbon disulphide, and analysis using gas chromatography with flame ionization detection. VPH is calculated by subtraction of BTEX, Decane, and Hexane from the VH concentrations.

C10-C12 Aromatic Hydrocarbons - were calculated by looking at the most common compounds eluted from the Gas Chromatograph equipped with a Mass Selective Detector from >C10-C12 and summing them together to get a total number.

C12-C16 Aromatic Hydrocarbons - were calculated by looking at the most common compounds eluted from the Gas Chromatograph equipped with a Mass Selective Detector from >C12-C16 and summing them together to get a total number (Acenaphthylene, Acenaphthene and Fluorene).

C16-C19 Aromatic Hydrocarbons - were calculated by looking at the most common compounds eluted (Phenanthrene and Anthracene) from the Gas Chromatograph equipped with a Mass Selective Detector from >C16-C19 a summing them together to get a total number.

Polynuclear Aromatic Hydrocarbons in Air - analysis was performed using procedures based on NIOSH Method 5515 involving desorption of PAH compounds from the filter or sorbent tube, followed by analysis using gas chromatography/mass spectrometry (GC/MS).

TEST RESULTS:

(See following pages)

Polycyclic Aromatic Hydrocarbons (ug) in Air

CLIENT SAMPLE IDENTIFICATION:	SVW09-1-09 0924 (PAH)	SVW09-2-09 0924 (PAH)	SVW09-3-09 0924 (PAH)	H5-Main-09 0925 (PAH)	
DATE SAMPLED:	Sep 24/09	Sep 24/09	Sep 24/09	Sep 25/09	REPORTING LIMIT
CANTEST ID:	909290074	909290078	909290082	909290088	
Naphthalene	<	<	<	<	0.1
Acenaphthylene	<	<	<	<	0.1
Acenaphthene	<	<	<	<	0.1
Fluorene	<	<	<	<	0.05
Phenanthrene	<	<	<	<	0.05
Anthracene	<	<	<	<	0.05
Total LMW-PAH's					
Fluoranthene	<	<	<	<	0.05
Pyrene	<	<	<	<	0.02
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					
Total PAH's					
>C10-C12 Aromatics	<	<	<	<	0.2
>C12-C16 Aromatics	<	<	<	<	2
>C16-C19 Aromatics	<	<	<	<	2

Results expressed as total micrograms (ug)
< = Less than reporting limit

Polycyclic Aromatic Hydrocarbons (ug) in Air

CLIENT SAMPLE IDENTIFICATION:	H5-Basement-090925 (PAH)	H5-A-090925 (PAH)	
DATE SAMPLED:	Sep 25/09	Sep 25/09	REPORTING LIMIT
CANTEST ID:	909290093	909290104	
Naphthalene	<	<	0.1
Acenaphthylene	<	<	0.1
Acenaphthene	<	<	0.1
Fluorene	<	<	0.05
Phenanthrene	<	<	0.05
Anthracene	<	<	0.05
Total LMW-PAH's			
Fluoranthene	<	<	0.05
Pyrene	<	<	0.02
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			
Total PAH's			
>C10-C12 Aromatics	<	<	0.2
>C12-C16 Aromatics	<	<	2
>C16-C19 Aromatics	<	<	2

Results expressed as total micrograms (ug)
< = Less than reporting limit

Polycyclic Aromatic Hydrocarbons (mg/m3) in Air

CLIENT SAMPLE IDENTIFICATION:	SVW09-1-09 0924 (PAH)	SVW09-2-09 0924 (PAH)	SVW09-3-09 0924 (PAH)	H5-Main-09 0925 (PAH)	
DATE SAMPLED:	Sep 24/09	Sep 24/09	Sep 24/09	Sep 25/09	REPORTING LIMIT
CANTEST ID:	909290074	909290078	909290082	909290088	
Naphthalene	< 0.0041667	< 0.0041667	< 0.0041667	<	0.002083
Acenaphthylene	< 0.0041667	< 0.0041667	< 0.0041667	<	0.002083
Acenaphthene	< 0.0041667	< 0.0041667	< 0.0041667	<	0.002083
Fluorene	< 0.0020833	< 0.0020833	< 0.0020833	<	0.001042
Phenanthrene	< 0.0020833	< 0.0020833	< 0.0020833	<	0.001042
Anthracene	< 0.0020833	< 0.0020833	< 0.0020833	<	0.001042
Total LMW-PAH's					
Fluoranthene	< 0.0020833	< 0.0020833	< 0.0020833	<	0.001042
Pyrene	< 0.0008333	< 0.0008333	< 0.0008333	<	0.000417
Benzo(a)anthracene	< 0.0004167	< 0.0004167	< 0.0004167	<	0.000208
Chrysene	< 0.0004167	< 0.0004167	< 0.0004167	<	0.000208
Benzo(b)fluoranthene	< 0.0004167	< 0.0004167	< 0.0004167	<	0.000208
Benzo(k)fluoranthene	< 0.0004167	< 0.0004167	< 0.0004167	<	0.000208
Benzo(a)pyrene	< 0.0004167	< 0.0004167	< 0.0004167	<	0.000208
Indeno(1,2,3-cd)pyrene	< 0.0004167	< 0.0004167	< 0.0004167	<	0.000208
Dibenz(a,h)anthracene	< 0.0004167	< 0.0004167	< 0.0004167	<	0.000208
Benzo(g,h,i)perylene	< 0.0004167	< 0.0004167	< 0.0004167	<	0.000208
Total HMW-PAH's	< 0.0004167	< 0.0004167	< 0.0004167	<	0.000208
Total PAH's					
>C10-C12 Aromatics	< 0.00833	< 0.00833	< 0.00833	<	0.00417
>C12-C16 Aromatics	< 0.00833	< 0.00833	< 0.00833	<	0.00417
>C16-C19 Aromatics	< 0.0833	< 0.0833	< 0.0833	<	0.0417
Surrogate Recovery					
Naphthalene-d8	66	62	55	64	-
Acenaphthene-d10	63	58	52	59	-
Phenanthrene-d10	65	67	61	59	-
Chrysene-d12	60	62	65	61	-
Perylene-d12	98	85	77	90	-

Results expressed as milligrams per cubic meter (mg/cu. m)
Surrogate recoveries expressed as percent (%)
< = Less than reporting limit

Polycyclic Aromatic Hydrocarbons (mg/m3) in Air

CLIENT SAMPLE IDENTIFICATION:	H5-Basement-090925 (PAH)	H5-A-090925 (PAH)	
DATE SAMPLED:	Sep 25/09	Sep 25/09	REPORTING LIMIT
CANTEST ID:	909290093	909290104	
Naphthalene	<	<	0.002083
Acenaphthylene	<	<	0.002083
Acenaphthene	<	<	0.002083
Fluorene	<	<	0.001042
Phenanthrene	<	<	0.001042
Anthracene	<	<	0.001042
Total LMW-PAH’s			
Fluoranthene	<	<	0.001042
Pyrene	<	<	0.000417
Benzo(a)anthracene	<	<	0.000208
Chrysene	<	<	0.000208
Benzo(b)fluoranthene	<	<	0.000208
Benzo(k)fluoranthene	<	<	0.000208
Benzo(a)pyrene	<	<	0.000208
Indeno(1,2,3-cd)pyrene	<	<	0.000208
Dibenz(a,h)anthracene	<	<	0.000208
Benzo(g,h,i)perylene	<	<	0.000208
Total HMW-PAH’s	<	<	0.000208
Total PAH’s			
>C10-C12 Aromatics	<	<	0.00417
>C12-C16 Aromatics	<	<	0.00417
>C16-C19 Aromatics	<	<	0.0417
Surrogate Recovery			
Naphthalene-d8	64	56	-
Acenaphthene-d10	56	53	-
Phenanthrene-d10	60	60	-
Chrysene-d12	65	61	-
Perylene-d12	93	86	-

Results expressed as milligrams per cubic meter (mg/cu. m)
Surrogate recoveries expressed as percent (%)
< = Less than reporting limit

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: October 5, 2009

GROUP NUMBER: 100929015

Volatile Organics in Air

CLIENT SAMPLE IDENTIFICATION:	SVW09-1-09 0924 (A/A)	SVW09-2-09 0924 (A/A)	SVW09-3-09 0924 (A/A)	H5-Main-09 0925 (A/A)	
DATE SAMPLED:	Sep 24/09	Sep 24/09	Sep 24/09	Sep 25/09	REPORTING LIMIT
CANTEST ID:	909290075	909290081	909290085	909290090	
Benzene	< 0.007	< 0.007	< 0.007	<	0.002
Toluene	< 0.006	< 0.006	< 0.006	<	0.001
Ethylbenzene	< 0.005	< 0.005	< 0.005	<	0.001
Total Xylenes	< 0.005	< 0.005	< 0.005	<	0.001

Results expressed as mL/cubic meter or ppm (v/v) (mL/cu. m)
< = Less than reporting limit

Volatile Organics in Air

CLIENT SAMPLE IDENTIFICATION:	H5-Basement-090925 (A/A)	H5-B-090925 (A/A)	
DATE SAMPLED:	Sep 25/09	Sep 25/09	
CANTEST ID:	909290095	909290107	REPORTING LIMIT
Benzene	< 0.002	<	0.001
Toluene	<	<	0.001
Ethylbenzene	<	<	0.001
Total Xylenes	<	<	0.001

Results expressed as mL/cubic meter or ppm (v/v) (mL/cu. m)
< = Less than reporting limit

Volatile Organics (ug) in Air

CLIENT SAMPLE IDENTIFICATION:	SVW09-1-09 0924 (A/A)	SVW09-2-09 0924 (A/A)	SVW09-3-09 0924 (A/A)	H5-Main-09 0925 (A/A)	REPORTING LIMIT	UNITS
DATE SAMPLED:	Sep 24/09	Sep 24/09	Sep 24/09	Sep 25/09		
CANTEST ID:	909290075	909290081	909290085	909290090		
C6-C13 Hydrocarbons (VHv)	<	<	<	<	5	ug
C6-C13 Hydrocarbons (VHv)	< 0.2	< 0.2	< 0.2	<	0.05	mg/cu. m
C6-C13 Hydrocarbons (VPHv)	<	<	<	<	5	ug
C6-C13 Hydrocarbons (VPHv)	< 0.2	< 0.2	< 0.2	<	0.05	mg/cu. m
Benzene	<	<	<	<	0.5	ug
Toluene	<	<	<	<	0.5	ug
Ethylbenzene	<	<	<	<	0.5	ug
Total Xylenes	<	<	<	<	0.5	ug
Naphthalene	<	<	<	<	0.5	ug
n-Hexane	<	<	<	<	0.5	ug

ug = total micrograms

mg/cu. m = milligrams per cubic meter

< = Less than reporting limit

Volatile Organics (ug) in Air

CLIENT SAMPLE IDENTIFICATION:	H5-Basement-090925 (A/A)	H5-B-090925 (A/A)		
DATE SAMPLED:	Sep 25/09	Sep 25/09	REPORTING LIMIT	UNITS
CANTEST ID:	909290095	909290107		
C6-C13 Hydrocarbons (VHv)	6.8	9.7	5	ug
C6-C13 Hydrocarbons (VHv)	0.07	0.10	0.05	mg/cu. m
C6-C13 Hydrocarbons (VPHv)	6.8	9.7	5	ug
C6-C13 Hydrocarbons (VPHv)	0.07	0.10	0.05	mg/cu. m
Benzene	<	<	0.5	ug
Toluene	<	<	0.5	ug
Ethylbenzene	<	<	0.5	ug
Total Xylenes	<	<	0.5	ug
Naphthalene	<	<	0.5	ug
n-Hexane	<	<	0.5	ug

ug = total micrograms
mg/cu. m = milligrams per cubic meter
< = Less than reporting limit

Volatile Organics (mg/m3) in Air

CLIENT SAMPLE IDENTIFICATION:	SVW09-1-09 0924 (A/A)	SVW09-2-09 0924 (A/A)	SVW09-3-09 0924 (A/A)	H5-Main-09 0925 (A/A)	REPORTING LIMIT
DATE SAMPLED:	Sep 24/09	Sep 24/09	Sep 24/09	Sep 25/09	
CANTEST ID:	909290075	909290081	909290085	909290090	
Benzene	< 0.02	< 0.02	< 0.02	<	0.005
Toluene	< 0.02	< 0.02	< 0.02	<	0.005
Ethylbenzene	< 0.02	< 0.02	< 0.02	<	0.005
Total Xylenes	< 0.02	< 0.02	< 0.02	<	0.005
Naphthalene	< 0.02	< 0.02	< 0.02	<	0.005
n-Hexane	< 0.02	< 0.02	< 0.02	<	0.005

Results expressed as milligrams per cubic meter (mg/cu. m)
< = Less than reporting limit

Volatile Organics (mg/m3) in Air

CLIENT SAMPLE IDENTIFICATION:	H5-Basement-090925 (A/A)	H5-B-090925 (A/A)	
DATE SAMPLED:	Sep 25/09	Sep 25/09	REPORTING LIMIT
CANTEST ID:	909290095	909290107	
Benzene	<	<	0.005
Toluene	<	<	0.005
Ethylbenzene	<	<	0.005
Total Xylenes	<	<	0.005
Naphthalene	<	<	0.005
n-Hexane	<	<	0.005

Results expressed as milligrams per cubic meter (mg/cu. m)
< = Less than reporting limit

Aromatic and Aliphatic Hydrocarbons (ug) in Air

CLIENT SAMPLE IDENTIFICATION:	SVW09-1-09 0924 (A/A)	SVW09-2-09 0924 (A/A)	SVW09-3-09 0924 (A/A)	H5-Main-09 0925 (A/A)	
DATE SAMPLED:	Sep 24/09	Sep 24/09	Sep 24/09	Sep 25/09	REPORTING LIMIT
CANTEST ID:	909290075	909290081	909290085	909290090	
C6-C8 Aromatics	<	<	<	<	0.2
C6-C8 Aliphatics	<	<	<	<	0.4
>C8-C10 Aromatics	<	<	<	<	0.2
>C8-C10 Aliphatics	<	<	<	<	0.4
>C10-C12 Aliphatics	<	<	<	2.1	0.2
>C12-C16 Aliphatics	<	<	<	3.3	2
>C16-C19 Aliphatics	<	<	<	<	2
>C10-C19 Hydrocarbons (Total)	<	<	<	5.4	2

Results expressed as total micrograms (ug)
< = Less than reporting limit

Aromatic and Aliphatic Hydrocarbons (ug) in Air

CLIENT SAMPLE IDENTIFICATION:	H5-Basement-090925 (A/A)	H5-B-090925 (A/A)	
DATE SAMPLED:	Sep 25/09	Sep 25/09	REPORTING LIMIT
CANTEST ID:	909290095	909290107	
C6-C8 Aromatics	<	<	0.2
C6-C8 Aliphatics	<	<	0.4
>C8-C10 Aromatics	<	<	0.2
>C8-C10 Aliphatics	<	<	0.4
>C10-C12 Aliphatics	3.4	4.2	0.2
>C12-C16 Aliphatics	11.0	19.5	2
>C16-C19 Aliphatics	<	<	2
>C10-C19 Hydrocarbons (Total)	14.4	23.7	2

Results expressed as total micrograms (ug)
< = Less than reporting limit

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: October 5, 2009

GROUP NUMBER: 100929015

CANTEST

Aromatic and Aliphatic Hydrocarbons (mg/m3) in Air

CLIENT SAMPLE IDENTIFICATION:	SVW09-1-09 0924 (A/A)	SVW09-2-09 0924 (A/A)	SVW09-3-09 0924 (A/A)	H5-Main-09 0925 (A/A)	REPORTING LIMIT
DATE SAMPLED:	Sep 24/09	Sep 24/09	Sep 24/09	Sep 25/09	
CANTEST ID:	909290075	909290081	909290085	909290090	
C6-C8 Aromatics	< 0.00833	< 0.00833	< 0.00833	<	0.00208
C6-C8 Aliphatics	< 0.0167	< 0.0167	< 0.0167	<	0.00417
>C8-C10 Aromatics	< 0.00833	< 0.00833	< 0.00833	<	0.00208
>C8-C10 Aliphatics	< 0.0167	< 0.0167	< 0.0167	<	0.00417
>C10-C12 Aliphatics	< 0.00833	< 0.00833	< 0.00833	0.022	0.00208
>C12-C16 Aliphatics	< 0.0833	< 0.0833	< 0.0833	0.03	0.0208
>C16-C19 Aliphatics	< 0.0833	< 0.0833	< 0.0833	<	0.0208
>C10-C19 Hydrocarbons (Total)	< 0.0833	< 0.0833	< 0.0833	0.06	0.0208

Results expressed as milligrams per cubic meter (mg/cu. m)
< = Less than reporting limit

Aromatic and Aliphatic Hydrocarbons (mg/m3) in Air

CLIENT SAMPLE IDENTIFICATION:	H5-Basement-090925 (A/A)	H5-B-090925 (A/A)	
DATE SAMPLED:	Sep 25/09	Sep 25/09	REPORTING LIMIT
CANTEST ID:	909290095	909290107	
C6-C8 Aromatics	<	<	0.00208
C6-C8 Aliphatics	<	<	0.00417
>C8-C10 Aromatics	<	<	0.00208
>C8-C10 Aliphatics	<	<	0.00417
>C10-C12 Aliphatics	0.035	0.044	0.00208
>C12-C16 Aliphatics	0.16	0.20	0.0208
>C16-C19 Aliphatics	<	<	0.0208
>C10-C19 Hydrocarbons (Total)	0.15	0.25	0.0208

Results expressed as milligrams per cubic meter (mg/cu. m)
< = Less than reporting limit

Laboratory Certificates of Analysis

SOIL

Analysis Report

CANTEST LTD.

Professional
Analytical
Services

4606 Canada Way
Burnaby, B.C.
V5G 1K5

FAX: 604 731 2386

TEL: 604 734 7276

1 800 665 8566

REPORT ON: Analysis of Soil Samples

REPORTED TO:
Morrow Environmental Consultants Inc.
8648 Commerce Court
Burnaby, BC
V5A 4N6

Att'n: Tim Drozda

CHAIN OF CUSTODY: 2182122, 2182126, 2182129, 2182130
PROJECT NAME: Pleasant Camp
PROJECT NUMBER: 131416

NUMBER OF SAMPLES: 16

REPORT DATE: September 9, 2009

DATE SUBMITTED: August 28, 2009 - August 31, 2009

GROUP NUMBER: 100901127

SAMPLE TYPE: Soil

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

TEST METHODS:

Volatile Petroleum Hydrocarbons (VPH) in Soil - results were obtained using B.C. MOELP CSR-Analytical Method 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.

CCME Petroleum Hydrocarbons in Soil - analysis was performed using Canadian Council of Ministers of the Environment (CCME) "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil" approved December 2000. The method involves extraction of the different hydrocarbon fractions and analysis by gas chromatography with flame ionization detection (GC/FID).

Canada-Wide Standard for Petroleum Hydrocarbons in Soil (F1 Fraction) - The F1 Fraction (nC6 to nC10) was analyzed based on the CCME Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil-Tier Method (2001). Analysis involves methanol extraction and quantitation using GasChromatography with Flame Ionization Detector (GC-FID). The F1 Fraction is reported with the BTEX compounds (benzene, toluene, ethylbenzene, and ortho, meta and para-xylenes) subtracted (e.g. corrected). These BTEX compounds analyzed by GCMS may be included in this report on request by the customer.

Canada-Wide Standard for Petroleum Hydrocarbons in Soil (F1 Fraction) - The F1 Fraction (nC6 to nC10) analysis was performed based on the CCME Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbo in Soil - Tier 1 Method (2001). Analysis involves methanol extraction and quantitation using Gas Chromatography with a Flame Ionization Detector (GC-FID). The F1 Fraction is reported with the BTEX compounds (Benzene, Toluene, Ethylbenzene, and Total Xylenes) subtracted (e.g. corrected). These BTEX compounds may be included in this report

(Continued)

CANTEST LTD.

Zhenyong Gao, M.Sc.
Coordinator, Trace Organics

Canada-Wide Standard for Petroleum Hydrocarbons in Soil (F1 Fraction)

on request by the customer.

Canada-Wide Standard for Petroleum Hydrocarbons in Soil (F2,F3 and F4 Fractions) - The F2 to F4 Fractions (nC10 to nC50) analysis was performed based on the CCME Reference Method for the Canada-Wide Standard for Petrole Hydrocarbons in Soil - Tier 1 Method (2001). Analysis involves extraction with50:50 hexane:acetone, silica-gel cleanup and quantitation using Gas Chromatography with a Flame Ionization Detector (GC-FID).

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

pH in Soil or Solid - analysis was performed based on procedures described in the "Manual on Soil Sampling and Methods of Analysis" (1993) published by the Canadian Society of Soil Science. The test was performed using a deionized water leach with measurement by pH meter.

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 C and C19 to C32 are quantified against eicosane (n-C20). LEPH & HEPH are calculated by subtraction of specified PAH’s.

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.

Silver in Soil - analysis was performed using Inductively Coupled Plasma Mass Spectrometry (ICP/MS).

Arsenic in Soil - analysis was performed using Inductively Coupled Plasma Mass Spectrometry (ICP/MS).

Cadmium in Soil - analysis was performed using Inductively Coupled Plasma Mass Spectrometry (ICP/MS).

Mercury in Soil - analysis was performed using Cold Vapour Atomic Fluorescence.

Molybdenum in Soil - analysis was performed using an acid digestion followed by determination using Inductively Coupled Plasma Mass Spectrometry (ICP/MS).

Strong Acid Leachable Metals in Soil - analysis was performed using B.C. MOELP Method "Strong Acid Leachable Metals in Soil, Version 1.0". The method involves drying the sample at 60 C, sieving using a 2 mm (10 mesh) sieve and digestion using a mixture of hydrochloric and nitric acids. Analysis was performed using Inductively Coupled Argon Plasma Spectroscopy (ICAP) or by specific techniques as described.

(Continued)

Selenium in Soil - analysis was using Inductively Coupled Plasma Mass Spectrometry (ICP/MS).

Thallium in Soil - analysis was performed using Inductively Coupled Plasma Mass Spectrometry (ICP/MS).

TEST RESULTS:

(See following pages)

Conventional Parameters in Soil

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	Moisture	pH
BH09-1-4-090821	Aug 21/09	909010357	14.9	-
BH09-2-3-090821	Aug 21/09	909010386	26.0	-
BH09-13-5-090825	Aug 25/09	909010404	9.3	-
FILL-1-090827	Aug 27/09	909010405	6.0	4.4
BH09-14-1-090827	Aug 27/09	909010410	15.1	-
BH09-14-3-090827	Aug 27/09	909010412	7.1	-
BH09-14-4-090827	Aug 27/09	909010417	6.8	-
BH09-14-6-090827	Aug 27/09	909010424	4.9	-
BH09-15-1-090828	Aug 28/09	909010426	9.1	-
BH09-15-2-090828	Aug 28/09	909010428	3.9	-
BH09-15-3-090828	Aug 28/09	909010429	4.3	-
BH09-15-4-090828	Aug 28/09	909010430	4.9	-
BH09-16-3-090828	Aug 28/09	909010431	6.1	-
BH09-17-2-090828	Aug 28/09	909010434	10.2	-
BH09-17-3-090828	Aug 28/09	909010439	5.6	-
BH09-17-5-090828	Aug 28/09	909010440	9.0	-
REPORTING LIMIT			0.1	0.1
UNITS			%	pH units

% = percent

Polycyclic Aromatic Hydrocarbons in Soil

CLIENT SAMPLE IDENTIFICATION:	BH09-13-5-090825	BH09-14-3-090827	BH09-14-4-090827	BH09-15-3-090828	
DATE SAMPLED:	Aug 25/09	Aug 27/09	Aug 27/09	Aug 28/09	
CANTEST ID:	909010404	909010412	909010417	909010429	REPORTING LIMIT
ANALYSIS DATE:	Sep 3/09	Sep 3/09	Sep 3/09	Sep 3/09	
Naphthalene	<	<	<	<	0.01
2-Methylnaphthalene	<	<	<	<	0.05
Acenaphthylene	<	<	<	<	0.005
Acenaphthene	<	<	<	<	0.005
Fluorene	<	0.27	0.19	0.14	0.01
Phenanthrene	<	0.37	0.26	0.17	0.01
Anthracene	<	<	<	<	0.01
Total LMW-PAH's		0.64	0.45	0.31	
Fluoranthene	<	<	<	<	0.01
Pyrene	0.02	0.04	0.04	0.02	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	<	<	<	<	0.005
Benzo(g,h,i)perylene	<	<	<	<	0.01
Total HMW-PAH's	0.02	0.04	0.04	0.02	
Total PAH's	0.02	0.68	0.49	0.33	

Results expressed as micrograms per gram, on a dry weight basis. (µg/g)
< = Less than reporting limit

Polycyclic Aromatic Hydrocarbons in Soil

CLIENT SAMPLE IDENTIFICATION:	BH09-17-3-090828	
DATE SAMPLED:	Aug 28/09	
CANTEST ID:	909010439	REPORTING LIMIT
ANALYSIS DATE:	Sep 3/09	
Naphthalene	<	0.01
2-Methylnaphthalene	<	0.05
Acenaphthylene	<	0.005
Acenaphthene	<	0.005
Fluorene	0.04	0.01
Phenanthrene	0.04	0.01
Anthracene	<	0.01
Total LMW-PAH's	0.08	
Fluoranthene	<	0.01
Pyrene	0.02	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	<	0.005
Benzo(g,h,i)perylene	<	0.01
Total HMW-PAH's	0.02	
Total PAH's	0.10	

Results expressed as micrograms per gram, on a dry weight basis. (μg/g)
< = Less than reporting limit

Extractable Petroleum Hydrocarbons (EPH) in Soil

CLIENT SAMPLE IDENTIFICATION:	BH09-1-4-090821	BH09-13-5-090825	FILL-1-090827	BH09-14-4-090827	
DATE SAMPLED:	Aug 21/09	Aug 25/09	Aug 27/09	Aug 27/09	REPORTING LIMIT
CANTEST ID:	909010357	909010404	909010405	909010417	
EPHs10-19	540	2600	<	<	250
EPHs19-32	<	550	<	980	250
LEPHs (corrected for PAH's)	-	2600	-	<	250
HEPHs (corrected for PAH's)	-	550	-	<	250

Results expressed as micrograms per gram, on a dry weight basis. (μg/g)
< = Less than reporting limit

Extractable Petroleum Hydrocarbons (EPH) in Soil

CLIENT SAMPLE IDENTIFICATION:	BH09-15-1-090828	BH09-15-2-090828	BH09-16-3-090828	BH09-17-2-090828	
DATE SAMPLED:	Aug 28/09	Aug 28/09	Aug 28/09	Aug 28/09	REPORTING LIMIT
CANTEST ID:	909010426	909010428	909010431	909010434	
EPHs10-19	<	<	<	3300	250
EPHs19-32	<	<	<	570	250

Results expressed as micrograms per gram, on a dry weight basis. (μg/g)
< = Less than reporting limit

Extractable Petroleum Hydrocarbons (EPH) in Soil

CLIENT SAMPLE IDENTIFICATION:	BH09-17-3-090828	BH09-17-5-090828	
DATE SAMPLED:	Aug 28/09	Aug 28/09	REPORTING LIMIT
CANTEST ID:	909010439	909010440	
EPHs10-19	620	<	250
EPHs19-32	<	<	250
LEPHs (corrected for PAH's)	620	-	250
HEPHs (corrected for PAH's)	<	-	250

Results expressed as micrograms per gram, on a dry weight basis. (µg/g)
< = Less than reporting limit

Monocyclic Aromatic Hydrocarbons-Methanol Extraction- in Soil

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	VPHs
BH09-13-5-090825	Aug 25/09	909010404	<
BH09-14-3-090827	Aug 27/09	909010412	<
BH09-15-3-090828	Aug 28/09	909010429	<
BH09-17-3-090828	Aug 28/09	909010439	<
REPORTING LIMIT			100
UNITS			μg/g

μg/g = micrograms per gram, on a dry weight basis.
< = Less than reporting limit

CCME Petroleum Hydrocarbons in Soil

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	F1 (C6-C10) uncorrected	F1 minus BTEX (C6-C10)
BH09-13-5-090825	Aug 25/09	909010404	21	21
BH09-14-3-090827	Aug 27/09	909010412	10	10
BH09-14-4-090827	Aug 27/09	909010417	<	<
BH09-15-3-090828	Aug 28/09	909010429	<	<
BH09-17-3-090828	Aug 28/09	909010439	<	<
REPORTING LIMIT			10	10
UNITS			µg/g	µg/g

µg/g = micrograms per gram, on a dry weight basis.
< = Less than reporting limit

CCME Petroleum Hydrocarbons in Soil

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	F2 (C10-C16) uncorrected	F3 (C16-C34) uncorrected
BH09-2-3-090821	Aug 21/09	909010386	<	18
BH09-13-5-090825	Aug 25/09	909010404	1300	800
BH09-14-1-090827	Aug 27/09	909010410	270	300
BH09-14-3-090827	Aug 27/09	909010412	790	470
BH09-14-4-090827	Aug 27/09	909010417	540	310
BH09-14-6-090827	Aug 27/09	909010424	410	350
BH09-15-3-090828	Aug 28/09	909010429	590	800
BH09-15-4-090828	Aug 28/09	909010430	680	580
BH09-17-3-090828	Aug 28/09	909010439	330	310
REPORTING LIMIT			70	100
UNITS			µg/g	µg/g

µg/g = micrograms per gram, on a dry weight basis.
< = Less than reporting limit

Strong Acid Soluble Metals in Soil

CLIENT SAMPLE IDENTIFICATION:		FILL-1-090827	
DATE SAMPLED:		Aug 27/09	
CANTEST ID:		909010405	REPORTING LIMIT
Antimony	Sb	<	0.1
Arsenic	As	3.5	0.1
Barium	Ba	50	1
Beryllium	Be	<	1
Cadmium	Cd	<	0.2
Chromium	Cr	27	2
Cobalt	Co	10	1
Copper	Cu	64	1
Lead	Pb	3.2	0.2
Mercury	Hg	0.02	0.01
Molybdenum	Mo	0.5	0.1
Nickel	Ni	19	2
Selenium	Se	0.2	0.2
Silver	Ag	<	0.1
Thallium	Tl	<	0.1
Tin	Sn	<	5
Vanadium	V	64	1
Zinc	Zn	37	1
Aluminum	Al	9780	10
Boron	B	5	1
Calcium	Ca	2510	1
Iron	Fe	21300	2
Magnesium	Mg	5900	1
Manganese	Mn	335	1
Phosphorus	P	650	20
Potassium	K	724	10
Sodium	Na	145	5
Strontium	Sr	13	1
Titanium	Ti	626	1
Zirconium	Zr	<	1

Results expressed as micrograms per gram, on a dry weight basis. (μg/g)
< = Less than reporting limit

CCME Petroleum Hydrocarbons in Soil

CLIENT SAMPLE IDENTIFICATION:	BH09-13-5-090825	BH09-14-3-090827	BH09-14-4-090827	BH09-15-3-090828	
DATE SAMPLED:	Aug 25/09	Aug 27/09	Aug 27/09	Aug 28/09	
CANTEST ID:	909010404	909010412	909010417	909010429	REPORTING LIMIT
Benzene	<	<	<	<	0.005
Ethylbenzene	<	<	<	<	0.018
Toluene	<	<	<	<	0.02
Xylenes	<	0.037	<	<	0.02

Results expressed as micrograms per gram, on a dry weight basis. (µg/g)
< = Less than reporting limit

CCME Petroleum Hydrocarbons in Soil

CLIENT SAMPLE IDENTIFICATION:	BH09-17-3-090828	
DATE SAMPLED:	Aug 28/09	REPORTING LIMIT
CANTEST ID:	909010439	
Benzene	<	0.005
Ethylbenzene	<	0.018
Toluene	<	0.02
Xylenes	<	0.02

Results expressed as micrograms per gram, on a dry weight basis. (µg/g)
< = Less than reporting limit

Analysis Report

CANTEST LTD.

Professional
Analytical
Services

4606 Canada Way
Burnaby, B.C.
V5G 1K5

FAX: 604 731 2386

TEL: 604 734 7276

1 800 665 8566

REPORT ON: Analysis of Soil Samples

REPORTED TO:
Morrow Environmental Consultants Inc.
8648 Commerce Court
Burnaby, BC
V5A 4N6

Att'n: Tim Drozda

CHAIN OF CUSTODY: 2182156, 2182158, 2182159, 2182160, 2182161, 2182162, 2182163, 2182164, 2182165
PROJECT NAME: Pleasant Camp
PROJECT NUMBER: 131416

NUMBER OF SAMPLES: 37

REPORT DATE: September 15, 2009

DATE SUBMITTED: September 2, 2009

GROUP NUMBER: 100905044

SAMPLE TYPE: Soil

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

TEST METHODS:

CCME Petroleum Hydrocarbons in Soil - analysis was performed using Canadian Council of Ministers of the Environment (CCME) "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil" approved December 2000. The method involves extraction of the different hydrocarbon fractions and analysis by gas chromatography with flame ionization detection (GC/FID).

Canada-Wide Standard for Petroleum Hydrocarbons in Soil (F1 Fraction) - The F1 Fraction (nC6 to nC10) was analyzed based on the CCME Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil-Tier Method (2001). Analysis involves methanol extraction and quantitation using GasChromatography with Flame Ionization Detector (GC-FID). The F1 Fraction is reported with the BTEX compounds (benzene, toluene, ethylbenzene, and ortho, meta and para-xylenes) subtracted (e.g. corrected). These BTEX compounds analyzed by GCMS may be included in this report on request by the customer.

Canada-Wide Standard for Petroleum Hydrocarbons in Soil (F1 Fraction) - The F1 Fraction (nC6 to nC10) analysis was performed based on the CCME Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbo in Soil - Tier 1 Method (2001). Analysis involves methanol extraction and quantitation using Gas Chromatography with a Flame Ionization Detector (GC-FID). The F1 Fraction is reported with the BTEX compounds (Benzene, Toluene, Ethylbenzene, and Total Xylenes) subtracted (e.g. corrected). These BTEX compounds may be included in this report on request by the customer.

Canada-Wide Standard for Petroleum Hydrocarbons in Soil (F2,F3 and F4 Fractions) - The F2 to F4 Fractions (nC10 to nC50) analysis was performed based on the CCME Reference Method for the Canada-Wide Standard for Petrole

(Continued)

CANTEST LTD.

Zhenyong Gao, M.Sc.
Coordinator, Trace Organics

Canada-Wide Standard for Petroleum Hydrocarbons in Soil (F2,F3 and F4 Fractions)

Hydrocarbons in Soil - Tier 1 Method (2001). Analysis involves extraction with50:50 hexane:acetone, silica-gel cleanup and quantitation using Gas Chromatography with a Flame Ionization Detector (GC-FID).

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

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 C and C19 to C32 are quantified against eicosane (n-C20). LEPH & HEPH are calculated by subtraction of specified PAH's.

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)

Conventional Parameters in Soil

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	Moisture
BH09-18-2-090829	Aug 29/09	909050259	6.2
BH09-9-7-090829	Aug 29/09	909050260	7.1
BH09-12-5-090829	Aug 29/09	909050261	6.5
BH09-12-6-090829	Aug 29/09	909050262	9.7
BH09-12-7-090829	Aug 29/09	909050263	16.3
BH09-12-10-090829	Aug 29/09	909050264	34.3
BH09-19-3-090829	Aug 29/09	909050265	10.4
BH09-19-4-090829	Aug 29/09	909050266	3.2
BH09-19-6-090829	Aug 29/09	909050267	4.2
BH09-19-8-090829	Aug 29/09	909050268	4.3
BH09-6-5-090829	Aug 29/09	909050269	6.0
BH09-6-6-090829	Aug 29/09	909050270	6.5
BH09-6-7-090829	Aug 29/09	909050271	6.7
BH09-7-5-090830	Aug 30/09	909050272	17.6
BH09-7-6-090829	Aug 30/09	909050273	8.8
BH09-7-7-090830	Aug 30/09	909050274	8.0
BH09-7-8-090830	Aug 30/09	909050275	9.7
BH09-1-5-090830	Aug 30/09	909050276	10.0
BH09-1-6-090830	Aug 30/09	909050277	9.5
BH09-1-7-090830	Aug 30/09	909050278	8.4
BH09-3-5-090830	Aug 30/09	909050279	9.9
BH09-4-4-090830	Aug 30/09	909050280	8.7
BH09-8-4-090830	Aug 30/09	909050281	14.3
BH09-8-8-090830	Aug 30/09	909050282	11.5
BH09-8-9-090830	Aug 30/09	909050283	6.8
BH09-8-12-090830	Aug 30/09	909050284	1.5
BH09-5-6-090831	Aug 31/09	909050285	6.3
BH09-10-29090831	Aug 31/09	909050286	6.0
BH09-20-3-090831	Aug 31/09	909050287	13.9
BH09-20-4-090831	Aug 31/09	909050288	5.1
BH09-21-2-090831	Aug 31/09	909050289	7.7
BH09-21-3-090831	Aug 31/09	909050290	4.7
BH09-21-4-090831	Aug 31/09	909050291	11.3
BH09-21-6-090831	Aug 31/09	909050292	5.0
BH09-11-7-090831	Aug 31/09	909050293	5.6
BH09-11-9-090831	Aug 31/09	909050294	5.0
BH09-11-10-090831	Aug 31/09	909050295	4.2
REPORTING LIMIT			0.1
UNITS			%

% = percent

Polycyclic Aromatic Hydrocarbons in Soil

CLIENT SAMPLE IDENTIFICATION:	BH09-18-2-090829	BH09-9-7-090829	BH09-12-7-090829	BH09-12-10-090829	
DATE SAMPLED:	Aug 29/09	Aug 29/09	Aug 29/09	Aug 29/09	
CANTEST ID:	909050259	909050260	909050263	909050264	REPORTING LIMIT
ANALYSIS DATE:	Sep 9/09	Sep 9/09	Sep 9/09	Sep 11/09	
Naphthalene	<	<	<	<	0.01
2-Methylnaphthalene	<	0.03	1.2	0.33	0.02
Acenaphthylene	<	<	<	<	0.005
Acenaphthene	<	<	<	<	0.005
Fluorene	<	0.02	0.43	0.18	0.01
Phenanthrene	<	0.03	0.73	0.29	0.01
Anthracene	<	<	<	<	0.01
Total LMW-PAH's		0.08	2.35	0.80	
Fluoranthene	<	<	<	<	0.01
Pyrene	<	<	0.05	0.03	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	<	<	<	<	0.005
Benzo(g,h,i)perylene	<	<	<	<	0.01
Total HMW-PAH's			0.05	0.03	
Total PAH's		0.08	2.4	0.83	

Results expressed as micrograms per gram, on a dry weight basis. (μg/g)
< = Less than reporting limit

Polycyclic Aromatic Hydrocarbons in Soil

CLIENT SAMPLE IDENTIFICATION:	BH09-19-3-090829	BH09-19-4-090829	BH09-19-6-090829	BH09-6-5-090829	
DATE SAMPLED:	Aug 29/09	Aug 29/09	Aug 29/09	Aug 29/09	
CANTEST ID:	909050265	909050266	909050267	909050269	REPORTING LIMIT
ANALYSIS DATE:	Sep 11/09	Sep 11/09	Sep 11/09	Sep 11/09	
Naphthalene	<	<	<	<	0.01
2-Methylnaphthalene	0.04	<	<	<	0.02
Acenaphthylene	<	<	<	<	0.005
Acenaphthene	<	<	<	<	0.005
Fluorene	0.02	<	0.19	<	0.01
Phenanthrene	0.03	<	0.16	<	0.01
Anthracene	<	<	<	<	0.01
Total LMW-PAH's	0.09		0.36		
Fluoranthene	<	<	<	<	0.01
Pyrene	<	0.04	0.06	0.05	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	<	<	<	<	0.005
Benzo(g,h,i)perylene	<	<	<	<	0.01
Total HMW-PAH's		0.04	0.06	0.05	
Total PAH's	0.09	0.04	0.42	0.05	

Results expressed as micrograms per gram, on a dry weight basis. (µg/g)
< = Less than reporting limit

Polycyclic Aromatic Hydrocarbons in Soil

CLIENT SAMPLE IDENTIFICATION:	BH09-6-6-0 90829	BH09-6-7-0 90829	BH09-7-6-0 90829	BH09-1-6-0 90830	
DATE SAMPLED:	Aug 29/09	Aug 29/09	Aug 30/09	Aug 30/09	
CANTEST ID:	909050270	909050271	909050273	909050277	REPORTING LIMIT
ANALYSIS DATE:	Sep 11/09	Sep 11/09	Sep 11/09	Sep 11/09	
Naphthalene	<	<	<	<	0.01
2-Methylnaphthalene	<	<	<	<	0.02
Acenaphthylene	<	<	<	<	0.005
Acenaphthene	<	<	<	<	0.005
Fluorene	<	0.16	<	<	0.01
Phenanthrene	<	0.28	<	<	0.01
Anthracene	<	<	<	<	0.01
Total LMW-PAH's		0.44			
Fluoranthene	<	<	<	<	0.01
Pyrene	0.05	0.09	0.02	0.01	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	<	<	<	<	0.005
Benzo(g,h,i)perylene	<	<	<	<	0.01
Total HMW-PAH's	0.05	0.09	0.02	0.01	
Total PAH's	0.05	0.53	0.02	0.01	

Results expressed as micrograms per gram, on a dry weight basis. (μg/g)
< = Less than reporting limit

Polycyclic Aromatic Hydrocarbons in Soil

CLIENT SAMPLE IDENTIFICATION:	BH09-3-5-0 90830	BH09-8-4-0 90830	BH09-5-6-0 90831	BH09-10-29 090831	
DATE SAMPLED:	Aug 30/09	Aug 30/09	Aug 31/09	Aug 31/09	
CANTEST ID:	909050279	909050281	909050285	909050286	REPORTING LIMIT
ANALYSIS DATE:	Sep 11/09	Sep 11/09	Sep 11/09	Sep 11/09	
Naphthalene	<	0.37	<	<	0.01
2-Methylnaphthalene	<	1.0	<	<	0.02
Acenaphthylene	<	<	<	<	0.005
Acenaphthene	<	<	<	<	0.005
Fluorene	<	0.09	<	0.09	0.01
Phenanthrene	<	0.09	0.07	0.07	0.01
Anthracene	<	<	<	<	0.01
Total LMW-PAH's		1.55	0.07	0.16	
Fluoranthene	<	<	<	<	0.01
Pyrene	0.21	<	<	<	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	<	<	<	<	0.005
Benzo(g,h,i)perylene	<	<	<	<	0.01
Total HMW-PAH's	0.21				
Total PAH's	0.21	1.55	0.07	0.16	

Results expressed as micrograms per gram, on a dry weight basis. (µg/g)
< = Less than reporting limit

Polycyclic Aromatic Hydrocarbons in Soil

CLIENT SAMPLE IDENTIFICATION:	BH09-21-4-090831	BH09-11-7-090831	REPORTING LIMIT
DATE SAMPLED:	Aug 31/09	Aug 31/09	
CANTEST ID:	909050291	909050293	
ANALYSIS DATE:	Sep 11/09	Sep 11/09	
Naphthalene	<	<	0.01
2-Methylnaphthalene	<	<	0.02
Acenaphthylene	<	<	0.005
Acenaphthene	<	<	0.005
Fluorene	0.11	0.26	0.01
Phenanthrene	0.13	0.37	0.01
Anthracene	<	<	0.01
Total LMW-PAH's	0.24	0.63	
Fluoranthene	<	<	0.01
Pyrene	0.03	0.04	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	<	<	0.005
Benzo(g,h,i)perylene	<	<	0.01
Total HMW-PAH's	0.03	0.04	
Total PAH's	0.27	0.67	

Results expressed as micrograms per gram, on a dry weight basis. (µg/g)
< = Less than reporting limit

Extractable Petroleum Hydrocarbons (EPH) in Soil

CLIENT SAMPLE IDENTIFICATION:	BH09-18-2-090829	BH09-12-5-090829	BH09-12-6-090829	BH09-19-4-090829	
DATE SAMPLED:	Aug 29/09	Aug 29/09	Aug 29/09	Aug 29/09	REPORTING LIMIT
CANTEST ID:	909050259	909050261	909050262	909050266	
EPHs10-19	390	990	910	620	250
EPHs19-32	460	330	450	<	250
LEPHs (corrected for PAH's)	390	-	-	620	250
HEPHs (corrected for PAH's)	460	-	-	<	250

Results expressed as micrograms per gram, on a dry weight basis. (μg/g)
< = Less than reporting limit

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: September 15, 2009

GROUP NUMBER: 100905044

Extractable Petroleum Hydrocarbons (EPH) in Soil

CLIENT SAMPLE IDENTIFICATION:	BH09-19-8-090829	BH09-6-5-090829	BH09-6-6-090829	BH09-1-6-090830	
DATE SAMPLED:	Aug 29/09	Aug 29/09	Aug 29/09	Aug 30/09	REPORTING LIMIT
CANTEST ID:	909050268	909050269	909050270	909050277	
EPHs10-19	2200	1200	1400	750	250
EPHs19-32	460	280	300	<	250
LEPHs (corrected for PAH's)	-	1200	1400	750	250
HEPHs (corrected for PAH's)	-	280	300	<	250

Results expressed as micrograms per gram, on a dry weight basis. (µg/g)
< = Less than reporting limit

Extractable Petroleum Hydrocarbons (EPH) in Soil

CLIENT SAMPLE IDENTIFICATION:	BH09-5-6-090831	BH09-10-29 090831	BH09-20-3-090831	BH09-20-4-090831	
DATE SAMPLED:	Aug 31/09	Aug 31/09	Aug 31/09	Aug 31/09	REPORTING LIMIT
CANTEST ID:	909050285	909050286	909050287	909050288	
EPHs10-19	830	690	<	<	250
EPHs19-32	340	<	<	<	250
LEPHs (corrected for PAH's)	830	690	-	-	250
HEPHs (corrected for PAH's)	340	<	-	-	250

Results expressed as micrograms per gram, on a dry weight basis. (μg/g)
< = Less than reporting limit

Extractable Petroleum Hydrocarbons (EPH) in Soil

CLIENT SAMPLE IDENTIFICATION:	BH09-21-4-090831	BH09-11-7-090831	
DATE SAMPLED:	Aug 31/09	Aug 31/09	REPORTING LIMIT
CANTEST ID:	909050291	909050293	
EPHs10-19	1500	2600	250
EPHs19-32	<	300	250
LEPHs (corrected for PAH's)	1500	2600	250
HEPHs (corrected for PAH's)	<	300	250

Results expressed as micrograms per gram, on a dry weight basis. (µg/g)
< = Less than reporting limit

CCME Petroleum Hydrocarbons in Soil

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	F2 (C10-C16) uncorrected	F3 (C16-C34) uncorrected
BH09-18-2-090829	Aug 29/09	909050259	200	380
BH09-9-7-090829	Aug 29/09	909050260	1000	600
BH09-12-5-090829	Aug 29/09	909050261	500	500
BH09-12-6-090829	Aug 29/09	909050262	480	500
BH09-12-7-090829	Aug 29/09	909050263	1500	990
BH09-12-10-090829	Aug 29/09	909050264	440	560
BH09-19-4-090829	Aug 29/09	909050266	420	430
BH09-6-5-090829	Aug 29/09	909050269	720	550
BH09-6-6-090829	Aug 29/09	909050270	810	610
BH09-6-7-090829	Aug 29/09	909050271	1500	1000
BH09-7-5-090830	Aug 30/09	909050272	230	410
BH09-7-6-090829	Aug 30/09	909050273	600	490
BH09-7-7-090830	Aug 30/09	909050274	1000	890
BH09-7-8-090830	Aug 30/09	909050275	380	350
BH09-1-5-090830	Aug 30/09	909050276	160	220
BH09-1-6-090830	Aug 30/09	909050277	460	400
BH09-1-7-090830	Aug 30/09	909050278	580	520
BH09-3-5-090830	Aug 30/09	909050279	1100	1000
BH09-4-4-090830	Aug 30/09	909050280	28	100
BH09-8-4-090830	Aug 30/09	909050281	580	240
BH09-8-8-090830	Aug 30/09	909050282	380	310
BH09-8-9-090830	Aug 30/09	909050283	970	510
BH09-8-12-090830	Aug 30/09	909050284	150	250
BH09-5-6-090831	Aug 31/09	909050285	450	450
BH09-10-29090831	Aug 31/09	909050286	520	220
BH09-21-2-090831	Aug 31/09	909050289	<	44
BH09-21-3-090831	Aug 31/09	909050290	350	380
BH09-21-4-090831	Aug 31/09	909050291	870	720
BH09-21-6-090831	Aug 31/09	909050292	120	150
BH09-11-7-090831	Aug 31/09	909050293	1400	830
BH09-11-9-090831	Aug 31/09	909050294	800	610
BH09-11-10-090831	Aug 31/09	909050295	340	340
REPORTING LIMIT			5	5
UNITS			µg/g	µg/g

µg/g = micrograms per gram, on a dry weight basis.
< = Less than reporting limit

CCME Petroleum Hydrocarbons in Soil

CLIENT SAMPLE IDENTIFICATION:	BH09-18-2-090829	BH09-9-7-090829	BH09-12-7-090829	BH09-12-10-090829	
DATE SAMPLED:	Aug 29/09	Aug 29/09	Aug 29/09	Aug 29/09	REPORTING LIMIT
CANTEST ID:	909050259	909050260	909050263	909050264	
F1 (C6-C10) uncorrected	<	<	<	-	10
F1 minus BTEX (C6-C10)	<	<	<	-	10
F2-Napth (C10-C16)	-	-	-	440	70
F3-PAH (C16-C34)	-	-	-	560	100

Results expressed as micrograms per gram, on a dry weight basis. (µg/g)
< = Less than reporting limit

CCME Petroleum Hydrocarbons in Soil

CLIENT SAMPLE IDENTIFICATION:	BH09-19-4-090829	BH09-6-5-090829	BH09-6-6-090829	BH09-6-7-090829	
DATE SAMPLED:	Aug 29/09	Aug 29/09	Aug 29/09	Aug 29/09	REPORTING LIMIT
CANTEST ID:	909050266	909050269	909050270	909050271	
F1 (C6-C10) uncorrected	<	<	<	-	10
F1 minus BTEX (C6-C10)	<	<	<	-	10
F2-Napth (C10-C16)	-	-	-	1500	70
F3-PAH (C16-C34)	-	-	-	1000	100

Results expressed as micrograms per gram, on a dry weight basis. (μg/g)
< = Less than reporting limit

CCME Petroleum Hydrocarbons in Soil

CLIENT SAMPLE IDENTIFICATION:	BH09-7-6-0 90829	BH09-1-6-0 90830	BH09-3-5-0 90830	BH09-8-4-0 90830	
DATE SAMPLED:	Aug 30/09	Aug 30/09	Aug 30/09	Aug 30/09	REPORTING LIMIT
CANTEST ID:	909050273	909050277	909050279	909050281	
F1 (C6-C10) uncorrected	<	<	<	23	10
F1 minus BTEX (C6-C10)	<	<	<	<	10

Results expressed as micrograms per gram, on a dry weight basis. (μg/g)
< = Less than reporting limit

CCME Petroleum Hydrocarbons in Soil

CLIENT SAMPLE IDENTIFICATION:	BH09-8-9-0 90830	BH09-5-6-0 90831	BH09-10-29 090831	BH09-21-4-090831	
DATE SAMPLED:	Aug 30/09	Aug 31/09	Aug 31/09	Aug 31/09	REPORTING LIMIT
CANTEST ID:	909050283	909050285	909050286	909050291	
F1 (C6-C10) uncorrected	<	<	<	<	10
F1 minus BTEX (C6-C10)	<	<	<	<	10

Results expressed as micrograms per gram, on a dry weight basis. (μg/g)
< = Less than reporting limit

CCME Petroleum Hydrocarbons in Soil

CLIENT SAMPLE IDENTIFICATION:	BH09-11-7-090831	
DATE SAMPLED:	Aug 31/09	REPORTING LIMIT
CANTEST ID:	909050293	
F1 (C6-C10) uncorrected	<	10
F1 minus BTEX (C6-C10)	<	10

Results expressed as micrograms per gram, on a dry weight basis. (µg/g)
< = Less than reporting limit

CCME Petroleum Hydrocarbons in Soil

CLIENT SAMPLE IDENTIFICATION:	BH09-18-2-090829	BH09-9-7-090829	BH09-12-7-090829	BH09-19-4-090829	
DATE SAMPLED:	Aug 29/09	Aug 29/09	Aug 29/09	Aug 29/09	REPORTING LIMIT
CANTEST ID:	909050259	909050260	909050263	909050266	
Benzene	<	<	<	<	0.005
Ethylbenzene	<	<	<	<	0.018
Toluene	<	<	<	<	0.02
Xylenes	<	<	<	<	0.02

Results expressed as micrograms per gram, on a dry weight basis. (μg/g)
< = Less than reporting limit

CCME Petroleum Hydrocarbons in Soil

CLIENT SAMPLE IDENTIFICATION:	BH09-6-5-0 90829	BH09-6-6-0 90829	BH09-7-6-0 90829	BH09-1-6-0 90830	
DATE SAMPLED:	Aug 29/09	Aug 29/09	Aug 30/09	Aug 30/09	REPORTING LIMIT
CANTEST ID:	909050269	909050270	909050273	909050277	
Benzene	<	<	<	<	0.005
Ethylbenzene	<	<	<	<	0.018
Toluene	<	<	<	<	0.02
Xylenes	<	<	<	<	0.02

Results expressed as micrograms per gram, on a dry weight basis. (μg/g)
< = Less than reporting limit

CCME Petroleum Hydrocarbons in Soil

CLIENT SAMPLE IDENTIFICATION:	BH09-3-5-0 90830	BH09-8-4-0 90830	BH09-8-9-0 90830	BH09-5-6-0 90831	
DATE SAMPLED:	Aug 30/09	Aug 30/09	Aug 30/09	Aug 31/09	REPORTING LIMIT
CANTEST ID:	909050279	909050281	909050283	909050285	
Benzene	<	<	<	<	0.005
Ethylbenzene	<	<	<	<	0.018
Toluene	<	<	<	<	0.02
Xylenes	<	0.09	<	<	0.02

Results expressed as micrograms per gram, on a dry weight basis. (μg/g)
< = Less than reporting limit

CCME Petroleum Hydrocarbons in Soil

CLIENT SAMPLE IDENTIFICATION:	BH09-10-29 090831	BH09-21-4- 090831	BH09-11-7- 090831	
DATE SAMPLED:	Aug 31/09	Aug 31/09	Aug 31/09	
CANTEST ID:	909050286	909050291	909050293	REPORTING LIMIT
Benzene	<	<	<	0.005
Ethylbenzene	<	<	<	0.018
Toluene	<	<	<	0.02
Xylenes	<	<	<	0.02

Results expressed as micrograms per gram, on a dry weight basis. (μg/g)
< = Less than reporting limit

Analysis Report

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REPORT ON: Analysis of Soil Samples

REPORTED TO: Morrow Environmental Consultants Inc.
8648 Commerce Court
Burnaby, BC
V5A 4N6

Att'n: Tim Drozda

CHAIN OF CUSTODY: 2182124, 2182126, 2182130, 2182157
PROJECT NAME: Pleasant Camp
PROJECT NUMBER: 131416

NUMBER OF SAMPLES: 4

REPORT DATE: September 15, 2009

DATE SUBMITTED: September 10, 2009

GROUP NUMBER: 100910069

SAMPLE TYPE: Soil

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

TEST METHODS:

Canada-Wide Standard for Petroleum Hydrocarbons in Soil (F2,F3 and F4 Fractions) - The F2 to F4 Fractions (nC10 to nC50) analysis was performed based on the CCME Reference Method for the Canada-Wide Standard for Petrole Hydrocarbons in Soil - Tier 1 Method (2001). Analysis involves extraction with50:50 hexane:acetone, silica-gel cleanup and quantitation using Gas Chromatography with a Flame Ionization Detector (GC-FID).

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

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 C and C19 to C32 are quantified against eicosane (n-C20). LEPH & HEPH are calculated by subtraction of specified PAH's.

TEST RESULTS:

(See following pages)

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Zhenyong Gao, M.Sc.
Coordinator, Trace Organics

Conventional Parameters in Soil

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	Moisture
BH09-7-3-090822	Aug 2/09	909100222	17.0
BH09-13-6-090825	Aug 25/09	909100224	7.4
BH09-15-5-090828	Aug 28/09	909100226	15.1
BH09-17-6-090828	Aug 28/09	909100227	5.4
REPORTING LIMIT			0.1
UNITS			%

% = percent

Extractable Petroleum Hydrocarbons (EPH) in Soil

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	EPHs10-19	EPHs19-32
BH09-7-3-090822	Aug 2/09	909100222	660	340
BH09-15-5-090828	Aug 28/09	909100226	<	<
BH09-17-6-090828	Aug 28/09	909100227	880	<
REPORTING LIMIT			250	250
UNITS			µg/g	µg/g

µg/g = micrograms per gram, on a dry weight basis.
< = Less than reporting limit

CCME Petroleum Hydrocarbons in Soil

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	F2 (C10-C16) uncorrected	F3 (C16-C34) uncorrected
BH09-7-3-090822	Aug 2/09	909100222	170	460
BH09-13-6-090825	Aug 25/09	909100224	<	22
REPORTING LIMIT			5	5
UNITS			μg/g	μg/g

μg/g = micrograms per gram, on a dry weight basis.
< = Less than reporting limit

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REPORT ON:	**Analysis of Soil Sample**
REPORTED TO:	**Morrow Environmental Consultants Inc.** **8648 Commerce Court** **Burnaby, BC** **V5A 4N6** **Att'n: Tim Drozda**
CHAIN OF CUSTODY:	**2182126**
PROJECT NAME:	**Pleasant Camp**
PROJECT NUMBER:	**131416**

NUMBER OF SAMPLES: 1 **REPORT DATE: September 8, 2009**

DATE SUBMITTED: August 31, 2009 **GROUP NUMBER: 100831018**

SAMPLE TYPE: Soil

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

TEST METHODS:

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

pH in Soil or Solid - analysis was performed based on procedures described in the "Manual on Soil Sampling and Methods of Analysis" (1993) published by the Canadian Society of Soil Science. The test was performed using a deionized water leach with measurement by pH meter.

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 C and C19 to C32 are quantified against eicosane (n-C20). LEPH & HEPH are calculated by subtraction of specified PAH's.

Silver in Soil - analysis was performed using Inductively Coupled Plasma Mass Spectrometry (ICP/MS).

Arsenic in Soil - analysis was performed using Inductively Coupled Plasma Mass Spectrometry (ICP/MS).

Cadmium in Soil - analysis was performed using Inductively Coupled Plasma Mass Spectrometry (ICP/MS).

Mercury in Soil - analysis was performed using Cold Vapour Atomic Fluorescence.

(Continued)

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Anna Becalska, PhD
Coordinator, Trace Metals

Molybdenum in Soil - analysis was performed using an acid digestion followed by determination using Inductively Coupled Plasma Mass Spectrometry (ICP/MS).

Strong Acid Leachable Metals in Soil - analysis was performed using B.C. MOELP Method "Strong Acid Leachable Metals in Soil, Version 1.0". The method involves drying the sample at 60 C, sieving using a 2 mm (10 mesh) sieve and digestion using a mixture of hydrochloric and nitric acids. Analysis was performed using Inductively Coupled Argon Plasma Spectroscopy (ICAP) or by specific techniques as described.

Selenium in Soil - analysis was using Inductively Coupled Plasma Mass Spectrometry (ICP/MS).

Thallium in Soil - analysis was performed using Inductively Coupled Plasma Mass Spectrometry (ICP/MS).

TEST RESULTS:

(See following pages)

Conventional Parameters in Soil

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	Moisture	pH
Fill-1-090827	Aug 27/09	908310111	6.0	5.5
REPORTING LIMIT UNITS			0.1 %	0.1 pH units

% = percent

Extractable Petroleum Hydrocarbons (EPH) in Soil

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	EPHs10-19	EPHs19-32
Fill-1-090827	Aug 27/09	908310111	<	<
REPORTING LIMIT UNITS			250 μg/g	250 μg/g

μg/g = micrograms per gram, on a dry weight basis.
< = Less than reporting limit

Strong Acid Soluble Metals in Soil

CLIENT SAMPLE IDENTIFICATION:		Fill-1-090827	
DATE SAMPLED:		Aug 27/09	REPORTING LIMIT
CANTEST ID:		908310111	
Antimony	Sb	<	0.1
Arsenic	As	2.3	0.1
Barium	Ba	32	1
Beryllium	Be	<	1
Cadmium	Cd	<	0.2
Chromium	Cr	9	2
Cobalt	Co	5	1
Copper	Cu	35	1
Lead	Pb	2.7	0.2
Mercury	Hg	0.04	0.01
Molybdenum	Mo	0.5	0.1
Nickel	Ni	8	2
Selenium	Se	0.2	0.2
Silver	Ag	<	0.1
Thallium	Tl	<	0.1
Tin	Sn	<	5
Vanadium	V	30	1
Zinc	Zn	24	1
Aluminum	Al	5930	10
Boron	B	1	1
Calcium	Ca	1950	1
Iron	Fe	11300	2
Magnesium	Mg	3190	1
Manganese	Mn	235	1
Phosphorus	P	590	20
Potassium	K	575	10
Sodium	Na	117	5
Strontium	Sr	8	1
Titanium	Ti	249	1
Zirconium	Zr	<	1

Results expressed as micrograms per gram, on a dry weight basis. (µg/g)
< = Less than reporting limit

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REPORT ON: Analysis of Water Samples

REPORTED TO:
Morrow Environmental Consultants Inc.
8648 Commerce Court
Burnaby, BC
V5A 4N6

Att'n: Dave Bridger

CHAIN OF CUSTODY: 2174566, 2174567, 2174568
PROJECT NAME: Pleasant Camp
PROJECT NUMBER: 131416E000

NUMBER OF SAMPLES: 27

REPORT DATE: July 27, 2009

DATE SUBMITTED: July 18, 2009

GROUP NUMBER: 100718016

SAMPLE TYPE: Water

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

TEST METHODS:

Anions in Water by Ion Chromatography - was determined based on Method 4110 in Standard Methods (21st Edition) and EPA Method 300.0 (Revision 2.1).

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

Nitrite in Water - was determined based on Method 4500-NO2 B in Standard Methods for the examination of Water and Wastewater (21st Edition) and from the BC Laboratory Methods Manual (2005).

Conventional Parameters - analyses were performed using procedures based on those described in the most current editions of "British Columbia Environmental Laboratory Manual for the Analysis of Water, Wastewater, Sediment and Biological Materials", (2005 edition) Province of British Columbia and "Standard Methods for the Examination of Water and Wastewater" (21st Edition), published by the American Public Health Association.

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.

(Continued)

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Zhenyong Gao, M.Sc.
Coordinator, Trace Organics

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)

Conventional Parameters in Water

CLIENT SAMPLE IDENTIFICATION:		MW08-5-090713	MW04-3-090713	MW03-1-090713	MW08-6-090713	
DATE SAMPLED:		Jul 13/09	Jul 13/09	Jul 13/09	Jul 13/09	
CANTEST ID:		907180089	907180090	907180091	907180092	REPORTED DETECTION LIMIT
Hardness	CaCO3	233	254	236	235	1
Dissolved Fluoride	F	<	<	<	<	0.05
Dissolved Chloride	Cl	1.78	2.34	1.50	4.17	0.2
Nitrate and Nitrite	N	<	<	0.06	0.07	0.05
Dissolved Nitrate	N	<	<	0.06	0.07	0.05
Nitrite	N	<	<	<	<	0.002
Dissolved Sulphate	SO4	8.16	13.0	10.6	6.64	0.5

Results expressed as milligrams per liter (mg/L)
< = Less than reported detection limit

Conventional Parameters in Water

CLIENT SAMPLE IDENTIFICATION:		MW08-3-090714	
DATE SAMPLED:		Jul 14/09	
CANTEST ID:		907180102	REPORTED DETECTION LIMIT
Hardness	CaCO3	239	1
Dissolved Fluoride	F	<	0.05
Dissolved Chloride	Cl	2.28	0.2
Nitrate and Nitrite	N	<	0.05
Dissolved Nitrate	N	<	0.05
Nitrite	N	<	0.002
Dissolved Sulphate	SO4	6.00	0.5

Results expressed as milligrams per liter (mg/L)
< = Less than reported detection limit

Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		MW08-5-090713	MW04-3-090713	MW03-1-090713	MW08-6-090713		
SAMPLE PREPARATION:		DISSOLVED	DISSOLVED	DISSOLVED	DISSOLVED		
DATE SAMPLED:		Jul 13/09	Jul 13/09	Jul 13/09	Jul 13/09		
CANTEST ID:		907180089	907180090	907180091	907180092	REPORTED DETECTION LIMIT	UNITS
Aluminum	Al	0.006	0.011	0.006	<	0.005	mg/L
Antimony	Sb	<	<	<	<	0.001	mg/L
Arsenic	As	<	<	<	0.002	0.001	mg/L
Barium	Ba	0.15	0.19	0.081	0.18	0.001	mg/L
Beryllium	Be	<	<	<	<	0.001	mg/L
Bismuth	Bi	<	<	<	<	0.001	mg/L
Boron	B	<	<	<	<	0.05	mg/L
Cadmium	Cd	<	<	<	<	0.0002	mg/L
Calcium	Ca	82.8	90.1	84.6	83.1	0.05	mg/L
Chromium	Cr	<	<	<	<	0.001	mg/L
Cobalt	Co	<	<	<	0.001	0.001	mg/L
Copper	Cu	0.001	<	<	<	0.001	mg/L
Iron	Fe	<	0.41	<	0.12	0.05	mg/L
Lead	Pb	<	<	<	<	0.001	mg/L
Lithium	Li	0.001	0.001	0.001	<	0.001	mg/L
Magnesium	Mg	6.34	6.92	5.92	6.65	0.05	mg/L
Manganese	Mn	0.25	0.48	0.001	0.72	0.001	mg/L
Mercury	Hg	<	<	<	<	0.02	µg/L
Molybdenum	Mo	0.0011	0.0014	<	0.0018	0.0005	mg/L
Nickel	Ni	0.001	<	<	<	0.001	mg/L
Phosphorus	P	<	<	<	<	0.15	mg/L
Potassium	K	1.7	2.1	1.5	2	0.1	mg/L
Selenium	Se	<	<	<	<	0.001	mg/L
Silicon	Si	4.6	5.6	4.3	5	0.25	mg/L
Silver	Ag	<	<	<	<	0.00025	mg/L
Sodium	Na	1.99	2.42	2.16	1.78	0.05	mg/L
Strontium	Sr	0.12	0.13	0.12	0.14	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

(Continued on next page)

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 27, 2009

GROUP NUMBER: 100718016

Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		MW08-5-090713	MW04-3-090713	MW03-1-090713	MW08-6-090713		
SAMPLE PREPARATION:		DISSOLVED	DISSOLVED	DISSOLVED	DISSOLVED		
DATE SAMPLED:		Jul 13/09	Jul 13/09	Jul 13/09	Jul 13/09		
CANTEST ID:		907180089	907180090	907180091	907180092	REPORTED DETECTION LIMIT	UNITS
Titanium	Ti	<	<	<	<	0.001	mg/L
Uranium	U	<	0.0005	<	0.0008	0.0005	mg/L
Vanadium	V	<	<	<	<	0.001	mg/L
Zinc	Zn	<	<	<	<	0.005	mg/L
Zirconium	Zr	<	<	<	<	0.01	mg/L

mg/L = milligrams per liter

μg/L = micrograms per liter

< = Less than reported detection limit

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 27, 2009

GROUP NUMBER: 100718016

Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		MW08-3-090 714		
SAMPLE PREPARATION:		DISSOLVED		
DATE SAMPLED:		Jul 14/09		
CANTEST ID:		907180102	REPORTED DETECTION LIMIT	UNITS
Aluminum	Al	0.006	0.005	mg/L
Antimony	Sb	<	0.001	mg/L
Arsenic	As	<	0.001	mg/L
Barium	Ba	0.075	0.001	mg/L
Beryllium	Be	<	0.001	mg/L
Bismuth	Bi	<	0.001	mg/L
Boron	B	<	0.05	mg/L
Cadmium	Cd	<	0.0002	mg/L
Calcium	Ca	82.2	0.05	mg/L
Chromium	Cr	<	0.001	mg/L
Cobalt	Co	0.002	0.001	mg/L
Copper	Cu	<	0.001	mg/L
Iron	Fe	0.06	0.05	mg/L
Lead	Pb	<	0.001	mg/L
Lithium	Li	<	0.001	mg/L
Magnesium	Mg	8.14	0.05	mg/L
Manganese	Mn	0.16	0.001	mg/L
Mercury	Hg	<	0.02	µg/L
Molybdenum	Mo	<	0.0005	mg/L
Nickel	Ni	0.003	0.001	mg/L
Phosphorus	P	<	0.15	mg/L
Potassium	K	0.7	0.1	mg/L
Selenium	Se	<	0.001	mg/L
Silicon	Si	3	0.25	mg/L
Silver	Ag	<	0.00025	mg/L
Sodium	Na	1.22	0.05	mg/L
Strontium	Sr	0.11	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

(Continued on next page)

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 27, 2009

GROUP NUMBER: 100718016

Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		MW08-3-090714		
SAMPLE PREPARATION:		DISSOLVED		
DATE SAMPLED:		Jul 14/09		
CANTEST ID:		907180102	REPORTED DETECTION LIMIT	UNITS
Titanium	Ti	<	0.001	mg/L
Uranium	U	<	0.0005	mg/L
Vanadium	V	<	0.001	mg/L
Zinc	Zn	<	0.005	mg/L
Zirconium	Zr	<	0.01	mg/L

mg/L = milligrams per liter μg/L = micrograms per liter
< = Less than reported detection limit

Polycyclic Aromatic Hydrocarbons in Water

CLIENT SAMPLE IDENTIFICATION:	MW06-5-090713	MW06-2-090713	MW03-3-090713	MW01-17D-090713	
DATE SAMPLED:	Jul 13/09	Jul 13/09	Jul 13/09	Jul 13/09	
CANTEST ID:	907180079	907180080	907180081	907180082	
ANALYSIS DATE:	Jul 21/09	Jul 21/09	Jul 21/09	Jul 21/09	REPORTED DETECTION LIMIT
Naphthalene	<	<	<	<	0.3
Acenaphthylene	<	<	<	<	0.1
Quinoline	<	<	<	<	0.5
Acenaphthene	<	0.29	<	<	0.1
Fluorene	<	0.65	<	<	0.05
Phenanthrene	<	<	<	<	0.05
Anthracene	<	<	<	<	0.01
Acridine	<	<	<	<	0.05
Total LMW-PAH's		0.94			
Fluoranthene	<	<	<	<	0.04
Pyrene	<	0.02	<	0.12	0.02
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		0.020		0.12	
Total PAH's		0.96		0.12	

Results expressed as micrograms per liter (μg/L)
< = Less than reported detection limit

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 27, 2009

GROUP NUMBER: 100718016

Polycyclic Aromatic Hydrocarbons in Water

CLIENT SAMPLE IDENTIFICATION:	MW08-7-090713	MW08-1-090713	MW-C-090713	MW04-2-090713	
DATE SAMPLED:	Jul 13/09	Jul 13/09	Jul 13/09	Jul 13/09	
CANTEST ID:	907180083	907180084	907180085	907180086	
ANALYSIS DATE:	Jul 21/09	Jul 21/09	Jul 21/09	Jul 21/09	REPORTED DETECTION LIMIT
Naphthalene	<	<	<	<	0.3
Acenaphthylene	<	<	<	<	0.1
Quinoline	<	<	<	<	0.5
Acenaphthene	0.58	<	<	<	0.1
Fluorene	1.5	<	<	0.23	0.05
Phenanthrene	0.19	<	<	<	0.05
Anthracene	<	<	<	<	0.01
Acridine	<	<	<	<	0.05
Total LMW-PAH's	2.27			0.23	
Fluoranthene	<	<	<	<	0.04
Pyrene	<	<	0.05	<	0.02
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			0.050		
Total PAH's	2.27		0.050	0.23	

Results expressed as micrograms per liter (µg/L)
< = Less than reported detection limit

REPORTED TO: Morrow Environmental Consultants Inc.

CANTEST

REPORT DATE: July 27, 2009

GROUP NUMBER: 100718016

Polycyclic Aromatic Hydrocarbons in Water

CLIENT SAMPLE IDENTIFICATION:	MW-B-090713	MW08-6-090714	MW08-5-090714	MW04-3-090714	
DATE SAMPLED:	Jul 13/09	Jul 14/09	Jul 14/09	Jul 14/09	
CANTEST ID:	907180087	907180093	907180094	907180095	
ANALYSIS DATE:	Jul 21/09	Jul 21/09	Jul 21/09	Jul 21/09	REPORTED DETECTION LIMIT
Naphthalene	<	<	<	<	0.3
Acenaphthylene	<	<	<	<	0.1
Quinoline	<	<	<	<	0.5
Acenaphthene	0.49	<	<	<	0.1
Fluorene	1.1	<	<	0.09	0.05
Phenanthrene	<	<	<	<	0.05
Anthracene	<	<	<	<	0.01
Acridine	<	<	<	<	0.05
Total LMW-PAH's	1.59			0.090	
Fluoranthene	<	<	<	<	0.04
Pyrene	0.02	<	<	<	0.02
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	0.020				
Total PAH's	1.61			0.090	

Results expressed as micrograms per liter (µg/L)
< = Less than reported detection limit

Polycyclic Aromatic Hydrocarbons in Water

CLIENT SAMPLE IDENTIFICATION:	MW03-1-090714	MW01-21-090714	MW-D-090714	AS-22-090714	
DATE SAMPLED:	Jul 14/09	Jul 14/09	Jul 14/09	Jul 14/09	
CANTEST ID:	907180096	907180097	907180098	907180099	
ANALYSIS DATE:	Jul 21/09	Jul 21/09	Jul 21/09	Jul 21/09	REPORTED DETECTION LIMIT
Naphthalene	<	<	<	<	0.3
Acenaphthylene	<	<	<	<	0.1
Quinoline	<	<	<	<	0.5
Acenaphthene	<	0.43	<	0.49	0.1
Fluorene	0.32	2.1	<	0.91	0.05
Phenanthrene	<	1.2	<	0.17	0.05
Anthracene	<	<	<	<	0.01
Acridine	<	<	<	<	0.05
Total LMW-PAH's	0.32	3.73		1.57	
Fluoranthene	<	<	<	<	0.04
Pyrene	<	<	<	<	0.02
Benzo(a)anthracene	<	<	<	<	0.01
Chrysene	<	<	<	<	0.01
Benzo(b)fluoranthene	<	<	<	<	0.01
Benzo(k)fluoranthene	<	<	<	<	0.01
Benzo(a)pyrene	0.01	<	<	<	0.01
Indeno(1,2,3-cd)pyrene	0.01	0.01	<	<	0.01
Dibenz(a,h)anthracene	0.01	0.01	<	<	0.01
Benzo(g,h,i)perylene	0.01	0.01	<	<	0.01
Total HMW-PAH's	0.04	0.03			
Total PAH's	0.36	3.76		1.57	

Results expressed as micrograms per liter (μg/L)
< = Less than reported detection limit

Polycyclic Aromatic Hydrocarbons in Water

CLIENT SAMPLE IDENTIFICATION:	AS-23-090714	AS-13-090714	MW08-3-090715	MW06-6-090715	
DATE SAMPLED:	Jul 14/09	Jul 14/09	Jul 15/09	Jul 15/09	
CANTEST ID:	907180100	907180101	907180105	907180106	
ANALYSIS DATE:	Jul 21/09	Jul 21/09	Jul 21/09	Jul 21/09	REPORTED DETECTION LIMIT
Naphthalene	<	<	<	<	0.3
Acenaphthylene	<	<	<	<	0.1
Quinoline	<	<	<	<	0.5
Acenaphthene	<	0.12	<	<	0.1
Fluorene	<	0.28	<	<	0.05
Phenanthrene	<	0.10	<	<	0.05
Anthracene	<	<	<	<	0.01
Acridine	<	<	<	<	0.05
Total LMW-PAH's		0.50			
Fluoranthene	<	<	<	<	0.04
Pyrene	<	0.03	<	<	0.02
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		0.03			
Total PAH's		0.53			

Results expressed as micrograms per liter (μg/L)
< = Less than reported detection limit

Extractable Petroleum Hydrocarbons (EPH) in Water

CLIENT SAMPLE IDENTIFICATION:	MW06-5-090713	MW06-2-090713	MW03-3-090713	MW01-17D-090713	
DATE SAMPLED:	Jul 13/09	Jul 13/09	Jul 13/09	Jul 13/09	
CANTEST ID:	907180079	907180080	907180081	907180082	REPORTED DETECTION LIMIT
EPHw10-19	120	600	170	7200	100
EPHw19-32	110	120	<	1200	100
LEPHw (corrected for PAH's)	120	600	170	7200	100
HEPHw (corrected for PAH's)	110	120	<	1200	100

Results expressed as micrograms per liter (μg/L)
< = Less than reported detection limit

Extractable Petroleum Hydrocarbons (EPH) in Water

CLIENT SAMPLE IDENTIFICATION:	MW08-7-090713	MW08-1-090713	MW-C-090713	MW04-2-090713	REPORTED DETECTION LIMIT
DATE SAMPLED:	Jul 13/09	Jul 13/09	Jul 13/09	Jul 13/09	
CANTEST ID:	907180083	907180084	907180085	907180086	
EPHw10-19	730	<	2300	160	100
EPHw19-32	180	<	440	<	100
LEPHw (corrected for PAH's)	730	<	2300	160	100
HEPHw (corrected for PAH's)	180	<	440	<	100

Results expressed as micrograms per liter (μg/L)
< = Less than reported detection limit

Extractable Petroleum Hydrocarbons (EPH) in Water

CLIENT SAMPLE IDENTIFICATION:	MW-B-090713	MW08-6-090714	MW08-5-090714	MW04-3-090714	
DATE SAMPLED:	Jul 13/09	Jul 14/09	Jul 14/09	Jul 14/09	REPORTED DETECTION LIMIT
CANTEST ID:	907180087	907180093	907180094	907180095	
EPHw10-19	580	360	120	<	100
EPHw19-32	170	170	120	<	100
LEPHw (corrected for PAH’s)	580	360	120	<	100
HEPHw (corrected for PAH’s)	170	170	120	<	100

Results expressed as micrograms per liter (µg/L)
< = Less than reported detection limit

Extractable Petroleum Hydrocarbons (EPH) in Water

CLIENT SAMPLE IDENTIFICATION:	MW03-1-090714	MW01-21-090714	MW-D-090714	AS-22-090714	
DATE SAMPLED:	Jul 14/09	Jul 14/09	Jul 14/09	Jul 14/09	REPORTED DETECTION LIMIT
CANTEST ID:	907180096	907180097	907180098	907180099	
EPHw10-19	<	420	<	650	100
EPHw19-32	<	130	<	120	100
LEPHw (corrected for PAH's)	<	420	<	650	100
HEPHw (corrected for PAH's)	<	130	<	120	100

Results expressed as micrograms per liter (μg/L)
< = Less than reported detection limit

Extractable Petroleum Hydrocarbons (EPH) in Water

CLIENT SAMPLE IDENTIFICATION:	AS-23-0907 14	AS-13-0907 14	PWD-1-0907 14	PWD-2-0907 14	
DATE SAMPLED:	Jul 14/09	Jul 14/09	Jul 14/09	Jul 14/09	REPORTED DETECTION LIMIT
CANTEST ID:	907180100	907180101	907180103	907180104	
EPHw10-19	<	430	560	340	100
EPHw19-32	<	200	260	< 250	100
LEPHw (corrected for PAH's)	<	430	-	-	100
HEPHw (corrected for PAH's)	<	200	-	-	100

Results expressed as micrograms per liter (µg/L)
< = Less than reported detection limit

Extractable Petroleum Hydrocarbons (EPH) in Water

CLIENT SAMPLE IDENTIFICATION:	MW08-3-090715	MW06-6-090715	
DATE SAMPLED:	Jul 15/09	Jul 15/09	
CANTEST ID:	907180105	907180106	REPORTED DETECTION LIMIT
EPHw10-19	180	<	100
EPHw19-32	140	<	100
LEPHw (corrected for PAH's)	180	<	100
HEPHw (corrected for PAH's)	140	<	100

Results expressed as micrograms per liter (µg/L)
< = Less than reported detection limit

Analysis Report

CANTEST LTD.

Professional
Analytical
Services

4606 Canada Way
Burnaby, B.C.
V5G 1K5

FAX: 604 731 2386

TEL: 604 734 7276

1 800 665 8566

REPORT ON: Analysis of Water Samples

REPORTED TO: Morrow Environmental Consultants Inc.
8648 Commerce Court
Burnaby, BC
V5A 4N6

Att'n: Dave Bridger

CHAIN OF CUSTODY: 2174564, 2174565
PROJECT NAME: Pleasant Camp
PROJECT NUMBER: 131416 E000

NUMBER OF SAMPLES: 24

REPORT DATE: July 21, 2009

DATE SUBMITTED: July 14, 2009

GROUP NUMBER: 100714077

SAMPLE TYPE: 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 procedures based on U.S. EPA 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.

Anions in Water by Ion Chromatography - was determined based on Method 4110 in Standard Methods (21st Edition) and EPA Method 300.0 (Revision 2.1).

Alkalinity in Water - was performed based on Method 2320 in Standard Methods (21st Edition).

Ammonia in Water - was performed using Flow Injection Analysis where the aqueous sample is injected into a carrier stream, which merges a sodium hydroxide stream. Gaseous ammonia is formed, which diffuses through a gas permeable membrane into an indicator stream. This indicator stream is comprised of a mixture of acid-base indicators, which will react with the ammonia gas; resulting in a colour shift which is measured photometrically @ 590 nm.

(Continued)

CANTEST LTD.

Anna Becalska, PhD
Trace Metals Coordinator

Nitrite in Water - was determined based on Method 4500-NO2 B in Standard Methods for the examination of Water and Wastewater (21st Edition) and from the BC Laboratory Methods Manual (2005).

Conventional Parameters - analyses were performed using procedures based on those described in the most current editions of "British Columbia Environmental Laboratory Manual for the Analysis of Water, Wastewater, Sediment and Biological Materials", (2005 edition) Province of British Columbia and "Standard Methods for the Examination of Water and Wastewater" (21st Edition), published by the American Public Health Association.

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.

Metals in Water - analysis was performed using Inductively Coupled Plasma Optical Emission Spectroscopy (ICP), Inductively Coupled Plasma-Mass Spectroscopy (ICP/MS).

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)

Conventional Parameters in Water

CLIENT SAMPLE IDENTIFICATION:		SW04-1-090711	SW04-2-090711	SW04-3-090711	SW04-4-090711	
DATE SAMPLED:		Jul 11/09	Jul 11/09	Jul 11/09	Jul 11/09	
CANTEST ID:		907140322	907140362	907140377	907140378	REPORTED DETECTION LIMIT
Hardness (Total)	CaCO3	18.1	19.1	19.7	20.7	0.2
Bicarbonate Alkalinity	HCO3	27.5	29.1	29.7	29.5	0.5
Carbonate Alkalinity	CO3	<	<	<	<	0.5
Hydroxide Alkalinity	OH	<	<	<	<	0.5
Dissolved Fluoride	F	<	<	<	<	0.05
Dissolved Chloride	Cl	<	<	<	<	0.2
Nitrate and Nitrite	N	0.25	0.26	0.27	0.27	0.05
Dissolved Nitrate	N	0.25	0.26	0.27	0.27	0.05
Nitrite	N	<	<	<	<	0.002
Dissolved Sulphate	SO4	1.93	2.09	2.04	2.11	0.5
Ammonia Nitrogen	N	<	<	<	<	0.01

Results expressed as milligrams per liter (mg/L)
< = Less than reported detection limit

Conventional Parameters in Water

CLIENT SAMPLE IDENTIFICATION:		SW-A-090711	MW03-7-090711	MW04-4-090711	MW03-9-090711	
DATE SAMPLED:		Jul 11/09	Jul 11/09	Jul 11/09	Jul 11/09	
CANTEST ID:		907140379	907140381	907140383	907140385	REPORTED DETECTION LIMIT
Hardness (Total)	CaCO3	18.2	-	-	-	0.2
Hardness	CaCO3	-	312	287	248	1
Bicarbonate Alkalinity	HCO3	27.2	-	-	-	0.5
Carbonate Alkalinity	CO3	<	-	-	-	0.5
Hydroxide Alkalinity	OH	<	-	-	-	0.5
Dissolved Fluoride	F	<	<	<	<	0.05
Dissolved Chloride	Cl	<	6.14	10.8	1.26	0.2
Nitrate and Nitrite	N	0.27	0.45	0.08	<	0.05
Dissolved Nitrate	N	0.27	0.45	0.08	<	0.05
Nitrite	N	<	<	<	<	0.002
Dissolved Sulphate	SO4	2.01	16.0	23.6	8.05	0.5
Ammonia Nitrogen	N	<	-	-	-	0.01

Results expressed as milligrams per liter (mg/L)
< = Less than reported detection limit

Conventional Parameters in Water

CLIENT SAMPLE IDENTIFICATION:		MW08-8-090711	MW-B-090712	MW01-19-090712	MW08-2-090712	REPORTED DETECTION LIMIT
DATE SAMPLED:		Jul 11/09	Jul 12/09	Jul 12/09	Jul 12/09	
CANTEST ID:		907140386	907140387	907140399	907140403	
Hardness	CaCO3	322	250	237	239	1
Dissolved Fluoride	F	<	<	<	0.11	0.05
Dissolved Chloride	Cl	8.61	5.62	1.65	0.55	0.2
Nitrate and Nitrite	N	<	<	0.24	<	0.05
Dissolved Nitrate	N	<	<	0.24	<	0.05
Nitrite	N	<	0.002	<	<	0.002
Dissolved Sulphate	SO4	17.9	4.74	10.5	20.1	0.5

Results expressed as milligrams per liter (mg/L)
< = Less than reported detection limit

Conventional Parameters in Water

CLIENT SAMPLE IDENTIFICATION:		MW-A-090712	MW06-5-090712	MW03-3-090712	MW08-7-090712	
DATE SAMPLED:		Jul 12/09	Jul 12/09	Jul 12/09	Jul 12/09	
CANTEST ID:		907140404	907140406	907140407	907140408	REPORTED DETECTION LIMIT
Hardness	CaCO3	239	244	245	248	1
Dissolved Fluoride	F	<	<	<	<	0.05
Dissolved Chloride	Cl	1.68	0.77	0.81	5.59	0.2
Nitrate and Nitrite	N	0.24	<	<	<	0.05
Dissolved Nitrate	N	0.24	<	<	<	0.05
Nitrite	N	<	<	<	<	0.002
Dissolved Sulphate	SO4	10.3	9.91	8.97	4.70	0.5

Results expressed as milligrams per liter (mg/L)
< = Less than reported detection limit

Conventional Parameters in Water

CLIENT SAMPLE IDENTIFICATION:		MW04-2-090712	
DATE SAMPLED:		Jul 12/09	
CANTEST ID:		907140410	REPORTED DETECTION LIMIT
Hardness	CaCO3	234	1
Dissolved Fluoride	F	<	0.05
Dissolved Chloride	Cl	2.99	0.2
Nitrate and Nitrite	N	<	0.05
Dissolved Nitrate	N	<	0.05
Nitrite	N	<	0.002
Dissolved Sulphate	SO4	9.03	0.5

Results expressed as milligrams per liter (mg/L)
< = Less than reported detection limit

Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		SW04-1-090711	SW04-2-090711	SW04-3-090711	SW04-4-090711		
SAMPLE PREPARATION:		TOTAL	TOTAL	TOTAL	TOTAL		
DATE SAMPLED:		Jul 11/09	Jul 11/09	Jul 11/09	Jul 11/09		
CANTEST ID:		907140322	907140362	907140377	907140378	REPORTED DETECTION LIMIT	UNITS
Aluminum	Al	0.025	0.026	0.03	0.027	0.001	mg/L
Antimony	Sb	<	<	<	<	0.0002	mg/L
Arsenic	As	<	<	<	<	0.0002	mg/L
Barium	Ba	0.0062	0.0066	0.0069	0.0074	0.0002	mg/L
Beryllium	Be	<	<	<	<	0.0002	mg/L
Bismuth	Bi	<	<	<	<	0.0002	mg/L
Boron	B	<	<	<	<	0.01	mg/L
Cadmium	Cd	<	<	<	<	0.00004	mg/L
Calcium	Ca	6.47	6.82	7.02	7.37	0.01	mg/L
Chromium	Cr	<	<	<	<	0.0002	mg/L
Cobalt	Co	<	<	<	<	0.0002	mg/L
Copper	Cu	<	0.0002	0.0002	0.0002	0.0002	mg/L
Iron	Fe	<	<	<	<	0.01	mg/L
Lead	Pb	<	<	<	<	0.0002	mg/L
Lithium	Li	<	<	<	<	0.0002	mg/L
Magnesium	Mg	0.46	0.51	0.51	0.54	0.01	mg/L
Manganese	Mn	0.0003	0.0004	0.0004	0.0004	0.0002	mg/L
Mercury	Hg	<	<	<	<	0.02	µg/L
Molybdenum	Mo	0.0003	0.0003	0.0002	0.0003	0.0001	mg/L
Nickel	Ni	<	<	<	<	0.0002	mg/L
Phosphorus	P	<	<	<	<	0.03	mg/L
Potassium	K	0.21	0.22	0.22	0.23	0.02	mg/L
Selenium	Se	<	<	<	<	0.0002	mg/L
Silicon	Si	1.82	1.85	1.85	1.87	0.05	mg/L
Silver	Ag	<	<	<	<	0.00005	mg/L
Sodium	Na	0.52	0.53	0.53	0.55	0.01	mg/L
Strontium	Sr	0.015	0.016	0.016	0.016	0.0002	mg/L
Tellurium	Te	<	<	<	<	0.0002	mg/L
Thallium	Tl	<	<	<	<	0.00002	mg/L
Thorium	Th	<	<	<	<	0.0001	mg/L
Tin	Sn	<	<	<	<	0.0002	mg/L

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Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		SW04-1-090711	SW04-2-090711	SW04-3-090711	SW04-4-090711		
SAMPLE PREPARATION:		TOTAL	TOTAL	TOTAL	TOTAL		
DATE SAMPLED:		Jul 11/09	Jul 11/09	Jul 11/09	Jul 11/09	REPORTED DETECTION LIMIT	UNITS
CANTEST ID:		907140322	907140362	907140377	907140378		
Titanium	Ti	<	0.0002	0.0004	0.0004	0.0002	mg/L
Uranium	U	<	<	<	<	0.0001	mg/L
Vanadium	V	0.0003	0.0003	0.0003	0.0003	0.0002	mg/L
Zinc	Zn	<	<	<	<	0.001	mg/L
Zirconium	Zr	<	<	<	<	0.002	mg/L

mg/L = milligrams per liter μg/L = micrograms per liter

< = Less than reported detection limit

Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		SW-A-090711	MW03-7-090711	MW04-4-090711	MW03-9-090711		
SAMPLE PREPARATION:		TOTAL	DISSOLVED	DISSOLVED	DISSOLVED		
DATE SAMPLED:		Jul 11/09	Jul 11/09	Jul 11/09	Jul 11/09		
CANTEST ID:		907140379	907140381	907140383	907140385	REPORTED DETECTION LIMIT	UNITS
Aluminum	Al	0.026	<	0.002	0.001	0.001	mg/L
Antimony	Sb	<	<	<	<	0.0002	mg/L
Arsenic	As	<	<	<	<	0.0002	mg/L
Barium	Ba	0.0063	0.124	0.127	0.076	0.0002	mg/L
Beryllium	Be	<	<	<	<	0.0002	mg/L
Bismuth	Bi	<	<	<	<	0.0002	mg/L
Boron	B	<	<	<	<	0.01	mg/L
Cadmium	Cd	<	<	<	0.00019	0.00004	mg/L
Calcium	Ca	6.52	113	103	88.2	0.01	mg/L
Chromium	Cr	<	0.0004	0.0003	0.0003	0.0002	mg/L
Cobalt	Co	<	<	0.0004	0.0008	0.0002	mg/L
Copper	Cu	<	0.0007	0.0006	0.0007	0.0002	mg/L
Iron	Fe	<	<	<	<	0.01	mg/L
Lead	Pb	<	<	<	<	0.0002	mg/L
Lithium	Li	<	0.0005	0.0007	0.0005	0.0002	mg/L
Magnesium	Mg	0.47	7.01	6.99	6.74	0.01	mg/L
Manganese	Mn	0.0003	0.0002	0.087	0.362	0.0002	mg/L
Mercury	Hg	<	<	<	<	0.02	µg/L
Molybdenum	Mo	0.0003	<	0.0004	0.0004	0.0001	mg/L
Nickel	Ni	<	0.0002	0.0009	0.001	0.0002	mg/L
Phosphorus	P	<	<	<	<	0.03	mg/L
Potassium	K	0.22	0.98	1.79	1.26	0.02	mg/L
Selenium	Se	<	<	<	<	0.0002	mg/L
Silicon	Si	1.84	4.14	4.29	4.25	0.05	mg/L
Silver	Ag	<	<	<	<	0.00005	mg/L
Sodium	Na	0.54	1.75	1.89	1.31	0.01	mg/L
Strontium	Sr	0.015	0.148	0.131	0.109	0.0002	mg/L
Tellurium	Te	<	<	<	<	0.0002	mg/L
Thallium	Tl	<	<	<	<	0.00002	mg/L
Thorium	Th	<	<	<	<	0.0001	mg/L
Tin	Sn	<	<	<	<	0.0002	mg/L

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Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		SW-A-090711	MW03-7-090711	MW04-4-090711	MW03-9-090711		
SAMPLE PREPARATION:		TOTAL	DISSOLVED	DISSOLVED	DISSOLVED		
DATE SAMPLED:		Jul 11/09	Jul 11/09	Jul 11/09	Jul 11/09		
CANTEST ID:		907140379	907140381	907140383	907140385	REPORTED DETECTION LIMIT	UNITS
Titanium	Ti	0.0002	<	<	<	0.0002	mg/L
Uranium	U	<	0.0003	0.0006	0.0003	0.0001	mg/L
Vanadium	V	0.0003	0.0007	0.0007	0.0006	0.0002	mg/L
Zinc	Zn	<	<	<	<	0.001	mg/L
Zirconium	Zr	<	<	<	<	0.002	mg/L

mg/L = milligrams per liter

μg/L = micrograms per liter

< = Less than reported detection limit

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 21, 2009

GROUP NUMBER: 100714077

Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		MW08-8-090711	MW-B-090712	MW01-19-090712	MW08-2-090712		
SAMPLE PREPARATION:		DISSOLVED	DISSOLVED	DISSOLVED	DISSOLVED		
DATE SAMPLED:		Jul 11/09	Jul 12/09	Jul 12/09	Jul 12/09	REPORTED DETECTION LIMIT	UNITS
CANTEST ID:		907140386	907140387	907140399	907140403		
Aluminum	Al	0.002	0.002	<	0.002	0.001	mg/L
Antimony	Sb	0.0002	<	<	<	0.0002	mg/L
Arsenic	As	0.0018	0.002	<	0.003	0.0002	mg/L
Barium	Ba	0.104	0.118	0.159	0.122	0.0002	mg/L
Beryllium	Be	<	<	<	<	0.0002	mg/L
Bismuth	Bi	<	<	<	<	0.0002	mg/L
Boron	B	<	<	<	<	0.01	mg/L
Cadmium	Cd	0.00007	0.00007	0.00006	0.00005	0.00004	mg/L
Calcium	Ca	112	87.5	83.9	85.2	0.05	mg/L
Chromium	Cr	0.0003	0.0003	0.0004	<	0.0002	mg/L
Cobalt	Co	0.0024	0.0018	<	0.0038	0.0002	mg/L
Copper	Cu	0.0002	<	<	0.0005	0.0002	mg/L
Iron	Fe	0.11	1.75	<	6.09	0.01	mg/L
Lead	Pb	<	<	<	<	0.0002	mg/L
Lithium	Li	0.0008	0.0007	0.0004	0.0006	0.0002	mg/L
Magnesium	Mg	10.2	7.66	6.65	6.26	0.05	mg/L
Manganese	Mn	0.641	0.897	0.0009	1.29	0.0002	mg/L
Mercury	Hg	<	<	<	<	0.02	µg/L
Molybdenum	Mo	0.001	0.0009	0.0002	0.0045	0.0001	mg/L
Nickel	Ni	0.0031	0.0012	<	0.0024	0.0002	mg/L
Phosphorus	P	<	<	<	<	0.03	mg/L
Potassium	K	2.13	1.53	1.06	1.19	0.02	mg/L
Selenium	Se	<	<	0.0004	<	0.0002	mg/L
Silicon	Si	3.97	4.08	3.64	4.54	0.05	mg/L
Silver	Ag	<	<	<	<	0.00005	mg/L
Sodium	Na	2.73	1.76	1.95	1.35	0.01	mg/L
Strontium	Sr	0.131	0.107	0.117	0.111	0.0002	mg/L
Tellurium	Te	<	<	<	<	0.0002	mg/L
Thallium	Tl	<	0.00002	<	<	0.00002	mg/L
Thorium	Th	<	<	<	<	0.0001	mg/L
Tin	Sn	<	<	<	<	0.0002	mg/L

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REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 21, 2009

GROUP NUMBER: 100714077

Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		MW08-8-090711	MW-B-090712	MW01-19-090712	MW08-2-090712		
SAMPLE PREPARATION:		DISSOLVED	DISSOLVED	DISSOLVED	DISSOLVED		
DATE SAMPLED:		Jul 11/09	Jul 12/09	Jul 12/09	Jul 12/09		
CANTEST ID:		907140386	907140387	907140399	907140403	REPORTED DETECTION LIMIT	UNITS
Titanium	Ti	<	<	<	<	0.0002	mg/L
Uranium	U	0.0007	0.0005	0.0003	0.001	0.0001	mg/L
Vanadium	V	0.0012	0.0008	0.0006	0.0007	0.0002	mg/L
Zinc	Zn	<	<	<	<	0.001	mg/L
Zirconium	Zr	<	<	<	<	0.002	mg/L

mg/L = milligrams per liter

μg/L = micrograms per liter

< = Less than reported detection limit

Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		MW-A-090712	MW06-5-090712	MW03-3-090712	MW08-7-090712	REPORTED DETECTION LIMIT	UNITS
SAMPLE PREPARATION:		DISSOLVED	DISSOLVED	DISSOLVED	DISSOLVED		
DATE SAMPLED:		Jul 12/09	Jul 12/09	Jul 12/09	Jul 12/09		
CANTEST ID:		907140404	907140406	907140407	907140408		
Aluminum	Al	0.001	<	<	0.002	0.001	mg/L
Antimony	Sb	<	<	<	<	0.0002	mg/L
Arsenic	As	<	0.0007	0.0004	0.0019	0.0002	mg/L
Barium	Ba	0.129	0.099	0.091	0.12	0.0002	mg/L
Beryllium	Be	<	<	<	<	0.0002	mg/L
Bismuth	Bi	<	<	<	<	0.0002	mg/L
Boron	B	<	<	<	<	0.01	mg/L
Cadmium	Cd	<	0.0001	0.00013	<	0.00004	mg/L
Calcium	Ca	85.0	86.5	86.4	86.7	0.05	mg/L
Chromium	Cr	0.0003	0.0002	<	0.0002	0.0002	mg/L
Cobalt	Co	<	0.002	0.0012	0.0019	0.0002	mg/L
Copper	Cu	<	0.0006	0.0005	<	0.0002	mg/L
Iron	Fe	<	0.18	0.02	1.7	0.01	mg/L
Lead	Pb	<	<	<	<	0.0002	mg/L
Lithium	Li	0.0004	0.0004	0.0005	0.0006	0.0002	mg/L
Magnesium	Mg	6.47	6.77	6.91	7.67	0.05	mg/L
Manganese	Mn	0.0008	0.841	1.51	0.903	0.0002	mg/L
Mercury	Hg	<	<	<	<	0.02	µg/L
Molybdenum	Mo	0.0002	0.0019	0.001	0.0009	0.0001	mg/L
Nickel	Ni	<	0.0019	0.0016	0.0011	0.0002	mg/L
Phosphorus	P	<	<	<	<	0.03	mg/L
Potassium	K	0.97	1.29	1.24	1.51	0.02	mg/L
Selenium	Se	0.0005	<	<	<	0.0002	mg/L
Silicon	Si	3.66	4.19	4.1	4.19	0.05	mg/L
Silver	Ag	<	<	<	<	0.00005	mg/L
Sodium	Na	1.66	1.24	1.23	1.76	0.01	mg/L
Strontium	Sr	0.115	0.106	0.105	0.107	0.0002	mg/L
Tellurium	Te	<	<	<	<	0.0002	mg/L
Thallium	Tl	<	<	<	<	0.00002	mg/L
Thorium	Th	<	<	<	<	0.0001	mg/L
Tin	Sn	<	<	<	<	0.0002	mg/L

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Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		MW-A-090712	MW06-5-090712	MW03-3-090712	MW08-7-090712		
SAMPLE PREPARATION:		DISSOLVED	DISSOLVED	DISSOLVED	DISSOLVED		
DATE SAMPLED:		Jul 12/09	Jul 12/09	Jul 12/09	Jul 12/09		
CANTEST ID:		907140404	907140406	907140407	907140408	REPORTED DETECTION LIMIT	UNITS
Titanium	Ti	<	0.0002	<	<	0.0002	mg/L
Uranium	U	0.0003	0.0005	0.0004	0.0005	0.0001	mg/L
Vanadium	V	0.0005	0.0006	0.0006	0.0008	0.0002	mg/L
Zinc	Zn	<	<	<	<	0.001	mg/L
Zirconium	Zr	<	<	<	<	0.002	mg/L

mg/L = milligrams per liter

µg/L = micrograms per liter

< = Less than reported detection limit

Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		MW04-2-090712		
SAMPLE PREPARATION:		DISSOLVED		
DATE SAMPLED:		Jul 12/09		
CANTEST ID:		907140410	REPORTED DETECTION LIMIT	UNITS
Aluminum	Al	<	0.001	mg/L
Antimony	Sb	<	0.0002	mg/L
Arsenic	As	0.0011	0.0002	mg/L
Barium	Ba	0.126	0.0002	mg/L
Beryllium	Be	<	0.0002	mg/L
Bismuth	Bi	<	0.0002	mg/L
Boron	B	<	0.01	mg/L
Cadmium	Cd	<	0.00004	mg/L
Calcium	Ca	83.4	0.05	mg/L
Chromium	Cr	<	0.0002	mg/L
Cobalt	Co	0.0004	0.0002	mg/L
Copper	Cu	<	0.0002	mg/L
Iron	Fe	1.36	0.01	mg/L
Lead	Pb	<	0.0002	mg/L
Lithium	Li	0.0006	0.0002	mg/L
Magnesium	Mg	6.14	0.05	mg/L
Manganese	Mn	0.341	0.0002	mg/L
Mercury	Hg	<	0.02	µg/L
Molybdenum	Mo	0.0011	0.0001	mg/L
Nickel	Ni	0.0004	0.0002	mg/L
Phosphorus	P	<	0.03	mg/L
Potassium	K	1.43	0.02	mg/L
Selenium	Se	<	0.0002	mg/L
Silicon	Si	3.91	0.05	mg/L
Silver	Ag	<	0.00005	mg/L
Sodium	Na	1.51	0.01	mg/L
Strontium	Sr	0.103	0.0002	mg/L
Tellurium	Te	<	0.0002	mg/L
Thallium	Tl	<	0.00002	mg/L
Thorium	Th	<	0.0001	mg/L
Tin	Sn	<	0.0002	mg/L

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Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		MW04-2-090712		
SAMPLE PREPARATION:		DISSOLVED		
DATE SAMPLED:		Jul 12/09		
CANTEST ID:		907140410	REPORTED DETECTION LIMIT	UNITS
Titanium	Ti	<	0.0002	mg/L
Uranium	U	0.0007	0.0001	mg/L
Vanadium	V	0.0004	0.0002	mg/L
Zinc	Zn	<	0.001	mg/L
Zirconium	Zr	<	0.002	mg/L

mg/L = milligrams per liter

μg/L = micrograms per liter

< = Less than reported detection limit

REPORTED TO: Morrow Environmental Consultants Inc.

CANTEST

REPORT DATE: July 21, 2009

GROUP NUMBER: 100714077

Polycyclic Aromatic Hydrocarbons in Water

CLIENT SAMPLE IDENTIFICATION:	MW03-10-09 0712	MW03-8-090 712	MW04-6-090 712	MW01-19-09 0712	
DATE SAMPLED:	Jul 12/09	Jul 12/09	Jul 12/09	Jul 12/09	
CANTEST ID:	907140391	907140396	907140397	907140399	REPORTED DETECTION LIMIT
ANALYSIS DATE:	Jul 16/09	Jul 16/09	Jul 16/09	Jul 16/09	
Naphthalene	< 3	<	<	<	0.3
Acenaphthylene	< 1	<	<	<	0.1
Quinoline	< 5	<	<	<	0.5
Acenaphthene	< 1	<	<	<	0.1
Fluorene	6.0	<	<	<	0.05
Phenanthrene	4.9	<	<	<	0.05
Anthracene	< 0.1	<	<	<	0.01
Acridine	< 0.5	<	<	<	0.05
Total LMW-PAH's	10.9				
Fluoranthene	< 0.4	<	<	<	0.04
Pyrene	1.5	0.04	<	<	0.02
Benzo(a)anthracene	< 0.1	0.02	<	<	0.01
Chrysene	< 0.1	0.02	<	<	0.01
Benzo(b)fluoranthene	< 0.1	0.02	<	<	0.01
Benzo(k)fluoranthene	< 0.1	0.01	<	<	0.01
Benzo(a)pyrene	< 0.1	0.01	<	<	0.01
Indeno(1,2,3-cd)pyrene	< 0.1	0.01	<	<	0.01
Dibenz(a,h)anthracene	< 0.1	<	<	<	0.01
Benzo(g,h,i)perylene	< 0.1	<	<	<	0.01
Total HMW-PAH's	1.50	0.13			
Total PAH's	12.4	0.13			

Results expressed as micrograms per liter (μg/L)
< = Less than reported detection limit
Sample# 907140391 - Detection limits adjusted: Dilution required

REPORTED TO: Morrow Environmental Consultants Inc.

CANTEST

REPORT DATE: July 21, 2009

GROUP NUMBER: 100714077

Polycyclic Aromatic Hydrocarbons in Water

CLIENT SAMPLE IDENTIFICATION:	MW08-2-090712	MW-A-090712	MW03-7-090712	MW04-4-090712	
DATE SAMPLED:	Jul 12/09	Jul 12/09	Jul 12/09	Jul 12/09	
CANTEST ID:	907140403	907140404	907140481	907140483	
ANALYSIS DATE:	Jul 16/09	Jul 16/09	Jul 16/09	Jul 16/09	REPORTED DETECTION LIMIT
Naphthalene	<	<	<	<	0.3
Acenaphthylene	<	<	<	<	0.1
Quinoline	<	<	<	<	0.5
Acenaphthene	0.20	<	<	<	0.1
Fluorene	0.37	<	<	<	0.05
Phenanthrene	<	<	<	<	0.05
Anthracene	<	<	<	<	0.01
Acridine	<	<	<	<	0.05
Total LMW-PAH's	0.57				
Fluoranthene	<	<	<	<	0.04
Pyrene	0.08	<	<	<	0.02
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	0.080				
Total PAH's	0.65				

Results expressed as micrograms per liter (μg/L)
< = Less than reported detection limit

Polycyclic Aromatic Hydrocarbons in Water

CLIENT SAMPLE IDENTIFICATION:	MW03-9-090712	MW08-8-090712	
DATE SAMPLED:	Jul 12/09	Jul 12/09	
CANTEST ID:	907140490	907140499	
ANALYSIS DATE:	Jul 16/09	Jul 16/09	REPORTED DETECTION LIMIT
Naphthalene	<	<	0.3
Acenaphthylene	<	<	0.1
Quinoline	<	<	0.5
Acenaphthene	0.33	0.13	0.1
Fluorene	1.1	0.49	0.05
Phenanthrene	0.28	0.16	0.05
Anthracene	<	<	0.01
Acridine	<	<	0.05
Total LMW-PAH's	1.71	0.78	
Fluoranthene	<	<	0.04
Pyrene	<	0.02	0.02
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		0.020	
Total PAH's	1.71	0.80	

Results expressed as micrograms per liter (μg/L)
< = Less than reported detection limit

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 21, 2009

GROUP NUMBER: 100714077

Monocyclic Aromatic Hydrocarbons in Water

CLIENT SAMPLE IDENTIFICATION:	SW04-1-090711	SW04-2-090711	SW04-3-090711	SW04-4-090711	
DATE SAMPLED:	Jul 11/09	Jul 11/09	Jul 11/09	Jul 11/09	
CANTEST ID:	907140322	907140362	907140377	907140378	REPORTED DETECTION LIMIT
ANALYSIS DATE:	Jul 15/09	Jul 15/09	Jul 15/09	Jul 15/09	
Benzene	<	<	<	<	0.1
Ethylbenzene	<	<	<	<	0.1
Toluene	<	<	<	<	0.1
Xylenes	<	<	<	<	0.1
Volatile Hydrocarbons VHw6-10	<	<	<	<	100
VPHw	<	<	<	<	100
Styrene	<	<	<	<	0.1
Surrogate Recovery					
Toluene-d8	93	91	93	95	-
Bromofluorobenzene	89	90	89	89	-

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

Monocyclic Aromatic Hydrocarbons in Water

CLIENT SAMPLE IDENTIFICATION:	SW-A-090711	
DATE SAMPLED:	Jul 11/09	
CANTEST ID:	907140379	
ANALYSIS DATE:	Jul 15/09	REPORTED DETECTION LIMIT
Benzene	<	0.1
Ethylbenzene	<	0.1
Toluene	<	0.1
Xylenes	<	0.1
Volatile Hydrocarbons VHw6-10	<	100
VPHw	<	100
Styrene	<	0.1
Surrogate Recovery		
Toluene-d8	93	-
Bromofluorobenzene	90	-

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

Extractable Petroleum Hydrocarbons (EPH) in Water

CLIENT SAMPLE IDENTIFICATION:	SW04-1-090711	SW04-2-090711	SW04-3-090711	SW04-4-090711	REPORTED DETECTION LIMIT
DATE SAMPLED:	Jul 11/09	Jul 11/09	Jul 11/09	Jul 11/09	
CANTEST ID:	907140322	907140362	907140377	907140378	
EPHw10-19	<	<	<	<	100
EPHw19-32	<	<	<	<	100

Results expressed as micrograms per liter (μg/L)
< = Less than reported detection limit

Extractable Petroleum Hydrocarbons (EPH) in Water

CLIENT SAMPLE IDENTIFICATION:	SW-A-090711	MW03-10-090712	MW03-8-090712	MW04-6-090712	
DATE SAMPLED:	Jul 11/09	Jul 12/09	Jul 12/09	Jul 12/09	
CANTEST ID:	907140379	907140391	907140396	907140397	REPORTED DETECTION LIMIT
EPHw10-19	<	34000	540	110	100
EPHw19-32	<	3900	170	190	100
LEPHw (corrected for PAH's)	-	34000	540	110	100
HEPHw (corrected for PAH's)	-	3900	170	190	100

Results expressed as micrograms per liter (µg/L)
< = Less than reported detection limit

Extractable Petroleum Hydrocarbons (EPH) in Water

CLIENT SAMPLE IDENTIFICATION:	MW01-19-090712	MW08-2-090712	MW-A-090712	MW03-7-090712	
DATE SAMPLED:	Jul 12/09	Jul 12/09	Jul 12/09	Jul 12/09	REPORTED DETECTION LIMIT
CANTEST ID:	907140399	907140403	907140404	907140481	
EPHw10-19	<	2200	<	<	100
EPHw19-32	<	360	<	<	100
LEPHw (corrected for PAH's)	<	2200	<	<	100
HEPHw (corrected for PAH's)	<	360	<	<	100

Results expressed as micrograms per liter (μg/L)
< = Less than reported detection limit

Extractable Petroleum Hydrocarbons (EPH) in Water

CLIENT SAMPLE IDENTIFICATION:	MW04-4-090712	MW03-9-090712	MW08-8-090712	
DATE SAMPLED:	Jul 12/09	Jul 12/09	Jul 12/09	
CANTEST ID:	907140483	907140490	907140499	REPORTED DETECTION LIMIT
EPHw10-19	120	490	580	100
EPHw19-32	190	140	220	100
LEPHw (corrected for PAH's)	120	490	580	100
HEPHw (corrected for PAH's)	190	140	220	100

Results expressed as micrograms per liter (µg/L)

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Professional
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4606 Canada Way
Burnaby, B.C.
V5G 1K5

FAX: 604 731 2386

TEL: 604 734 7276

1 800 665 8566

Analysis Report

REPORT ON: **Analysis of Water Samples**

REPORTED TO: **Morrow Environmental Consultants Inc.**
8648 Commerce Court
Burnaby, BC
V5A 4N6

Att'n: Tim Drozda

CHAIN OF CUSTODY: **2182128**
PROJECT NAME: **Pleasant Camp**
PROJECT NUMBER: **131416**

NUMBER OF SAMPLES: 8 **REPORT DATE: September 8, 2009**

DATE SUBMITTED: August 31, 2009 **GROUP NUMBER: 100831012**

SAMPLE TYPE: Water

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

TEST METHODS:

Anions in Water by Ion Chromatography - was determined based on Method 4110 in Standard Methods (21st Edition) and EPA Method 300.0 (Revision 2.1).

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 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).

TEST RESULTS:

(See following pages)

CANTEST LTD.

Anna Becalska, PhD
Trace Metals Coordinator

Conventional Parameters in Water

CLIENT SAMPLE IDENTIFICATION:		MW08-6-090 826	MW08-7-090 826	MW08-8-090 826	MW03-10-09 0828	
DATE SAMPLED:		Aug 26/09	Aug 26/09	Aug 26/09	Aug 28/09	REPORTING LIMIT
CANTEST ID:		908310031	908310032	908310033	908310039	
Hardness	CaCO3	232	276	347	302	1
Dissolved Fluoride	F	<	<	<	<	0.05
Dissolved Chloride	Cl	4.34	5.38	7.98	1.55	0.2
Dissolved Nitrate	N	<	<	<	<	0.05
Dissolved Sulphate	SO4	3.52	7.60	61.2	19.9	0.5

Results expressed as milligrams per liter (mg/L)
< = Less than reporting limit

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: September 8, 2009

GROUP NUMBER: 100831012

Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		MW08-6-090826	MW08-7-090826	MW08-8-090826	MW03-10-090828		
SAMPLE PREPARATION:		DISSOLVED	DISSOLVED	DISSOLVED	DISSOLVED		
DATE SAMPLED:		Aug 26/09	Aug 26/09	Aug 26/09	Aug 28/09	REPORTING LIMIT	UNITS
CANTEST ID:		908310031	908310032	908310033	908310039		
Aluminum	Al	0.01	0.011	0.012	0.007	0.005	mg/L
Antimony	Sb	<	<	<	<	0.001	mg/L
Arsenic	As	0.002	0.003	0.001	0.006	0.001	mg/L
Barium	Ba	0.18	0.14	0.12	0.25	0.001	mg/L
Beryllium	Be	<	<	<	<	0.001	mg/L
Bismuth	Bi	<	<	<	<	0.001	mg/L
Boron	B	<	<	<	<	0.05	mg/L
Cadmium	Cd	<	<	<	<	0.0002	mg/L
Calcium	Ca	81.9	95.7	120	109	0.05	mg/L
Chromium	Cr	<	<	<	<	0.001	mg/L
Cobalt	Co	<	0.002	0.002	0.003	0.001	mg/L
Copper	Cu	<	<	<	<	0.001	mg/L
Iron	Fe	1.45	1.55	2.92	6	0.05	mg/L
Lead	Pb	<	<	<	<	0.001	mg/L
Lithium	Li	0.001	<	0.001	<	0.001	mg/L
Magnesium	Mg	6.58	8.99	11.6	7.01	0.05	mg/L
Manganese	Mn	0.66	1.28	0.8	1.37	0.001	mg/L
Mercury	Hg	<	<	<	<	0.02	µg/L
Molybdenum	Mo	0.0013	0.0017	0.0006	0.0027	0.0005	mg/L
Nickel	Ni	0.001	0.003	0.003	0.015	0.001	mg/L
Phosphorus	P	<	<	<	<	0.15	mg/L
Potassium	K	2	1.9	2.6	2.2	0.1	mg/L
Selenium	Se	<	<	<	<	0.001	mg/L
Silicon	Si	5.8	6	3.9	4.7	0.25	mg/L
Silver	Ag	<	<	<	<	0.00025	mg/L
Sodium	Na	1.6	2.34	3.43	1.21	0.05	mg/L
Strontium	Sr	0.13	0.15	0.17	0.15	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

(Continued on next page)

Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		MW08-6-090826	MW08-7-090826	MW08-8-090826	MW03-10-090828		
SAMPLE PREPARATION:		DISSOLVED	DISSOLVED	DISSOLVED	DISSOLVED		
DATE SAMPLED:		Aug 26/09	Aug 26/09	Aug 26/09	Aug 28/09		
CANTEST ID:		908310031	908310032	908310033	908310039	REPORTING LIMIT	UNITS
Titanium	Ti	<	<	<	<	0.001	mg/L
Uranium	U	<	0.001	0.0007	0.0069	0.0005	mg/L
Vanadium	V	<	<	<	<	0.001	mg/L
Zinc	Zn	0.005	<	<	<	0.005	mg/L
Zirconium	Zr	<	<	<	<	0.01	mg/L

mg/L = milligrams per liter

< = Less than reporting limit

µg/L = micrograms per liter

Extractable Petroleum Hydrocarbons (EPH) in Water

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	EPHw10-19	EPHw19-32
MW08-6-090827	Aug 27/09	908310034	370	<
MW08-7-090827	Aug 27/09	908310035	410	<
MW08-8-090827	Aug 27/09	908310036	450	<
MW03-10-090829	Aug 29/09	908310041	2600	470
REPORTING LIMIT			250	250
UNITS			µg/L	µg/L

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

Analysis Report

CANTEST LTD.

Professional
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4606 Canada Way
Burnaby, B.C.
V5G 1K5

FAX: 604 731 2386

TEL: 604 734 7276

1 800 665 8566

REPORT ON: Analysis of Water Samples

REPORTED TO: Morrow Environmental Consultants Inc.
8648 Commerce Court
Burnaby, BC
V5A 4N6

Att'n: Dave Bridger

CHAIN OF CUSTODY: 2078187, 2078186, 2078002
PROJECT NAME: Pleasent Camp
PROJECT NUMBER: 131416 E009

NUMBER OF SAMPLES: 22

REPORT DATE: October 5, 2009

DATE SUBMITTED: September 28, 2009

GROUP NUMBER: 100928032

SAMPLE TYPE: Water

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

TEST METHODS:

Anions in Water by Ion Chromatography - was determined based on Method 4110 in Standard Methods (21st Edition) and EPA Method 300.0 (Revision 2.1).

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

Nitrite in Water - was determined based on Method 4500-NO2 B in Standard Methods for the examination of Water and Wastewater (21st Edition) and from the BC Laboratory Methods Manual (2005).

Conventional Parameters - analyses were performed using procedures based on those described in the most current editions of "British Columbia Environmental Laboratory Manual for the Analysis of Water, Wastewater, Sediment and Biological Materials", (2005 edition) Province of British Columbia and "Standard Methods for the Examination of Water and Wastewater" (21st Edition), published by the American Public Health Association.

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.

(Continued)

CANTEST LTD.

Anna Becalska, PhD
Trace Metals Coordinator

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.

Dissolved Metals in Water - Samples were filtered in the laboratory and quantitatively determined using Inductively Coupled Plasma Optical Emission Spectroscopy (ICP) and/or Inductively Coupled Plasma-Mass Spectroscop (ICP/MS).

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)

Conventional Parameters in Water

CLIENT SAMPLE IDENTIFICATION:		MW03-9-090 924	MW08-6-090 924	MW04-4-090 924	MW04-5-090 924	REPORTING LIMIT
DATE SAMPLED:		Sep 24/09	Sep 24/09	Sep 24/09	Sep 24/09	
CANTEST ID:		909280066	909280067	909280068	909280069	
Hardness	CaCO3	55.8	50.8	44.5	56.9	0.2
Dissolved Fluoride	F	<	<	<	<	0.05
Dissolved Chloride	Cl	5.18	7.79	16.9	9.24	0.2
Nitrate and Nitrite	N	0.23	0.05	0.38	0.15	0.05
Dissolved Nitrate	N	0.23	0.05	0.38	0.14	0.05
Nitrite	N	<	0.004	<	0.008	0.002
Dissolved Sulphate	SO4	13.1	10.3	11.8	8.33	0.5

Results expressed as milligrams per liter (mg/L)
< = Less than reporting limit

Conventional Parameters in Water

CLIENT SAMPLE IDENTIFICATION:		MW03-7-090924	MW04-2-090924	MW04-1-090924	MW01-20-090924	
DATE SAMPLED:		Sep 24/09	Sep 24/09	Sep 24/09	Sep 24/09	REPORTING LIMIT
CANTEST ID:		909280070	909280071	909280072	909280074	
Hardness	$CaCO_3$	50.4	52.2	36.2	35.3	0.2
Dissolved Fluoride	F	<	<	<	<	0.05
Dissolved Chloride	Cl	3.68	5.20	7.17	12.5	0.2
Nitrate and Nitrite	N	0.25	<	0.46	0.19	0.05
Dissolved Nitrate	N	0.25	<	0.46	0.19	0.05
Nitrite	N	<	<	<	<	0.002
Dissolved Sulphate	SO_4	12.1	11.8	4.56	5.15	0.5

Results expressed as milligrams per liter (mg/L)
< = Less than reporting limit

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: October 5, 2009

GROUP NUMBER: 100928032

Conventional Parameters in Water

CLIENT SAMPLE IDENTIFICATION:		MW08-7-090924	MW08-A-090924	
DATE SAMPLED:		Sep 24/09	Sep 24/09	REPORTING LIMIT
CANTEST ID:		909280086	909280087	
Hardness	CaCO3	56.1	51.4	0.2
Dissolved Fluoride	F	<	<	0.05
Dissolved Chloride	Cl	9.91	7.93	0.2
Nitrate and Nitrite	N	<	0.08	0.05
Dissolved Nitrate	N	<	0.08	0.05
Nitrite	N	0.007	0.003	0.002
Dissolved Sulphate	SO4	8.26	10.8	0.5

Results expressed as milligrams per liter (mg/L)
< = Less than reporting limit

Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		MW03-9-090924	MW08-6-090924	MW04-4-090924	MW04-5-090924		
SAMPLE PREPARATION:		DISSOLVED	DISSOLVED	DISSOLVED	DISSOLVED		
DATE SAMPLED:		Sep 24/09	Sep 24/09	Sep 24/09	Sep 24/09		
CANTEST ID:		909280066	909280067	909280068	909280069	REPORTING LIMIT	UNITS
Aluminum	Al	0.002	0.001	0.003	0.001	0.001	mg/L
Antimony	Sb	<	<	<	<	0.0001	mg/L
Arsenic	As	<	0.0003	<	0.0004	0.0002	mg/L
Barium	Ba	0.024	0.036	0.021	0.033	0.0002	mg/L
Beryllium	Be	<	<	<	<	0.0001	mg/L
Bismuth	Bi	<	<	<	<	0.0001	mg/L
Boron	B	0.015	0.02	0.015	0.012	0.005	mg/L
Cadmium	Cd	0.00003	<	<	<	0.00001	mg/L
Calcium	Ca	19.3	17.5	15.6	19.4	0.01	mg/L
Cesium	Cs	<	<	<	<	0.0001	mg/L
Chromium	Cr	<	<	<	<	0.0002	mg/L
Cobalt	Co	0.0005	0.0004	<	0.0002	0.0001	mg/L
Copper	Cu	0.0001	<	0.0001	<	0.0001	mg/L
Iron	Fe	0.1	0.24	<	0.52	0.01	mg/L
Lanthanum	La	<	<	<	<	0.0001	mg/L
Lead	Pb	<	<	<	<	0.00005	mg/L
Lithium	Li	0.0002	0.0002	<	0.0002	0.0001	mg/L
Magnesium	Mg	1.83	1.73	1.33	2.01	0.005	mg/L
Manganese	Mn	0.179	0.11	0.0037	0.174	0.0001	mg/L
Mercury	Hg	<	<	<	<	0.02	µg/L
Molybdenum	Mo	0.0001	0.0002	<	0.0001	0.0001	mg/L
Nickel	Ni	<	<	<	<	0.0002	mg/L
Phosphorus	P	<	<	<	<	0.015	mg/L
Potassium	K	0.3	0.39	0.35	0.38	0.01	mg/L
Rhenium	Re	<	<	<	<	0.0001	mg/L
Rubidium	Rb	0.0003	0.0002	0.0002	0.0005	0.0001	mg/L
Selenium	Se	<	<	<	<	0.0002	mg/L
Silicon	Si	0.9	1.05	0.65	0.84	0.05	mg/L
Silver	Ag	<	<	<	<	0.00004	mg/L
Sodium	Na	0.46	0.59	1.2	0.76	0.005	mg/L
Strontium	Sr	0.028	0.027	0.023	0.027	0.0001	mg/L

(Continued on next page)

Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		MW03-9-090924	MW08-6-090924	MW04-4-090924	MW04-5-090924		
SAMPLE PREPARATION:		DISSOLVED	DISSOLVED	DISSOLVED	DISSOLVED		
DATE SAMPLED:		Sep 24/09	Sep 24/09	Sep 24/09	Sep 24/09		
CANTEST ID:		909280066	909280067	909280068	909280069	REPORTING LIMIT	UNITS
Sulphur	S	1	1	1	1	1	mg/L
Tellurium	Te	<	<	<	<	0.0002	mg/L
Thallium	Tl	<	<	<	<	0.00002	mg/L
Thorium	Th	<	<	<	<	0.00005	mg/L
Tin	Sn	<	<	<	<	0.0001	mg/L
Titanium	Ti	<	<	<	<	0.0002	mg/L
Tungsten	W	<	<	<	<	0.0001	mg/L
Uranium	U	0.00009	0.00012	0.00008	0.00019	0.00005	mg/L
Vanadium	V	<	<	<	<	0.0001	mg/L
Zinc	Zn	<	<	<	<	0.001	mg/L
Zirconium	Zr	<	<	<	<	0.0001	mg/L

mg/L = milligrams per liter

< = Less than reporting limit

μg/L = micrograms per liter

Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		MW03-7-090924	MW04-2-090924	MW04-1-090924	MW01-20-090924		
SAMPLE PREPARATION:		DISSOLVED	DISSOLVED	DISSOLVED	DISSOLVED		
DATE SAMPLED:		Sep 24/09	Sep 24/09	Sep 24/09	Sep 24/09	REPORTING LIMIT	UNITS
CANTEST ID:		909280070	909280071	909280072	909280074		
Aluminum	Al	<	0.001	<	0.002	0.001	mg/L
Antimony	Sb	<	<	<	<	0.0001	mg/L
Arsenic	As	<	0.0003	<	<	0.0002	mg/L
Barium	Ba	0.021	0.029	0.012	0.0077	0.0002	mg/L
Beryllium	Be	<	<	<	<	0.0001	mg/L
Bismuth	Bi	<	<	<	<	0.0001	mg/L
Boron	B	0.01	0.009	0.008	<	0.005	mg/L
Cadmium	Cd	<	<	<	<	0.00001	mg/L
Calcium	Ca	18	18	12.4	12.5	0.01	mg/L
Cesium	Cs	<	<	<	<	0.0001	mg/L
Chromium	Cr	<	<	<	<	0.0002	mg/L
Cobalt	Co	<	0.0001	<	<	0.0001	mg/L
Copper	Cu	<	<	<	<	0.0001	mg/L
Iron	Fe	<	0.23	<	<	0.01	mg/L
Lanthanum	La	<	<	<	<	0.0001	mg/L
Lead	Pb	<	<	<	<	0.00005	mg/L
Lithium	Li	<	<	<	<	0.0001	mg/L
Magnesium	Mg	1.33	1.72	1.28	0.98	0.005	mg/L
Manganese	Mn	0.0001	0.074	0.0004	<	0.0001	mg/L
Mercury	Hg	<	<	<	<	0.02	µg/L
Molybdenum	Mo	<	0.0002	<	<	0.0001	mg/L
Nickel	Ni	<	<	<	<	0.0002	mg/L
Phosphorus	P	<	<	<	<	0.015	mg/L
Potassium	K	0.18	0.31	0.24	0.15	0.01	mg/L
Rhenium	Re	<	<	<	<	0.0001	mg/L
Rubidium	Rb	<	0.0002	0.0002	<	0.0001	mg/L
Selenium	Se	<	<	<	<	0.0002	mg/L
Silicon	Si	0.71	0.84	0.5	0.52	0.05	mg/L
Silver	Ag	<	<	<	<	0.00004	mg/L
Sodium	Na	0.47	0.81	0.69	1.82	0.005	mg/L
Strontium	Sr	0.027	0.027	0.017	0.02	0.0001	mg/L

(Continued on next page)

Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		MW03-7-090924	MW04-2-090924	MW04-1-090924	MW01-20-090924		
SAMPLE PREPARATION:		DISSOLVED	DISSOLVED	DISSOLVED	DISSOLVED		
DATE SAMPLED:		Sep 24/09	Sep 24/09	Sep 24/09	Sep 24/09	REPORTING LIMIT	UNITS
CANTEST ID:		909280070	909280071	909280072	909280074		
Sulphur	S	1	1	<	<	1	mg/L
Tellurium	Te	<	<	<	<	0.0002	mg/L
Thallium	Tl	<	<	<	<	0.00002	mg/L
Thorium	Th	<	<	<	<	0.00005	mg/L
Tin	Sn	<	<	<	<	0.0001	mg/L
Titanium	Ti	<	<	<	<	0.0002	mg/L
Tungsten	W	<	<	<	<	0.0001	mg/L
Uranium	U	0.00005	0.00013	0.00007	<	0.00005	mg/L
Vanadium	V	<	<	<	<	0.0001	mg/L
Zinc	Zn	<	<	<	<	0.001	mg/L
Zirconium	Zr	<	<	<	<	0.0001	mg/L

mg/L = milligrams per liter

μg/L = micrograms per liter

< = Less than reporting limit

Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		MW08-7-090924	MW08-A-090924		
SAMPLE PREPARATION:		DISSOLVED	DISSOLVED		
DATE SAMPLED:		Sep 24/09	Sep 24/09	REPORTING LIMIT	UNITS
CANTEST ID:		909280086	909280087		
Aluminum	Al	<	0.002	0.001	mg/L
Antimony	Sb	<	<	0.0001	mg/L
Arsenic	As	0.0004	0.0003	0.0002	mg/L
Barium	Ba	0.024	0.034	0.0002	mg/L
Beryllium	Be	<	<	0.0001	mg/L
Bismuth	Bi	<	<	0.0001	mg/L
Boron	B	<	<	0.005	mg/L
Cadmium	Cd	<	<	0.00001	mg/L
Calcium	Ca	18.9	17.7	0.01	mg/L
Cesium	Cs	<	<	0.0001	mg/L
Chromium	Cr	<	<	0.0002	mg/L
Cobalt	Co	0.0003	0.0004	0.0001	mg/L
Copper	Cu	<	<	0.0001	mg/L
Iron	Fe	0.57	0.22	0.01	mg/L
Lanthanum	La	<	<	0.0001	mg/L
Lead	Pb	<	<	0.00005	mg/L
Lithium	Li	<	0.0002	0.0001	mg/L
Magnesium	Mg	2.14	1.75	0.005	mg/L
Manganese	Mn	0.216	0.109	0.0001	mg/L
Mercury	Hg	<	<	0.02	µg/L
Molybdenum	Mo	0.0001	0.0002	0.0001	mg/L
Nickel	Ni	<	<	0.0002	mg/L
Phosphorus	P	<	<	0.015	mg/L
Potassium	K	0.38	0.39	0.01	mg/L
Rhenium	Re	<	<	0.0001	mg/L
Rubidium	Rb	0.0005	0.0002	0.0001	mg/L
Selenium	Se	<	<	0.0002	mg/L
Silicon	Si	0.87	1.05	0.05	mg/L
Silver	Ag	<	<	0.00004	mg/L
Sodium	Na	0.81	0.59	0.005	mg/L
Strontium	Sr	0.026	0.027	0.0001	mg/L

(Continued on next page)

Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		MW08-7-090924	MW08-A-090924		
SAMPLE PREPARATION:		DISSOLVED	DISSOLVED		
DATE SAMPLED:		Sep 24/09	Sep 24/09		
CANTEST ID:		909280086	909280087	REPORTING LIMIT	UNITS
Sulphur	S	1	1	1	mg/L
Tellurium	Te	<	<	0.0002	mg/L
Thallium	Tl	<	<	0.00002	mg/L
Thorium	Th	<	<	0.00005	mg/L
Tin	Sn	<	<	0.0001	mg/L
Titanium	Ti	<	<	0.0002	mg/L
Tungsten	W	<	<	0.0001	mg/L
Uranium	U	0.00011	0.00011	0.00005	mg/L
Vanadium	V	<	<	0.0001	mg/L
Zinc	Zn	<	<	0.001	mg/L
Zirconium	Zr	<	<	0.0001	mg/L

mg/L = milligrams per liter

μg/L = micrograms per liter

< = Less than reporting limit

Polycyclic Aromatic Hydrocarbons in Water

CLIENT SAMPLE IDENTIFICATION:	MW03-8-090925	MW03-7-090925	MW04-4-090925	MW04-6-090925	
DATE SAMPLED:	Sep 25/09	Sep 25/09	Sep 25/09	Sep 25/09	
CANTEST ID:	909280075	909280076	909280077	909280078	REPORTING LIMIT
ANALYSIS DATE:	Sep 29/09	Sep 29/09	Sep 29/09	Sep 29/09	
Naphthalene	<	<	<	<	0.3
Acenaphthylene	<	<	<	<	0.1
Quinoline	<	<	<	<	0.5
Acenaphthene	<	<	<	<	0.1
Fluorene	0.08	<	<	<	0.05
Phenanthrene	<	<	<	<	0.05
Anthracene	<	<	<	<	0.01
Acridine	<	<	<	<	0.05
Total LMW-PAH's	0.08				
Fluoranthene	<	<	<	<	0.04
Pyrene	0.09	<	<	<	0.02
Benzo(a)anthracene	<	<	<	<	0.01
Chrysene	0.02	<	<	<	0.01
Benzo(b)fluoranthene	<	<	<	<	0.01
Benzo(k)fluoranthene	<	<	<	<	0.01
Benzo(a)pyrene	0.02	<	<	<	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	0.13				
Total PAH's	0.21				

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

Polycyclic Aromatic Hydrocarbons in Water

CLIENT SAMPLE IDENTIFICATION:	MW03-9-090925	MW03-10-090925	MW03-11-090925	MW04-1-090925	
DATE SAMPLED:	Sep 25/09	Sep 25/09	Sep 25/09	Sep 25/09	
CANTEST ID:	909280079	909280080	909280081	909280088	REPORTING LIMIT
ANALYSIS DATE:	Sep 29/09	Sep 28/09	Sep 28/09	Sep 28/09	
Naphthalene	<	<	<	<	0.3
Acenaphthylene	<	<	<	<	0.1
Quinoline	<	<	<	<	0.5
Acenaphthene	<	0.48	<	<	0.1
Fluorene	<	0.97	<	<	0.05
Phenanthrene	<	<	<	<	0.05
Anthracene	<	<	<	<	0.01
Acridine	<	<	<	<	0.05
Total LMW-PAH's		1.45			
Fluoranthene	<	<	<	<	0.04
Pyrene	<	0.12	<	<	0.02
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		0.12			
Total PAH's		1.57			

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

Polycyclic Aromatic Hydrocarbons in Water

CLIENT SAMPLE IDENTIFICATION:	MW04-2-090925	MW04-5-090925	MW08-7-090925	MW01-20-090925	
DATE SAMPLED:	Sep 25/09	Sep 25/09	Sep 25/09	Sep 25/09	
CANTEST ID:	909280089	909280090	909280091	909280092	REPORTING LIMIT
ANALYSIS DATE:	Sep 28/09	Sep 28/09	Sep 28/09	Sep 28/09	
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					
Fluoranthene	<	<	<	<	0.04
Pyrene	<	<	<	<	0.02
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					
Total PAH's					

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

Extractable Petroleum Hydrocarbons (EPH) in Water

CLIENT SAMPLE IDENTIFICATION:	MW03-8-090925	MW03-7-090925	MW04-4-090925	MW04-6-090925	REPORTING LIMIT
DATE SAMPLED:	Sep 25/09	Sep 25/09	Sep 25/09	Sep 25/09	
CANTEST ID:	909280075	909280076	909280077	909280078	
EPHw10-19	1100	<	<	<	100
EPHw19-32	380	<	<	150	100
LEPHw (corrected for PAH's)	1100	<	<	<	100
HEPHw (corrected for PAH's)	380	<	<	150	100

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

Extractable Petroleum Hydrocarbons (EPH) in Water

CLIENT SAMPLE IDENTIFICATION:	MW03-9-090925	MW03-10-090925	MW03-11-090925	MW04-1-090925	
DATE SAMPLED:	Sep 25/09	Sep 25/09	Sep 25/09	Sep 25/09	REPORTING LIMIT
CANTEST ID:	909280079	909280080	909280081	909280088	
EPHw10-19	<	3900	250	<	100
EPHw19-32	<	1000	400	<	100
LEPHw (corrected for PAH's)	<	3900	250	<	100
HEPHw (corrected for PAH's)	<	1000	400	<	100

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

Extractable Petroleum Hydrocarbons (EPH) in Water

CLIENT SAMPLE IDENTIFICATION:	MW04-2-090925	MW04-5-090925	MW08-7-090925	MW01-20-090925	
DATE SAMPLED:	Sep 25/09	Sep 25/09	Sep 25/09	Sep 25/09	REPORTING LIMIT
CANTEST ID:	909280089	909280090	909280091	909280092	
EPHw10-19	<	<	<	<	100
EPHw19-32	<	170	<	<	100
LEPHw (corrected for PAH's)	<	<	<	<	100
HEPHw (corrected for PAH's)	<	170	<	<	100

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

CANTEST LTD.

Professional
Analytical
Services

4606 Canada Way
Burnaby, B.C.
V5G 1K5

FAX: 604 731 2386

TEL: 604 734 7276

1 800 665 8566

Analysis Report

REPORT ON: **Analysis of Water Samples**

REPORTED TO: **Morrow Environmental Consultants Inc.**
8648 Commerce Court
Burnaby, BC
V5A 4N6

Att'n: Dave Bridger

CHAIN OF CUSTODY: **2181268, 2078001, 2068452, 2078195**
PROJECT NAME: **Pleasent Camp**
PROJECT NUMBER: **131416 E009**

NUMBER OF SAMPLES: 36

REPORT DATE: October 9, 2009

DATE SUBMITTED: September 29, 2009

GROUP NUMBER: 100929013

SAMPLE TYPE: 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 procedures based on U.S. EPA 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.

Anions in Water by Ion Chromatography - was determined based on Method 4110 in Standard Methods (21st Edition) and EPA Method 300.0 (Revision 2.1).

Alkalinity in Water - was performed based on Method 2320 in Standard Methods (21st Edition).

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

Ammonia in Water - was performed using Flow Injection Analysis where the aqueous sample is injected into a carrier stream, which merges a sodium hydroxide stream. Gaseous ammonia is formed, which diffuses through a gas permeable membrane into an indicator stream. This indicator stream is comprised of a mixture of acid-base

(Continued)

CANTEST LTD.

Zenyong Gao, M.Sc.
Coordinator, Trace Organics

Ammonia in Water

indicators, which will react with the ammonia gas; resulting in a colour shift which is measured photometrically @ 590 nm.

Nitrite in Water - was determined based on Method 4500-NO2 B in Standard Methods for the examination of Water and Wastewater (21st Edition) and from the BC Laboratory Methods Manual (2005).

Conventional Parameters - analyses were performed using procedures based on those described in the most current editions of "British Columbia Environmental Laboratory Manual for the Analysis of Water, Wastewater, Sediment and Biological Materials", (2005 edition) Province of British Columbia and "Standard Methods for the Examination of Water and Wastewater" (21st Edition), published by the American Public Health Association.

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.

Metals in Water - analysis was performed using Inductively Coupled Plasma Optical Emission Spectroscopy (ICP), Inductively Coupled Plasma-Mass Spectroscopy (ICP/MS).

Dissolved Metals in Water - Samples were filtered in the laboratory and quantitatively determined using Inductively Coupled Plasma Optical Emission Spectroscopy (ICP) and/or Inductively Coupled Plasma-Mass Spectroscop (ICP/MS).

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.

COMMENTS:

MW09-19-090926 (S#909290123)Determination of Dissolved Metal s was performed on a sample submitted in a non-standard container. Inappropriate containers may compromise the integrity of the sample. SW-04-2-090926, SW-04-3-090926, SW-04-4-090926 requested Dissolved metals analysis on COC, bottles indicate TOTAL METALS. GJS Ammended Report. This report supersedes all previous reports. Total Metals results for samples SW04-1-090926, SW-04-2-090926, SW-04-3-090926, SW-04-4-090926 were reported incorrectly. These results have been updated. ABA

TEST RESULTS:

(See following pages)

Conventional Parameters in Water

CLIENT SAMPLE IDENTIFICATION:		MW09-5-090925	MW-B-090925	MW08-3-090925	MW08-8-090926	
DATE SAMPLED:		Sep 25/09	Sep 25/09	Sep 25/09	Sep 24/09	REPORTING LIMIT
CANTEST ID:		909290072	909290076	909290077	909290086	
Hardness	CaCO3	273	247	213	264	0.2
Dissolved Fluoride	F	<	<	<	<	0.05
Dissolved Chloride	Cl	0.99	1.32	2.02	8.08	0.2
Nitrate and Nitrite	N	<	0.30	0.26	1.55	0.05
Dissolved Nitrate	N	<	0.30	0.25	1.53	0.05
Nitrite	N	0.010	<	0.007	0.020	0.002
Dissolved Sulphate	SO4	11.0	8.64	7.45	7.16	0.5

Results expressed as milligrams per liter (mg/L)
< = Less than reporting limit

Conventional Parameters in Water

CLIENT SAMPLE IDENTIFICATION:		MW03-3-090925	MW06-4-090925	MW01-19-090925	MW09-16-090926	
DATE SAMPLED:		Sep 25/09	Sep 25/09	Sep 25/09	Sep 26/09	REPORTING LIMIT
CANTEST ID:		909290092	909290096	909290098	909290123	
Hardness	CaCO3	316	332	173	297	0.2
Dissolved Fluoride	F	-	-	-	<	0.05
Dissolved Chloride	Cl	-	-	-	5.00	0.2
Nitrate and Nitrite	N	-	-	-	1.22	0.05
Dissolved Nitrate	N	-	-	-	1.22	0.05
Nitrite	N	-	-	-	0.003	0.002
Dissolved Sulphate	SO4	-	-	-	18.0	0.5

Results expressed as milligrams per liter (mg/L)
< = Less than reporting limit

Conventional Parameters in Water

CLIENT SAMPLE IDENTIFICATION:		MW08-4-090926	SW04-1-090926	SW04-2-090926	SW04-3-090926	
DATE SAMPLED:		Sep 26/09	Sep 26/09	Sep 26/09	Sep 26/09	REPORTING LIMIT
CANTEST ID:		909290124	909290134	909290135	909290136	
Hardness (Total)	CaCO3	-	15.1	16.3	16.3	0.2
Hardness	CaCO3	97.4	-	-	-	0.2
Bicarbonate Alkalinity	HCO3	-	20.2	20.7	20.8	0.5
Carbonate Alkalinity	CO3	-	<	<	<	0.5
Hydroxide Alkalinity	OH	-	<	<	<	0.5
Dissolved Fluoride	F	1.04	<	-	<	0.05
Dissolved Chloride	Cl	4.95	<	-	<	0.2
Nitrate and Nitrite	N	<	0.28	-	0.28	0.05
Dissolved Nitrate	N	<	0.28	-	0.28	0.05
Nitrite	N	<	<	-	<	0.002
Dissolved Sulphate	SO4	46.1	1.30	-	1.30	0.5
Ammonia Nitrogen	N	-	<	<	<	0.01

Results expressed as milligrams per liter (mg/L)
< = Less than reporting limit

Conventional Parameters in Water

CLIENT SAMPLE IDENTIFICATION:		SW04-4-090926	
DATE SAMPLED:		Sep 26/09	
CANTEST ID:		909290137	REPORTING LIMIT
Hardness (Total)	CaCO3	16.5	0.2
Bicarbonate Alkalinity	HCO3	21.1	0.5
Carbonate Alkalinity	CO3	<	0.5
Hydroxide Alkalinity	OH	<	0.5
Dissolved Fluoride	F	<	0.05
Dissolved Chloride	Cl	<	0.2
Nitrate and Nitrite	N	0.28	0.05
Dissolved Nitrate	N	0.28	0.05
Nitrite	N	<	0.002
Dissolved Sulphate	SO4	1.28	0.5
Ammonia Nitrogen	N	<	0.01

Results expressed as milligrams per liter (mg/L)
< = Less than reporting limit

Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		MW09-5-090925	MW-B-090925	MW08-3-090925	MW08-8-090926		
SAMPLE PREPARATION:		DISSOLVED	DISSOLVED	DISSOLVED	DISSOLVED		
DATE SAMPLED:		Sep 25/09	Sep 25/09	Sep 25/09	Sep 24/09		
CANTEST ID:		909290072	909290076	909290077	909290086	REPORTING LIMIT	UNITS
Aluminum	Al	0.003	<	0.001	0.001	0.001	mg/L
Antimony	Sb	0.0001	<	0.0002	0.0001	0.0001	mg/L
Arsenic	As	0.0018	<	0.0003	<	0.0002	mg/L
Barium	Ba	0.12	0.149	0.1	0.084	0.0002	mg/L
Beryllium	Be	<	<	<	<	0.0001	mg/L
Bismuth	Bi	<	<	<	<	0.0001	mg/L
Boron	B	<	<	0.011	<	0.005	mg/L
Cadmium	Cd	0.00002	0.00003	0.00026	0.00024	0.00001	mg/L
Calcium	Ca	97.9	87.6	74.6	91.1	0.01	mg/L
Cesium	Cs	<	<	<	<	0.0001	mg/L
Chromium	Cr	<	<	<	0.0003	0.0002	mg/L
Cobalt	Co	0.0023	<	0.0008	0.0002	0.0001	mg/L
Copper	Cu	0.0003	0.0002	0.0007	0.0043	0.0001	mg/L
Iron	Fe	1.94	<	<	<	0.01	mg/L
Lanthanum	La	<	<	<	<	0.0001	mg/L
Lead	Pb	<	<	<	0.00021	0.00005	mg/L
Lithium	Li	0.0004	0.0006	0.0005	0.0005	0.0001	mg/L
Magnesium	Mg	6.94	6.71	6.32	8.84	0.005	mg/L
Manganese	Mn	0.55	0.0012	0.242	0.085	0.0001	mg/L
Mercury	Hg	<	<	<	<	0.02	µg/L
Molybdenum	Mo	0.0011	0.0002	0.0004	0.0003	0.0001	mg/L
Nickel	Ni	0.0026	<	0.0028	0.0012	0.0002	mg/L
Phosphorus	P	<	<	<	<	0.015	mg/L
Potassium	K	1.3	1.1	1.08	1.76	0.01	mg/L
Rhenium	Re	<	<	<	<	0.0001	mg/L
Rubidium	Rb	0.0024	0.0005	0.0024	0.0018	0.0001	mg/L
Selenium	Se	0.0003	0.0004	<	0.0002	0.0002	mg/L
Silicon	Si	4.35	3.99	3.37	3.25	0.05	mg/L
Silver	Ag	<	<	<	<	0.00004	mg/L
Sodium	Na	0.95	2.25	2.29	7.15	0.005	mg/L
Strontium	Sr	0.142	0.152	0.101	0.131	0.0001	mg/L

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REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: October 9, 2009

GROUP NUMBER: 100929013

CANTEST

Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		MW09-5-090925	MW-B-090925	MW08-3-090925	MW08-8-090926		
SAMPLE PREPARATION:		DISSOLVED	DISSOLVED	DISSOLVED	DISSOLVED		
DATE SAMPLED:		Sep 25/09	Sep 25/09	Sep 25/09	Sep 24/09	REPORTING LIMIT	UNITS
CANTEST ID:		909290072	909290076	909290077	909290086		
Sulphur	S	5	4	2	3	1	mg/L
Tellurium	Te	<	<	<	<	0.0002	mg/L
Thallium	Tl	<	<	0.00004	0.00004	0.00002	mg/L
Thorium	Th	<	<	<	<	0.00005	mg/L
Tin	Sn	<	<	<	0.0003	0.0001	mg/L
Titanium	Ti	0.0004	0.0003	0.0002	0.0003	0.0002	mg/L
Tungsten	W	<	<	<	<	0.0001	mg/L
Uranium	U	0.001	0.00029	0.00033	0.00048	0.00005	mg/L
Vanadium	V	0.0002	0.0001	0.0003	0.0001	0.0001	mg/L
Zinc	Zn	<	0.001	0.003	0.002	0.001	mg/L
Zirconium	Zr	<	<	<	<	0.0001	mg/L

mg/L = milligrams per liter

μg/L = micrograms per liter

< = Less than reporting limit

Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		MW03-3-090925	MW06-4-090925	MW01-19-090925	MW09-16-090926		
SAMPLE PREPARATION:		DISSOLVED	DISSOLVED	DISSOLVED	DISSOLVED		
DATE SAMPLED:		Sep 25/09	Sep 25/09	Sep 25/09	Sep 26/09	REPORTING LIMIT	UNITS
CANTEST ID:		909290092	909290096	909290098	909290123		
Aluminum	Al	<	<	<	0.006	0.001	mg/L
Antimony	Sb	<	<	<	0.0002	0.0001	mg/L
Arsenic	As	<	<	<	0.0003	0.0002	mg/L
Barium	Ba	0.102	0.127	0.102	0.182	0.0002	mg/L
Beryllium	Be	<	<	<	<	0.0001	mg/L
Bismuth	Bi	<	<	<	<	0.0001	mg/L
Boron	B	<	<	<	0.007	0.005	mg/L
Cadmium	Cd	0.00004	0.0001	0.00001	0.00003	0.00001	mg/L
Calcium	Ca	112	117	61.6	103	0.01	mg/L
Cesium	Cs	<	<	<	<	0.0001	mg/L
Chromium	Cr	<	<	0.0002	<	0.0002	mg/L
Cobalt	Co	<	0.0001	<	0.0007	0.0001	mg/L
Copper	Cu	0.0007	0.0006	0.0003	0.0009	0.0001	mg/L
Iron	Fe	<	<	<	<	0.01	mg/L
Lanthanum	La	<	<	<	<	0.0001	mg/L
Lead	Pb	<	<	<	<	0.00005	mg/L
Lithium	Li	0.0005	0.0006	0.0004	0.0019	0.0001	mg/L
Magnesium	Mg	8.95	9.47	4.74	9.65	0.005	mg/L
Manganese	Mn	0.015	0.055	0.0002	0.117	0.0001	mg/L
Mercury	Hg	<	<	<	<	0.02	µg/L
Molybdenum	Mo	0.0003	0.0001	0.0002	0.0011	0.0001	mg/L
Nickel	Ni	<	<	<	0.0044	0.0002	mg/L
Phosphorus	P	<	<	<	0.02	0.015	mg/L
Potassium	K	1.03	0.9	0.77	7.34	0.01	mg/L
Rhenium	Re	<	<	<	<	0.0001	mg/L
Rubidium	Rb	0.0008	0.0009	0.0004	0.0041	0.0001	mg/L
Selenium	Se	0.0009	<	0.0004	0.0004	0.0002	mg/L
Silicon	Si	3.43	3.75	2.77	4.03	0.05	mg/L
Silver	Ag	<	<	<	<	0.00004	mg/L
Sodium	Na	1.78	1.93	1.58	3.18	0.005	mg/L
Strontium	Sr	0.171	0.179	0.109	0.244	0.0001	mg/L

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Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		MW03-3-090925	MW06-4-090925	MW01-19-090925	MW09-16-090926		
SAMPLE PREPARATION:		DISSOLVED	DISSOLVED	DISSOLVED	DISSOLVED		
DATE SAMPLED:		Sep 25/09	Sep 25/09	Sep 25/09	Sep 26/09	REPORTING LIMIT	UNITS
CANTEST ID:		909290092	909290096	909290098	909290123		
Sulphur	S	11	5	2	-	1	mg/L
Tellurium	Te	<	<	<	<	0.0002	mg/L
Thallium	Tl	<	<	<	0.00005	0.00002	mg/L
Thorium	Th	<	<	<	<	0.00005	mg/L
Tin	Sn	<	<	<	0.0005	0.0001	mg/L
Titanium	Ti	0.0005	0.0005	0.0002	0.0007	0.0002	mg/L
Tungsten	W	<	<	<	<	0.0001	mg/L
Uranium	U	0.00063	0.00055	0.00021	0.0015	0.00005	mg/L
Vanadium	V	<	0.0002	0.0001	0.0003	0.0001	mg/L
Zinc	Zn	0.001	<	0.001	<	0.001	mg/L
Zirconium	Zr	<	<	<	<	0.0001	mg/L

mg/L = milligrams per liter

μg/L = micrograms per liter

< = Less than reporting limit

Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		MW08-4-090926	SW04-1-090926	SW04-2-090926	SW04-3-090926		
SAMPLE PREPARATION:		DISSOLVED	TOTAL	TOTAL	TOTAL		
DATE SAMPLED:		Sep 26/09	Sep 26/09	Sep 26/09	Sep 26/09	REPORTING LIMIT	UNITS
CANTEST ID:		909290124	909290134	909290135	909290136		
Aluminum	Al	0.005	0.081	0.11	0.089	0.001	mg/L
Antimony	Sb	0.0013	<	<	<	0.0001	mg/L
Arsenic	As	0.0028	<	<	<	0.0002	mg/L
Barium	Ba	0.034	0.0056	0.006	0.006	0.0002	mg/L
Beryllium	Be	<	<	<	<	0.0001	mg/L
Bismuth	Bi	<	<	<	<	0.0001	mg/L
Boron	B	0.047	<	<	<	0.005	mg/L
Cadmium	Cd	<	<	<	<	0.00001	mg/L
Calcium	Ca	30.1	5.28	5.68	5.68	0.01	mg/L
Cesium	Cs	<	<	<	<	0.0001	mg/L
Chromium	Cr	0.0011	<	<	<	0.0002	mg/L
Cobalt	Co	0.0014	<	<	<	0.0001	mg/L
Copper	Cu	<	0.0004	0.0004	0.0004	0.0001	mg/L
Iron	Fe	<	<	<	0.02	0.01	mg/L
Lanthanum	La	<	<	<	<	0.0001	mg/L
Lead	Pb	<	<	<	<	0.00005	mg/L
Lithium	Li	0.0047	<	<	<	0.0001	mg/L
Magnesium	Mg	5.36	0.46	0.52	0.5	0.005	mg/L
Manganese	Mn	0.233	0.0006	0.0008	0.0009	0.0001	mg/L
Mercury	Hg	<	<	<	<	0.02	µg/L
Molybdenum	Mo	0.013	0.0002	0.0002	0.0002	0.0001	mg/L
Nickel	Ni	0.026	<	<	<	0.0002	mg/L
Phosphorus	P	<	<	<	<	0.015	mg/L
Potassium	K	1.8	0.17	0.19	0.18	0.01	mg/L
Rhenium	Re	<	<	<	<	0.0001	mg/L
Rubidium	Rb	0.0015	0.0003	0.0003	0.0003	0.0001	mg/L
Selenium	Se	0.0004	<	<	<	0.0002	mg/L
Silicon	Si	5.84	2.19	2.32	2.14	0.05	mg/L
Silver	Ag	<	<	<	<	0.00004	mg/L
Sodium	Na	36.3	0.59	0.63	0.6	0.005	mg/L
Strontium	Sr	0.132	0.013	0.014	0.014	0.0001	mg/L

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Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		MW08-4-090926	SW04-1-090926	SW04-2-090926	SW04-3-090926		
SAMPLE PREPARATION:		DISSOLVED	TOTAL	TOTAL	TOTAL		
DATE SAMPLED:		Sep 26/09	Sep 26/09	Sep 26/09	Sep 26/09		
CANTEST ID:		909290124	909290134	909290135	909290136	REPORTING LIMIT	UNITS
Sulphur	S	18	<	<	<	1	mg/L
Tellurium	Te	<	<	<	<	0.0002	mg/L
Thallium	Tl	<	<	<	<	0.00002	mg/L
Thorium	Th	<	<	<	<	0.00005	mg/L
Tin	Sn	<	<	<	<	0.0001	mg/L
Titanium	Ti	0.0009	0.0008	0.0009	0.001	0.0002	mg/L
Tungsten	W	0.0053	<	<	<	0.0001	mg/L
Uranium	U	0.0011	0.00008	0.00008	0.00008	0.00005	mg/L
Vanadium	V	0.0013	0.0003	0.0003	0.0003	0.0001	mg/L
Zinc	Zn	0.043	<	<	<	0.001	mg/L
Zirconium	Zr	<	<	<	<	0.0001	mg/L

mg/L = milligrams per liter

μg/L = micrograms per liter

< = Less than reporting limit

Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		SW04-4-090926		
SAMPLE PREPARATION:		TOTAL		
DATE SAMPLED:		Sep 26/09		
CANTEST ID:		909290137	REPORTING LIMIT	UNITS
Aluminum	Al	0.082	0.001	mg/L
Antimony	Sb	<	0.0001	mg/L
Arsenic	As	<	0.0002	mg/L
Barium	Ba	0.0061	0.0002	mg/L
Beryllium	Be	<	0.0001	mg/L
Bismuth	Bi	<	0.0001	mg/L
Boron	B	<	0.005	mg/L
Cadmium	Cd	<	0.00001	mg/L
Calcium	Ca	5.79	0.01	mg/L
Cesium	Cs	<	0.0001	mg/L
Chromium	Cr	<	0.0002	mg/L
Cobalt	Co	<	0.0001	mg/L
Copper	Cu	0.0005	0.0001	mg/L
Iron	Fe	<	0.01	mg/L
Lanthanum	La	<	0.0001	mg/L
Lead	Pb	<	0.00005	mg/L
Lithium	Li	<	0.0001	mg/L
Magnesium	Mg	0.5	0.005	mg/L
Manganese	Mn	0.0007	0.0001	mg/L
Mercury	Hg	<	0.02	µg/L
Molybdenum	Mo	0.0002	0.0001	mg/L
Nickel	Ni	<	0.0002	mg/L
Phosphorus	P	<	0.015	mg/L
Potassium	K	0.18	0.01	mg/L
Rhenium	Re	<	0.0001	mg/L
Rubidium	Rb	0.0003	0.0001	mg/L
Selenium	Se	<	0.0002	mg/L
Silicon	Si	2.16	0.05	mg/L
Silver	Ag	<	0.00004	mg/L
Sodium	Na	0.61	0.005	mg/L
Strontium	Sr	0.014	0.0001	mg/L

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Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		SW04-4-090 926		
SAMPLE PREPARATION:		TOTAL		
DATE SAMPLED:		Sep 26/09		
CANTEST ID:		909290137	REPORTING LIMIT	UNITS
Sulphur	S	<	1	mg/L
Tellurium	Te	<	0.0002	mg/L
Thallium	Tl	<	0.00002	mg/L
Thorium	Th	<	0.00005	mg/L
Tin	Sn	<	0.0001	mg/L
Titanium	Ti	0.0008	0.0002	mg/L
Tungsten	W	<	0.0001	mg/L
Uranium	U	0.00008	0.00005	mg/L
Vanadium	V	0.0003	0.0001	mg/L
Zinc	Zn	<	0.001	mg/L
Zirconium	Zr	<	0.0001	mg/L

mg/L = milligrams per liter

μg/L = micrograms per liter

< = Less than reporting limit

Polycyclic Aromatic Hydrocarbons in Water

CLIENT SAMPLE IDENTIFICATION:	MW-C-090926	MW01-17D-090926	MW08-4-090927	AS-15-090927	
DATE SAMPLED:	Sep 26/09	Sep 26/09	Sep 27/09	Sep 27/09	
CANTEST ID:	909290079	909290087	909290105	909290106	REPORTING LIMIT
ANALYSIS DATE:	Oct 1/09	Oct 1/09	Oct 1/09	Oct 1/09	
Naphthalene	< 3	< 3	<	<	0.3
Acenaphthylene	< 1	< 1	<	<	0.1
Quinoline	< 5	< 5	<	<	0.5
Acenaphthene	< 1	< 1	<	<	0.1
Fluorene	< 0.5	< 0.5	<	<	0.05
Phenanthrene	< 0.5	< 0.5	<	<	0.05
Anthracene	< 0.1	< 0.1	<	<	0.01
Acridine	< 0.5	< 0.5	<	<	0.05
Total LMW-PAH's					
Fluoranthene	< 0.4	< 0.4	<	<	0.04
Pyrene	< 0.2	< 0.2	<	<	0.02
Benzo(a)anthracene	< 0.1	< 0.1	<	<	0.01
Chrysene	< 0.1	< 0.1	<	<	0.01
Benzo(b)fluoranthene	< 0.1	< 0.1	<	<	0.01
Benzo(k)fluoranthene	< 0.1	< 0.1	<	<	0.01
Benzo(a)pyrene	< 0.1	< 0.1	<	<	0.01
Indeno(1,2,3-cd)pyrene	< 0.1	< 0.1	<	<	0.01
Dibenz(a,h)anthracene	< 0.1	< 0.1	<	<	0.01
Benzo(g,h,i)perylene	< 0.1	< 0.1	<	<	0.01
Total HMW-PAH's					
Total PAH's					

Results expressed as micrograms per liter (µg/L)
< = Less than reporting limit
Sample# 909290079 , 909290087 - Detection limits adjusted: Interference present in sample

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Polycyclic Aromatic Hydrocarbons in Water

CLIENT SAMPLE IDENTIFICATION:	AS-4-090927	MW06-1-090926	MW09-16-090927	MW01-19-090926	REPORTING LIMIT
DATE SAMPLED:	Sep 27/09	Sep 26/09	Sep 27/09	Sep 26/09	
CANTEST ID:	909290108	909290109	909290111	909290113	
ANALYSIS DATE:	Oct 1/09	Oct 1/09	Oct 1/09	Oct 1/09	
Naphthalene	< 3	<	<	<	0.3
Acenaphthylene	< 1	<	<	<	0.1
Quinoline	< 5	<	<	<	0.5
Acenaphthene	< 1	<	<	<	0.1
Fluorene	< 0.5	<	<	<	0.05
Phenanthrene	< 0.5	<	<	<	0.05
Anthracene	< 0.1	<	<	<	0.01
Acridine	< 0.5	<	<	<	0.05
Total LMW-PAH's					
Fluoranthene	< 0.4	<	<	<	0.04
Pyrene	< 0.2	<	<	<	0.02
Benzo(a)anthracene	< 0.1	<	<	<	0.01
Chrysene	< 0.1	<	<	<	0.01
Benzo(b)fluoranthene	< 0.1	<	<	<	0.01
Benzo(k)fluoranthene	< 0.1	<	<	<	0.01
Benzo(a)pyrene	< 0.1	<	<	<	0.01
Indeno(1,2,3-cd)pyrene	< 0.1	<	<	<	0.01
Dibenz(a,h)anthracene	< 0.1	<	<	<	0.01
Benzo(g,h,i)perylene	< 0.1	<	<	<	0.01
Total HMW-PAH's					
Total PAH's					

Results expressed as micrograms per liter (μg/L)
< = Less than reporting limit
Sample# 909290108 - Detection limits adjusted: Interference present in sample

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: October 9, 2009

GROUP NUMBER: 100929013

Polycyclic Aromatic Hydrocarbons in Water

CLIENT SAMPLE IDENTIFICATION:	MW08-6-090926	MW-B-090926	MW-A-090926	MW01-21-090926	
DATE SAMPLED:	Sep 26/09	Sep 26/09	Sep 26/09	Sep 26/09	
CANTEST ID:	909290114	909290115	909290116	909290125	REPORTING LIMIT
ANALYSIS DATE:	Oct 1/09	Oct 1/09	Oct 1/09	Oct 1/09	
Naphthalene	<	<	<	<	0.3
Acenaphthylene	<	<	<	<	0.1
Quinoline	<	<	<	<	0.5
Acenaphthene	<	<	<	0.18	0.1
Fluorene	<	<	<	0.95	0.05
Phenanthrene	<	<	<	0.38	0.05
Anthracene	<	<	<	<	0.01
Acridine	<	<	<	<	0.05
Total LMW-PAH's				1.51	
Fluoranthene	<	<	<	<	0.04
Pyrene	<	<	<	<	0.02
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					
Total PAH's				1.51	

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

Polycyclic Aromatic Hydrocarbons in Water

CLIENT SAMPLE IDENTIFICATION:	AS-11-0909 26	AS-13-0909 27	MW08-8-090 926	AS-22-0909 27	
DATE SAMPLED:	Sep 27/09	Sep 26/09	Sep 26/09	Sep 27/09	
CANTEST ID:	909290126	909290127	909290128	909290129	REPORTING LIMIT
ANALYSIS DATE:	Oct 1/09	Oct 1/09	Oct 1/09	Oct 1/09	
Naphthalene	<	<	<	<	0.3
Acenaphthylene	<	<	<	<	0.1
Quinoline	<	<	<	<	0.5
Acenaphthene	0.13	<	<	<	0.1
Fluorene	0.25	0.11	<	<	0.05
Phenanthrene	<	<	<	<	0.05
Anthracene	<	<	<	<	0.01
Acridine	<	<	<	<	0.05
Total LMW-PAH's	0.38	0.11			
Fluoranthene	<	<	<	<	0.04
Pyrene	<	<	<	<	0.02
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					
Total PAH's	0.38	0.11			

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

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: October 9, 2009

GROUP NUMBER: 100929013

Polycyclic Aromatic Hydrocarbons in Water

CLIENT SAMPLE IDENTIFICATION:	MW08-3-090926	MW03-3-090926	MW06-2-090926	SW04-1-090926	
DATE SAMPLED:	Sep 26/09	Sep 26/09	Sep 26/09	Sep 26/09	
CANTEST ID:	909290130	909290132	909290133	909290134	REPORTING LIMIT
ANALYSIS DATE:	Oct 1/09	Oct 1/09	Oct 1/09	Oct 1/09	
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					
Fluoranthene	<	<	<	<	0.04
Pyrene	<	<	<	<	0.02
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					
Total PAH's					

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

Polycyclic Aromatic Hydrocarbons in Water

CLIENT SAMPLE IDENTIFICATION:	SW04-2-090926	SW04-3-090926	SW04-4-090926	MW08-2-090926	REPORTING LIMIT
DATE SAMPLED:	Sep 26/09	Sep 26/09	Sep 26/09	Sep 26/09	
CANTEST ID:	909290135	909290136	909290137	909290138	
ANALYSIS DATE:	Oct 2/09	Oct 2/09	Oct 2/09	Oct 2/09	
Naphthalene	<	<	<	< 0.6	0.3
Acenaphthylene	<	<	<	< 0.2	0.1
Quinoline	<	<	<	< 1	0.5
Acenaphthene	<	<	<	< 0.2	0.1
Fluorene	<	<	<	< 0.1	0.05
Phenanthrene	<	<	<	< 0.1	0.05
Anthracene	<	<	<	< 0.02	0.01
Acridine	<	<	<	< 0.1	0.05
Total LMW-PAH's					
Fluoranthene	<	<	<	< 0.08	0.04
Pyrene	<	<	<	0.18	0.02
Benzo(a)anthracene	<	<	<	< 0.02	0.01
Chrysene	<	<	<	< 0.02	0.01
Benzo(b)fluoranthene	<	<	<	< 0.02	0.01
Benzo(k)fluoranthene	<	<	<	< 0.02	0.01
Benzo(a)pyrene	<	<	<	< 0.02	0.01
Indeno(1,2,3-cd)pyrene	<	<	<	< 0.02	0.01
Dibenz(a,h)anthracene	<	<	<	< 0.02	0.01
Benzo(g,h,i)perylene	<	<	<	< 0.02	0.01
Total HMW-PAH's				0.18	
Total PAH's				0.18	

Results expressed as micrograms per liter (μg/L)
< = Less than reporting limit
Sample# 909290138 - Detection limits adjusted: Dilution required

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Polycyclic Aromatic Hydrocarbons in Water

CLIENT SAMPLE IDENTIFICATION:	MWP4-090927	MW09-5-090926	MW-D-090926	
DATE SAMPLED:	Sep 27/09	Sep 26/09	Sep 26/09	
CANTEST ID:	909290140	909290141	909290142	
ANALYSIS DATE:	Oct 2/09	Oct 2/09	Oct 2/09	REPORTING LIMIT
Naphthalene	<	<	<	0.6
Acenaphthylene	<	<	<	0.2
Quinoline	<	<	<	1
Acenaphthene	1.0	<	<	0.2
Fluorene	2.3	<	<	0.1
Phenanthrene	1.3	1.4	1.8	0.1
Anthracene	<	<	<	0.02
Acridine	<	<	<	0.1
Total LMW-PAH’s	4.60	1.40	1.80	
Fluoranthene	<	<	<	0.08
Pyrene	0.05	0.36	0.43	0.04
Benzo(a)anthracene	<	<	<	0.02
Chrysene	<	<	<	0.02
Benzo(b)fluoranthene	<	<	<	0.02
Benzo(k)fluoranthene	<	<	<	0.02
Benzo(a)pyrene	<	<	0.02	0.02
Indeno(1,2,3-cd)pyrene	<	<	<	0.02
Dibenz(a,h)anthracene	<	<	<	0.02
Benzo(g,h,i)perylene	<	<	<	0.02
Total HMW-PAH’s	0.05	0.36	0.45	
Total PAH’s	4.65	1.76	2.25	

Results expressed as micrograms per liter (μg/L)
< = Less than reporting limit
Sample# 909290140 , 909290141 , 909290142 - Detection limits adjusted: Dilution required

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Monocyclic Aromatic Hydrocarbons in Water

CLIENT SAMPLE IDENTIFICATION:	SW04-1-090 926	SW04-2-090 926	SW04-3-090 926	SW04-4-090 926	
DATE SAMPLED:	Sep 26/09	Sep 26/09	Sep 26/09	Sep 26/09	
CANTEST ID:	909290134	909290135	909290136	909290137	
ANALYSIS DATE:	Oct 1/09	Oct 1/09	Oct 1/09	Oct 1/09	REPORTING LIMIT
Benzene	<	<	<	<	0.1
Ethylbenzene	<	<	<	<	0.1
Toluene	<	<	<	<	0.1
Xylenes	<	<	<	<	0.1
Volatile Hydrocarbons VHw6-10	<	<	<	<	100
VPHw	<	<	<	<	100
Styrene	<	<	<	<	0.1
Surrogate Recovery					
Toluene-d8	97	97	100	96	-
Bromofluorobenzene	87	88	84	86	-

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

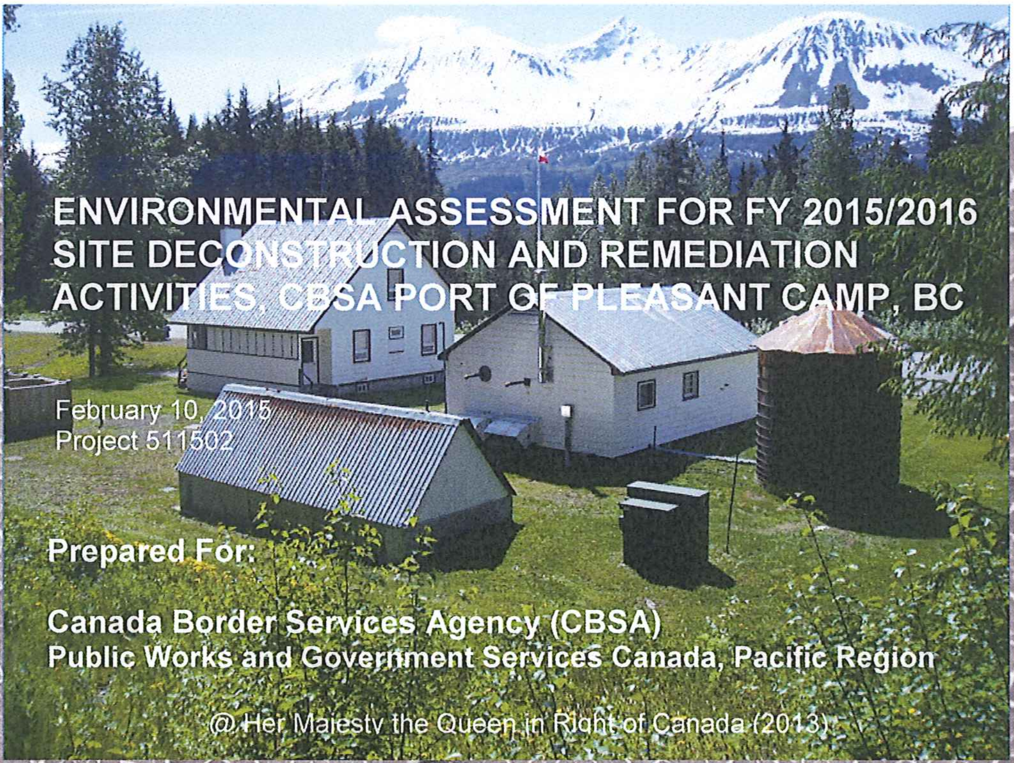
Extractable Petroleum Hydrocarbons (EPH) in Water

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	EPHw10-19	EPHw19-32
MW-C-090926	Sep 26/09	909290079	170000	22000
MW01-17D-090926	Sep 26/09	909290087	72000	10000
MW08-4-090927	Sep 27/09	909290105	<	<
AS-15-090927	Sep 27/09	909290106	<	310
AS-4-090927	Sep 27/09	909290108	1600	760
MW06-1-090926	Sep 26/09	909290109	<	<
MW09-16-090927	Sep 27/09	909290111	<	<
MW01-19-090926	Sep 26/09	909290113	<	<
MW08-6-090926	Sep 26/09	909290114	<	<
MW-B-090926	Sep 26/09	909290115	<	<
MW-A-090926	Sep 26/09	909290116	<	<
MW01-21-090926	Sep 26/09	909290125	260	<
AS-11-090926	Sep 27/09	909290126	1500	450
AS-13-090927	Sep 26/09	909290127	610	<
MW08-8-090926	Sep 26/09	909290128	<	<
AS-22-090927	Sep 27/09	909290129	1900	590
MW08-3-090926	Sep 26/09	909290130	<	260
MW03-3-090926	Sep 26/09	909290132	<	<
MW06-2-090926	Sep 26/09	909290133	330	270
SW04-1-090926	Sep 26/09	909290134	<	<
SW04-2-090926	Sep 26/09	909290135	<	<
SW04-3-090926	Sep 26/09	909290136	<	<
SW04-4-090926	Sep 26/09	909290137	<	<
MW08-2-090926	Sep 26/09	909290138	6600	1100
MWP4-090927	Sep 27/09	909290140	3700	1000
MW09-5-090926	Sep 26/09	909290141	14000	1900
MW-D-090926	Sep 26/09	909290142	17000	2200
REPORTING LIMIT			250	250
UNITS			μg/L	μg/L

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

APPENDIX H - ENVIRONMENTAL ASSESSMENT FOR FY 2015/2016 SITE DECONSTRUCTION AND REMEDIATION ACTIVITIES, CBSA PORT OF PLEASANT CAMP, BC

SNC·LAVALIN



ENVIRONMENTAL ASSESSMENT FOR FY 2015/2016 SITE DECONSTRUCTION AND REMEDIATION ACTIVITIES, CBSA PORT OF PLEASANT CAMP, BC

February 10, 2015
Project 511502

Prepared For:

Canada Border Services Agency (CBSA)
Public Works and Government Services Canada, Pacific Region

SNC-LAVALIN INC.

Prepared By:

Andrea Paetow, R.P.Bio.
Intermediate Environmental Assessor

Karen Klassen, B.A.
Intermediate Environmental Assessor

Reviewed By:

PROFESSIONAL GEOSCIENTIST
PROVINCE OF BRITISH COLUMBIA
D. W. BRIDGER
#29452
Feb 10, 2015

Brian Yates, B.Sc., R.P.Bio.
Senior Environmental Assessor

Dave Bridger, M.Sc., P.Geo.
Senior Program Coordinator

EXECUTIVE SUMMARY

At the request of Public Works and Government Services Canada (PWGSC), the Environment and Water business unit of SNC-Lavalin Inc. (SNC-Lavalin) has prepared an updated Environmental Assessment (EA) for the deconstruction/decommissioning of existing facilities, and remediation activities at the Canada Border Services Agency (CBSA) Port of Pleasant Camp border crossing in Pleasant Camp, British Columbia, herein referred to as the Project.

At the request of PWGSC, the EA will not include the portion of activities related to the construction of a new customs facility. The EA will be updated at a later date upon request to include future construction works. For the purposes of this EA, the Project will include the deconstruction, decommissioning and remediation activities.

The EA has been prepared to assist the CBSA in determining whether the Project is likely to result in significant adverse environmental effects. Although not a requirement under the 2012 Canadian Environmental Assessment Act (CEAA), the CBSA has requested the EA for due diligence purposes and to aid in construction planning.

The Project is located along Highway 7 (Haines Highway) in northwest British Columbia, approximately 180 km south of Haines Junction, Yukon Territory. The entire Project involves the redevelopment of the border crossing facility including deconstruction and decommissioning of various buildings, a fuel tank, water tank, and other associated underground services.

The EA for the Project was conducted based on reviews of available literature and databases as well as component specific inventories and assessments. The assessment of potential effects focused on the following environmental categories:

- Air;
- Surface Water and Groundwater;
- Soils and Terrain;
- Fish, Fish Habitat, Aquatic Wildlife and Aquatic Wildlife Habitat;
- Terrestrial Wildlife, Birds and Vegetation;
- Archaeology, Cultural and Heritage Features;
- Land and Resource Use;
- Public Health and Safety and Noise;
- Socioeconomics; and
- First Nations Communities and Land Use.

A summary of potential effects, their appropriate avoidance and mitigation (where required) on valued ecosystem components (VECs) and valued social components (VSCs) within each of the categories was conducted. The significance of potentially remaining residual effects was also assessed.

The Project deconstruction effects are predicted to be insignificant, taking into account the limited footprint and the short duration of deconstruction. There are no known environmental issues that cannot be addressed through routine mitigation measures and environmental best management practices. With these measures in place, potential operation and maintenance effects of the Project are also considered to be insignificant. In summary, based on the knowledge of the Project available as of this date, and taking into account the implementation of the mitigation measures described in this assessment, the Project is not likely to cause significant adverse environmental effects.

Accidents and malfunctions that could potentially occur during the respective phases of the Project are expected to be limited to hazardous material spills. There is a potential for residual effects as a result of spills; however, fuel and other hazardous material usage at the Site as a result of the proposed redevelopment is anticipated to be equivalent to that of current operations and therefore does not result in increased potential for residual impacts at the Site. This potential effect can be minimized through the preparation and implementation of an effective emergency response plan and best management practices.

An assessment of potential effects of the environment on the Project was conducted and considered environmental factors such as earthquakes and flooding. With appropriate standards and specifications in place for structures and regular inspections and maintenance, potential adverse effects from the environment on the Project are considered insignificant.

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1 INTRODUCTION

The Pleasant Camp Port of Entry is a remote land border crossing located on the British Columbia/Alaska border. Redevelopment of the border crossing facility will involve construction of a new site service building; installation of new underground services; deconstruction and decommissioning of various buildings, fuel and water tanks, and other associated underground services; remediation activities and subsequent construction of a new customs facility. At the request of Public Works and Government Services Canada (PWGSC), the Environmental Assessment (EA) will not include the portion of activities related to the construction of a new customs facility. The EA will be updated at a later date upon request to include future construction works. For the purposes of this EA, the Project will include the deconstruction, decommissioning and remediation activities.

Previously, SNC-Lavalin prepared an EA for the construction, operation, modification, maintenance and decommissioning/abandonment of the Pleasant Camp residential housing complex, which included deconstruction and removal of four modular residences and two garage buildings, construction of four residential duplex units with garages, and the removal and reinstallation of underground fuel distribution system and removal / reinstallation of two septic fields. The Pleasant Camp housing project was part of a plan that included housing construction to accommodate border staff at all Yukon border crossings (Little Gold, Beaver Creek, and Pleasant Camp).

At the request of PWGSC, SNC-Lavalin has prepared an EA for the Project to assist the Canada Border Services Agency (CBSA) in determining whether the Project is likely to result in significant adverse environmental effects. Under the revised *Canadian Environmental Assessment Act* (CEAA) that has come into effect in May of 2012, the Project no longer triggers a CEAA screening. However, the CBSA has requested the EA for due diligence purposes, and to aid in construction planning.

Information distribution and public or First Nations consultation is not included in the scope of this assessment.

1.1 Project Location

The Project is located along Highway 7 (Haines Highway) in northwest British Columbia, approximately 180 km south of Haines Junction, Yukon Territory (Location Plan Drawing 511502-001). The Project site is located on federal land north of Highway 7, on and around the site of the existing customs office. The nearest settlement is Haines, Alaska located approximately 75 km to the south.

The Project site is located on a bench along the northeast side of the Highway at the base of a steep slope. The ground surface slopes gently from northeast to southwest and is partially paved and partially covered with grasses, shrubs and a few trees. The surrounding area is heavily forested, with steep mountainous terrain descending to the Klehini River Valley. Granite Creek, a tributary of the Klehini River, passes beneath the Highway approximately 50 m northwest of the site. On the west side of the Highway, approximately 35 m southwest of the site, the creek continues south at the base of a steep bank. Granite Creek, and the areas beyond the west side of the Highway right-of-way, are located within the Tatshenshini-Alsek Provincial Park. An un-named tributary of the Klehini River is located southeast of the site boundary (Drawing 511502-002).

The area of the Pleasant Camp facility is approximately 2.0 ha in size and is comprised of two lots as indicated below:

- Cassiar District Lot 6350; and
- Cassiar District Lot 1047.

1.2 Project Scope and Rationale

The current facilities at the Pleasant Camp border crossing consist of 15 buildings and structures, including a Well House, Maintenance Building, Garage, Customs Office, Generator Building, 22,700 L Main Fuel Storage Tank Enclosure, Remediation System Enclosure, House #9 (formerly House #5), and new four staff residential duplexes (Houses #1 through 8) constructed in 2010 (Drawings 511502-003 and 004).

Previous environmental investigations have identified hydrocarbon impacted soil and groundwater at the Pleasant Camp Port facility, within the boundaries of District Lot 6350. The contamination is inferred to be associated with a fuel spill that occurred in 1980 when diesel fuel was released through a floor drain in the generator building as a result of fuel overflowing from the day tank (also located in the generator building). The quantity of fuel released was estimated to be on the order of 18,170 L (4,800 gal). Additional information obtained in 2008 indicates that circa 1975, reportedly approximately 11,360 L (3,000 gal) of diesel fuel was accidentally pumped into the former water well (the water well was mistaken for an underground storage tank [UST] fill pipe) located immediately north of the generator building. The water well was reportedly backfilled with concrete and abandoned.

As documented in SNC-Lavalin's fiscal year (FY) 2009/2010 report (SNC-Lavalin, 2010b), approximately 2,250 m^3 of hydrocarbon impacted soils (exceeding federal commercial [CL] land use standards and guidelines) currently exist below the area in the vicinity of the Generator Building and House #9 (Drawing 511502-005). A portion of the contaminated soils are present between 1.2 m and 1.5 m depth in the vicinity of the Generator Building (inferred source area) and the remaining soils are located at depths ranging from 5.5 m to 8.2 m below House #9 and further south, including off Site under a portion of Haines Highway. The hydrocarbon-impacted soils continue to be a source of dissolved phase hydrocarbons in groundwater and the dissolved phase hydrocarbon plume extends over an area of approximately 950 m^2 with the extent of light non-aqueous phase liquid (LNAPL) covering an area of approximately 400 m^2. Operation of a combined air sparge and soil vapour extraction (SVE) system for three years between 2006 and 2009 was successful in reducing the size of the dissolved phase and LNAPL plumes by up to 65% and 75%, respectively; however, the system was shut down due to high costs of running the system and limited ongoing effectiveness.

Monitoring of groundwater quality on District Lot 6350 and surface water quality in Granite Creek is ongoing and is documented in recent reports completed by SNC-Lavalin (SNC-Lavalin, 2014).

CBSA intends to redevelop the border crossing facility commencing in FY 2015/2016 with the deconstruction and decommissioning of existing facilities located above or adjacent to the soil contamination, including: the Generator Building, House #9, the 22,700 L aboveground storage tank (AST) fuel tank enclosure, fire water tank, and other associated underground services. The Custom's Building and Maintenance Building will remain in place. The proposed limits of remedial excavation are shown on Drawing 511502-006 and the proposed future border crossing facility is shown on Drawing 511502-007. SNC-Lavalin understands that CBSA currently intends to carry out the Port redevelopment project in two phases.

Phase I will be carried out in FY 2015/2016 and will include:

- Deconstruction of existing structures including: Garage, water storage tank, the main 22,700 L fuel aboveground storage tank (AST) and enclosure, Generator Building, House #9, remediation system enclosure, and existing underground services;
- Construction of a new Site Services Building;
- Installation of new buried site services including power, telephone, water and fuel;
- Installation of a new wellhead at existing capped well; and
- remedial excavation of all accessible contaminated soils (and groundwater) located below the border crossing facility and potentially off Site under the Highway right-of-way.

Phase II will be completed in FY 2016/2017 or later, and will include deconstruction of the Customs Building and construction of a new Customs Office. As requested by PWGSC, the EA will be updated at that time to incorporate details pertaining to the construction phase.

The proposed Project works are to be completed within the boundaries of District Lot 6350 (the "Site"). The lot boundary and proposed re-development footprint are shown in Drawing 511502-007. Due to significant snowfalls that occur during the winter at the Site, all work must be carried out between the late spring (May) and early fall (mid October) in 2015 and 2016.

Activities are anticipated to include: building and paving demolition; excavation; backfilling and compaction; installation of new underground services and construction of a new site services building. As part of the demolition activities, clearing of existing vegetation (including trees) may be required. Construction equipment will likely include the use of heavy equipment such as excavators, cranes and compressors. A contractor camp will likely be established in the southern portion of the Site; the location of the camp has not yet been confirmed.

Phase II activities are anticipated to be limited to building demolition and construction of a new customs facility building.

Operations and maintenance activities are expected to continue for a currently undetermined period of time, and are likely to include routine maintenance of buildings and paved areas and equipment. The Project can be considered permanent for the purposes of this EA; therefore, there are no decommissioning plans at the time of this assessment. Activities associated with replacement of infrastructure and equipment at end-of-life, or at an earlier time if deemed obsolete, are considered the same as those required for operations and maintenance and are therefore not specifically assessed further.

The Project scope of work will adhere to the following criteria:

- The Project shall be designed to the National Building Code 2010.
- The Project shall follow PWGSC and CBSA Sustainable Development policies and strategies to minimize environmental impacts, conserve natural resources, maximize energy efficiencies, and adapt innovative technologies.
- Exterior architectural appearance of new facilities shall be similar to the existing facilities.

1.3 Regulatory Framework

The federal and provincial environmental legislation applicable to the Project is described in this section. Compliance with the Acts and regulations should be addressed by obtaining the required permits, licences and approvals, through Project design and by applying mitigation and best management practices, as appropriate.

1.3.1 Federal Regulatory Framework

Canadian Environmental Assessment Act

Under the revised CEAA that has come into effect in May of 2012, this Project no longer triggers a CEAA screening level review. The Project will also not require a federal authority to provide a license, permit, certificate or other regulatory authorization and is therefore not triggered under this requirement.

However, the CBSA has requested the EA for due diligence purposes and to aid in construction planning, to determine whether the Project is likely to result in significant adverse environmental effects.

Fisheries Act

The Project is not expected to require a *Fisheries Act* Authorization since Project activities do not negatively affect fish habitat.

Navigable Waters Protection Act

The Project is not anticipated to have an effect on navigable waters.

Species at Risk Act

In the unlikely event that species at risk are encountered, the Project will comply with the *Species At Risk Act* (SARA), which provides for the legal protection of wildlife species listed in Schedule 1 of the *Act*. Schedule 1 is the official list of wildlife species at risk in Canada. Under SARA, killing, harming, harassing, capturing, taking, possessing, collecting, buying, selling or trading of individuals of endangered, threatened and extirpated species listed in Schedule 1 of the Act is prohibited. Also, damage or destruction of residences (e.g., nests or dens) belonging to wildlife species at risk is prohibited.

Migratory Birds Convention Act

The Project will comply with the *Migratory Birds Convention Act* for the protection of migratory birds, their eggs and their nests. No permit authorization is expected to be required through the Act.

Canadian Environmental Protection Act

The *Canadian Environmental Protection Act,* 1999, governs codes of practice respecting pollution prevention or specifying procedures, practices or release limits for environmental control relating to works, undertakings and activities during any phase of their development and operation, including the location, design, construction, start-up, closure, dismantling and clean-up phases and any subsequent monitoring activities. Accidental releases during construction would be regulated under this legislation. Requirements for installation/removal of fuel/oil storage tank would also be regulated under this Act (Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations).

Transportation of Dangerous Goods Act

The *Transportation of Dangerous Goods Act* governs the handling or transportation of dangerous goods. Requirements must be followed if substances listed in Schedule A of the Act are transported to / from the Project site.

1.3.2 Provincial Regulatory Framework

BC Environmental Assessment Act

Provincially, the Project does not trigger environmental review under the BC Environmental Assessment Act (BCEAA) as defined in the *Reviewable Projects Regulation*.

Environmental Management Act

The provincial *Environmental Management Act* (EMA) regulates pollution prevention, spill reporting, air emissions, and waste disposal and management. Accidental releases during construction would be regulated under this legislation.

Forest and Range Practices Act

The *Forest and Range Practices Act* (FRPA) governs forestry related activities, including removal of crown timber, wood/vegetation burning and slashing through the Ministry of Forest and Range (MoFR).

A Licence to Cut is required before clearing can begin on Crown land. A Licence to Cut is not required to cut timber located on private land. All forestry (i.e., tree cutting) operations must comply with the *Forest and Range Practices Act*.

A permit (Timber Mark) to remove any merchantable timber from the site will also be required if trees are cleared. If burning and slashing is planned, a permit (burning #) will need to be obtained.

Approvals or permits may be required through the FRPA in areas where the Project involves tree clearing. The use of forest service roads is not anticipated.

Heritage Conservation Act

An Archaeological Overview Assessment (AOA) was not required for the Project. A permit would be required under the *Heritage Conservation Act* to undertake archaeological investigations in the Project area and for archaeological monitoring during construction. However, this is not expected to be required for the Project.

Wildlife Act

It is a contravention of the BC *Wildlife Act* to possess, take, injure, molest or destroy a bird, its nest or eggs except as provided by regulation (hunting / trapping). No permits for the Project are anticipated to be required under the *Wildlife Act*.

Weed Control Act

The *Weed Control Act of BC* requires that landowners control the spread of noxious weeds on their property as defined in the Provincial and Regional District Noxious Weed List Schedule A.

1.3.3 Local Government Approvals – BC Ministry of Communities and Rural Development

The Site is located in an unincorporated area of the Stikine region. The Stikine regional district does not have its own environmental regulations or bylaws governing development within its boundaries, and defers to those of the province and federal regulators. Therefore, no local permit requirements are anticipated for the proposed works at the Site.

2 ENVIRONMENTAL AND SOCIOECONOMIC ASSESSMENT METHODS

This Chapter identifies and describes:

- The methods used to scope the environmental assessment and describe baseline conditions.
- The methods used to identify and evaluate potential effects that may result from the components of the Project.
- The methods used to identify measures to avoid, reduce or otherwise mitigate or manage those potential effects.
- The methods used to identify and assess the significance of potential residual effects resulting from the Project.

2.1 Scope of Environmental Assessment

The EA has been prepared for due diligence purposes. Potential issues and effects associated with the Project are based on the Project description and proposed site development plan provided by CBSA (Drawing 511502-007), and augmented based on a review of previous site visit information (e.g., site visits by (SLE[1] in 2008 and 2010) and a site reconnaissance by SLE in October 2012.

Project-related effects are changes to the biophysical or human environment that are caused by a project and its activities as defined by the scope of the project. Cumulative effects include those likely to result from the project in combination with other pre-existing developments and/or in combination with developments that will be carried out as a result of the project. The assessment takes into account practical means to avoid or minimize potential effects of the Project through mitigation measures.

Potential effects of the Project were considered and evaluated through completion of assessments for the following environmental components:

- Air;
- Surface Water and Groundwater;
- Soil and Terrain;
- Fish, Fish Habitat, Aquatic Wildlife and Aquatic Wildlife Habitat;
- Terrestrial Wildlife, Birds and Vegetation;
- Archaeology, Cultural and Heritage Features;
- Land and Resource Use;
- Public Health, Safety and Noise;

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[1] Now known as the Environment & Water business unit of SNC-Lavalin Inc. (SNC-Lavalin).

- Socioeconomics; and
- First Nations Communities and Land Use.

The effects assessment for each component included procedures to:

- Evaluate the existing environment that may be affected by the Project (baseline conditions);
- Identify the potential Project-related environment interactions and the potential effects of those interactions;
- Determine practical mitigation measures to avoid, reduce, mitigate or otherwise manage identified potential effects;
- Evaluate and characterize the potential residual effects (i.e., effects remaining after application of mitigation measures) on valued ecosystem components (VECs) and valued social components (VSCs) for each Project phase (construction, operations / maintenance);
- Evaluate and characterize potential cumulative effects, taking into account proposed mitigation measures;
- Determine the significance of all residual effects; and
- Identify monitoring and follow-up programs required to assess mitigation effectiveness, as required.

VEC / VSCs were scoped in 2010 (SLE, 2010a) and identified based on:

- Identification of the issues of greatest concern and relevance to the Project associated with the biophysical conditions and cultural/socioeconomic (human) resources of the Project area;
- Identification of measurable parameters to assess Project-related effects and cumulative effects for each VEC / VSC;
- Regulatory requirements;
- Assessment of spatial and temporal boundaries; and
- Professional judgement.

Table 2-1 provides a summary of VECs and VSCs and general methods of the assessment. Professional judgment was applied in each case.

TABLE 2-1: Valued Ecosystem and Social Components (VECs / VSCs) and General Methods of the Assessment

Component	VEC / VSC	VEC / VSC Definition / Rationale	General Assessment Methods
Physical*			
Air	Local Air Quality, Greenhouse Gas Concentrations	• Local air quality can be negatively affected by Project activity effects including dust and engine emissions. The existing buildings on Site may be a source of asbestos containing materials.	Qualitative comparison of air quality variables before, during and after the project.
Surface Water and Groundwater	Water Quality	• Project activities may result in an increase in the TSS in receiving waters, reducing the water quality. • Accidental release of chemicals may also pollute local surface and ground waters.	The surface water and groundwater assessment consisted of identification and mapping of water bodies in the Project area and their anticipated connectivity.
Soil and Terrain	Soil Quality	• Project activity can compress soils, or reduce soil quality through increased erosion or introduction of pollutants.	Surficial soil information was obtained from previous site visit assessments.
Biological			
Fish, Fish Habitat and Aquatic Wildlife and Habitat	Fish, fish habitat, endangered or threatened aquatic wildlife species	• Fish, fish habitat and general aquatic habitat are known to be present in the wider Project setting. Project activities may result in an increase in the TSS in receiving waters, reducing the water quality. • Accidental releases of chemicals (fuel spills, etc.) may also migrate to local surface waters.	Aquatic habitats were identified using existing mapping and ground truth of the Project area. As no in-stream work or work in riparian areas is required, detailed fish presence/absence and habitat inventories were not completed.
Terrestrial Wildlife, Birds and Vegetation	Endangered or threatened wildlife, bird and plant species, and plant communities	• There is potential for introduction of invasive species to the Project area. • Accidental release of chemicals may also pollute local surface and ground waters utilized by these species. • Construction noise from Project activities has the potential to disturb local wildlife. • Waste generated at the Site may be an attractant to area wildlife.	The VEC list was refined based on a detailed analysis of the habitats present in the immediate area using information from regional, provincial, and federal government agencies. A combination of literature review and field observations was used to determine the expected occurrence of VECs within the immediate Project area.

TABLE 2-1 (Cont'd): Valued Ecosystem and Social Components (VECs / VSCs) and General Methods of the Assessment

Component	VEC / VSC	VEC / VSC Definition / Rationale	General Assessment Methods
Social			
Archaeology, Cultural and Heritage Features	Archaeology, Cultural and Heritage Features	• Project activities include excavation and therefore the potential exists to disturb previously undiscovered archaeological and heritage resources if excavation is to occur outside previously disturbed areas.	A search for known archaeological sites was previously submitted to the Archaeology Branch of the Ministry of Tourism, Culture and the Arts (SLE, 2010a). General observations were also conducted in the Project area. An AOA was not required for this phase of the Project.
Land and Resource Use	Water Navigation, Parks and Protected Areas, Recreation Sites, Commercial Resource Use, and Aesthetics	• The Project will not alter on-Site land use types. Land use VECs are therefore considered with respect to the surrounding area.	Professional judgment was applied and government websites were reviewed for activities in the Project area.
Public Health and Safety, and Noise	Public Health and Safety, and Noise Levels	• The Project is likely to increase local traffic volumes. • Project activity noise from Project activities may have negative effects on local residents. • The existing buildings on Site may be a source of asbestos containing materials.	Qualitative comparison of variables before, during and after the Project.
Socioeconomics	Economic Opportunity and Services Access	• The Project has the potential to increase employment and local supplier opportunity.	The assessment was based on publicly available Project setting information.
First Nations Communities and Land Use	Traditional Use	• The Project is not anticipated to impact local First Nations Communities and Land Use.	The assessment was based on a review of existing land use and professional judgment.

* Noise has been assessed within the biological and social assessments.

2.2 Environmental and Socioeconomic Impact Assessment Study Area

Given the developed nature of the site, and the fact that Project activities will occur within the existing facility footprint, the impact assessment study area is limited to the Project site and immediately surrounding areas.

2.3 Identification of Project – Environment Interactions

An issues and Project-environment interactions matrix (Table 2-2) was developed to aid in identifying areas of potential interaction between the components of the Project and the biophysical and human environment. The matrix considers potential effects that may arise during Project activities, as well as accidental events.

For each major component or activity during the Project activities completed throughout the deconstruction and remediation phase, potential Project-environment interactions between each activity and each component of the environment were ranked as:

● **Likely interaction, potential effects to be assessed;**

○ **Limited interaction, no potential effects anticipated; or**

n/a **No interaction, no potential effects.**

The Project-environment interaction matrix (Table 2-2) was used to identify Project components and activities that would most likely affect VECs and VSCs. Professional judgment, and information obtained through searches of publicly available databases and literature were used to identify the extent of the potential effects and anticipated interactions between components of the Project activities and issues of concern. Where existing knowledge indicated that an interaction was likely to result in no effect or a minimal effect, the issue would usually not warrant further assessment. Issues ranked as a “likely interaction” were evaluated for potential effects (Section 3).

TABLE 2-2: Project - Environment Interaction Matrix

Project Activities and Physical Works	Air	Surface Water and Ground Water	Soil and Terrain	Fish, Fish Habitat, Aquatic Wildlife and Habitat	Terrestrial Wildlife, Birds and Vegetation	Archaeology, Cultural, and Heritage Features	Land and Resource use	Public Health and Safety, and Noise	Socioeconomics	First Nations Communities and Land Use
Deconstruction and Remediation										
Building demolition	●	○	○	○	●	n/a	n/a	●	○	n/a
Tree / vegetation clearing	●	●	●	●	●	●	○	●	●	n/a
Temporary and permanent facilities set-up	●	●	●	●	●	n/a	○	●	●	n/a
Excavation	●	●	●	●	●	●	n/a	●	●	n/a
Removal of underground fuel lines/services	○	●	●	○	○	○	n/a	○	●	n/a
Vehicle traffic	●	○	●	○	●	n/a	n/a	●	○	n/a
Waste management	○	○	●	○	●	○	○	○	○	○
Equipment servicing	●	●	●	●	○	n/a	n/a	○	●	n/a
Equipment and material storage	n/a	○	○	○	○	n/a	n/a	○	n/a	n/a

Notes: ● - Likely interaction, potential effects to be assessed; ○ - Limited interaction, no potential effects anticipated; n/a - No interaction, no potential effects.

2.4 Assessment of Environmental Effects

Project-environment interactions and potential effects are based on a prediction and evaluation of potential changes (effects) to identified VECs and VSCs directly associated with demolition / construction and operation / maintenance activities completed throughout the deconstruction and remediation phase of the Project. Potential effects arising from the Project combined with other past, present and likely projects or activities (cumulative effects) are also assessed in the cumulative effects assessment (Section 3).

Potential effects of Project-environment interactions are summarized and discussed in Section 3. The effects assessment uses a variety of methods to identify potential Project-related effects including, but not limited to, literature and background data-information reviews and field assessment. If potential Project-environment effects could not be avoided through planning and design, measures were developed to mitigate potential effects on VECs and VSCs during Project activities. These measures are described in Section 3.

Mitigation measures considered include: environmental protection measures, best management practices (BMPs) and protocols; site-specific measures (i.e., timing of Project activities to avoid sensitive periods (biological); and contingency measures to address accidents and malfunctions that could affect the environment).

Potential residual effects were identified by reviewing potential effects that remain after applying mitigation and compensation measures for the deconstruction and remediation phase (including demolition), and identified based on Project activity and operation / maintenance. The importance (significance and likelihood) of residual effects after mitigation was determined based on the assessment of environmental effects relative to thresholds, standards and professional judgment. The methods used to determine the significance of environmental residual effects are described below in Section 2.6.

The potential for Project-environmental residual effects to combine and act cumulatively with similar effects from other past, present and likely projects or activities was determined as a final stage of the assessment. This involved determining whether other projects and activities have been or are being developed in the vicinity of the Project and whether these projects could potentially act in a cumulative manner with the residual Project effects. The main goal of the cumulative effects assessment was to determine if “the project contributions to regional cumulative environmental effects have the potential to measurably change the health or sustainability of the resource in question” (CEA, 1999).

2.5 Development of Mitigation and Environmental Management Strategies

Potential Project-environment effects were used as the basis to identify measures to avoid, reduce or otherwise mitigate, manage or compensate for those potential effects. Measures were developed based on the type of effect and their utility to address Project related activities and concerns. Avoiding potential Project-related impacts is a priority during the environmental assessment process; avoidance measures include selection of the most appropriate construction works methods, equipment, material and timing of activities.

Impact mitigation refers to the elimination, reduction or control of adverse Project-environmental effects, and includes restitution for any damage to the environment caused by such effects through replacement, restoration, compensation or any other means.

This assessment proposes technical mitigation measures to address potential Project effects during the construction and operations / maintenance activities completed throughout the deconstruction and remediation phase. Appropriate mitigation measures were determined based on the principle of no net loss and include use and implementation of appropriate construction guidelines, BMPs, engineering planning, good design and structural standards.

2.6 Determining Significance of Residual Effects

The main component in the assessment of potential environmental impacts of a project is to identify and determine the likelihood of significant adverse environmental impacts/effects. The approach most commonly used involves establishing defined thresholds or standards beyond which residual environmental effects (i.e., effects predicted to occur after all mitigation is considered) are considered significant.

Either specific or general evaluation criteria were used to determine the likelihood of significant adverse environmental impacts/effects on specific VECs and VSCs resulting from the Project. Standards used during a determination of significance include recognized government or industry regulations or objectives (thresholds) above which an effect would be predicted to occur. Thresholds reflect the limits of an acceptable state for an environmental component based on resource management objectives, community standards, scientific literature or ecological processes (e.g., population and habitat conditions / state for fish, plants or wildlife). Where available, standards, guidelines or recognized thresholds were used to evaluate the potential changes in a measurable parameter or VEC / VSC based on potential Project-related effects and/or cumulative effects.

For components that could not be assessed with reference to specific criteria, professional judgment was applied in order to determine significance. Evaluation criteria were used to assess the significance of potential Project-related adverse effects for each VEC and VSC. Five general evaluation criteria were used:

- **Magnitude:** this refers to the magnitude, or severity, of the effect. The greater the magnitude, the greater the effect.
- **Geographic Extent:** this refers to the extent of change over the geographic area of the project. The geographic extent of effects can be local or regional. Local effects may be less significant than regional effects.
- **Duration:** this refers to the length of time the effect lasts. The duration of an effect can be short-term (<1 year), medium (1-10 years) or long-term (>10 years). Short-term effects may not be as significant as long-term effects.

- **Frequency:** this refers to how often the effect occurs. The frequency of an effect can be either once, continuous (occurs regularly) or sporadic (occurs >1 time at irregular intervals). Rare or infrequent effects may not be significant, whereas frequent or continuous effects may have a greater effect.
- **Reversibility:** this refers to the degree to which the effect is reversible. Effects can be reversible or permanent. Reversible effects may be less significant than irreversible, or permanent, effects.

Each potential residual effect was rated for significance using all or a subset of these evaluation criteria. A potential effect was considered significant if it had a magnitude of moderate or high, the effect would extend beyond the spatial and temporal extent of the Project site, the effect would occur over the long-term and on a regular or continuous basis, and the effect was irreversible. This matrix and corresponding definitions and abbreviates (used in Section 3) are summarized in Table 2-3.

TABLE 2-3: Screening System for Significance of Residual Effects

Magnitude	Geographic Extent	Duration	Frequency	Reversibility
No effect (negligible) **[N]**[1]	Local, restricted to the Project site **[L]**	Short-term; Construction phase only **[S]**	Rare; Occurs once **[Ra]**	Reversible **[Rev]**
Low **[L]**	Regional; would extend beyond areas within and immediately adjacent to the Project site **[R]**	Medium-term; 10-years following construction **[Med]**	Sporadic/ Intermittent; Occurs sporadically and at irregular intervals **[SI]**	Irreversible; Irreversible during the life of the Project **[Irev]**
Moderate **[M]**		Long-term; > 10-years following construction **[L]**	Regular; Occurs on a regular basis and at regular intervals **[R]**	
High **[H]**			Continuous; Occurs continuously **[C]**	

▨ = Significant residual effect

1 – Bold letters in [ ] brackets represent abbreviates for their respective significance designations. The abbreviations are as follows: Magnitude - No Effect [N], Low [L], Moderate [M], and High [H]; Geographic Extent – Local [L], Regional [R]; Duration – Short-term [S], Medium-term [Med], Long-term [L]; Frequency – Rare [Ra], Sporadic/Intermittent [SI], Regular [R], Continuous [C]; Reversibility – Reversible [R], and Irreversible [Irev]. These abbreviates are used in the environmental effects summary tables in Chapter 5.

The significance of Project-related effects on VECs and VSCs is described in detail in Section 3.

2.7 Evaluation of Cumulative Effects

When assessing cumulative effects, it is important to apply the level of effort appropriate to the scope of the project and its anticipated effects. Almost all cumulative effects assessment approaches discussed in the literature, including the framework set out in CEA Agency's “Cumulative Effects Assessment Practitioners Guide” (CEA, 1999) are intended for large projects, with a high likelihood of causing effects at the regional level. Given the small footprint of the Project a simplified approach was adopted. This simplified approach is consistent with the requirement to assess cumulative effects that are likely to result from the Project in combination with other pre-existing developments and/or in combination with developments that will be carried out as a direct result of this Project.

Cumulative effects were only assessed if all three of the following conditions were met for the environmental effect under consideration:

- The Project will result in a measurable, demonstrable or reasonably-expected significant residual environmental effect on a VEC or VSC (i.e., is there an environmental effect that can be measured or that can reasonably be expected to occur?).
- The Project-specific significant residual environmental effect on that component does, or is likely to, act in a cumulative fashion with the environmental effects of other past or future projects and activities that are likely to occur).
- There is a reasonable expectation that the Project’s contribution to cumulative environmental effects will affect the viability or sustainability of the resource or value.

3 ENVIRONMENTAL EFFECTS ASSESSMENT

This section provides an assessment of potential effects of the Project on each of the following environmental components:

- Air;
- Surface Water and Groundwater;
- Soil and Terrain;
- Fish, Fish Habitat, Aquatic Wildlife and Aquatic Wildlife Habitat;
- Terrestrial Wildlife, Birds and Vegetation;
- Archaeology, Cultural and Heritage Features;
- Land and Resource Use;
- Public Health and Safety, and Noise;
- Socioeconomics; and
- First Nations Communities and Land Use.

Key VECs and VSCs for the above disciplines, as well as potential effects on the VECs and VSCs, are identified in each of the following sections.

After summarizing the potential effects, appropriate impact avoidance, mitigation and where required, compensatory activities are described for each potential effect. A conclusion is made if residual effects remain following implementation of the impact avoidance, mitigation and compensation. Where these residual effects remain, an assessment of their significance is provided. Significant residual effects that remain are summarized in Section 4. The residual effects included in Section 4 are then reviewed in a cumulative effects analysis in Section 5. Photographs of the Site are included in Appendix I.

3.1 Air

3.1.1 Baseline

The CBSA Port of Pleasant Camp border crossing facility is located in a remote region of the northwest portion of British Columbia. The nearest settlements are Haines, Alaska (located approximately 75 km to the south) and Haines Junction, Yukon (located approximately 180 km to the north).

There is no air quality station located near the Project site. In general, air quality at the Project site is expected to be of good quality as the site is located in an isolated, non-industrial area. Local air quality may be impacted at various times of the year by natural or anthropogenic sources including dust (wind-blown or road dust), smoke (wildfires and/or wood stove emissions) and vehicle emissions.

3.1.2 Assessment of Potential Effects

There is the potential for dust emissions (fine suspended particulate matter) to increase in the atmosphere as a result of various Project activities at the Site. The potential for dust will be greatest from open excavations or stockpiled soil, during loading and unloading of soil (if required), and during building demolition. In addition, there is potential for the introduction of asbestos fibres into the surrounding environment as a result of building demolition.

Research has indicated that fine particulate matter (PM_{10} and $PM_{2.5}$) in the air is associated with various adverse health effects in people who already have compromised respiratory systems, and thus presents a health hazard. There is also a potential for vapour and odour emissions from the Site during Project activities; however, they are anticipated to be minimal. Vapours and odours could be released from Project activities including exhaust from the operation of heavy equipment. Dust, vapours, and odours could also migrate through the air beyond the perimeter of the Site, although this effect is limited and transient and air quality will return to normal once equipment is removed from the site at the completion of Project activities.

On-Site thermal desorption is being considered as an option for treatment of the contaminated soils excavated during the Project activities. The process results in clean off gas but there is the potential for the accidental release of contaminants/dust during the treatment process in the event that air pollution controls malfunction or are not properly in place.

The potential effects on air quality may also include an increase in emissions of greenhouse gases during the construction (including demolition) and operations / maintenance activities completed throughout the deconstruction and remediation phase.

3.1.2.1 Adverse Impact on Local Air Quality from Equipment Emissions and Fugitive Dust

Any adverse impacts to local air quality as a result of the Project would mainly result from emissions of Criteria Air Contaminants (CACs) and Greenhouse Gases (GHGs) as a result of Project activities. Adverse impacts to air quality have been divided into three categories:

1) Equipment emissions – combustion of fossil fuels by construction vehicles (e.g., excavator, bulldozer) and equipment (e.g., diesel generators); accidental release of contaminants from on-Site thermal desorption treatment.

2) Fugitive dust – construction activities that involve the movement of soil (including treatment process), vehicular traffic on unpaved roads and wind erosion of exposed soils (e.g., overburden stockpiles).

3) Burning vegetation debris – smoke emissions resulting from burning vegetation debris created during tree/shrub clearing activities.

Equipment Emissions

The majority of equipment emissions will occur during activities completed throughout the deconstruction and remediation phase of the Project. The main source of equipment emissions will be associated with diesel combustion engines of heavy equipment (e.g., excavators, bulldozers). The use of heavy equipment will likely decrease as the construction schedule moves towards completion. Additional sources of equipment emissions include light-duty trucks and portable generators used to power hand-held equipment. The use of light-duty trucks and portable generators is anticipated to remain constant throughout construction. The accidental release of emissions from the treatment process during thermal desorption could be another potential source of emissions.

CACs associated with equipment emissions include SO_2, NO, CO, PM and VOC. GHGs associated with equipment emissions include CO_2, N_2O and CH_4.

Fugitive Dust

Fugitive dust emissions result in the release of particulate matter, a CAC, into the local air shed. The development of fugitive dust is most likely to occur from Project activities, including the demolition of existing facilities, site remediation activities and wind erosion of exposed soils (e.g., overburden stockpiles). The amount of fugitive dust created will be subject to variable climatic conditions (e.g., precipitation, wind) and the moisture content of soil.

Vegetation Debris Burning

Clearing and grubbing is not anticipated during the deconstruction and remediation phase of the Project; however, there is a small chance vegetation clearing and grubbing will be required if Project activities are to occur outside previously disturbed areas.

In the unlikely event that clearing and grubbing is required, it will result in the generation of vegetative debris (e.g., non-merchantable timber, slash) that will be required to be disposed of. One option for disposal of vegetative debris is burning. Burning of vegetation debris will result in the release of PM, CO and VOC, all of which are CACs. Under the *Environmental Management Act*, the Ministry of Environment (MoE) has developed the *Open Burning Smoke Control Regulation* and its Code of Practice for the control of burning in a safe and environmentally responsible manner. The regulation outlines the requirements needed to conduct a burn that minimizes impacts to the local air shed.

Soil Removal

The greatest potential impact from fugitive dust will likely occur during activities that involve the exposure or removal of soil. Certain components of the Project may require exposing soil in paved and vegetated areas, and possible movement of soil to and from excavations. There is also the potential release of fugitive dust related to the movement of soil associated with the thermal desorption treatment process.

Topsoil and overburden material removed or brought to the Project site is anticipated to be stored on Site in stockpiles. The stockpiles may be a source of fugitive dust and susceptible to wind erosion if stored improperly.

The creation of fugitive dust during the operation and maintenance activities completed throughout the deconstruction and remediation phase of the Project will be limited to vehicle traffic; however, this is expected to be minimal as the majority of vehicle traffic is expected to occur on paved areas of the Site.

3.1.2.2 Greenhouse Gas Emissions

Greenhouse gas emissions have been identified in Section 3.1.2.1 Equipment Emissions. As Project activities progress towards completion, greenhouse gas emissions are anticipated to decrease in correlation with the volume of construction equipment working on Site.

3.1.3 Mitigation and Environmental Management

3.1.3.1 Adverse Impact on Local Air Quality from Equipment Emissions and Fugitive Dust

Several methods exist to control dust and vapour emissions. The contractor at the Site will be responsible to minimize the potential for dust, odours and vapours at the Site during Project activities. Methods to control air quality could include the following:

- controlling the exposed surface area of excavator faces by limiting the size of the excavation and/or stockpiles at any time;
- covering soil stockpiles on Site with tarps to reduce the emissions of dusts from the piles. Trucks transporting soil should have the soil covered during the transportation. Water and/or tarps or cover materials should be used in the excavation, and along hauling routes;
- applying water or other dust suppressant products where required to provide a further level of protection. Care must be taken to ensure that these materials do not discharge from the site without treatment;
- vehicle speed limits should be controlled and vehicle idling minimized. Street cleaning and dust control should be conducted on an as needed basis;
- varying the Project activities schedule to accommodate wind conditions if necessary. If wind conditions and temperature are conducive to generation of odours, vapours and dust, the project may be halted temporarily if prior actions cannot control emissions to acceptable levels;
- ensuring equipment is clean, well maintained and in good working condition;
- avoiding unnecessary idling. In cold weather, where possible, electrical heaters should be used rather than engine idling to prevent engine freeze;
- burning must comply with *The Open Burning Smoke Control Regulation* and adhere to the conditions outlined in the burn registration number administered by the regional Ministry of Forests, Lands and Natural Resource Operations (MFLNRO) office to minimize impacts from debris burning; and

- ensure that the proper air pollution controls are in place for the thermal desorption treatment process if being used on the site.

3.1.3.2 Greenhouse Gas Emissions

- during all work, engine idling should be avoided. Additionally, it should be ensured that vehicles and equipment are maintained to the manufactures specifications.

TABLE 3-1: Potential Effects of the Project on Air

Component / VEC	Phase / Activity	Effect Description	Assessment of Residual Effects		
			Proposed Mitigation and Compensation	Residual Effect (Yes/No)	Direction
Air Quality					
Local Air Quality	Project activities during deconstruction and remediation	Adverse impact on local air quality from equipment emissions and fugitive dust, during Project activities.	• Avoid unnecessary idling. In cold weather, where possible, use electrical heaters rather than idling to prevent engine freeze. • Ensure vehicles and equipment are maintained to the manufacturer's specifications. • Where possible, avoid soil exposure during dry periods. • Cover stockpiled soil with measures such as tarps, or straw mulch to minimize the potential of wind erosion. • Burning will comply with *The Open Burning Smoke Control Regulation* and adhere to the conditions outlined in the burn registration number administered by the regional MFLNRO office. • Ensure thermal desorption treatment equipment is maintained to the manufacturer's specifications and proper controls are in place.	Yes	Negative
	Operation & maintenance activities during reconstruction and remediation	Adverse impact on local air quality from equipment emissions and fugitive dust.	• Avoid unnecessary idling. In cold weather, where possible, use electrical heaters rather than idling to prevent engine freeze. • Ensure vehicles and equipment are maintained to the manufacturer's specifications.	No	-

TABLE 3-1 (Cont'd): Potential Effects of the Project on Air

Component / VEC	Phase / Activity	Effect Description	Assessment of Residual Effects		
			Proposed Mitigation and Compensation	Residual Effect (Yes/No)	Direction
Air Quality					
Greenhouse Gas Concentrations	Project activities during deconstruction and remediation	Greenhouse gas emissions.	• Avoid unnecessary idling. In cold weather, where possible, use electrical heaters rather than idling to prevent engine freeze. • Ensure vehicles and equipment are maintained to the manufactures specifications.	Yes	Negative
	Operation & maintenance activities during deconstruction and remediation	Greenhouse gas emissions.	• Avoid unnecessary idling. In cold weather, where possible, use electrical heaters rather than idling to prevent engine freeze; • Ensure vehicles and equipment are maintained to the manufacturer's specifications.	No	-

3.1.4 Potential Residual Effect

A summary of potential residual effects during the Project activities completed throughout the deconstruction and remediation phase of the Project on air quality are summarized in Table 3-2 and described below. As the proposed Project activities are not expected to result in an increase of baseline conditions (i.e., increased traffic volumes at the Site) during the operation and maintenance activities during this phase of the Project, residual impacts are not anticipated to be significant.

TABLE 3-2: Potential Residual Effects of the Project on Air

Project Component	VEC/VSC	Residual Effect Description	Magnitude[1]	Geographic Extent[1]	Duration[1]	Frequency[1]	Reversibility[1]	Significance[2]
Project activities	• Local Air Quality	• Adverse impact on local air quality from equipment emissions and fugitive dust during Project activities.	L	L	S	R	R	N
	• Greenhouse Gas Concentrations	• Greenhouse gas emissions during Project activities.	L	R	S	R	I	N

[1] See Table 2-3 for definitions

[2] S = Significant; N = Not significant

The following residual effects on air quality from the Project have the potential to remain after mitigation measures have been implemented:

- Greenhouse gas, other vehicle, and fugitive dust emissions from Project activities.

Residual effects on local air quality and greenhouse gas emissions as a result of Project activities are expected to be minimal, due to their predicted short-term duration, and reversibility.

3.1.5 Contribution to Cumulative Effects

Residual effects were identified with respect to air quality; however, no interaction between Project activities and other Projects in the vicinity are anticipated and, therefore, no cumulative effects are expected.

3.2 Surface Water and Groundwater

3.2.1 Baseline

There are no watercourses located directly on the Project site. Nearby surface water bodies include Granite Creek, located approximately 35 m west of the western perimeter of the Site; an un-named tributary of the Klehini River, located approximately 30 m southeast of the easternmost housing unit (Unit #1); and the Klehini River, located approximately 200 m southwest of the Site. A drainage ditch is located along the northeast perimeter of the Site, which appeared to be connected to Granite Creek via a culvert and swale in the northwest, adjacent to Haines Highway outside the property boundary (Photographs 14 and 15). Based on contour lines (BC MoE, 2012), local topography and field observations, surface flows at the Project site may drain to the northwest, southwest or southeast.

A search of the BC Water Resource Atlas identified no recorded aquifers or groundwater wells within the Project area; however, a historic water well existed on Site from which potable water used to be obtained until accidental filling of the well with diesel fuel (refer to Section 1.2). Recent investigations of the area indicate that a groundwater table is encountered between approximately 3 m and 8 m depth (SLE, 2010; SLE, 2013). Drinking water for CBSA staff is currently obtained from an intake on Granite Creek.

3.2.2 Assessment of Potential Effects

This section describes the interactions between the Project and surface water and groundwater quality (as VEC) within the Project area.

The potential effects during the construction and operations / maintenance activities completed throughout the deconstruction and remediation phase on the VEC include:

- Changes to surface water quality and turbidity.
- Hazardous spills to ground.

The potential effects of the Project on surface water and groundwater quality and proposed mitigation measures during the activities completed throughout the deconstruction and remediation phase are summarized in Table 3-3 and described below.

3.2.2.1 Changes to Surface Water Quality and Turbidity

As no in-stream works are proposed, surface water sources are not expected to be directly affected by Project activities. However, exposed sediments and other potentially deleterious substances which may result from excavation activities, releases from fuelling or staging areas (including fuel/oil storage tank installation/removal), or other activities during the construction (including demolition) and operations / maintenance activities completed throughout the deconstruction and remediation phase, have the potential to migrate to surrounding ditches or into nearby surface waters (Section 3.3.1).

3.2.2.2 Potential Impacts to Groundwater

Project activities during the construction (including demolition) and operations / maintenance activities completed throughout the deconstruction and remediation phase may potentially impact groundwater through unintentional introduction of hazardous substances (e.g., gasoline, hydraulic fluids, antifreeze solutions etc.) to ground. This may be associated with the use of aboveground or underground fuel lines, on-Site septic systems, portable generators, fuel/oil tank installation/removal activities, or fuelling and operation of equipment on the Site.

3.2.3 Mitigation and Environmental Management

3.2.3.1 Changes to Surface Water Quality and Turbidity

Mitigation measures should be implemented prior to site demolition/Project activities to minimize the potential for erosion and to prevent sediment from migrating during precipitation events, or migration of materials from accidental release (e.g. fuel, oil). Mitigation measures should include the development of a spill prevention and emergency response plan for Project activities (Section 3.2.3.2) and an erosion and sediment control plan as well as methods for monitoring of the effectiveness of this plan. This plan should include (but not be limited to) consideration of the following measures:

- Installing silt fencing, or equivalent, around areas to be cleared, as well as stockpiled and exposed soil to prevent sediment laden runoff from entering catch basins, area ditches or from migrating in the direction of the unnamed tributary identified on the Site.
- Establishing staging area(s) for fuelling equipment. The staging areas should be located at least 30 m from area ditches and surface water drainages.
- The nearest surface water is Granite Creek located 35 m west/northwest the Site. This distance should be confirmed on the ground; if any Project activities were to take place within 30 m of the creek, further assessment would be required.
- Covering and protecting stockpiled and/or exposed soil to minimize erosion.
- Implementing erosion control techniques in anticipation of heavy precipitation.Monitoring of Project activities.

Adverse impacts to surface water quality during operations and maintenance activities of the deconstruction and remediation phase of the Project are not anticipated.

3.2.3.2 Potential Impacts to Groundwater

Site-specific recommendations to reduce adverse impacts to groundwater resources should include:

- The development of a spill prevention and emergency response plan for Project activities. The plan should include hazard identification, risk analysis, emergency response planning and organization and reporting of incidents. The plan should also address the establishment of fuel staging areas and hazards associated with the ongoing use of fuels at the site. Fuel staging areas should not be located in areas of high groundwater elevation. Secondary containment measures should also be implemented to prevent fuel leaks and spills.
- Fuel/oil tank removal or installation requirements as per appropriate legislation (i.e., Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations) shall be followed.

TABLE 3-3: Potential Effects of the Project on Surface Water and Groundwater

Component / VEC	Phase / Activity	Effect Description	Assessment of Residual Effects		
			Proposed Mitigation and Compensation	Residual Effect (Yes/No)	Direction
Surface and Groundwater Quality					
Water Quality	Project activities during deconstruction and remediation	Adverse changes to surface water quality and turbidity. Hazardous spills to aquatic habitat or to ground.	• Develop an erosion and sediment control plan. • Develop a spill prevention and emergency response plan. • Follow legislative requirement for removal of fuel/oil storage tank(s) • Establish staging area(s) for fuelling and equipment. Staging areas should be at least 30 m from creeks, area ditches and surface water drainages.	No	-
	Operation & maintenance activities during reconstruction and remediation	Adverse changes to surface water quality. Hazardous spills to aquatic habitat or to ground. Excess nutrients or chemicals applied to the landscaped areas to enter drainage areas.	• Develop a spill prevention and emergency response plan. • Install storage tank(s) following legislative requirements.	No	-

3.2.4 Potential Residual Effects

Through Project design, mitigation and implementation of environmental management plans and best management practices, residual effects are not anticipated with respect to surface water and groundwater quality as a result of the Project activities completed throughout the deconstruction and remediation phase of the Project.

3.2.5 Contribution to Cumulative Effects

As no residual effects are predicted with respect to surface water and groundwater quality as a result of the activities completed throughout the deconstruction and remediation phase of the Project, no cumulative effects are expected.

3.3 Soils and Terrain

3.3.1 Baseline

The Site is located on a bench of land along the northeast side of Haines Highway at the base of a steep slope. The elevation in this area is approximately 300 m above sea level (asl). The ground surface is relatively flat throughout the Site, and slopes gently from northeast to southwest. Surface cover at the Site consists of a mixture of grass, gravel, asphalt and scattered trees. The surrounding area is heavily forested, with steep mountainous terrain descending to the Klehini River Valley.

The bedrock geology of the Project site has been described in iMap BC (2012) as Paleozoic – Silurian to Permian undivided sedimentary rocks, consisting of mixed carbonate clastic and volcanic sequence. Older marine strata were described as being probably back-reef and lagoonal facies, while some younger, coarser clastic units were probably deposited in an intertidal or deltaic environment.

Based on the Agriculture and Agri-Food Canada (2012) mapping tool, mineral soil makes up 100% of the surface material in the region encompassing Pleasant Camp. The surficial geology at the Project site and in the surrounding area is described as Podzolic (Ferro-Humic Podzol), while the areas to the west (e.g., in Tatshenshini-Alsek Provincial Park) are described as Brunisolic (Sombric Brunisol). The local surface form is given as level to undulating, with well and moderately well drained soils.

Shallow subsurface geology consists mainly of fills overlying moderately to highly permeable granular sediments to depths of 10.4 m, overlying bedrock (SNC-Lavalin Morrow Environmental, 2005). In some areas, low permeability silt tills directly overlie bedrock. The overburden deposits generally represent un-stratified, glacial drift typical of an ice-contact depositional environment. These deposits contain grain sizes that range from cobbles to silt and clay. The gravel and cobbles have been found to be angular to sub-angular in shape indicating a relatively local provenance and lack of depositional water (SNC-Lavalin Morrow Environmental, 2005).

The potential effects of the Project on soils and terrain and proposed mitigation measures during the construction (including demolition) and operations / maintenance activities completed throughout the deconstruction and remediation phase are summarized in Table 3-4 and described below.

3.3.2 Assessment of Potential Effects

The potential effects during the construction (including) and operations / maintenance activities completed throughout the deconstruction and remediation phase on the VEC (soil quality) include:

- reduction in soil quality due to soil compaction or introduction of pollutants to soils during Project activity; and
- increased soil erosion as a result of Project activities.

Adverse impacts to soil quality have been divided into the following three categories:

- Soil erosion – The exposure of soil can potentially increase soil erosion.
- Soil compaction – The compaction of soil from the use of heavy equipment.
- Introduction of pollutants – Accidental release (e.g., spills) of hazardous materials (e.g., hydrocarbons) impacting soil quality.

Potential effects on Site terrain and stability during the deconstruction and remediation phase of the Project are expected to be minimal.

3.3.2.1 Soil Erosion

The potential for soil erosion will be most prevalent during Project activities when underlying soils are exposed to erosional forces. The potential for soil erosion is low during operations and maintenance activities completed throughout the deconstruction and remediation phase of the Project.

3.3.2.2 Soil Compaction

Soil compaction (as a result of the use of heavy equipment on Site) decreases the ability of the soil to absorb rainfall, thus increasing the potential for surface water runoff. However, this effect will be minimal as heavy equipment (e.g., excavators, bulldozers) utilized on Site during Project activities will largely travel on paved areas or in previously compacted areas (i.e., where asphalt has been removed). The Project is not anticipated to result in any significant impacts as a result of soil compaction, as the Site has already been graded and paved.

Soil compaction during the operation and maintenance activities completed throughout the deconstruction and remediation phase of the Project is anticipated to be negligible as vehicles and equipment required for maintenance will travel on paved access roads to the site.

3.3.2.3 Introduction of Pollutants

There is the potential for the accidental release of pollutants (i.e., hazardous materials) during demolition and remediation activities. Examples of hazardous materials anticipated to be used include diesel, gasoline, lubricant and motor oil. The accidental release of hazardous materials can potentially contaminate exposed soil, thus impacting soil quality. It is anticipated that the use of hazardous materials in association with the construction equipment will remain constant for the duration of the Project. The potential for accidental releases of hazardous materials can be minimized by following regulatory and manufacture standards and guidelines. The potential introduction of pollutants during the deconstruction and remediation phase of the Project may result from spills and/or leaks associated with the potential for spills and/or leaks from the ongoing use of fuels at the Site and removal/installation of oil or fuel storage tanks.

3.3.3 Mitigation and Environmental Management

To reduce the potential impact to soils and terrain, the following mitigation measures are recommended:

- Site-specific recommendations to reduce potential adverse impacts to area soil, including the development of a spill prevention and emergency response plan for the construction and operations / maintenance activities completed throughout the deconstruction and remediation phase of the project should be developed.
- During Project activities, appropriate erosion and sediment control measures should be implemented to minimize the potential for increased soil erosion, for example, covering exposed soil with tarps or straw mulch.
- Restrict the operation of heavy machinery to designated areas to minimize the impact on surrounding soils.
- Comply with regulatory requirements (i.e., storage tank installation and removal) and industry best management practices (i.e., fuelling in designated areas, security and secondary containment in fuel storage areas, minimizing the amount of hazardous material stored on Site, spill kit present on Site, posted emergency procedures) during and following Project activities.
- Practice good housekeeping on Site. Ensure proper use, storage and disposal of deleterious substances and their containers (and all other wastes) generated during and after Project activities.

TABLE 3-4: Potential Effects of the Project on Soil Quality

Component / VEC	Phase / Activity	Effect Description	Assessment of Residual Effects		
			Proposed Mitigation and Compensation	Residual Effect (Yes/No)	Direction
Soil Quality					
Soil Quality	Project activities during deconstruction and remediation	Reduction in soil quality or availability due to soil compaction or introduction of pollutants to soils during Project activity, and increased soil erosion.	• Implement sediment and erosion control measures. For example, cover exposed soil with tarps or straw mulch. • Restrict the operation of heavy machinery to designated areas to minimize the potential of soil compaction. • Implement regulatory requirements and industry best management practices for hazardous material handling and storage (e.g., fuel in designated areas, security and secondary containment in fuel storage areas, minimize the amount of hazardous material stored on Site, spill kit present on Site, posted emergency procedures, installation/removal procedures) to minimize the potential for an accidental release (e.g., spill) of pollutants. • Develop site-specific spill contingency plans.	No	-
	Operation & maintenance activities during deconstruction and remediation	Reduction in soil quality or availability due to soil compaction or introduction of pollutants to soils.	• Develop site-specific spill contingency plans.	No	-

3.3.4 Potential Residual Effects

No residual effects are anticipated if the recommended mitigation measures outlined above are implemented. Through Project design, mitigation and implementation of environmental management plans and best management practices, residual effects are not anticipated with respect to soil quality as a result of the Project activities during the deconstruction and remediation phase of the Project.

3.3.5 Contribution to Cumulative Effects

As no residual effects are predicted with respect to soil quality as a result of the Project activities throughout the deconstruction and remediation phase of the Project, no cumulative effects are expected.

3.4 Fish, Fish Habitat, Aquatic Wildlife and Aquatic Wildlife Habitat

3.4.1 Baseline

Granite Creek (no watershed code) is the nearest named water body to the Project site (Photograph 4). Granite Creek flows southwest prior to crossing Haines Highway approximately 50 m northwest of the Site, and then continues south-southeast before merging into the Klehini River (watershed code 960-487000-39700). The Klehini River provides valuable habitat for area fish and wildlife. Fish species known to occur in the Klehini River include Dolly Varden char (*Salvelinus malma*), Chinook salmon (*Oncorhynchus tshawytscha*), Coho salmon (*Oncorhynchus kisutch*), Sockeye salmon (*Oncorhynchus nerka*), Rainbow/Steelhead trout (*Oncorhynchus mykiss*), Arctic grayling (*Thymallus arcticus*) and Slimy sculpin (*Cottus cognatus*) (BC Ministry of Sustainable Resource Management, 2003 in SNC-Lavalin Morrow Environmental, 2005; Golder, 2001 in SNC-Lavalin Morrow Environmental, 2005; FISS, 2012; Alaska Fishing Guides, 2012).

Fish presence in Granite Creek and the un-named tributary of the Klehini River (located southeast of the Site boundary) has not been documented to date; however, given their connectivity to the Klehini River, they are considered to provide similar fish habitat if barriers to fish are absent.

3.4.2 Fish Species at Risk

A search of the BC Conservation Data Centre (BC CDC), using BC Species and Ecosystems Explorer, was conducted to determine the potential presence of federally and provincially listed fish species in the creeks in the vicinity of the Project site. The following search parameters were used: Skeena Stikine Forest District (Cassiar), Skeena Region, Stikine Regional District, and Coastal Western Hemlock (CWH) Biogeoclimatic Zone. The search results for fish species at risk are included in Table 4 (Appendix II).

Based on the habitat preferences of these species and habitat conditions present at the Project site, two fish species have a moderate potential to occur in the creeks around the Project site: cutthroat trout (*Oncorhynchus clarkii* ssp. *clarkii*) and bull trout (*Salvelinus confluentus*). Both species are provincially blue listed; none are federally listed under Schedule 1 of the Species At Risk Act (SARA, 2012).

No listed fish species at risk are known to occur in the creeks surrounding the Project site, based on Government databases and previous surveys (FISS, 2012; BC Ministry of Sustainable Resource Management, 2003 in SNC-Lavalin Morrow Environmental, 2005; Golder, 2001 in SNC-Lavalin Morrow Environmental, 2005).

The potential effects of the Project on fish, aquatic wildlife or habitat and proposed mitigation measures during Project activities completed throughout the deconstruction and remediation phase are summarized in Table 3-5 and described below.

3.4.3 Assessment of Potential Effects

As Project activities do not include any in-stream works or the removal of any existing riparian vegetation on or in the vicinity of the Site (i.e., along Granite Creek and the unnamed creek) the Project is not expected to have direct impact on fish, aquatic wildlife or their habitat. The riparian habitat located between Granite Creek and the developed areas of the Site is currently vegetated (mixed forest), and approximately 50 m wide. Southeast of the Site towards the unnamed tributary is an approximately 30 m wide strip of riparian habitat. No impacts to these riparian habitats are anticipated; however, exposed sediments and other potentially deleterious substances which may result from excavation activities, releases from fuelling or staging areas, or other Project activities, have the potential to migrate to creeks via surface water drainages and require mitigation.

The operational activities associated with the deconstruction and remediation phase of the project are not anticipated to impact fish, fish habitat, aquatic wildlife or aquatic wildlife habitat.

3.4.4 Mitigation and Environmental Management

Mitigation measures should include the development of a spill prevention and emergency response plan for Project activities and an erosion and sediment control plan as well as monitoring of the effectiveness of this plan to prevent sediment and other deleterious substances from migrating to surface waters and/or riparian habitat during precipitation events. This plan should include (but not be limited to) consideration of the following measures:

- Installing silt fencing, or equivalent, around stockpiles and exposed soil to prevent sediment laden runoff from entering catch basins or from migrating in the direction of Granite Creek and the unnamed tributary identified on the Site.
- Establish staging area(s) for fuelling equipment. The staging areas should be at least 30 m from area ditches, creeks and surface water drainages.
- Cover and protect stockpiled and/or exposed soil to minimize erosion.
- Implement erosion control techniques in anticipation of heavy precipitation.
- Develop a spill prevention and emergency response plan (see Section 3.2.3.2).
- Conduct monitoring of Project activities.

TABLE 3-5: Potential Effects of the Project on Fish, Fish Habitat, Aquatic Wildlife and Aquatic Wildlife Habitat

Component / VEC	Phase / Activity	Effect Description	Assessment of Residual Effects		
			Proposed Mitigation and Compensation	Residual Effect (Yes/No)	Direction
Fish, Fish Habitat, Aquatic Wildlife and Aquatic Wildlife Habitat					
Fish, Fish Habitat, Aquatic Wildlife and Aquatic Wildlife Habitat	Project activities and maintenance during deconstruction and remediation	Exposed sediments and other potentially deleterious substances which may result from land clearing and excavation activities, releases from fuelling or staging areas, or other activities have the potential to migrate via surface water drainages.	• Develop an erosion and sediment control plan. • Develop a spill prevention and emergency response plan. • Establish staging area(s) for fuelling equipment in developed areas. The staging areas should be at least 30 m from creeks, area ditches and surface water drainages.	No	-

3.4.5 Potential Residual Effects

No residual effects are predicted with respect to fish, aquatic wildlife or their habitat as a result of Project activities completed throughout the deconstruction and remediation phase of the Project. Through Project design and mitigation, as well as implementation of environmental management plans and best management practices, effects of the Project are considered negligible.

3.4.6 Contribution to Cumulative Effects

As no residual effects are anticipated with respect to fish, aquatic wildlife or riparian habitat as a result of the Project activities completed throughout the deconstruction and remediation phase of the Project, no cumulative effects are expected.

3.5 Terrestrial Wildlife, Birds and Vegetation

3.5.1 Baseline

The Pleasant Camp Port facility is located within the CWH biogeoclimatic zone, wet maritime (wm) subzone. The CWHwm subzone is one of the rainiest regions in the province with average precipitation amounts ranging from 1,000 mm to 4,400 mm (Meidinger and Pojar, 1991). In the northern parts of the subzone (including the Project site), where the CWHwm occupies elevations from sea level to 300 m, an estimated 40% to 50% of total precipitation falls as snow. Mean annual temperatures range from 5.2 ºC to 10.5 ºC (Meidinger and Pojar, 1991).

Natural ecosystems within the CWHwm subzone are typically comprised of forests dominated by western hemlock (*Tsuga heterophylla*), western red cedar (*Thuja plicata*), Sitka spruce (*Picea sitchensis*) and amabilis fir (*Abies amabilis*). Typical understory vegetation includes Alaskan blueberry (*Vaccinium alaskaense*), oval-leaved blueberry (*Vaccinium ovalifolium*), red huckleberry (*Vaccinium parvifolium*), salal (*Gaultheria shallon*), bunchberry (*Cornus canadensis*), false azalea (*Menziesia ferruginea*), deer fern (*Blechnum spicant*) and various moss species, such as step moss (*Hylocomium splendens*), lanky moss (*Rhytidiadelphus loreus*) and Oregon beaked moss (*Kindbergia oregana*).

Vegetation in the general area has previously been identified as healthy and abundant, consisting of mixed forest, with deciduous and coniferous trees, tall and low shrubs, grasses and mosses on the side slopes (SNC-Lavalin Morrow Environmental, 2005). An historic pipeline right-of-way (ROW) exists to the north of the Project site (Drawing 131416-003). Dense riparian forest is present in closer proximity to Granite Creek. Trees shroud over the creek bed in many places. Devil's club (*Oplopanax horridus)* was encountered at the base of the slope indicating a higher moisture environment (SNC-Lavalin Morrow Environmental, 2005). Dense coniferous forest was observed south of Granite Creek, beyond the Haines Highway.

During SLE’s habitat assessment conducted on October 18, 2012, tree species in the forest surrounding the Project site were identified as Sitka spruce, western hemlock, western red cedar and black cottonwood (*Populus balsamifera* ssp. *trichocarpa*). As 15 cm to 25 cm of snow had fallen the night prior to October 18, identification of shrub and herb species was limited and included Sitka alder (*Alnus crispa* ssp. *sinuata*), Nootka rose (*Rosa nutkana*), Indian hellebore (*Veratrum viride*) and fireweed (*Epilobium angustifolium*). Native vegetation on the Project site has largely been cleared and replaced by the current port facilities. On-Site vegetation consists of landscaped grassy areas, flower beds and small groves of trees scattered throughout the area (refer to Drawing 131416-003). Four tree groves were identified on the Project site in October 2012, each of them consisting of two to five black cottonwoods (Table 3-6). A fifth tree grove was identified on photographs from a previous (2008) site visit (Photograph 3, Appendix I); however, it no longer existed in October 2012. Photographs of the vegetation on the Project site (taken during site visits in June 2008 and October 2011, and on October 18, 2012) are included in Appendix I (Photographs 1 through 15).

TABLE 3-6: Tree Groves on the Project Site

Tree Grove	# Trees	Tree Species	DBH* (cm)
1	3	Black cottonwood (3)	230; 167; 203
2	4**	Black cottonwood (2)	--***
		Sitka spruce (2)	--
3	2	Black cottonwood (2)	133; 181
4	5	Black cottonwood	164; 154; 38; 137; 112
5	Previously 5 (absent in 2012)	Unknown conifers	unknown

* DBH = Diameter at Breast Height.
** Tree Grove 2 was part of a forested slope; only those trees near the Project site were included in the count.
*** DBH was not measured in Grove 2 due to slope and snow conditions.

Wildlife in the region is reported to include black-tailed deer (*Odocoileus hemionus*), mountain goat (*Oreamnos americanus*), grizzly bear (*Ursus arctos*), wolverine (*Gulo gulo*), marten (*Martes americana*), cougar (*Puma concolor*), coyote (*Canis latrans*) and wolf (*Canis lupus*). Bird species that would be expected to be common include owls, bald eagle (*Haliaeetus leucocephalus*), pileated woodpecker (*Dryocopus pileatus*), northern flicker (*Colaptes auratus*), common raven (*Corvus corax*), gray jay (*Perisoreus canadensis*), varied thrush (*Ixoreus naevius*), black-capped chickadee (*Poecile atricapilla*) and wrens (Golder, 2001 as referenced in SNC-Lavalin Morrow Environmental, 2005).

During the October 2012 site visit, wildlife observations at the Project site included chickadees (*Poecile* sp.) in Tree Grove 1 and two flocks of un-identified songbirds passing over the site. No raptors or raptor nests (in-active) were observed on the Project site or in the surrounding trees. Reports of frequent grizzly bear sightings have been previously noted and two grizzly bears were observed on October 18, 2012, approximately half-way between Haines Junction and Pleasant Camp (Photograph 16). Given the remoteness of the Site and undeveloped nature of the surrounding areas, it can be assumed that a variety of wildlife and bird species (including raptors and owls) may enter the developed portion of the site and adjacent areas from time to time.

3.5.2 Species at Risk

A search of the BC CDC, using BC Species and Ecosystems Explorer, was conducted to determine the potential presence of federally (under SARA (2012) Schedule 1) and provincially listed plant species, plant communities and animal species occurring in and around the Project site. Results are based on the following search parameters: Skeena Stikine Forest District (Cassiar), Skeena Region, Stikine Regional District, CWH biogeoclimatic zone (and for plant communities CWHwm subzone). The following habitat types were searched: forest, grassland/shrub steppe, lakes, riparian, rock/sparsely vegetated rock, shrubland, stream, river, and wetland. The search results for plant species at risk are shown in Table 1, plant communities at risk in Table 2, and animal species at risk in Table 3 (Appendix II).

The probability of each species to occur within the Project study area was ranked as low, moderate or high (and as “possible” or “unlikely” for plant communities), based on comparing individual species’ habitat preference descriptions to habitat types identified within the study area.

Three provincially listed plant species at risk were identified as having a moderate probability of occurring in the Project vicinity: dwarf bog bunchberry (*Cornus suecica*), Hornemann’s willowherb (*Epilobium hornemannii* ssp. *behringianum*), and dotted saxifrage (*Micranthes nelsoniana var. carlottae*). No plant species with high probability were identified. Dwarf bog bunchberry is provincially red listed and may occur in moist to mesic forests and meadows; Hornemann’s willowherb and dotted saxifrage are blue listed and prefer rocky outcrops, cliffs and ledges as well as streambanks (Table 1 Appendix II).

Five plant communities at risk have been identified that could possibly occur in the vicinity of the Project site (Table 2 Appendix II). The sweet gale – Sitka sedge[2] community is red listed and occurs in moist/wetland habitat while the remaining four communities (Sitka spruce/skunk cabbage; Sitka spruce/salmonberry; black cottonwood – red alder/salmonberry; and western hemlock – Sitka spruce/step moss) are blue listed and occur on forested sites.

Seven terrestrial wildlife species at risk were identified as having a moderate (with one species rated moderate to high) probability of occurring in the Project vicinity, including two bird species, four mammal species and one invertebrate species (Table 3 Appendix II). The Margined White, *guppyi* subspecies (*Pieris marginalis guppyi*), a provincially blue listed butterfly species, was rated moderate to high due to the availability of suitable habitat in damp deciduous riparian forest along Granite Creek and surrounding areas. Olive-sided flycatcher (*Contopus cooperi*) – listed as threatened under the SARA and also provincially blue listed – breeds in forested habitat with standing dead trees and nearby water. Barn swallow (*Hirundo rustica*) – provincially blue listed – prefers buildings and other man-made structures for nesting. Keen’s myotis (*Myotis keenii*) – a provincially red listed species – is associated with dense tracts of coastal forest dominated by western hemlock. Fisher (*Martes pennanti*), wolverine (*Gulo gulo luscus*) and grizzly bear (*Ursus arctos*) are provincially blue listed. While fishers prefer dense forests, especially old growth riparian habitat, and avoid open areas, wolverines and grizzly bears are often seen in open habitats and can occur at all elevations.

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[2] Scientific Names are listed in Table 2

A rare occurrence search (BC CDC, 2012; iMap, BC, 2012) was also conducted to determine documented (mapped) sightings of red listed or blue listed species in the vicinity of the Project site. The search results indicated no documented occurrences of red listed or blue listed species within a 500 m radius of the Site.

3.5.3 Invasive Species

There is a potential for invasive plant species to occur on the Project site and in surrounding areas, due to the presence of compacted soils along roads and in developed areas.

The potential effects of the Project on terrestrial wildlife, birds and vegetation and proposed mitigation measures during the construction and operations / maintenance activities completed throughout the deconstruction and remediation phase are summarized in Table 3-7 and described below.

3.5.4 Assessment of Potential Effects

Project activities are limited to the previously disturbed site footprint and do not include the removal of any riparian vegetation in proximity (within 30 m) of watercourses. Clearing and grubbing activities are not anticipated during the deconstruction and remediation phase of the Project; however, there is a small chance vegetation clearing and grubbing will be required if Project activities are to occur outside previously disturbed areas.

Potential impacts to the terrestrial VECs (i.e., endangered or threatened wildlife, birds and vegetation) as a result of Project activities (including demolition) are predicted to be low and are discussed below.

3.5.4.1 Increased Opportunity for Establishment or Spread of Invasive Plant Species

Noxious or invasive weeds may become established or spread into the surrounding area as a result of Project activities and associated exposed soils on the Project site, and increased vehicle traffic in the area.

3.5.4.2 Loss or Alteration of Wildlife Habitat

Destruction or alteration of wildlife habitat may occur if in the unlikely event clearing and grubbing is required, for example through loss of tree roosting and foraging habitat and direct destruction of nests, burrows, and/or den sites.

3.5.4.3 Mortality and Injury to Individual Animals

Individual animals may be killed or injured, for example as a result of: vehicle-wildlife collisions; ingestion of solid waste, antifreeze or other toxic fluids; and unauthorized hunting, feeding or harassment of wildlife by construction personnel.

3.5.4.4 Adverse Physiological or Behavioural Effects to Animals

Animals may be indirectly affected as a result of Project activity disturbance, for example due to noise or light impacts on nesting or mating function.

During the Project activities completed throughout the deconstruction and remediation phase, poor housekeeping practices or unsuitable waste storage on the Site may inadvertently attract area wildlife to the Site.

3.5.5 Mitigation and Environmental Management

The following mitigation measures are recommended in order to reduce adverse impacts to vegetation, wildlife and wildlife habitat resulting from Project activities, such as excavation, at the Site:

3.5.5.1 Increased Opportunity for Establishment or Spread of Invasive Plant Species

- Properly clean all equipment prior to accessing the Project site to reduce the introduction and spread of invasive plant species.

3.5.5.2 Loss or Alteration of Wildlife Habitat

- In the unlikely event that clearing and grubbing is required, clearly stake and mark site boundaries to prevent inadvertent clearing outside the boundary, and demarcate areas where vegetation should be retained in the field (using flagging tape).
- Avoid tree and shrub clearing as much as possible to protect wildlife trees and existing forested and riparian habitat surrounding the Site, including along Granite Creek and the unnamed tributary.

3.5.5.3 Mortality and Injury to Individual Animals

- In the unlikely event that clearing and grubbing is required, complete required tree and shrub clearing outside of bird nesting windows (May 1 to July 31 for breeding songbirds and February 5 to August 31 for raptors);
- If Project activities (including demolition) are planned during the bird nesting season, a qualified professional shall conduct active nest surveys to identify presence or absence of active songbird or raptor nests at least 24 hours prior to Project activities; any nests identified in trees/shrubs to be removed, if clearing is required, need to be protected until young have fledged;
- Implement appropriate waste management practices to prevent poisoning of wildlife; for example, potential wildlife attractants such as food waste should be disposed of in appropriate containers;
- Report vehicle-wildlife collisions, install warning signs and impose reduced speed limits in areas where collisions may occur; and

- Address prevention and mitigation of wildlife mortality/morbidity in training and awareness sessions for all personnel.

3.5.5.4 Adverse Physiological or Behavioural Effects to Animals

- Avoid unnecessary noise and other disruption.

TABLE 3-7: Potential Effects of the Project on Terrestrial Wildlife, Birds and Vegetation

Component / VEC	Phase / Activity	Effect Description	Assessment of Residual Effects		
			Proposed Mitigation and Compensation	Residual Effect (Yes/No)	Direction
Terrestrial Wildlife, Birds and Vegetation					
Vegetation	Project activities (including demolition) during deconstruction and remediation	Increased opportunity for establishment or spread of invasive plant species from Project activities and exposing of soils on the Project site.	• Properly clean all equipment prior to accessing the Project site to reduce the introduction and spread of invasive plant species.	No	-
Terrestrial Wildlife, Birds and Vegetation	Project activities (including demolition) during deconstruction and remediation	Loss or alteration of wildlife habitat.	• Mark site boundaries to prevent inadvertent clearing outside the boundary, and demarcate areas where vegetation should be retained in the field. • Avoid tree and shrub clearing as much as possible.	No	-
Terrestrial Wildlife, Birds and Vegetation	Project activities (including demolition) during deconstruction and remediation	Mortality and injury to individual animals (e.g., as a result of: vehicle-wildlife collisions; ingestion of solid waste, antifreeze or other toxic fluids; and unauthorized hunting, feeding or harassment of wildlife by personnel). Adverse physiological or behavioural effects from construction disturbance (e.g., adverse effect of noise or light on nesting or mating function).	• If demolition/construction activities are planned during the bird nesting season, a qualified professional shall conduct active nest surveys to identify presence or absence of active songbird or raptor nests at least 24 hours prior to Project activities. • Implement appropriate waste management practices to prevent poisoning of wildlife. • Report vehicle-wildlife collisions, install warning signs and impose reduced speed limits in areas where collisions may occur. • Address prevention and mitigation of wildlife mortality/morbidity in training and awareness sessions for construction personnel. • Avoid unnecessary noise and other disruption. • Potential wildlife attractants such as food waste should be disposed in appropriate containers (during all phases of the project). General housekeeping best management practices should also be adhered to.	No	-

TABLE 3-7 (Cont'd): Potential Effects of the Project on Terrestrial Wildlife, Birds and Vegetation

Component / VEC	Phase / Activity	Effect Description	Assessment of Residual Effects		
			Proposed Mitigation and Compensation	Residual Effect (Yes/No)	Direction
	Operation & maintenance activities during deconstruction and remediation	Mortality and injury to individual animals (e.g., as a result of: vehicle-wildlife collisions; ingestion of solid waste, antifreeze or other toxic fluids; and unauthorized hunting, feeding or harassment of wildlife by personnel).	• Report vehicle-wildlife collisions, install warning signs and impose reduced speed limits in areas where collisions may occur. • Avoid unnecessary noise and other disruption. • Potential wildlife attractants such as food waste should be disposed in appropriate containers (during all phases of the project). General housekeeping best management practices should also be adhered to.	No	-

3.5.6 Potential Residual Effects

No residual effects are predicted with respect to terrestrial wildlife, birds or vegetation as a result of the Project activities completed throughout the deconstruction and remediation phase of the Project. Through Project design and mitigation, as well as implementation of environmental management plans and best management practices, effects of the Project are considered negligible.

3.5.7 Contribution to Cumulative Effects

As no residual effects are predicted with respect to terrestrial wildlife, birds or vegetation as a result of the Project activities completed throughout the deconstruction and remediation phase of the Project, no cumulative effects are expected.

3.6 Archaeology, Cultural and Heritage Features

3.6.1 Baseline

SLE submitted a request to the Archaeology Branch of the BC Ministry of Tourism, Culture and the Arts for known archaeological sites. The Ministry indicated that the Project site does not contain any known archaeological sites. Due to the already developed nature of the area and the results of the request, an AOA was determined to be unnecessary at this time.

3.6.2 Assessment of Potential Effects

Although there have been no archaeological resources identified within the Project site, site preparation, particularly intrusive works, could potentially disturb or destroy previously unidentified archaeological resources if work is to occur in previously undisturbed areas.

3.6.3 Mitigation and Environmental Management

In the unlikely event that cultural materials, archaeological features, and/or human remains are encountered during Project activity, all work should cease and the Archaeology Branch of the BC Ministry of Tourism, Culture and the Arts, as well as local police, should be contacted immediately.

3.6.4 Potential Residual Effects

As the project involves the replacement and/or upgrades to existing facilities, no additional residual effects are expected for the Project with respect to archaeological, cultural or heritage resources.

3.6.5 Contribution to Cumulative Effects

As no residual effects are predicted with respect to archaeological, cultural or heritage resources as a result of the construction, operations or maintenance of the Project, no cumulative effects are expected.

3.7 Land and Resource Use

3.7.1 Baseline

The Pleasant Camp Port of Entry facility is situated on federal land. The facility is a land border crossing that processes regular and commercial vehicle traffic. The surrounding lands are sparsely populated and include heavy-forested areas with steep mountainous terrain. Areas beyond the west side of the highway right-of-way are located within the Tatshenshini-Alsek Provincial Park. The nearest settlement is Haines, Alaska located approximately 75 km to the south.

3.7.2 Assessment of Potential Effects

Effects on land and resource use in the Project area are not anticipated as the Project activities will be contained on the previously disturbed areas of the site. In addition, exterior architectural appearance of the new facilities will be similar to the existing. Based on these factors, no adverse effects are expected from the Project on parks and protected areas, recreation areas, aesthetics, commercial forestry, mineral development, commercial recreation operations and navigable waters and land use issues pertaining to these components are therefore not discussed further.

3.7.3 Potential Residual Effects

No effects (and therefore no residual effects) are expected with respect to land and resource use.

3.7.4 Contribution to Cumulative Effects

Cumulative environmental impacts to land and resource use are not anticipated.

3.8 Public Health and Safety and Noise

3.8.1 Baseline

The Pleasant Camp Port of Entry facility is located along a remote stretch of Haines Highway. With the exception of the Haines Highway corridor, the area surrounding the Project site is undeveloped. The public may have access to the Site when travelling between Haines, Alaska, and Haines Junction, Yukon Territory, and therefore may be exposed to construction traffic or other Project related health and safety issues.

The potential effects of the Project on public health, safety and noise and proposed mitigation measures during the Project activities completed throughout the deconstruction and remediation phase are summarized in Table 3-8 and described below.

3.8.2 Assessment of Potential Effects

Potential effects during Project activities (including demolition) include the following issues to public health and safety, and noise:

3.8.2.1 Public Safety Impacts from Traffic Due to Changes in Traffic Patterns

There is the potential for adverse impacts on public safety as a result of changes in traffic patterns in and around the Project site during Project activities. Traffic patterns are not expected to change during the operation and maintenance activities associated with the deconstruction and remediation phase of the Project.

3.8.2.2 Adverse Impacts to Local Residents from Project Activity Noise

Increased noise from Project activities may have the potential to impact local residents (i.e., CBSA employees, construction workers).

3.8.2.3 Adverse Impacts to Construction Workers and Local Residents as a Result of Transient Asbestos Fibres resulting from Building Demolition

A hazardous material survey was conducted and is provided under separate cover (SLE, 2013a). The survey identified the presence of asbestos containing materials, which will be removed as part of the remediation work.

3.8.3 Mitigation and Environmental Management

This section outlines mitigation measures that should be implemented to reduce the potential for adverse effects on public health and safety.

3.8.3.1 Public Safety Impacts from Traffic Due to Changes in Traffic Patterns

Advance notice of any Project activities should be posted in appropriate locations to inform the public of upcoming Project activities. Where possible, activities should be staged to result in partial road closure (if any), rather than full. Appropriate personnel should be employed to coordinate traffic along the road and install clear signage during Project activities warning of large equipment and traffic pattern changes.

3.8.3.2 Adverse Impacts on Local Residents from Project Activity Noise

Project activities, where possible, should be scheduled during regular daytime hours. If activities are required to occur during irregular or night time hours, advanced notice should be provided to local residents.

3.8.3.3 Adverse Impacts to Construction Workers and Local Residents as a Result of Transient Asbestos Fibres Resulting from Building Demolition

A building survey for asbestos (and other hazardous building materials) should be conducted prior to building demolition and appropriate mitigation measures should be developed as deemed necessary. Any hazardous building materials identified should be managed/ controlled in accordance with the EMA and BC *Hazardous Waste Regulation* (HWR).

TABLE 3-8: Potential Effects of the Project on Public Health & Safety and Noise

Component/ VEC/ VSC	Phase / Activity	Effect Description	Assessment of Residual Effects		
			Proposed Mitigation and Compensation	Residual Effect (Yes/No)	Direction
Public Health & Safety and Noise					
Health	Project activities during deconstruction and remediation	Public safety impacts from traffic due to changes in traffic patterns.	• Install clear signage during construction warning of large equipment, traffic pattern changes. • Employ person on Site to coordinate traffic along road.	No	-
		Adverse impacts on local residents from Project activity noise.	• Stage Project activities, where possible, during regular daytime hours. • Provide advance notice of activities during irregular / night time hours.	No	-
		Adverse impacts to construction workers and local residents as a result of transient asbestos fibres resulting from building demolition.	• A building survey for asbestos (and other hazardous building materials) should be conducted prior to building demolition. If asbestos is confirmed present in existing building materials the materials should be managed/ controlled in accordance with the Environmental Management Act and BC Hazardous Waste Regulation.	No	-

3.8.4 Potential Residual Effects

Through effective mitigation and adherence to rigorous health and safety measures, the potential residual effects that may remain after mitigation measures have been implemented are expected to be negligible.

3.8.5 Contribution to Cumulative Effects

Given the prediction of negligible residual effects, cumulative impacts on public health, safety and noise are not anticipated.

3.9 Socioeconomics

3.9.1 Baseline

The Pleasant Camp Border Crossing employs numerous CBSA officers and is important to the regional economy. Supplies and materials for maintaining the site are anticipated to be purchased regionally. Local contractors are occasionally utilized to assist in maintaining the facilities.

The potential effects of the Project on socioeconomics and proposed mitigation measures during the deconstruction and remediation phase are summarized in Table 3-9 and described below.

3.9.2 Assessment of Potential Effects

The potential effects during the deconstruction and remediation phase of the Project on socioeconomics include:

3.9.2.1 Increased Job Opportunities

An increased demand for labour is expected as a result of Project activities and possibly as a result of increased operation and maintenance opportunities.

3.9.2.2 Increased Opportunities for Local/Regional Suppliers

A positive impact is expected for local/regional suppliers in the way of increased business opportunities during the deconstruction and remediation phase of the Project (e.g., supply of materials/equipment associated with demolition, excavation, soil treatment, miscellaneous contracting activities).

3.9.2.3 Disruption or Alteration of Transportation Patterns, During Construction Activities

During the Project activities completed throughout the deconstruction and remediation phase of the Project, there will likely be some alteration of traffic patterns in and possibly around the Project site. Temporary road closures (or partial road closures) may also be required in the immediate vicinity of the Project site.

3.9.3 Mitigation and Environmental Management

This section outlines recommended mitigation measures to reduce the potential for adverse effects on socioeconomics.

3.9.3.1 Increased Job Opportunities

No mitigation measures are considered necessary as this is a positive effect.

3.9.3.2 Increased Opportunities for Local Suppliers

No mitigation measures are considered necessary as this is a positive effect.

3.9.3.3 Disruption or Alteration of Traffic Patterns during Project Activities

Advance notice of any Project activities should be posted in areas frequented by the general public. Where possible, activities should be staged to result in partial road closure (if any), rather than full. Appropriate personnel should be employed to coordinate traffic along the road and install clear signage during Project activities warning of large equipment and traffic pattern changes.

TABLE 3-9: Potential Effects of the Project on Socioeconomics

Component / VEC/ VSC	Phase / Activity	Effect Description	Assessment of Residual Effects		
			Proposed Mitigation and Compensation	Residual Effect (Yes/No)	Direction
Socioeconomics					
Economic Opportunity and Services Access	Project activities during deconstruction and remediation	Positive effect of increased job and business opportunities	• None recommended.	No	-
		Disruption or alteration of transportation patterns due to temporary road closures/detours	• Provide advance notice of Project activities and install clear signage warning of traffic pattern changes. • Stage Project activities, where possible, to result in only partial road closure, rather than full closure.	No	-
	Project activities during deconstruction and remediation	Positive effect of increased job and business opportunities	• None recommended.	No	-

3.9.4 Potential Residual Effects

The potential for residual effects remaining after mitigation measures have been implemented is expected to be negligible.

3.9.5 Contribution to Cumulative Effects

As no residual, negative effects have been identified as likely resulting from the Project on socioeconomics, an assessment of contribution to cumulative effects has not been conducted.

3.10 First Nations Communities and Land Use

3.10.1 Baseline

The Project footprint is located within the traditional territory of the Champagne and Aishihik First Nations and is included in their Statement of Intent Boundary.

Traditional use studies and consultation activities have not been performed as part of this assessment, given the limited Project footprint, and an already developed site.

3.10.2 Assessment of Potential Effects

The potential Project effects identified for First Nations interests are associated with a potential interest in, or use of, other valued ecosystem and social components described within this assessment, for example, archaeological and cultural features, fish and fish habitat and terrestrial wildlife and vegetation. The effects on those components (and therefore potential First Nations interests), are described elsewhere in this report. No significant adverse effects have been identified.

3.10.3 First Nations Interests Mitigation

The potential Project effects identified for First Nations interests will be mitigated through the measures proposed for the potential Project effects to the other valued ecosystem and social components described within this assessment.

3.10.4 Potential Residual Effects

No residual effects are expected for the Project with respect to First Nations Communities and First Nations Land use.

3.10.5 Contribution to Cumulative Effects

As no residual effects are expected for the Project with respect to First Nations Communities and First Nations Land use, no cumulative effects are anticipated.

4 SUMMARY OF RESIDUAL EFFECTS

No significant residual environmental effects are expected as a result of the Project activities completed throughout the deconstruction and remediation phase of the Project, following implementation of the mitigation measures proposed in Section 3 Environmental Effects Assessment.

5 SUMMARY OF CUMULATIVE EFFECTS

Residual effects were identified for air quality but these are expected to be minor and insignificant in nature. No additional residual environmental effects are expected as a result of the Project activities associated with the deconstruction and remediation phase of the Project and no interaction between Project activities and other Projects in the vicinity are anticipated. It is considered unlikely that the Project will result in any significant adverse cumulative effects.

6 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

Environmental factors that may pose a risk to the Project activities completed throughout the deconstruction and remediation phase of the Project include earthquakes and flooding.

6.1 Earthquakes

There is a risk of earthquakes in British Columbia, including at the Project site. This risk is typically addressed in the engineering of the works. Potential effects range from relatively minor damage to equipment, to catastrophic failure of the buildings, depending on the severity of the earthquake. The Canadian Building code, engineering standards and practices specify certain measures to minimize the risk of effects from an earthquake. The works should be designed to meet or exceed these measures; therefore, the residual risk of these effects occurring is considered low.

6.2 Flooding

The Project site is not located within a designated floodplain area (BC Water Resource Atlas, 2010). Potential effects of localized flooding may include limited access to and from the Pleasant Camp Port of Entry facility. Mitigation measures for this potential impact may include the use of sandbags or other flood water control methods installed around the port facilities, and preparation of a contingency plan for emergency access in the case of a flooding event. Provided that these mitigation measures are followed, no residual effects are anticipated during Project activities associated with the deconstruction and remediation phase of the Project.

7 ACCIDENTS AND MALFUNCTIONS

This section addresses the potential effects of accidents and malfunctions that may occur during the deconstruction and remediation phase of the Project, and identifies mitigation measures that should be implemented to prevent or reduce the risk and severity of their occurrence.

Accidents and malfunctions that could potentially occur during the respective phases of the Project are expected to be limited to hazardous material spills. Hazardous material spills could occur during the Project activities completed throughout the deconstruction and remediation phase of the Project due to accidents and/or malfunctions associated with:

- Project activity equipment and vehicles (i.e., trucks, excavators, cranes, generators) which may contain fuel, oil, lubricants and other hazardous substances.
- Spills and/or leaks associated with underground fuel lines on Site.
- Spills and/or leaks associated (potential antifreeze solutions) with the on-Site septic system.
- Hazardous materials (such as maintenance oils, antifreeze, and sanitary effluents) contained within the Project boundary.

7.1 Potential Effects

Consequences of potential spill events during construction or operations may include:

- Contamination of groundwater and associated impacts on public health in the case that contaminants reach an aquifer used for human consumption.
- Contamination of on-Site surface waters with associated impacts to downstream aquatic receptors.
- Soil contamination.

7.2 Mitigation Measures

The following mitigation measures should be implemented to minimize the risk and potential adverse environmental effects related to hazardous materials spills:

- Preparation of site or activity specific Environmental Protection Plans (EPPs), including a spill prevention and emergency response plan, and erosion and sediment control plan for Project works.
- Provide appropriate training to personnel in spill prevention and emergency response procedures prior to commencing work.
- Supply spill kits and emergency response procedure documentation to all construction vehicles and heavy equipment.

- Use environmentally friendly biodegradable chemicals and lubricants and low-sulphur fuels, where feasible, in vehicles and equipment.
- Store hazardous materials away from aquatic environments in designated locations constructed from impermeable materials and equipped with drains for collection and transfer of materials to treatment and disposal facilities in the event of a spill.
- Re-fuel, assemble and park trucks and equipment at designated locations which are contained.
- Adhere to all applicable regulatory requirements for transportation of dangerous goods, hazardous materials handling and on-Site fuel storage.

7.3 Potential Residual Effects

There is a potential for residual effects as a result of spills, accidents or malfunctions; however, fuel and other hazardous material usage at the Site as a result of the proposed scope of work is anticipated to be equivalent to that of current operations and therefore does not result in increased potential for residual impacts at the Site. This potential effect can be minimized through the preparation and implementation of an effective emergency response plan and best management practices.

8 CONCLUSIONS AND COMMITMENTS

This section provides conclusions and commitments for each of the environmental and social components for this Project.

8.1 *Air*

The potential effects of the Project on air quality during the activities associated with the deconstruction and remediation phase include adverse impacts from equipment emissions, fugitive dust (including potential asbestos) during building demolition, and emissions of greenhouse gases.

Any potential adverse impacts to local air quality from the Project would mainly result from emissions of criteria air contaminants and greenhouse gases during Project activities associated with deconstruction and remediation. Effective mitigation measures include avoiding unnecessary idling in cold weather, using electrical heaters rather than idling to prevent engine freeze, ensuring vehicles and equipment are maintained to the manufacturer's specifications, avoiding soil exposure during dry periods and covering stockpiled soil with measures such as tarps, or straw mulch to minimize the potential of wind erosion.

8.2 *Surface Water and Groundwater*

The potential effects of the Project on surface and groundwater quality during the activities completed throughout the deconstruction and remediation phase include changes to surface water quality and turbidity and hazardous spills to ground. On-site surface water quality is not expected to be adversely affected by the Project; however, exposed sediments and other potentially deleterious substances which may result from the Project have the potential to migrate via surface water drainage. Potential effects on water quality are not anticipated if the following mitigation measures are followed:

- Develop an erosion and sediment control plan.
- Develop a spill prevention and emergency response plan.
- Establish staging area(s) for fuelling equipment. The staging areas should be at least 30 m from area ditches and surface water drainages.

8.3 *Soils and Terrain*

The potential effects on soil quality during the deconstruction and remediation phase includes: a reduction in soil quality or availability due to soil compaction or introduction of pollutants to soils; and increased soil erosion from Project activities. Site-specific recommendations to reduce potential adverse impacts to area soil include the development of erosion and sediment control measures and a spill prevention and emergency response plan for the activities associated with the deconstruction and remediation phase of the project.

8.4 Fish, Fish Habitat, Aquatic Wildlife and Aquatic Wildlife Habitat

No direct impacts to fish, fish habitat, aquatic wildlife and aquatic wildlife habitat are anticipated; however, exposed sediments and other potentially deleterious substances which may result from land clearing and excavation activities, releases from fuelling or staging areas, or other activities during the Project activities have the potential to migrate via surface water drainages. Mitigation measures should be implemented during Project activities to minimize the potential for erosion and to prevent sediment and other deleterious substances. Mitigation measures should include the development of an erosion and sediment control plan as well as monitoring of the effectiveness of this plan.

8.5 Terrestrial Wildlife, Birds and Vegetation

Project activities are limited to the previously disturbed Site footprint and do not include the removal of any riparian vegetation in proximity (within 30 m) of watercourses. In addition, poor housekeeping or unsuitable waste storage on the Site may inadvertently attract area wildlife to the Site.

Recommended mitigation measures include having a qualified professional conduct a habitat assessment for owls/raptors in the area if Project activities are planned during the active nesting period. Any nests (or additional bird species observed in the area) within 200 m of the Site should be identified and appropriate mitigation measures should be developed as deemed necessary. Disruptive Project activities (blasting, etc.) should be avoided during sensitive breeding, migratory or nesting periods. Potential wildlife attractants such as food waste should be disposed in appropriate containers and general housekeeping best management practices should be adhered to during the construction and operations / maintenance activities completed throughout the deconstruction and remediation phase of the Project.

8.6 Archaeology, Cultural and Heritage Features

Although there have been no archaeological resources identified within the Project site, site preparation, particularly intrusive works, could potentially disturb or destroy previously unidentified archaeological resources if Project activities are to occur on previously undisturbed areas. In the unlikely event that cultural materials, archaeological features, and/or human remains are encountered during construction, all work should cease and the Archaeology Branch of the BC Ministry of Tourism, Culture and the Arts should be contacted, as well as the local police.

8.7 Land and Resource Use

Effects on land and resource use in the Project area are not anticipated as the Project involves only the replacement or upgrade of existing facilities and the Pleasant Camp Port of Entry will continue to function as a land border crossing.

8.8 Public Health and Safety and Noise

The potential effects on public health and safety, and noise during the activities completed throughout the deconstruction and remediation phase of the Project include: potential public safety impacts from traffic due to changes in traffic patterns and adverse impacts on local residents from Project activity noise and potential transient asbestos fibres resulting from building demolition. Mitigation measures such as advanced notice of any Project activities to the surrounding communities, coordination of traffic by trained personnel, clear signage warning of large equipment or traffic pattern changes and secure fencing of equipment and work sites should be implemented to minimize the potential effects. Project activities should also be staged and limited to daytime hours to reduce noise impacts. A building survey for asbestos (and other hazardous building materials) should be conducted prior to building demolition. If asbestos is confirmed present in existing building materials the materials should be managed/controlled in accordance with the EMA and BC HWR.

Potential adverse effects to public health and safety, and noise quality are anticipated to be minimal during the construction and operations / maintenance activities completed throughout the deconstruction and remediation phase of the Project due to implementation of recommended mitigation measures.

8.9 Socioeconomics

The potential effects on socioeconomics during the deconstruction and remediation phase of the Project include: positive effects through increased job opportunities and increased opportunities for local suppliers; as well as adverse impacts from disruption or alteration of transportation patterns, temporary road closures and detours during the Project activities associated with the deconstruction and remediation phase. Potential adverse effects from the Project on socioeconomics are expected to be low due to the relatively small scale of the Project.

8.10 First Nations Communities and Land Use

The potential Project effects identified for First Nations interests are associated with a potential interest in, or use of, other valued ecosystem and social components described within this assessment, for example, archaeological and cultural features, and fish and fish habitat. The effects on those components and, therefore, potential First Nations interests, are described elsewhere in this report. No significant adverse effects have been identified.

8.11 Accidents and Malfunctions

There is a potential for residual effects as a result of spills, accidents or malfunctions; however, fuel and other hazardous material usage at the Site as a result of the proposed upgrades is anticipated to be equivalent to that of current operations and therefore does not result in increased potential for residual impacts at the Site. This potential effect can be minimized through the preparation and implementation of an effective emergency response plan and best management practices.

8.12 Effects of the Environment on the Project

An assessment of potential effects of the environment on the Project was conducted and considered environmental factors such as earthquakes and flooding. With appropriate standards and specifications in place for structures and regular inspections and maintenance, potential adverse effects from the environment on the Project are considered insignificant.

8.13 Environmental Management and Monitoring

The Project should comply with the general guidelines, best management practices and mitigation measures outlined in this environmental assessment report. With these measures in place potential construction effects of the Project are considered to be insignificant and ongoing environmental monitoring is not anticipated to be required.

8.14 Summary of Effects

The Project activity effects are predicted to be insignificant, taking into account the limited footprint and the short duration of the scope of the Project. There are no known environmental issues that cannot be addressed through routine mitigation measures and environmental best management practices. With these measures in place, potential operation and maintenance activities completed throughout the deconstruction and remediation phase of the Project are also considered to be insignificant. In summary, based on the knowledge of the Project available as of this date, and taking into account the implementation of the mitigation measures described in this assessment, the Project is not likely to cause significant adverse environmental effects.

Potential residual effects are identified with respect to air quality; however these are minor in nature. No interaction between Project activities and any other Projects in the vicinity is anticipated, and the Project is not considered to contribute to cumulative effects.

Table 9-1 summarizes potential effects on VECs and VSCs, and appropriate measures for their avoidance and mitigation (where required). The significance of potentially remaining residual effects was also included.

TABLE 8-1: Potential Effects Summary

Component / VEC	Phase / Activity	Effect Description	Assessment of Residual Effects		
			Proposed Mitigation and Compensation	Residual Effect (Yes/No) & Direction	Follow-Up Required
Air Quality					
Local Air Quality	Project activities during deconstruction and remediation	Adverse impact on local air quality from equipment emissions and fugitive dust, during Project activities.	• Avoid unnecessary idling. In cold weather, where possible, use electrical heaters rather than idling to prevent engine freeze. • Ensure vehicles and equipment are maintained to the manufacturer's specifications. • Where possible, avoid soil exposure during dry periods. • Cover stockpiled soil with measures such as tarps, or straw mulch to minimize the potential of wind erosion. • If required, burning will comply with *The Open Burning Smoke Control Regulation* and adhere to the conditions outlined in the burn registration number administered by the regional MFLNRO office. • Ensure thermal desorption treatment equipment is maintained to the manufacturer's specifications and proper controls are in place.	Yes, Negative	No
	Operation & maintenance activities during reconstruction and remediation	Adverse impact on local air quality from equipment emissions and fugitive dust.	• Avoid unnecessary idling. In cold weather, where possible, use electrical heaters rather than idling to prevent engine freeze. • Ensure vehicles and equipment are maintained to the manufacturer's specifications.	No	No

TABLE 8-1 (Cont'd): Potential Effects Summary

Component / VEC	Phase / Activity	Effect Description	Assessment of Residual Effects		
			Proposed Mitigation and Compensation	Residual Effect (Yes/No) & Direction	Follow-Up Required
Air Quality					
Greenhouse Gas Concentrations	Project activities during deconstruction and remediation	Greenhouse gas emissions.	• Avoid unnecessary idling. In cold weather, where possible, use electrical heaters rather than idling to prevent engine freeze. • Ensure vehicles and equipment are maintained to the manufactures specifications.	Yes, Negative	No
	Operation & maintenance activities during reconstruction and remediation	Greenhouse gas emissions.	• Avoid unnecessary idling. In cold weather, where possible, use electrical heaters rather than idling to prevent engine freeze. • Ensure vehicles and equipment are maintained to the manufacturer's specifications.	No	No
Surface and Groundwater Quality					
Water Quality	Project activities during deconstruction and remediation	Adverse changes to surface water quality and turbidity. Hazardous spills to aquatic habitat or to ground.	• Develop an erosion and sediment control plan. • Develop a spill prevention and emergency response plan. • Establish staging area(s) for fuelling and equipment. Staging areas should be at least 30 m from creeks, area ditches and surface water drainages.	No	No
	Operation & maintenance activities during reconstruction and remediation	Adverse changes to surface water quality. Hazardous spills to aquatic habitat or to ground. Excess nutrients or chemicals applied to the landscaped areas to enter drainage areas.	• Develop a spill prevention and emergency response plan.	No	No

TABLE 8-1 (Cont'd): Potential Effects Summary

Component / VEC	Phase / Activity	Effect Description	Assessment of Residual Effects		
			Proposed Mitigation and Compensation	Residual Effect (Yes/No) & Direction	Follow-Up Required
Soil Quality					
Soil Quality	Project activities during deconstruction and remediation	Reduction in soil quality or availability due to soil compaction or introduction of pollutants to soils during Project activity, and increased soil erosion.	• Implement sediment and erosion control measures. For example, cover exposed soil with tarps or straw mulch. • Restrict the operation of heavy machinery to designated areas to minimize the potential of soil compaction. • Implement industry best management practices for hazardous material handling (e.g., fuel in designated areas, security and secondary containment in fuel storage areas, minimize the amount of hazardous material stored on Site, spill kit present on Site, posted emergency procedures) to minimize the potential for an accidental release (e.g., spill) of pollutants. • Develop site-specific spill contingency plans.	No	No
	Operation & maintenance activities during reconstruction and remediation	Reduction in soil quality or availability due to soil compaction or introduction of pollutants to soils.	• Develop site-specific spill contingency plans.	No	No

TABLE 8-1 (Cont'd): Potential Effects Summary

Component / VEC	Phase / Activity	Effect Description	Assessment of Residual Effects		
			Proposed Mitigation and Compensation	Residual Effect (Yes/No) & Direction	Follow-Up Required
Fish, Fish Habitat, Aquatic Wildlife and Aquatic Wildlife Habitat					
Fish, Fish Habitat, Aquatic Wildlife and Aquatic Wildlife Habitat	Project activities and maintenance during deconstruction and remediation	Exposed sediments and other potentially deleterious substances which may result from land clearing and excavation activities, releases from fuelling or staging areas, or other activities have the potential to migrate via surface water drainages.	• Develop an erosion and sediment control plan. • Develop a spill prevention and emergency response plan. • Establish staging area(s) for fuelling equipment in developed areas. The staging areas should be at least 30 m from creeks, area ditches and surface water drainages.	No	No
Terrestrial Wildlife, Birds and Vegetation					
Vegetation	Project activities (including demolition) during deconstruction and remediation	Increased opportunity for establishment or spread of invasive plant species from Project activities and exposing of soils on the Project site.	• Properly clean all equipment prior to accessing the Project site to reduce the introduction and spread of invasive plant species.	No	-
Terrestrial Wildlife, Birds and Vegetation	Project activities (including demolition) during deconstruction and remediation	Loss or alteration of wildlife habitat.	• Mark site boundaries to prevent inadvertent clearing outside the boundary, and demarcate areas where vegetation should be retained in the field. • Avoid tree and shrub clearing as much as possible.	No	-

TABLE 8-1 (Cont'd): Potential Effects Summary

Component / VEC	Phase / Activity	Effect Description	Assessment of Residual Effects Proposed Mitigation and Compensation	Residual Effect (Yes/No) & Direction	Follow-Up Required
Terrestrial Wildlife, Birds and Vegetation (Cont'd)					
Terrestrial Wildlife, Birds and Vegetation	Project activities (including demolition) during deconstruction and remediation	Mortality and injury to individual animals (e.g., as a result of: vehicle-wildlife collisions; ingestion of solid waste, antifreeze or other toxic fluids; and unauthorized hunting, feeding or harassment of wildlife by personnel). Adverse physiological or behavioural effects from construction disturbance (e.g., adverse effect of noise or light on nesting or mating function).	• If demolition/construction activities are planned during the bird nesting season, a qualified professional shall conduct active nest surveys to identify presence or absence of active songbird or raptor nests at least 24 hours prior to Project activities. • Implement appropriate waste management practices to prevent poisoning of wildlife. • Report vehicle-wildlife collisions, install warning signs and impose reduced speed limits in areas where collisions may occur. • Address prevention and mitigation of wildlife mortality/morbidity in training and awareness sessions for construction personnel. • Avoid unnecessary noise and other disruption. • Potential wildlife attractants such as food waste should be disposed in appropriate containers. General housekeeping best management practices should also be adhered to.	No	No

TABLE 8-1 (Cont'd): Potential Effects Summary

Component / VEC	Phase / Activity	Effect Description	Assessment of Residual Effects		
			Proposed Mitigation and Compensation	Residual Effect (Yes/No) & Direction	Follow-Up Required
Terrestrial Wildlife, Birds and Vegetation (Cont'd)					
	Operation & maintenance activities during deconstruction and remediation	Mortality and injury to individual animals (e.g., as a result of: vehicle-wildlife collisions; ingestion of solid waste, antifreeze or other toxic fluids; and unauthorized hunting, feeding or harassment of wildlife by personnel).	• Report vehicle-wildlife collisions, install warning signs and impose reduced speed limits in areas where collisions may occur. • Avoid unnecessary noise and other disruption. • Potential wildlife attractants such as food waste should be disposed in appropriate containers (during all phases of the project). General housekeeping best management practices should also be adhered to.	No	No
Public Health & Safety and Noise					
Health	Project activities during deconstruction and remediation	Public safety impacts from traffic due to changes in traffic patterns.	• Install clear signage during construction warning of large equipment, traffic pattern changes. • Employ person on Site to coordinate traffic along road.	No	No
		Adverse impacts on local residents from Project activity noise.	• Stage Project activities, where possible, during regular daytime hours. • Provide advance notice of activities during irregular / night time hours.	No	No
		Adverse impacts to construction workers and local residents as a result of transient asbestos fibres resulting from building demolition.	• A building survey for asbestos (and other hazardous building materials) should be conducted prior to building demolition. If asbestos is confirmed present in existing building materials the materials should be managed/ controlled in accordance with the Environmental Management Act and BC Hazardous Waste Regulation.	No	No

TABLE 8-1 (Cont'd): Potential Effects Summary

Component / VEC	Phase / Activity	Effect Description	Assessment of Residual Effects		
			Proposed Mitigation and Compensation	Residual Effect (Yes/No) & Direction	Follow-Up Required
Socioeconomics					
Economic Opportunity and Services Access	Project activities during deconstruction and remediation	Positive effect of increased job and business opportunities.	• None recommended.	No	No
		Disruption or alteration of transportation patterns due to temporary road closures/detours.	• Provide advance notice of Project activities and install clear signage warning of traffic pattern changes. • Stage Project activities, where possible, to result in only partial road closure, rather than full closure.	No	No
	Project activities during deconstruction and remediation	Positive effect of increased job and business opportunities.	• None recommended.	No	No

9 NOTICE TO READER

This report has been prepared by the Environment & Water business unit of SNC-Lavalin Inc. (SNC-Lavalin) for Canada, who has been party to the development of the scope of work for this project and understands its limitations. Copyright of this report vests with Her Majesty the Queen in Right of Canada. This report was prepared in accordance with a services contract between SNC-Lavalin and Canada, including General Conditions 2035 of the Standard Acquisition Clauses and Conditions (SACC) Manual.

This report is intended to provide information to Canada to assist it in making business decisions. SNC-Lavalin is not a party to the various considerations underlying the business decisions, and does not make recommendations regarding such business decisions.

The findings, conclusions and recommendations in this report have been developed in a manner consistent with the level of skill normally exercised by environmental professionals currently practising under similar conditions in the area. The findings contained in this report are based, in part, upon information provided by others. If any of the information is inaccurate, modifications to the findings, conclusions and recommendations may be necessary.

The findings, conclusions and recommendations presented by SNC-Lavalin in this report reflect SNC-Lavalin's best judgement based on the site conditions at the time of the site inspection on the date(s) set out in this report and on information available at the time of preparation of this report. They have been prepared for specific application to this site and are based, in part, upon visual observation of the site in June 2008 and October 2012, review and analysis of available mapping and other information from regional, provincial, and federal government agencies as described in this report during a specific time interval. The findings cannot be extended to previous or future site conditions or to portions of the site which were unavailable for direct observation, subsurface locations which were not investigated directly, or materials or analysis which were not specified. Substances, plant or animal species, other than those described may exist within the site, reported substance parameters may exist in areas of the site not investigated, and concentrations of substances greater or less than those reported may exist between sample locations.

The findings and conclusions of this report are valid only as of the date of this report. If site conditions change, new information is discovered, or unexpected site conditions are encountered in future work, including excavations, borings, or other studies, SNC-Lavalin should be requested to re-evaluate the findings, conclusions and/or recommendations of this report, and to provide amendments as required.

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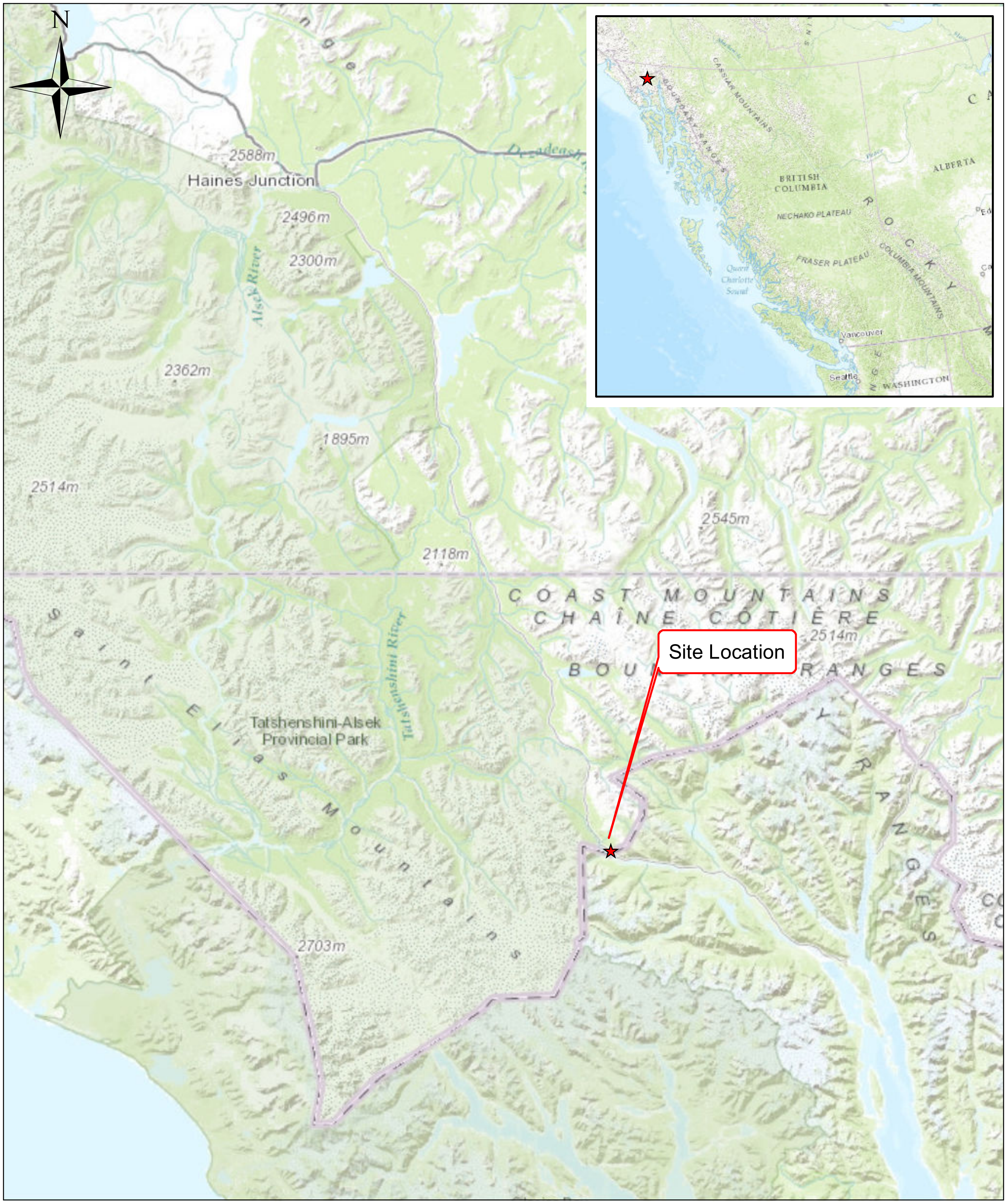
11 LIST OF ACRONYMS

ºC	Degrees Celsius
AOA	Archaeological Overview Assessment
asl	Above sea level
AST	Aboveground Storage Tank
BC	British Columbia
BC CDC	BC Conservation Data Centre
BCEAA	BC Environmental Assessment Act
BMPs	Best Management Practices
CACs	Criteria Air Contaminants
CBSA	Canada Border Services Agency
CDC	Conservation Data Centre
CEAA	Canadian Environmental Assessment Act
CH_4	Methane
cm	Centimetre
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CWHwm	Coastal Western Hemlock Wet Maritime
EA	Environmental Assessment
EMA	Environmental Management Act
EPPs	Environmental Protection Plans
FRPA	Forest and Range Practices Act
FY	Fiscal Year
gal	Gallon
GHGs	Greenhouse Gases
Golder	Golder Associates
ha	Hectare

HWR	*Hazardous Waste Regulation* (HWR), B.C. Reg. 63/88, including amendments up to B.C. Reg. 63/2009
km	Kilometre
L	Litre
LNAPL	Light non-aqueous phase liquid
m	Metre
MFLNRO	Ministry of Forests, Lands and Natural Resource Operations
mm	Millimetre
MoE	Ministry of Environment
MoFR	Ministry of Forests and Range
MoTI	Ministry of Transportation and Infrastructure
N_2O	Nitrous Oxide
NO	Nitrogen Oxide
PM	Particulate Matter
PWGSC	Public Works and Government Services Canada
RL	Residential Land Use
SARA	Species at Risk Act
SO_2	Sulphur Dioxide
SLE	SNC-Lavalin Inc., Environment Division
SNC-Lavalin	The Environment & Water business unit of SNC-Lavalin Inc.
SVE	Soil Vapour Extraction
TSS	Total Suspended Solids
UST	Underground Storage Tank
VECs	Valued Ecosystem Components
VOC	Volatile Organic Compounds
VSCs	Valued Social Components

DRAWINGS

- 511502-001 – Location Plan
- 511502-002 – Key Plan
- 511502-003 – Pleasant Camp Facility Overview and Habitat
- 511502-004 – Wide Area Site Plan
- 511502-005 – Site Plan
- 511502-006 – Proposed Remedial Excavation Area
- 511502-007 – Proposed Port Development Plan



LEGEND

★ Site Location

NOTES

1. Original in colour.
2. Numerical scale reflects full-size print. Print scaling will distort this scale, however scale bar will remain accurate.
3. Intended for illustration purposes, accuracy has not been verified for construction or navigation purposes.

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CLIENT NAME:
PUBLIC WORKS & GOVERNMENT SERVICES CANADA

PROJECT LOCATION:
CANADIAN BORDER SERVICES AGENCY
PORT OF PLEASANT CAMP, BC

LOCATION PLAN

0 27,500 55,000 110,000 165,000 220,000 Meters

BY:	LH	DATE:	2015/02/10	REF No:	REV: 0
CHK'D:	DWB	SCALE:	1:2,500,000	511502-001	

\\Proj_srv\projects\Current Projects\Public Works and Gov't Services Canada\511502 - Pleasant Camp\Geomatics\GIS\Map Series\511502-001_LocPlan.mxd

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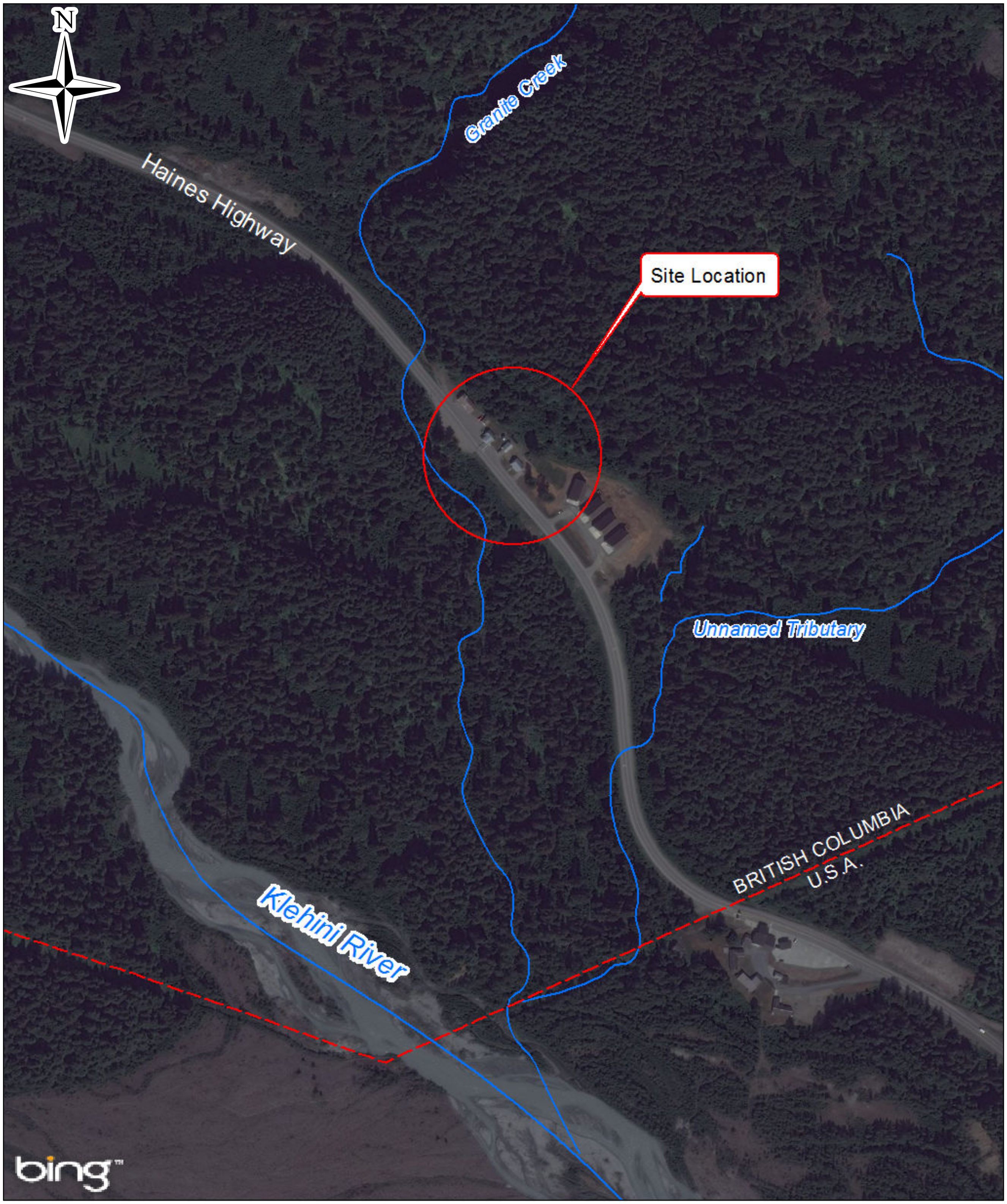

LEGEND

- - - National Border

— Streams

NOTES

1. Original in colour.
2. Numerical scale reflects full-size print. Print scaling will distort this scale, however scale bar will remain accurate.
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CLIENT NAME:
PUBLIC WORKS & GOVERNMENT SERVICES CANADA

PROJECT LOCATION:
CANADA BORDER SERVICES AGENCY
PORT OF PLEASANT CAMP, BC

KEY PLAN

0 75 150 300 450 600 Meters

BY:	LH	DATE:	2015/02/10	REF No:	REV: 0
CHK'D:	DWB	SCALE:	1:6,000	511502-002	

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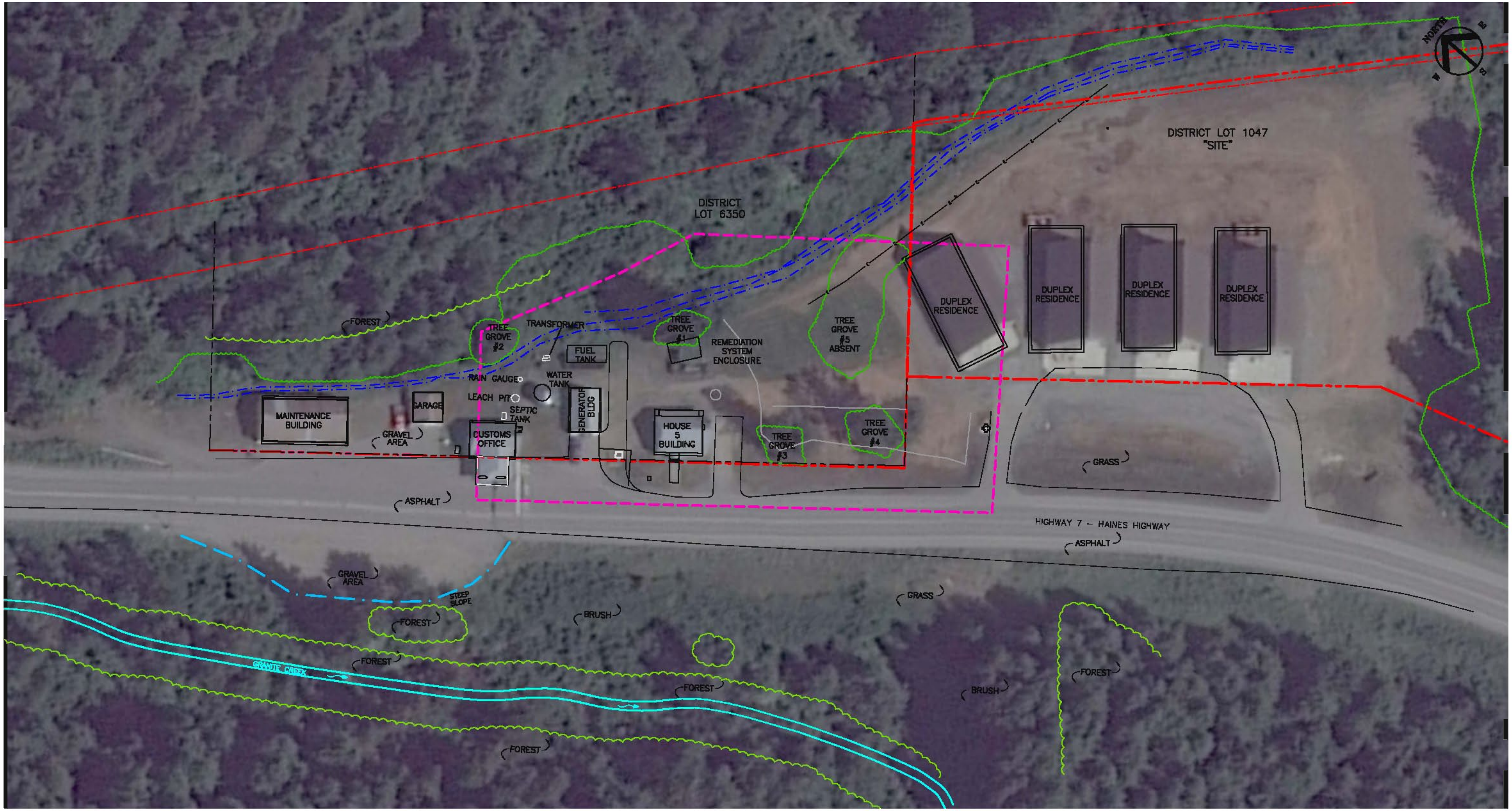

LEGEND

0 10 20 30 40 METRES

▬ ▬ ▬	FOOTPRINT
▬ - - ▬	DISTRICT LOT LINE
— - - —	LOT BOUNDARY
〰〰〰	TREELINE
▬ ▬ · ▬	STEEP SLOPE
——	CREEK
-·—·—	DITCH
—·-·—	PIPELINE RIGHT OF WAY (ROW)

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED ON SITE. NOT ALL UTILITIES MAY BE SHOWN.

REFERENCE DRAWINGS

DWG. NO.	DATE	DESCRIPTION
–	–	–

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
0	2013–03–31	ISSUED TO CLIENT	AJK	DWB

SNC · LAVALIN

CLIENT NAME:
PUBLIC WORKS & GOVERNMENT SERVICES CANADA

PROJECT LOCATION:
CANADA BORDER SERVICES AGENCY
PORT OF PLEASANT CAMP, BC

TITLE:
PLEASANT CAMP -
FACILITY OVERVIEW AND HABITAT

DWN BY: LH	SCALE: 1:800	DATE: 2012 11 26	DWG No: REV.: 0
CHK'D: DWB	PLOT: 20131112.1302	CADFILE:511502_003	511502-003

PATH: P:\CURRENT PROJECTS\PUBLIC WORKS AND GOV'T SERVICES CANADA\511502 – PLEASANT CAMP\GEOMATICS\CAD\511502_003.DWG

LEGEND

- LOT BOUNDARY
- FORMER STRUCTURES
- TELEPHONE LINE (UG)
- WATER LINE
- ELECTRICAL LINE
- FUEL LINE
- ELECTRICAL/TELEPHONE LINE
- SEPTIC
- AS/SVE SYSTEM PIPING
- UTILITY CORRIDOR (2011)
- Ⓞ BOREHOLE (OTHER)
- ◓ MONITORING WELL (OTHER)
- ◑ MONITORING WELL (SLE)
- ⊕ BOREHOLE
- Ⓢ AIR SPARGE WELL (SLE)
- Ⓥ SOIL VAPOUR EXTRACTION WELL (SLE)
- Ⓦ SOIL VAPOUR WELL
- ◪ TEST PIT
- ■ TRENCH SAMPLE
- TOPOGRAPHIC MAJOR CONTOUR (2m)
- TOPOGRAPHIC MINOR CONTOUR (0.5m)
- ✪ FLAGPOLE (ARBITRARY DATUM)
- ▼ SURFACE WATER SAMPLING LOCATION
- ◎ FIRE HYDRANT
- ⊕ DESTROYED MONITORING WELL

0 5 10 15
METRES

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED ON SITE. NOT ALL UTILITIES MAY BE SHOWN.

REFERENCE DRAWINGS

No.	DATE	DESCRIPTION
08059/08073	2008-06-28	UNDERHILL GEOMATICS LTD.

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
0	2013-03-31	ISSUED TO CLIENT	AJK	DWB

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CLIENT NAME:
PUBLIC WORKS &
GOVERNMENT SERVICES CANADA

PROJECT LOCATION:
CANADA BORDER SERVICES AGENCY
PORT OF PLEASANT CAMP, BC

TITLE:
WIDE AREA SITE PLAN

DWN BY: JEC	SCALE: 1:300	DATE: 2013-03-25	DWG No: REV.: **0**
CHK'D: DB	PLOT: 20131029.0956	CADFILE: 511502R03	**511502-004**

PATH: P:\CURRENT PROJECTS\PUBLIC WORKS AND GOV'T SERVICES CANADA\511502 – PLEASANT CAMP\GEOMATICS\CAD\511502R03.DWG

LEGEND

0 1 2 10 METRES

▬ ▬ ▬	LOT BOUNDARY
······	FORMER STRUCTURES
—T—	TELEPHONE LINE (UG)
—W—	WATER LINE
—E—	ELECTRICAL LINE
—F—	FUEL LINE
—HT—	ELECTRICAL/TELEPHONE LINE
—SE—	SEPTIC
— — —	AS/SVE SYSTEM PIPING
— — —	UTILITY CORRIDOR (2011)
Ⓞ	BOREHOLE (OTHER)
◓	MONITORING WELL (OTHER)
◕	MONITORING WELL (SLE)
⊕	BOREHOLE
Ⓢ	AIR SPARGE WELL (SLE)
Ⓥ	SOIL VAPOUR EXTRACTION WELL (SLE)
Ⓦ	SOIL VAPOUR WELL
◪	TEST PIT
■	TRENCH SAMPLE
——	TOPOGRAPHIC MAJOR CONTOUR (2m)
——	TOPOGRAPHIC MINOR CONTOUR (0.5m)
✪	FLAGPOLE (ARBITRARY DATUM)
▼	SURFACE WATER SAMPLING LOCATION
◎	FIRE HYDRANT
⦶	DESTROYED MONITORING WELL
—·—·—	CURRENT INFERRED DISSOLVED PHASE HYDROCARBON IMPACTED AREA GREATER THAN CSR AW/DW STANDARDS/FEDERAL GUIDELINES (2012)
—·—·—	APPROXIMATE EXTENT OF SOIL GREATER THAN THE CL GUIDELINES/STANDARDS

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED ON SITE. NOT ALL UTILITIES MAY BE SHOWN.

REFERENCE DRAWINGS

No.	DATE	DESCRIPTION
08059/08073	2008-06-28	UNDERHILL GEOMATICS LTD.

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
0	2013-03-31	ISSUED TO CLIENT	AJK	DWB

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CLIENT NAME:
PUBLIC WORKS &
GOVERNMENT SERVICES CANADA

PROJECT LOCATION:
CANADA BORDER SERVICES AGENCY
PORT OF PLEASANT CAMP, BC

TITLE:
SITE PLAN

DWN BY: JEC | SCALE: 1:200 | DATE: 2013-03-25 | DWG No: | REV.: **0**
CHK'D: DB | PLOT: 20131029.0957 | CADFILE: 511502R03 | **511502-005**

PATH: P:\CURRENT PROJECTS\PUBLIC WORKS AND GOV'T SERVICES CANADA\511502 – PLEASANT CAMP\GEOMATICS\CAD\511502R03.DWG

LEGEND

0 1 2 METRES 10

- LOT BOUNDARY
- FORMER STRUCTURES
- TELEPHONE LINE (UG)
- WATER LINE
- ELECTRICAL LINE
- FUEL LINE
- ELECTRICAL/TELEPHONE LINE
- SEPTIC
- AS/SVE SYSTEM PIPING
- UTILITY CORRIDOR (2011)
- PROPOSED U/G UTILITIES TO BE INSTALLED
- Ⓞ BOREHOLE (OTHER)
- ◓ MONITORING WELL (OTHER)
- ◕ MONITORING WELL (SNC-LAVALIN)
- ⊕ BOREHOLE
- Ⓢ AIR SPARGE WELL (SNC-LAVALIN)
- Ⓥ SOIL VAPOUR EXTRACTION WELL (SNC-LAVALIN)
- Ⓦ SOIL VAPOUR WELL
- ◩ TEST PIT
- ■ TRENCH SAMPLE
- Ⓗ HAND AUGER SAMPLE
- ✪ FLAGPOLE (ARBITRARY DATUM)
- SURFACE WATER SAMPLING LOCATION
- FIRE HYDRANT
- DESTROYED MONITORING WELL
- 🟨 AREA 1 INFERRED EXTENT OF IMPACTED SOILS (APPROXIMATE)
- 🟨 AREA 2 INFERRED EXTENT OF IMPACTED SOILS (APPROXIMATE)
- 🟫 AREA 3 INFERRED EXTENT OF IMPACTED SOILS (APPROXIMATE)
- 🟧 AREA 4 INFERRED EXTENT OF IMPACTED SOILS (APPROXIMATE)
- INFERRED EXTENT OF HYDROCARBON IMPACTED SOILS >CL/RL STANDARDS/GUIDELINES
- APPROXIMATE LIMIT OF EXCAVATION TOP OF SLOPE (ASSUMES 2H:1V SLOPE)

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED ON SITE. NOT ALL UTILITIES MAY BE SHOWN.

REFERENCE DRAWINGS

No.	DATE	DESCRIPTION
08059/08073	2008-06-28	UNDERHILL GEOMATICS LTD.

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
1	2015-02-11	ISSUED TO CLIENT	AJK	DWB
0	2013-03-31	ISSUED TO CLIENT	AJK	DWB

SNC·LAVALIN

CLIENT NAME:
PUBLIC WORKS &
GOVERNMENT SERVICES CANADA

PROJECT LOCATION:
CANADA BORDER SERVICES AGENCY
PORT OF PLEASANT CAMP, BC

TITLE:

PROPOSED REMEDIAL EXCAVATION AREA

DWN BY: AJK
SCALE: 1:200
DATE: 2013-03-25
DWG No: REV.: 1
CHK'D: DWB
PLOT: 20150211.1137
CADFILE: 511502-SR0
511502-006

PATH: P:\CURRENT PROJECTS\PUBLIC WORKS AND GOV'T SERVICES CANADA\511502 – PLEASANT CAMP\GEOMATICS\CAD\511502-SR0.DWG

LEGEND

0 1 2 10 METRES

- LOT BOUNDARY
- FORMER STRUCTURES
- T — TELEPHONE LINE (UG)
- W — WATER LINE
- E — ELECTRICAL LINE
- F — FUEL LINE
- HT — ELECTRICAL/TELEPHONE LINE
- SE — SEPTIC
- AS/SVE SYSTEM PIPING
- UTILITY CORRIDOR (2011)
- F — LD — PROPOSED U/G UTILITIES TO BE INSTALLED

- ⓪ BOREHOLE (OTHER)
- ◓ MONITORING WELL (OTHER)
- ◉ MONITORING WELL (SNC–LAVALIN)
- ⊕ BOREHOLE
- Ⓢ AIR SPARGE WELL (SNC–LAVALIN)
- Ⓥ SOIL VAPOUR EXTRACTION WELL (SNC–LAVALIN)
- Ⓦ SOIL VAPOUR WELL
- ◪ TEST PIT
- ■ TRENCH SAMPLE
- Ⓗ HAND AUGER SAMPLE

- ✪ FLAGPOLE (ARBITRARY DATUM)
- Ⓨ SURFACE WATER SAMPLING LOCATION
- ✿ FIRE HYDRANT
- ⦶ DESTROYED MONITORING WELL
- PROPOSED LOCATION OF FUTURE

- 🟩 ACCESS ROADWAY FOR PORT FACILITY (PRELIMINARY)
- 🟪 PROPOSED LOCATION OF FUTURE PORT FACILITY BUILDINGS/STRUCTURES (PRELIMINARY)
- ‒ ‒ ‒ APPROXIMATE LIMIT OF EXCAVATION TOP OF SLOPE (ASSUMES 2H:1V SLOPE)

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED ON SITE. NOT ALL UTILITIES MAY BE SHOWN.

REFERENCE DRAWINGS

No.	DATE	DESCRIPTION
08059/08073	2008–06–28	UNDERHILL GEOMATICS LTD.

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
1	2015–02–11	ISSUED TO CLIENT	AJK	DWB
0	2013–03–31	ISSUED TO CLIENT	AJK	DWB

SNC·LAVALIN

CLIENT NAME:
PUBLIC WORKS &
GOVERNMENT SERVICES CANADA

PROJECT LOCATION:
CANADA BORDER SERVICES AGENCY
PORT OF PLEASANT CAMP, BC

TITLE:

PROPOSED PORT DEVELOPEMENT PLAN

DWN BY: AJK	SCALE: 1:200	DATE: 2013–03–25	DWG No: REV.: 1
CHK'D: DWB	PLOT: 20150211.1137	CADFILE: 511502–SR0	SR-003

PATH: P:\CURRENT PROJECTS\PUBLIC WORKS AND GOV'T SERVICES CANADA\511502 – PLEASANT CAMP\GEOMATICS\CAD\511502–SR0.DWG

APPENDIX I

Photographs

Photograph 1: Area vegetation southwest of the Site (June, 2008).

Photograph 2: Border crossing facility, facing west, with generator building, water tank and fuel tank in foreground (June, 2008).

Photograph 3: On-site vegetation (June, 2008). Note: Tree Grove 5 (conifers) in centre and Tree Grove 4 (cottonwoods) on right.

Photograph 4: Granite Creek (June, 2008).

Photograph 5: View of new residential units (#1 to 8 from right), facing east (October 2011).

Photograph 6: Tree Grove 1 north of remediation system enclosure, facing East towards forested slope (October, 2012).

Photograph 7: Tree Grove 2, north of customs building, facing north (October 2012).

Photograph 8: View of fuel tank, generator building and water tank, with ditch to right and Grove 2 in background, facing west (October 2012).

Photograph 9: Tree Grove 3 (foreground) and Tree Grove 4 (rear), facing southeast towards Haines Highway (October 2012).

Photograph 10: View from Tree Grove 4 to the northwest, with Tree Grove 1 to centre-left (October 2012). Note: Tree Grove 5 is absent.

Photograph 11: View from Tree Grove 4 to the northeast, with House #8 visible on right (October 2012). Note: Tree Grove 5 is absent.

Photograph 12: Ditch and vegetated slope behind Tree Grove 1, facing east (October 2012).

Photograph 13: View of area on the west side of the maintenance building, facing east (October 2012).

Photograph 14: Swale behind conifer west of maintenance building, facing southeast (October 2012).

Photograph 15: View of swale facing west. Swale leads towards Granite Creek (October 2012).

Photograph 16: Grizzly bears on side of Haines Highway between Haines Junction and Pleasant Camp (October 2012).

APPENDIX II

Species At Risk Search Results

Table 1:	Plant Species At Risk Potentially Occurring in the Pleasant Camp Project Area
Table 2:	Ecological Communities at Risk Potentially Occurring in the Pleasant Camp Project Area
Table 3:	Wildlife Species at Risk Potentially Occurring at the Pleasant Camp Project Site and in Surrounding Areas

TABLE 1: Plant Species At Risk Potentially Occurring in the Pleasant Camp Project Area

Scientific Name	English Name	Agency Listing	Status*	Preferred Habitat	Probability of Occurrence on the Project Site
Vascular					
Callitriche heterophylla var. *heterophylla*	Two-edged water-starwort	BC Government	Blue	Shallow ponds, slow-moving streams and shorelines in the lowland and montane zones	Low. Unsuitable Habitat.
Cornus suecica	Dwarf bog bunchberry	BC Government	Red	Moist to mesic forests and meadows in the lowland to alpine zones; rare in coastal BC	Moderate. Limited potential in forested habitat around the Project site.
Epilobium hornemannii ssp. *behringianum*	Hornemann's willowherb	BC Government	Blue	Wet to moist rocky cliffs, meadows, thickets, and river banks in the montane zone; frequent throughout BC	Moderate. Limited potential in thickets and riparian habitat along Granite Creek.
Juncus arcticus ssp. *alaskanus*	Arctic rush	BC Government	Blue	Tidal flats and lakeshores in the lowland and montane zones; ssp. alaskanus rare in N and E BC	Low. Unsuitable Habitat.
Micranthes nelsoniana var. *carlottae*	Dotted saxifrage	BC Government	Blue	Moist rock outcrops, ledges and streambanks from the montane to alpine zones; endemic to BC and SE AK	Moderate. Limited potential along Granite Creek.
Nephroma occultum	Cryptic paw	BC Government; SARA	Blue; Schedule 1 (Special Concern)	Infrequent over conifers in open humid old-growth maritime and intermontane forests at lower elevations; endemic to North America	Low. Unsuitable Habitat.
Pinguicula villosa	Hairy butterwort	BC Government	Blue	Bogs and ponds (usually in Sphagnum) in the lowland and montane zones; rare in NW, NE and WC BC	Low. Unsuitable Habitat.
Potamogeton perfoliatus	Perfoliate pondweed	BC Government	Blue	Lakes in the montane zone; rare in BC north of 53 N	Low. Unsuitable Habitat.

* Red-listed species are extirpated, endangered, or threatened. Blue-listed species are of special concern.
Search Criteria – Search Type: Plant AND Forest District: Skeena Stikine Forest District - Cassiar (DSS_C); AND Ministry of Environment (MoE) Region: 6 – Skeena AND Regional Districts: Stikine (SKRD); AND Habitat Types: Forest, Grassland/Shrub Steppe, Lakes, Riparian, Rock/Sparsely Vegetated Rock, Shrubland, Stream, River, and Wetland; AND BGC Zone Coastal Western Hemlock (CWH) AND Restricted to Red, Blue, and Legally designated species. [Search Performed: October 12, 2012]

TABLE 2: Ecological Communities at Risk Potentially Occurring in the Pleasant Camp Project Area

Scientific Name	English Name	Agency Listing	Status	Present on Site
Alnus incana / Equisetum arvense	Mountain alder / common horsetail	BC Government	Blue	Unlikely
Carex sitchensis - Oenanthe sarmentosa	Sitka sedge - Pacific water-parsley	BC Government	Blue	Unlikely
Carex sitchensis / Sphagnum spp.	Sitka sedge / peat-mosses	BC Government	Red	Unlikely
Myrica gale / Carex sitchensis	Sweet gale / Sitka sedge	BC Government	Red	Possible
Picea sitchensis / Lysichiton americanus	Sitka spruce / skunk cabbage	BC Government	Blue	Possible
Picea sitchensis / Rubus spectabilis Wet Maritime	Sitka spruce / salmonberry Wet Maritime	BC Government	Blue	Possible
Populus trichocarpa - Alnus rubra / Rubus spectabilis	Black cottonwood - red alder / salmonberry	BC Government	Blue	Possible
Tsuga heterophylla - Picea sitchensis / Hylocomium splendens	Western hemlock - Sitka spruce / step moss	BC Government	Blue	Possible
Tsuga heterophylla / Sphagnum girgensohnii	Western hemlock / common green peat-moss	BC Government	Blue	Unlikely

* Search Criteria – Search Type: Ecological Communities AND Ecosystem Realm-Groups: Terrestrial - Flood OR Terrestrial - Forest OR Terrestrial - Grassland OR Terrestrial - Hydrogenic OR Terrestrial - Subalpine (shrub) OR Wetland - Mineral OR Wetland - Peatland AND Forest Districts: Skeena Stikine Forest District (DSS) (Provincially red and blue listed communities) AND MOE Regions: 6- Skeena AND Regional Districts: Stikine (SKRD) AND BGC Zone, Subzone, Variant, Phase: CWHwm [Search performed: October 12, 2012]

TABLE 3: Wildlife Species at Risk Potentially Occurring at the Pleasant Camp Project Site and in Surrounding Areas

Scientific Name	English Name	Agency Listing	Status	Preferred Habitat	Probability of Occurrence on the Project Site
Amphibians					
Anaxyrus boreas	Western Toad	BC Government, COSEWIC/SARA	Blue, Special Concern / Schedule 1	Variety of forested, brush and mountain meadow areas. Breed in ponds or shallow lake edges. Hatchlings and tadpoles line in the warmest, shallowest water available.	Low. No breeding habitat present.
Birds					
Asio flammeus	Short-eared Owl	BC Government, Identified Wildlife (May 2004), COSEWIC/SARA	Blue, Special Concern / Schedule 1	Extensive areas of open habitats including dry marshes, estuaries, fields, forest clearings, grasslands and rangeland / farmland, but is absent from heavily forested areas. Nest on the ground under low shrubs, reeds or grasses, usually near water; nest sites in BC found adjacent to agricultural areas in shrubby grass fields, grass 20-90 cm high, crude nests on the ground	Low. Unsuitable habitat.
Bartramia longicauda	Upland Sandpiper	BC Government	Red	Closely tied to tall grass, and occasionally mid-grass, prairie habitats for nesting; shortgrass habitats for foraging; in northeastern B.C. often breeds in native grasslands	Low. Unsuitable habitat.
Calcarius pictus	Smith's Longspur	BC Government	Blue	Nests on grassy tundra at edges of tree line; winters on dry hilltops with particular types of short grass.	Low. Unsuitable habitat.
Chordeiles minor	Common Nighthawk	COSEWIC/SARA	Threatened / Schedule 1	Nesting habitat is diverse, includes logged or burned areas of coastal forests, open ponderosa pine forest, grassland habitat, and sand and gravel habitats of marine and fluvial beaches	Low. Unsuitable habitat.

TABLE 3 (Cont'd): Wildlife Species at Risk Potentially Occurring at the Pleasant Camp Project Site and in Surrounding Areas

Scientific Name	English Name	Agency Listing	Status	Preferred Habitat	Probability of Occurrence on the Project Site
Birds (Cont'd)					
Contopus cooperi	Olive-sided flycatcher	BC Government, COSEWIC/SARA	Blue, Threatened / Schedule 1	Semi-open habitats with standing dead trees, often around bogs or beaver ponds. Perch in snags; preferred breeding habitat in forest and woodland, especially burned-over areas with standing dead trees; in taiga, subalpine coniferous forest and mixed coniferous-deciduous forest; non-breeding habitat a variety of forest	Moderate. Limited preferred habitat (i.e., permanent standing water) available on site.
Euphagus carolinus	Rusty Blackbird	BC Government, COSEWIC/SARA	Blue, Special Concern / Schedule 1	Nests in the boreal forest and favours the shores of wetlands such as slow-moving streams, peat bogs, marshes, swamps, beaver ponds and pasture edges; in wooded areas rarely enters the forest interior; during winter mainly frequents damp forests and, to a lesser extent, cultivated fields	Low. Unsuitable habitat.
Falco peregrinus anatum	Peregrine Falcon, *anatum* subspecies	BC Government, COSEWIC/SARA	Red, Threatened / Schedule 1	Forages in open areas with an abundance of prey close to sea coast or interior lakes and rivers; breeding habitat nearly always contains a prominent cliff; *anatum* subspecies mostly around the extreme southwest coast	Low. Unsuitable habitat.
Falco rusticolus	Gyrfalcon	BC Government	Blue	Rare in expansive open spaces such as tundra, marshes, and farmland; nests on cliff ledges.	Low. Unsuitable habitat.
Hirundo rustica	Barn Swallow	BC Government	Blue	Nests in buildings, under bridges and on other human structures.	Moderate. Buildings and structures available on and near the site.

TABLE 3 (Cont'd): Wildlife Species at Risk Potentially Occurring at the Pleasant Camp Project Site and in Surrounding Areas

Scientific Name	English Name	Agency Listing	Status	Preferred Habitat	Probability of Occurrence on the Project Site
Birds (Cont'd)					
Limnodromus griseus	Short-billed Dowitcher	BC Government	Blue	Non-breeding: mudflats, estuaries, shallow marshes, pools, ponds, flooded fields and sandy beaches; prefers shallow salt water with soft muddy bottom, but visits various wetlands during migration; nests in grassy or mossy tundra and wet meadows, in muskeg	Low. Unsuitable habitat.
Limosa haemastica	Hudsonian Godwit	BC Government	Red	Uncommon on mudflats and in shallow water; nests around ponds within spruce woods.	Low. Unsuitable habitat.
Phalaropus lobatus	Red-necked Phalarope	BC Government	Blue	Breeds on tundra ponds; migrates and winters in small flocks on open ocean along lines of floating weeds and debris; generally uncommon to rare inland, but very large numbers gather at certain alkaline lakes in fall.	Low. Unsuitable habitat.
Pluvialis dominica	American Golden-Plover	BC Government	Blue	Uncommon on dry mudflats and in shortgrass fields and pastures; nests on relatively dry upland tundra.	Low. Unsuitable habitat.
Tringa incana	Wandering Tattler	BC Government	Blue	Nests along rocky streams in mountainous areas; winters along rocky shores.	Low. Unsuitable habitat.

TABLE 3 (Cont'd): Wildlife Species at Risk Potentially Occurring at the Pleasant Camp Project Site and in Surrounding Areas

Scientific Name	English Name	Agency Listing	Status	Preferred Habitat	Probability of Occurrence on the Project Site
Mammals					
Gulo gulo luscus	Wolverine, *luscus* subspecies	BC Government, Identified Wildlife (May 2004), COSEWIC	Blue, Special Concern	Forest habitat of all elevations, also tundra and alpine. Highest densities occur in mountainous regions. Females den at higher elevations under rocks, logs or snow.	Moderate. Limited preferred habitat (available foraging/security habitat in forest; unsuitable breeding habitat).
Martes pennanti	Fisher	BC Government, Identified Wildlife (June 2006),	Blue	Occurs primarily in dense coniferous or mixed forests, including early successional forest with dense overhead cover; continuous canopy cover very important, avoids open areas; rest sites include: tree branches, tree cavities, coarse woody debris and ground sites; large diameter trees with cavities, especially riparian cottonwoods are important den sites in BC	Moderate. Limited preferred habitat (available foraging/security habitat in forest; unsuitable breeding habitat).
Myotis keenii	Keen's Myotis	BC Government, COSEWIC/SARA	Red, Data Deficient/Schedule 3	Associated with dense tracts of coastal forest, particularly low-elevation forest dominated by western hemlock; breeding structures are tree cavities, rock crevices and small caves	Moderate. Limited preferred habitat (available foraging/security habitat in forest; unsuitable breeding habitat).
Ursus arctos	Grizzly Bear	BC Government, Identified Wildlife (May 2004), COSEWIC	Blue, Special Concern	Forage in non-forested to partially forested areas or sites with many tree gaps; security habitat and day bedding areas are closed forest sites near higher quality forage; habitat strongly influenced by presence and activities of people; dig dens at high elevations for over winter hibernation	Moderate. Limited preferred habitat (available foraging/security habitat in creek riparian areas/forest; unsuitable breeding habitat).

TABLE 3 (Cont'd): Wildlife Species at Risk Potentially Occurring at the Pleasant Camp Project Site and in Surrounding Areas

Scientific Name	English Name	Agency Listing	Status	Preferred Habitat	Probability of Occurrence on the Project Site
Invertebrates					
Boloria astarte distincta	Astarte Fritillary, *distincta* subspecies	BC Government	Blue	Occurs in the high mountains of western Alberta and central BC north to the Yukon and the NWT; lives on high rocky ridges and rockslides in mountains above the timberline.	Low. Unsuitable habitat.
Parnassius phoebus	Phoebus Parnassian	BC Government	Red	Occurs in the Ogilvie Mountains and at high elevations (above 1,800 m) in the St. Elias Mountains; found in alpine meadows above treeline.	Low. Unsuitable habitat.
Pieris marginalis guppyi	Margined White, *guppyi* subspecies	BC Government	Blue	Occurs locally throughout southern and central BC north to Atlin; the habitat at low elevations is damp deciduous forest areas with partial shade and cool temperatures; at mid-elevations, willow/alder scrub river floodplains or avalanche chutes; and at high elevations, cool, damp subalpine meadows; their habitats are cool and moist, with regularly occurring low to moderate disturbance levels.	Moderate to High. Potential habitat available at the Project site and in adjacent riparian habitat along Granite Creek.
Fish					
Acipenser medirostris	Green Sturgeon	BC Government, COSEWIC/SARA	Red, Special Concern/Schedule 1	Freshwater streams, rivers, estuarine habitat, and marine waters; marine and estuarine environments are the main habitats utilized by green sturgeon in Canada	Low. Unsuitable habitat.

TABLE 3 (Cont'd): Wildlife Species at Risk Potentially Occurring at the Pleasant Camp Project Site and in Surrounding Areas

Scientific Name	English Name	Agency Listing	Status	Preferred Habitat	Probability of Occurrence on the Project Site
Fish (Cont'd)					
Oncorhynchus clarkii clarkii	Cutthroat Trout, *clarkii* subspecies	BC Government	Blue	Spawning usually occurs in low-gradient stream reaches that have gravel substrate, water depths near 0.2 m – 0.40 m, and mean water velocities from 0.25 m/s to 1.05 m/s; cover near spawning habitat is important for adult fish to hold in before beginning spawning and to escape predators; for stream resident fish, optimal foraging habitat usually consists of a series of riffles and pools with excellent cover in the form of undercut banks, log jams, boulders, and/or deep pools; requires small, low gradient coastal streams and estuarine habitats; well-shaded streams with water temperatures below 18 C are optimal.	Moderate. Potential habitat in Granite Creek and the Klehini River.
Salvelinus confluentus	Bull Trout	BC Government	Blue	Small streams, large rivers, lakes and reservoirs; typical systems are undisturbed, contain natural flows, have stable channels, clean gravels, deep pools and lots of cover; cold clean water is important.	Moderate. Potential habitat in Granite Creek and the Klehini River.
Stenodus leucichthys	Inconnu	BC Government	Blue	Occurs in coastal brackish waters near mouths of rivers, but usually in rivers or some land-locked lakes. At sea, it is found throughout the basin in pelagic zone with temperatures below 18 C and 20 m - 50 m deep; juveniles and adults overwinter and forage at sea; encountered in large lowland rivers during migration.	Low. Unsuitable habitat.

TABLE 3 (Cont'd): Wildlife Species at Risk Potentially Occurring at the Pleasant Camp Project Site and in Surrounding Areas

Scientific Name	English Name	Agency Listing	Status	Preferred Habitat	Probability of Occurrence on the Project Site
Fish (Cont'd)					
Thaleichthys pacificus	Eulachon	BC Government, COSEWIC	Blue, Endangered to Threatened	Nearshore ocean bottom, coastal inlets; adults commonly live at 20 m - 200 m but have been recorded as deep as 625 m; spawn in coastal freshwater streams over bottoms of silt, sand, gravel, cobble or detritus but prefer bar and riffle habitat containing sand or pea-gravel, seldom more than a few miles inland.	Low. Unsuitable habitat.

Search Criteria: Search Type: Animal; Forest Districts: Skeena Stikine Forest District – Cassiar (DSS_C) AND MOE Regions: 6 - Skeena AND Regional Districts: Stikine (SKRD); (restricted to Red, Blue, and Legally designated species) AND BGC Zone: CWH. [Search Performed: October 12, 2012]

SNC·LAVALIN

8648 Commerce Court
Burnaby, British Columbia
Canada V5A 4N6
Tel.: 604-515-5151
www.snclavalin.com

APPENDIX I - GEOTECHNICAL INVESTIGATION CBSA PORT OF PLEASANT CAMP BORDER CROSSING, PLEASANT CAMP, BRITISH COLUMBIA

SNC·LAVALIN
Environment

Division of
SNC-LAVALIN INC.
8648 Commerce Court
Burnaby, British Columbia
Canada V5A 4N6

Tel.: 604-515-5151
Fax: 604-515-5150

GEOTECHNICAL INVESTIGATION
CBSA PORT OF PLEASANT CAMP BORDER CROSSING

Pleasant Camp, British Columbia

Prepared for:
Public Works and Government Services Canada

Prepared By:

Navid Safi, E.I.T.
Junior Geotechnical Engineer

Reviewed By:

R. R. SINGH
March 31
2013

Raveen Singh, P.Eng.
Senior Geotechnical Engineer

D. W. BRIDGER
#29452
Mar 31/2013

Dave Bridger, M.Sc., P.Geo.
Senior Project Coordinator

511502
March 31, 2013

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1. INTRODUCTION

At the request of Public Works and Government Services Canada (PWGSC), SNC-Lavalin Inc. Environment Division (SLE) has completed a geotechnical site investigation at the Canada Border Services Agency (CBSA) Port of Pleasant Camp border crossing in Pleasant Camp, British Columbia (the ‘site’). The investigation was carried out in Fiscal Year (FY) 2012/2013 in advance of site remediation and redevelopment of the Port facility planned for FY 2013/2014 and 2014/2015.

Based on available information provided by PWGSC, it is understood that the site redevelopment activities will comprise the following:

FY 2013/2014

- Deconstruction/decommissioning of the existing facilities including the Customs Building, Generator Building, House #9, 22,700 fuel above ground storage tank (AST), fire water water tank, and other associated underground utilities;
- Remedial excavation of contaminated soils up to a depth of 6 m in the vinicity of the Generator Building and House #9, followed by backfilling;
- Installation of permanent facilities following remediation including an electrical building, a backup generator, main fuel storage and distribution system; and underground utilities (power, water, communication, and fuel); and

FY 2014/2015

- Deconstruction of the existing Customs Building and construction of a new border crossing facility.

For the purposes of this report, the ‘Project’ will include the work carried out in FY 2013/2014. .

This geotechnical report presents the results of field investigation, laboratory testing, and a summary of subsurface conditions at the subject site, and provides geotechnical considerations for the excavation and backfilling portion of the Project. It is understood that recommendations pertaining to construction of future roadways and/or buildings on the site are considered outside the scope of this assessment.

The EA was carried out in accordance with SLE's work plan dated October 2, 2012[1] and under PWGSC Task Authorization (TA) No. 700233938 on Remediation Consultants Contract No. E0276-110680/005/XSB.

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[1] *FY 2012/2013 Work Plan and Cost Estimate for Site Deconstruction and Remediation Planning and Preparation, CBSA Port of Pleasant Camp Border Crossing, Pleasant Camp, BC*, prepared by SLE, dated October 12, 2012.

2. PROPOSED REDEVELOPMENT

2.1. Site Description

The site is located in British Columbia on Haines Highway approximately 65 km from Haines, Alaska and 174 km from Haines Junction, Yukon. The location of the site is shown on Figure 1.

At the time of writing this report the main site features at the existing facility comprise of fifteen buildings and structures, including a Well House, Maintenance Building, Garage, Customs Office, Generator Building, 22,700 L Main Fuel Storage Tank Enclosure, Remediation System Enclosure, House #9 (formerly House #5), and new four staff residential duplexes (Houses #1 through 8) constructed in 2010. The site is bounded to the south by Haines Highway and to the north by a steep mountain slope. The site is situated between the toe of the slope and the highway.

2.2. Proposed Development

Based on a preliminary drawing provided by CBSA, the anticipated redevelopment will consist of 3 structures, a main Customs Building, Generator Building and tertiary Garage. These structures are expected to be relatively light 1 or 2 storey buildings. The approximate footprint of the building is shown on a schematic drawing presented as Figure 2 in Appendix I. Vehicle parking areas will also be constructed east and west of the main building as shown on Figure 2.

Prior to the redevelopment activity, it is understood that the site requires excavation to remove contaminated soils; the proposed excavation depth varies over the site, but is up to 6 m below existing grades. The approximate footprint of the excavation is shown on Figure 3 in Appendix I.

3. FIELD INVESTIGATION AND LABORATORY TESTING

3.1. Field Investigation

Field drilling was conducted from October 5 to October 8, 2012, using a subcontracted drilling rig provided by Geotech Drilling Ltd. of Prince George, BC. Utilities on the site were located in advance of the borehole investigation. A total of 9 boreholes and 4 Dynamic Cone Penetration Test (DCPT) boreholes were completed for the geotechnical investigation, as shown on Figure 4 in Appendix I. The boreholes were drilled to depths ranging between 3.1 meters below ground surface (m BGS) to 20.7 m BGS using a truck mounted odex rig. A summary of the borehole completion depths and handheld Global Positioning System coordinates are provided in Table A below represented by Universal Transverse Mercator (UTM) coordinates.

TABLE A: Borehole Completion Summary

Borehole Number	Ground Elevation (masl)	Borehole Depth (m)	UTM Location (NAD 83) Zone 8	
			Northing (m)	Easting (m)
DH12-01	275.1	7.6	6591491	422548
DH12-02	273.5	5.8	6591482	422567
DH12-03	276.1	3.1	6591514	422527
DH12-04	273.5	13.7	6591463	422579
DH12-05	276.2	7.6	6591495	422526
DH12-06	275.2	19.1	6591460	422551
DH12-07	275.5	9.6	6591482	422548
DH12-08	274.4	12.2	6591445	422541
DH12-09	272.75	20.7	6591455	422598
DCPT 01 (at DH12-05)		5.2	6591495	422526
DCPT-02 (at DH12-04)		1.4	6591463	422579
DCPT-03 (at DH12-09)		3.1	6591455	422598
DCPT-04 (at DH12-08)		3.4	6591445	422541

Boreholes were visually logged and sampled by SLE personnel at the time of drilling. Disturbed cutting samples as well as Standard Penetration Test (SPT) split spoon samples were collected for visual classification and laboratory testing. In addition, both SPT and DCPT tests were carried out. The SPTs were performed in the boreholes at 3.0 m intervals. SPT is a dynamic in-situ test conducted using a drop hammer to drive an open ended steel pipe 450 mm into the ground. SPT blow counts are added to give an N Values, which are used for correlating varies soil parameters including soil consistency and relative density.

DCPT is a continuous test conducted using a drop hammer to drive a steel rod into the ground. DCPT can be used to provide a continuous resistance versus depth profile and to infer soil type or density variations. DCPTs were performed within a meter of boreholes DH12-04, 05 and DH12-08, 09. The DCPT holes were advanced until refusal and were backfilled with bentonite chips.

Details of soil description together with DCPT results and all other geotechnical data collected during the investigation are presented on the borehole logs in Appendix II.

In addition to the above, a large soil sample was also obtained from a borrow source (gravel pit) nearby to determine suitability for backfill material during later phases of the project.

3.2. Laboratory Tests

All soil samples obtained from the field investigation were sent to SLE materials testing laboratory in Saskatoon for further classification and testing. Laboratory testing included moisture content and grain size analysis. The testing program is summarized in Table B.

TABLE B: Summary of Laboratory Testing

Borehole	Sample I.D.	Depth (m)	Laboratory Tests
DH12-04	G1	0.8	Water content + Grain size analysis
DH12-04	G5	8.4	Water content + Grain size analysis
DH12-04	S6	9.1	Water content + Grain size analysis
DH12-05	S1	3.0	Water content + Grain size analysis
DH12-06	G2	2.3	Water content + Grain size analysis
DH12-06	G4	6.9	Water content + Grain size analysis
DH12-06	S5	7.6	Water content
DH12-06	G6	8.4	Water content
DH12-06	G8	11.4	Water content + Grain size analysis
DH12-06	S11	18.3	Water content + Grain size analysis
DH12-07	S2	1.5	Water content
DH12-07	G3	2.3	Water content + Grain size analysis
DH12-07	G5	5.3	Water content + Grain size analysis
DH12-07	G6	6.9	Water content + Grain size analysis
DH12-08	S2	4.6	Water content
DH12-08	G3	6.9	Water content
DH12-08	G5	9.9	Water content + Grain size analysis
DH12-09	S2	3.0	Water content
DH12-09	G3	5.3	Water content + Grain size analysis
DH12-09	S6	9.1	Water content
DH12-09	S8	15.2	Water content + Grain size analysis
DH12-09	S9	18.3	Water content
PIT 1	B1	-	Modified Proctor

Laboratory test results are summarized on the borehole logs in Appendix II and are included for reference in Appendix III.

4. SITE CHARACTERIZATION

4.1. Site Stratigraphy

The general soil profile encountered at the site consists of varying depths of sands and gravels overlying bedrock. The details of the encountered subsurface soil conditions are shown on the borehole logs. The stratigraphy is shown on Figures 5 and 6, respectively. The major soil units and their properties are briefly described herein:

- A sand layer was encountered at the ground surface in boreholes DH12-01, DH12-02, DH12-04, DH12-05, DH12-06, DH12-07 and DH12-08. It was also present beneath a gravel layer in borehole DH12-09. The thickness of the sand varies from 1.5 m to 18.4 m below existing grades. The sand encountered at the site was generally described as silty, fine to medium grained with trace gravels. It was dry to wet and brown in colour. There were some coarser grained zones at several boreholes. SPT blow counts (per 300 mm of penetration) in the sand material ranged from 3 to 50+, indicating a very loose to very dense condition;

- A sand and gravel layer was present at the ground surface of boreholes DH12-03, DH12-04, and beneath the sand in boreholes DH12-06 and DH12-07. The sand and gravel ranges in thickness from 0.9 m to 10 m. The sand and gravel consisted of sub-rounded to sub-angular gravels, and medium to coarse grained sand. It was damp to wet and brown to dark grey in colour. SPT blow counts in the sand and gravel material ranged from 8 to 50+ indicating a dense to very dense relative density;

- A gravel layer with thicknesses of 0.6 and 3.0 m was encountered beneath the sand in borehole DH12-08. This same layer is believed to be below the surface at borehole DH12-09. The gravel encountered contained trace silt and some sand. It was light grey in colour and wet. SPT blow counts in the gravel material ranged were all 50+ indicating very dense relative density;

- A sand and silt layer was present in borehole DH12-06 beneath the sand with a thickness of 9.5 m. The sand and silt was described as fine grained, low to non plastic, and contained some gravel. It was light to dark grey in colour and was dry to wet. SPT blow counts in the silt and sand material ranged from 20 to 50+ indicating a compact to very dense relative density;

- Bedrock was encountered in all of the boreholes at depths ranging from 2.5 m to 19 m. Due to the odex drilling method, further bedrock classification were not possible. All of the boreholes were terminated at refusal within the bedrock; and

- Groundwater conditions were measured in previously installed site monitoring wells by SLE personnel, and are summarized on the following table. The locations of the wells are depicted on Figure 4.

TABLE C: October 2012 Groundwater Conditions

Borehole Number	Elevation (masl)	Groundwater Level on October 7, 2012 (m BGS)	Groundwater Elevation on October 7, 2012 (masl)
AS-11	275.684	4.754	270.93
MWP4	275.524	4.580	270.944
MW03-11	275.849	5.323	270.526
MW04-1	274.165	5.780	268.385
MW04-5	276.043	6.330	269.713
MW03-10D	275.601	9.327	266.274

4.2. Laboratory Test Results

4.2.1. Moisture Contents

Twenty two moisture content tests were carried out and the results are shown on the borehole logs provided in Appendix II. Moisture ranged from 4.8% to 27.8%, the results are presented in Appendix III.

4.2.2. Grain Size Distribution

Wash test Grain size analyses were carried out on fourteen samples. A summary of the grain size distribution results are presented in Table C. The grain size distribution curves are provided in Appendix III.

TABLE D: Particle Size Distribution Summary

Borehole Number	Sample Number	Depth (m BGS)	Particle Size Distribution		
			% gravel	% sand	% fines (clay and silt)
DH12-04	G1	0.8	23	54	23
DH12-04	G5	8.4	34	56	10
DH12-04	S6	9.1	53	36	11
DH12-05	S1	3.0	59	30	11
DH12-06	G2	2.3	18	56	25
DH12-06	G4	6.9	32	47	25

TABLE D (Cont'd): Particle Size Distribution Summary

Borehole Number	Sample Number	Depth (m BGS)	Particle Size Distribution		
			% gravel	% sand	% fines (clay and silt)
DH12-06	G8	11.4	24	60	16
DH12-06	S11	18.3	4	92	4
DH12-07	G3	2.3	24	62	14
DH12-07	G5	5.3	39	48	13
DH12-07	G6	6.9	8	47	45
DH12-08	G5	9.9	55	37	8
DH12-09	G3	5.3	27	57	16
DH12-09	S8	15.2	20	73	7

4.3. Groundwater Monitoring

The groundwater levels were monitored within six previously drilled monitoring wells at site. As listed in Table C, the monitored groundwater level on October 7, 2012 ranged from 4.6 m to 9.3 m BGS. Based on previous measurements taken by SLE from 2001 to 2011, the ground water table at the excavation site varies from 1.9 m to 8.9 m BGS.

It should be noted that the observed October 2012 water level represent a short term condition. Groundwater levels can vary in response to seasonal factors and precipitation; therefore, the actual groundwater conditions at the time of construction could vary from those recorded during this investigation.

5. GEOTECHNICAL DISCUSSIONS AND CONSIDERATIONS

5.1. General Assessment

The following discussion is not a specific geotechnical design and should only be used for geotechnical considerations in any future development. It is understood that the proposed buildings will be light structures constructed atop the area to be remediated. The subsurface conditions comprise sand, silt and gravel overlying bedrock. The recorded groundwater level ranges from 1.9 m to 8.9 m BGS in the proposed project area.

The following design considerations were prepared for the temporary excavations and dewatering, backfill materials, placement and compaction aspects of the project.

5.2. Temporary Excavation

Shallow temporary excavation slopes shall follow the recommendation stated in the BC Occupation Health and Safety Regulations (OH&S) and WorkSafe BC. The excavation slopes should be checked regularly for signs of spalling, cracking, tension cracks at crest, etc., particularly after periods of rain. Local flattening of the excavation slopes may be required if instabilities of the cut slopes are observed. For temporary excavations, equipment, spoil piles, rocks and construction materials should be kept at least 1.2 m from the edge of the excavation (as stated in Part 20 of the BC OH&S). Groundwater will require special measures as detailed elsewhere in this report.

The stability of the proposed excavation slopes for removing contaminated soils at site were analyzed using SLOPE/W 2012 computer software. Borehole DH12-06 was drilled near the maximum depth of excavation of 6 m. The subsurface soils encountered in this borehole consisted of approximately 1.5 m of loose sand underlain by approximately 9.5 m of gravelly and silty Sand underlain by 4 m of coarser grained gravelly Sand.

Groundwater levels within the excavation area were obtained from SLE’s monitoring data from 2001 to 2011. The lowest and highest recorded depth were 1.9 and 8.9 m BGS, respectively with an average of approximately 4 m BGS. The groundwater level was modeled for the average depth of about 4 m BGS.

The strength parameters used in the slope stability analysis are as follows:

TABLE E: Strength Parameters

Soil Type	Bulk Density (kN/m^3)	Friction Angle (degrees)	Cohesion (kPa)
Sand	18	28	0
gravelly and silty Sand	20	35	0
gravelly Sand	22	39	0

Sensitivity analyses were performed to demonstrate the dependence of slope stability on variation of the input parameters. Sensitivity analyses involve re-running of stability calculations with variations in soil strength parameters to find what changes will occur to the stability factor of safety.

Excavation side slopes of 2H:1V, 1.5H:1V and 1H:1V were studied. A live load of 16 kPa was assumed and applied at ground surface 2 m from the crest of the excavation to account for equipment on the slopes during excavation work.

TABLE F: Excavation Slope Stability Factor of Safety

Friction Angle (gravelly and silty Sand)	Factor Of Safety (FOS)		
	2H:1V	1.5H:1V	1H:1V
25	0.917	0.734	0.559
30	1.154	0.896	0.679
35**	1.371	1.071	0.799
37.5	1.485	1.168	0.890

** Friction Angle of 35 Degrees was used for temporary excavation slope design

Based on the slope stability analyses, a 1.5H:1V slope is recommended for the temporary 6 m excavation work. It should be noted that some sloughing of the excavation walls should be anticipated for this slope. Sloughed material should be collected and reused to restore the slopes back to 1.5H:1V. Sloughing should be monitored by a qualified geotechnical engineer to ensure the stability of the excavation. The slope stability analysis plots are presented in Appendix V.

The contractor may use the following alternative short-term temporary excavation method if preferred. The initial slope should be cut to 1.5H:1V to a depth of 3 m below the existing ground surface elevations. For excavations below this elevation up to a total maximum of 6 m, a sequence of panel excavations can be completed using 1H:1V slope, provided that

- Each panel is no greater than 2 m in width;

- The groundwater table has been sufficiently reduced as specified above, and there is no water entering the excavated panel from the soil face;
- Workers are not to enter the excavated area of the soil panel once it is removed;
- The area of the panel is to be backfilled immediately with competent materials to counter soil relaxation;
- The sequence is executed such that each panel is backfilled prior to excavating the adjacent panel; and
- Each panel excavation is to remain open for a period of no longer than 4 hours.

After bulk excavation is completed, all slopes are to be restored to a 1.5H:1V for longer term stability. Dewatering is required at all times during this period.

5.1. Dewatering

Sufficient dewatering system will be required in order to lower the groundwater table well below the excavation slopes to ensure FOS is achieved. Dewatering should keep the excavation dry and maintain the groundwater at least 1 m below the excavation base at all times. Surface drainage should be directed away from the crest of any excavation, particularly where workers and equipment are present. It is suggested that an excavated pit with a standard sump pumps may be sufficient for dewatering excavations at this site. However the contractor will be responsible to design and to ensure an adequate dewatering system is in place at all times during excavations.

5.2. Backfill Materials, Placement and Compaction

Prior to placement of fill material, representative bulk samples (about 25 kg) should be taken of the proposed fill soils and laboratory tests should be conducted to determine, natural moisture content, grain size-distribution and Modified Proctor moisture-density relationship. These test results are necessary for the proper control of construction for the engineered fill. Based on previous measurements taken by SLE from 2001 to 2011, the ground water table at site varies from 1.9 m to 8.9 m BGS.

Prior to placing any fill, the exposed subgrade surface should be prepared in accordance with the preceding sections. It is important that the fill soils be compacted uniformly in order to minimize the potential of subsequent differential vertical movements.

It should be noted that this is a preliminary backfill material requirement and procedures. The backfill material and backfill procedures are to be finalized once the final design is completed.

5.2.1. Backfill

Only approved fill shall be used to backfill the excavated area. Organic materials and frozen soil are also not suitable as backfill material and should be stockpiled separately during excavation. The compacted thickness of each lift of backfill should not exceed 150 mm, compacted uniformly.

The following backfill material types are recommended:

- Type 1 - 75 minus well graded sand and gravel with less than 10% fines compacted to 95% of Modified Proctor Maximum Dry Density (MPMDD) (ASTM D1557) should be used under the main building footprint of approximately 350 m^2, garage footprint of approximately 85 m^2 and the generator building footprint of approximately 45 m^2.

- Type 2 - 75 minus well graded sand and gravel with less than 20 % fines compacted to 95% MPMDD should be used under future roadways and other ancillary non-building features to be constructed on site.

- Type 3 - Native non-contaminated sand and gravel compacted to 90% of MPMDD should be used in general landscaping areas

6. CONSTRUCTION CONTROL AND MONITORING

It is highly recommended that a geotechnical engineer be present during site development and construction. The quality control program would typically include

- Inspection during excavation;
- In-situ density and moisture content testing during placement of fill/backfill; and
- Materials laboratory testing during construction.

7. NOTICE TO READER

This report has been prepared by SNC-Lavalin Inc., Environment Division (SLE) for Canada, who has been party to the development of the scope of work for this project and understands its limitations. Copyright of this report vests with Her Majesty the Queen in Right of Canada. This report was prepared in accordance with a services contract between SLE and Canada, including General Conditions 2035 of the Standard Acquisition Clauses and Conditions (SACC) Manual.

This report is intended to provide information to Canada to assist it in making business decisions. SLE is not a party to the various considerations underlying the business decisions, and does not make recommendations regarding such business decisions.

The findings, conclusions and recommendations in this report have been developed in a manner consistent with the level of skill normally exercised by geotechnical professionals currently practicing under similar conditions in the area. The findings contained in this report are based, in part, upon information provided by others. If any of the information is inaccurate, modifications to the findings, conclusions and recommendations may be necessary.

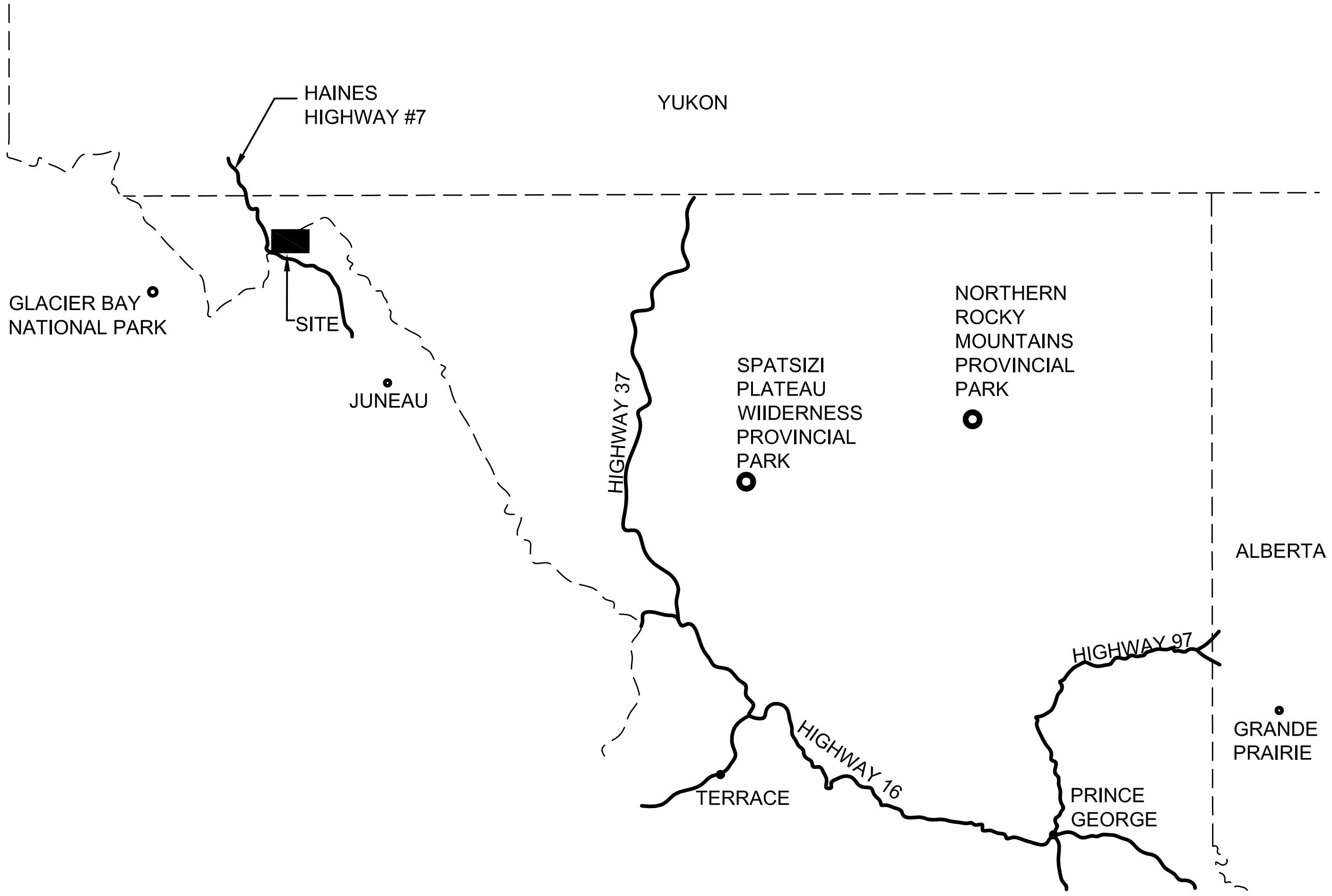
The findings, conclusions and recommendations presented by SLE in this report reflect SLE's best judgment based on the site conditions at the time of the site inspection on the date(s) set out in this report and on information available at the time of preparation of this report. They have been prepared for specific application to this site and are based, in part, upon visual observation of the site in October 2012, subsurface investigation at discrete locations and depths, and specific analysis of specific materials as described in this report during a specific time interval. If site conditions change, new information is discovered, or unexpected site conditions are encountered in future work, including excavations, borings, or other studies, SLE should be requested to re-evaluate the findings, conclusions and recommendations of this report, and to provide amendments as required.

The findings and conclusions of this report are valid only as of the date of this report. If site conditions change, new information is discovered, or unexpected site conditions are encountered in future work, including excavations, borings, or other studies, the findings, conclusions and/or recommendations of this report should be re-evaluated. It is recommended that users of this report should engage a suitably qualified professional to assist in interpreting the significance, if any, of the findings.

APPENDIX I

Figures

SITE PLAN
SCALE 1:5,000



LOCATION PLAN
SCALE 1:12,500

0 100 200 300 400 500 m

SCALE 1:12,500

0 50 100 150 200 m

SCALE 1:5,000

LEGEND

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED PRIOR TO INTRUSIVE WORK. NOT ALL UTILITIES MAY BE SHOWN.

REFERENCE DRAWINGS

41–130–100	–	MORROW ENGINEERING LTD. SITE PLAN
DWG. NO.	DATE	DESCRIPTION

REVISIONS

0	–	–	–	–
REV.	DATE	DESCRIPTION	BY	CHK

SNC•LAVALIN Environment

CLIENT NAME:
PUBLIC WORKS &
GOVERNMENT SERVICES CANADA

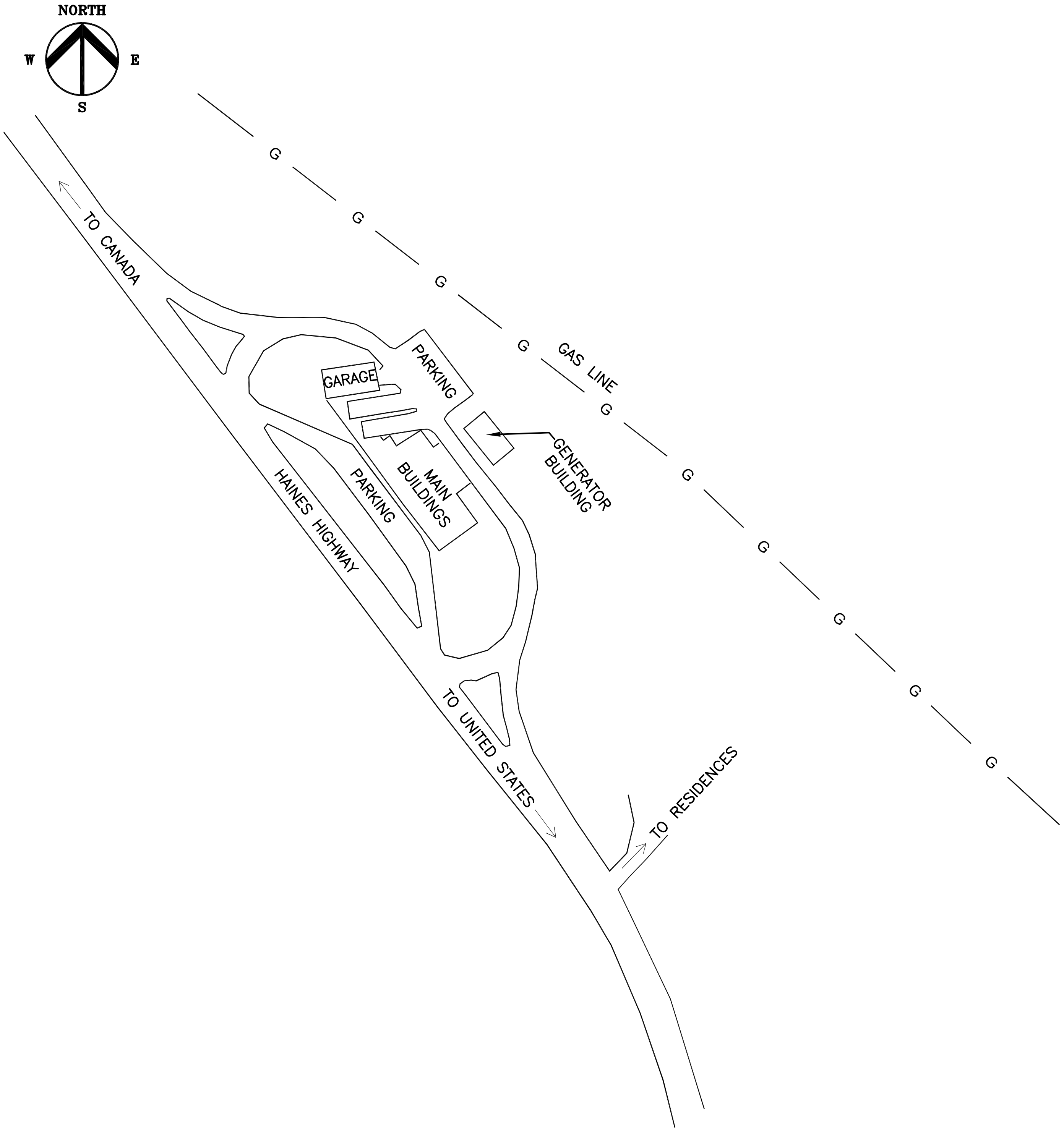
PROJECT LOCATION:
CANADA BORDER SERVICES AGENCY
PORT OF PLEASANT CAMP, B.C.

TITLE:

LOCATION PLAN

DWN BY: PCB/CW	SCALE: AS SHOWN	DATE: 2013 03 26	DWG No: REV.: 0
CHK'D: NS	PLOT: 20130718.1127	CADFILE:511502–61–1	511502-1

PATH: P:\SLE\01 – BRITISH COLUMBIA\JCS#131416–E011 CBSA PLEASANT CAMP REMEDIAL EXCAVATION\DRAFTING\DRAFTING\511502–61–1.DWG



NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED PRIOR TO INTRUSIVE WORK. NOT ALL UTILITIES MAY BE SHOWN.

LEGEND

REFERENCE DRAWINGS

DWG. NO.	DATE	DESCRIPTION
–	–	–

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
0	–	–	–	–

SNC•LAVALIN Environment

CLIENT NAME:
PUBLIC WORKS &
GOVERNMENT SERVICES CANADA

PROJECT LOCATION:
CANADA BORDER SERVICES AGENCY
PORT OF PLEASANT CAMP, B.C.

TITLE:

SITE PLAN
PROPOSED STRUCTURES

DWN BY: PCB	SCALE: NTS	DATE: 2013 03 26	DWG No: REV.: 0
CHK'D: NS	PLOT: 20130718.1133	CADFILE:511502–61–3	511502-2

PATH: P:\SLE\01 – BRITISH COLUMBIA\JCS#131416–E011 CBSA PLEASANT CAMP REMEDIAL EXCAVATION\DRAFTING\DRAFTING\511502–61–3.DWG

LEGEND

- LOT BOUNDARY
- FORMER STRUCTURES
- TELEPHONE LINE (UG)
- WATER LINE
- WATER LINE (REVISED LOCATION BASED ON FIELD OBSERVATIONS)
- ELECTRICAL LINE
- ELECTRICAL LINE (REVISED LOCATION BASED ON FIELD OBSERVATIONS)
- FUEL LINE
- FUEL LINE (REVISED LOCATION BASED ON FIELD OBSERVATIONS)
- ELECTRICAL/TELEPHONE LINE
- SEPTIC
- AS/SVE SYSTEM PIPING
- UTILITY CORRIDOR (2011)
- BOREHOLE (OTHER)
- MONITORING WELL (OTHER)
- MONITORING WELL (SLE)
- BOREHOLE
- AIR SPARGE WELL (SLE)
- SOIL VAPOUR EXTRACTION WELL (SLE)
- SOIL VAPOUR WELL
- TEST PIT
- TRENCH SAMPLE
- TOPOGRAPHIC MAJOR CONTOUR (2m)
- TOPOGRAPHIC MINOR CONTOUR (0.5m)
- FLAGPOLE (ARBITRARY DATUM)
- SURFACE WATER SAMPLING LOCATION
- FIRE HYDRANT
- DESTROYED MONITORING WELL
- SECTION LINE

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED ON SITE. NOT ALL UTILITIES MAY BE SHOWN.

REFERENCE DRAWINGS

No.	DATE	DESCRIPTION
08059/08073	2008–06–28	UNDERHILL GEOMATICS LTD.

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK

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Environment

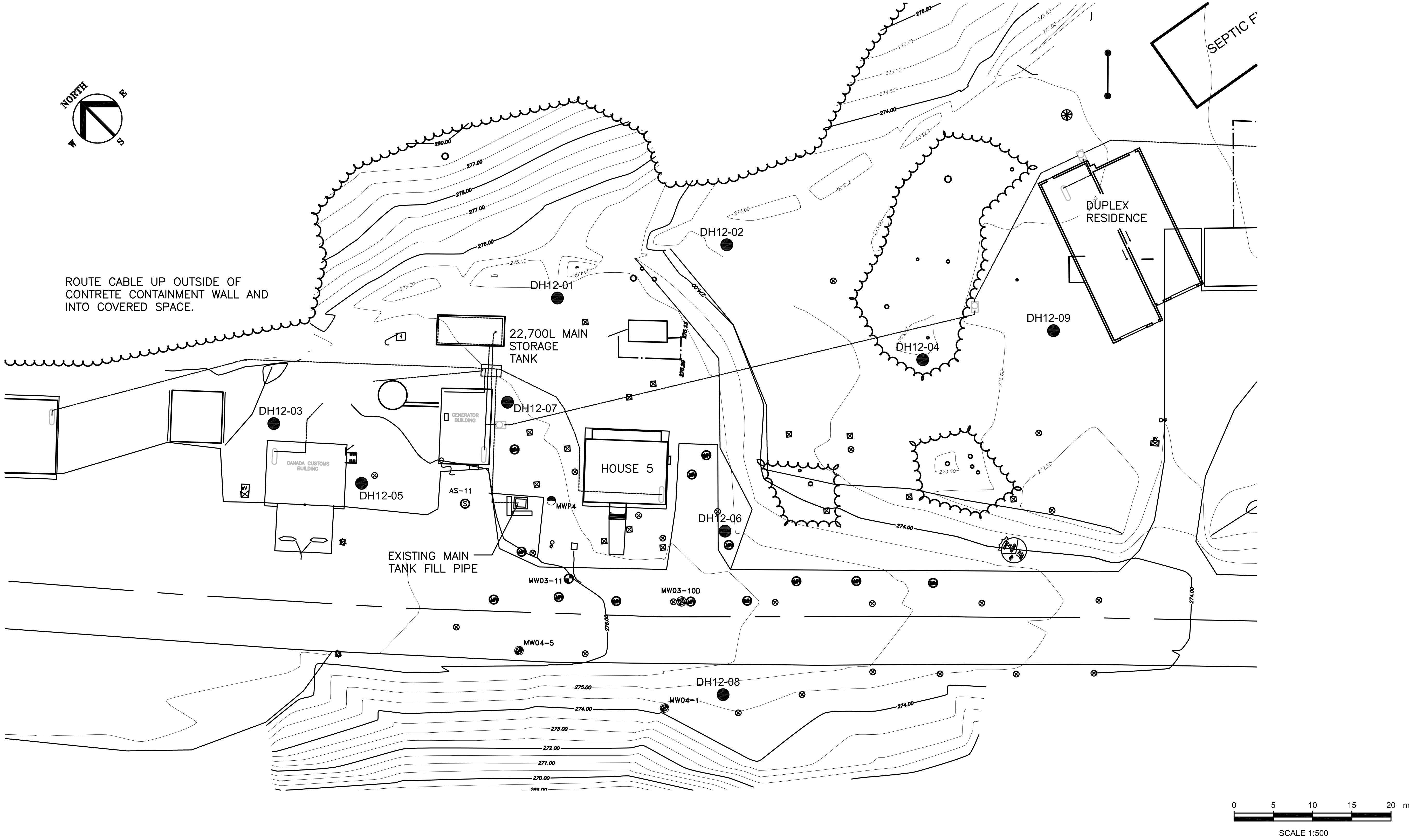
CLIENT NAME:
PUBLIC WORKS &
GOVERNMENT SERVICES CANADA

PROJECT LOCATION:
CANADA BORDER SERVICES AGENCY
PORT OF PLEASANT CAMP, BC

TITLE:
PROPOSED EXCAVATION FOOTPRINT

DWN BY: PCB
SCALE: 1:200
DATE: 2013 04 17
DWG No: 511502-3
REV.: 0
CHK'D: NS
PLOT: 20130718.1137
CADFILE:511502–61–4

PATH: P:\SLE\01 – BRITISH COLUMBIA\JCS#131416–E011 CBSA PLEASANT CAMP REMEDIAL EXCAVATION\DRAFTING\DRAFTING\511502–61–4.DWG



LEGEND

●	BOREHOLE	○	TRAVERSE HUB
ⓢ ⊛	MONITORING WELL	WV ⋈	WATER VALVE
◔ ☐	ELECTRICAL BOX	⊗	OBSERVATION MONITORING WELL WATER
☼	TRAFFIC LIGHT	◇	WELL
○☼	STREET LIGHT	◉	SEPTIC PIPE
S	OVERHANG SIGN	⊛	SATELLITE DISH
●	MANHOLE	▭	MARKER FOR U/G HIGH VOLTAGE CABLE
☒	AERATOR	◡◡◡	TREELINE
○	TREE DIAMETER (VARIES IN SIZE)		

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED PRIOR TO INTRUSIVE WORK. NOT ALL UTILITIES MAY BE SHOWN.
3. DISTANCES ARE IN METRES (m).
4. CONTOURS ARE IN 0.50 m INTERVALS.
5. ELEVATIONS ARE IN METRES ABOVE SEA LEVEL (masl).

REFERENCE DRAWINGS

41–130–100	–	MORROW ENGINEERING LTD. SITE PLAN
DWG. NO.	DATE	DESCRIPTION

REVISIONS

0	–	–	–	–
REV.	DATE	DESCRIPTION	BY	CHK

SNC•LAVALIN Environment

CLIENT NAME:
PUBLIC WORKS &
GOVERNMENT SERVICES CANADA

PROJECT LOCATION:
CANADA BORDER SERVICES AGENCY
PORT OF PLEASANT CAMP, B.C.

TITLE:

SITE PLAN WITH BOREHOLE LOCATIONS

DWN BY: PCB/CW
SCALE: AS SHOWN
DATE: 2013 03 26
DWG No: 511502-4
REV.: 0
CHK'D: NS
PLOT: 20130718.1129
CADFILE:511502–61–1

PATH: P:\SLE\01 – BRITISH COLUMBIA\JCS#131416–E011 CBSA PLEASANT CAMP REMEDIAL EXCAVATION\DRAFTING\DRAFTING\511502–61–1.DWG

LEGEND

◐ Ⓢ Ⓥ MONITORING WELLS

● BOREHOLE

NOTES

1. ORIGINAL DRAWING IN COLOUR.
2. LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE ONLY AND SHOULD BE CONFIRMED PRIOR TO INTRUSIVE WORK. NOT ALL UTILITIES MAY BE SHOWN.
3. DRAWING FOR CONSTRUCTION – CONCEPTUAL DESIGN PLANNING PURPOSES ONLY.
3. DISTANCES ARE IN METRES (m).
4. CONTOURS ARE IN 0.50 m INTERVALS.
5. ELEVATIONS ARE IN METRES ABOVE SEA LEVEL (masl).

REFERENCE DRAWINGS

41–130–100	–	MORROW ENGINEERING LTD. SITE PLAN
DWG. NO.	DATE	DESCRIPTION

REVISIONS

0	–	–	–	–
REV.	DATE	DESCRIPTION	BY	CHK

SNC•LAVALIN
Environment

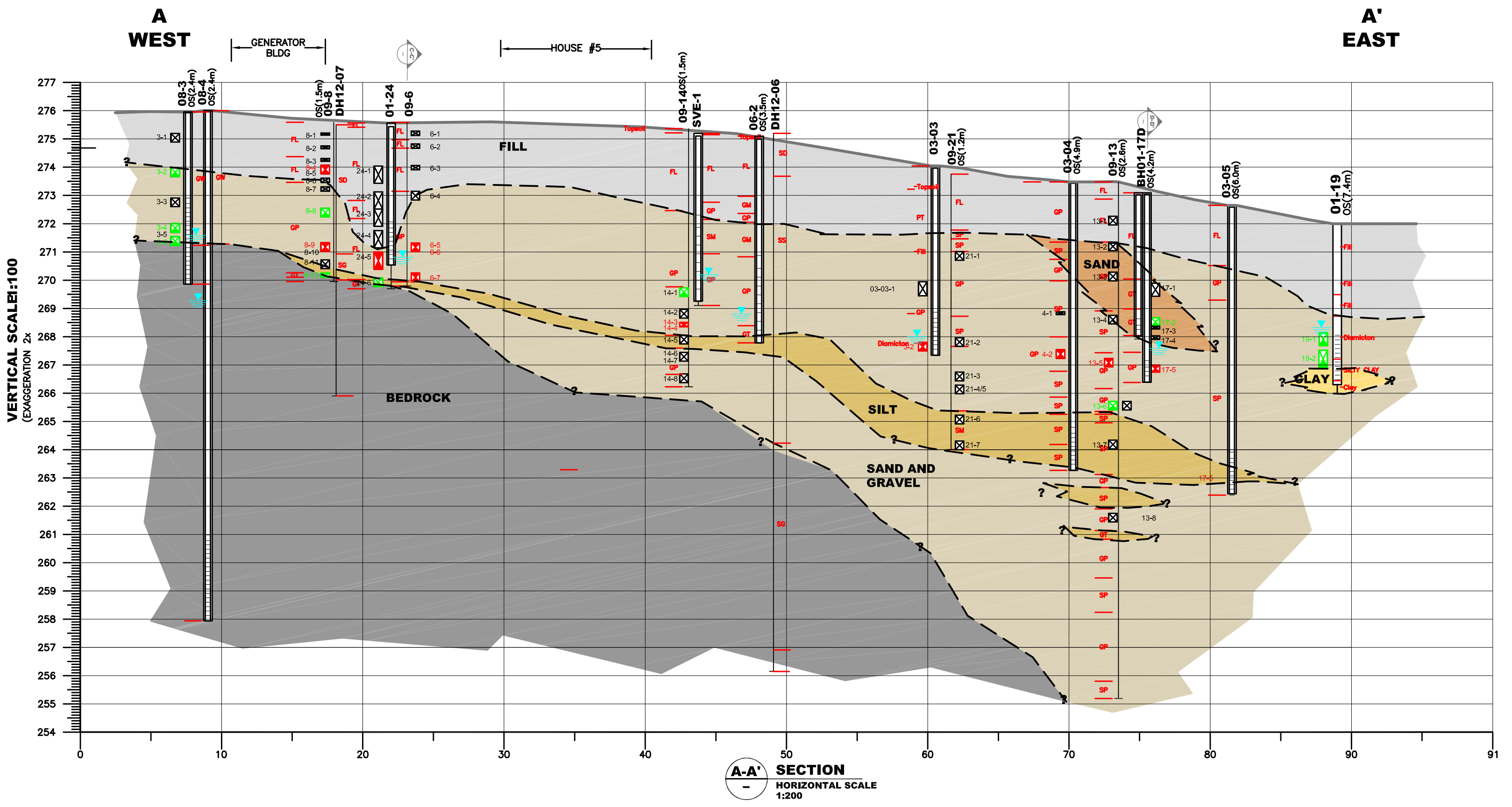
CLIENT NAME:
PUBLIC WORKS &
GOVERNMENT SERVICES CANADA

PROJECT LOCATION:
CANADA BORDER SERVICES AGENCY
PORT OF PLEASANT CAMP, B.C.

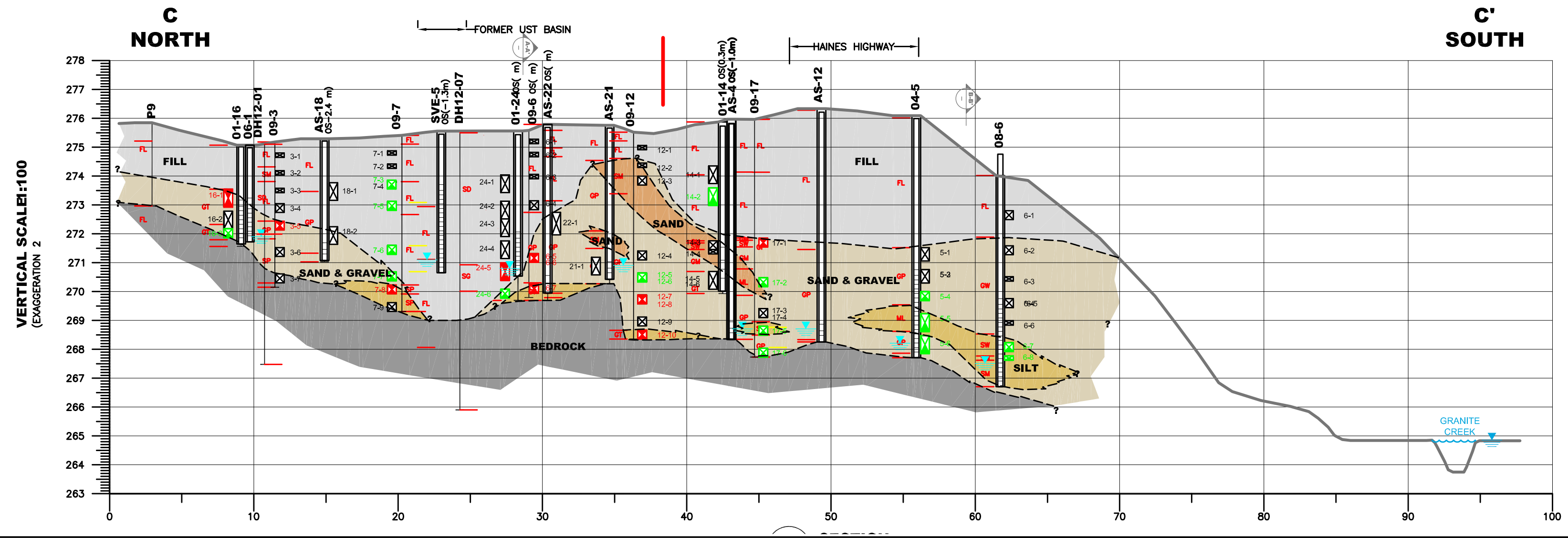
TITLE: **BOREHOLES AND MONITORING WELL WITH CONTOUR AND SECTION LINES**

DWN BY: PCB/CW	SCALE: AS SHOWN	DATE: 2013 03 26	DWG No: REV.: **0**
CHK'D: NS	PLOT: 20130718.1140	CADFILE:511502–61–2	**511502-5**

PATH: P:\SLE\01 – BRITISH COLUMBIA\JCS#131416–E011 CBSA PLEASANT CAMP REMEDIAL EXCAVATION\DRAFTING\DRAFTING\511502–61–2.DWG



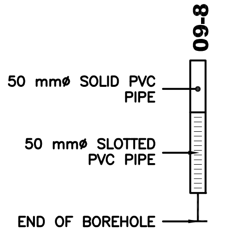
A-A' SECTION
HORIZONTAL SCALE 1:200



LEGEND

▨	SAND, & GRAVEL (FILL)
▨	SAND, & GRAVEL
🟧	SAND, SILTY TO SOME SILT
▨	SILT & SAND TILL
🟨	CLAY
▨	BEDROCK
— — — — —	INFERRED STRATIGRAPHIC BOUNDARY
▽	GROUNDWATER ELEVATION
☒	SAMPLE (NOT ANALYZED)
🟩	CONCENTRATION(S) LESS THAN THE APPLICABLE CSR OR CCME STANDARDS
🟥	CONCENTRATION(S) GREATER THAN THE APPLICABLE CSR OR CCME STANDARDS

NOTES



REFERENCE DRAWINGS

DWG. NO.	DATE	DESCRIPTION
	–	

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
0	–	–	–	–

SNC·LAVALIN Environment

CLIENT NAME:
PUBLIC WORKS & GOVERNMENT SERVICES CANADA

PROJECT LOCATION:
CANADA BORDER SERVICES AGENCY
PORT OF PLEASANT CAMP, B.C.

TITLE:
GEOLOGICAL CROSS-SECTION A-A' AND C-C'

DWN BY: PCB/CW	SCALE: AS SHOWN	DATE: 2013 03 26	DWG No: REV.: 0
CHK'D: NS	PLOT: 20130718.1142	CADFILE:511502–62–1	511502-6

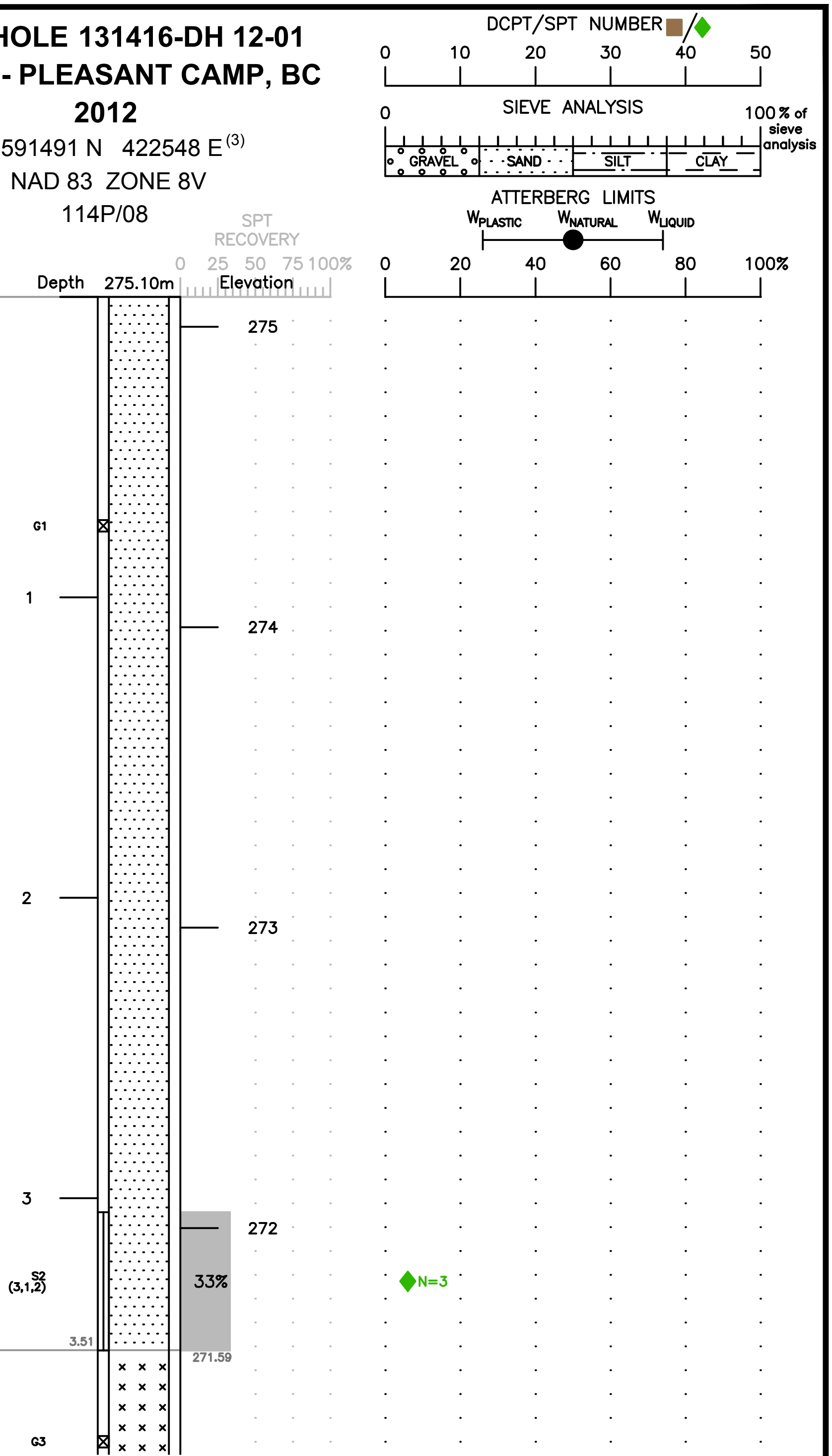
PATH: P:\SLE\01 – BRITISH COLUMBIA\JCS#131416–E011 CBSA PLEASANT CAMP REMEDIAL EXCAVATION\DRAFTING\DRAFTING\511502–62–1.DWG

APPENDIX II

Borehole Logs

BOREHOLE 131416-DH 12-01
PWGSC - PLEASANT CAMP, BC
2012

6591491 N 422548 E$^{(3)}$
NAD 83 ZONE 8V
114P/08



SAND: silty, fine to medium grained, cohesion (silt), moist, brown.
- at 0.2 m: non-cohesive, damp
- at 3.0 m: very loose, coarse grained, some gravel

BEDROCK: light grey, dry, hard and slow drilling, dusty

NOTES:
1. Dynamic Cone Penetration / Standard Penetration Tests (SPT) conducted with 63.5 kg (140 lb) automatic trip hammer falling 762 mm (30 inches).
2. (#,#) dentes DCPT / (#,#,#) denotes SPT blows per 152 mm (6.0 inches).
3. Coordinates are handheld GPS. Accuracy for this unit is +/− 15 m.
4. Elevations are in meters above sea level (masl) and interpolated from contours (+/− 0.50 m).
5. Depths are in meters (m).

PAGE 1 OF 2

LIMITATION

This drill log is a summary of the conditions estimated by the field personnel at the specific location at the time of drilling. The conditions and properties described above will vary between locations and may vary with time.

CLIENT

PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PRODUCED BY

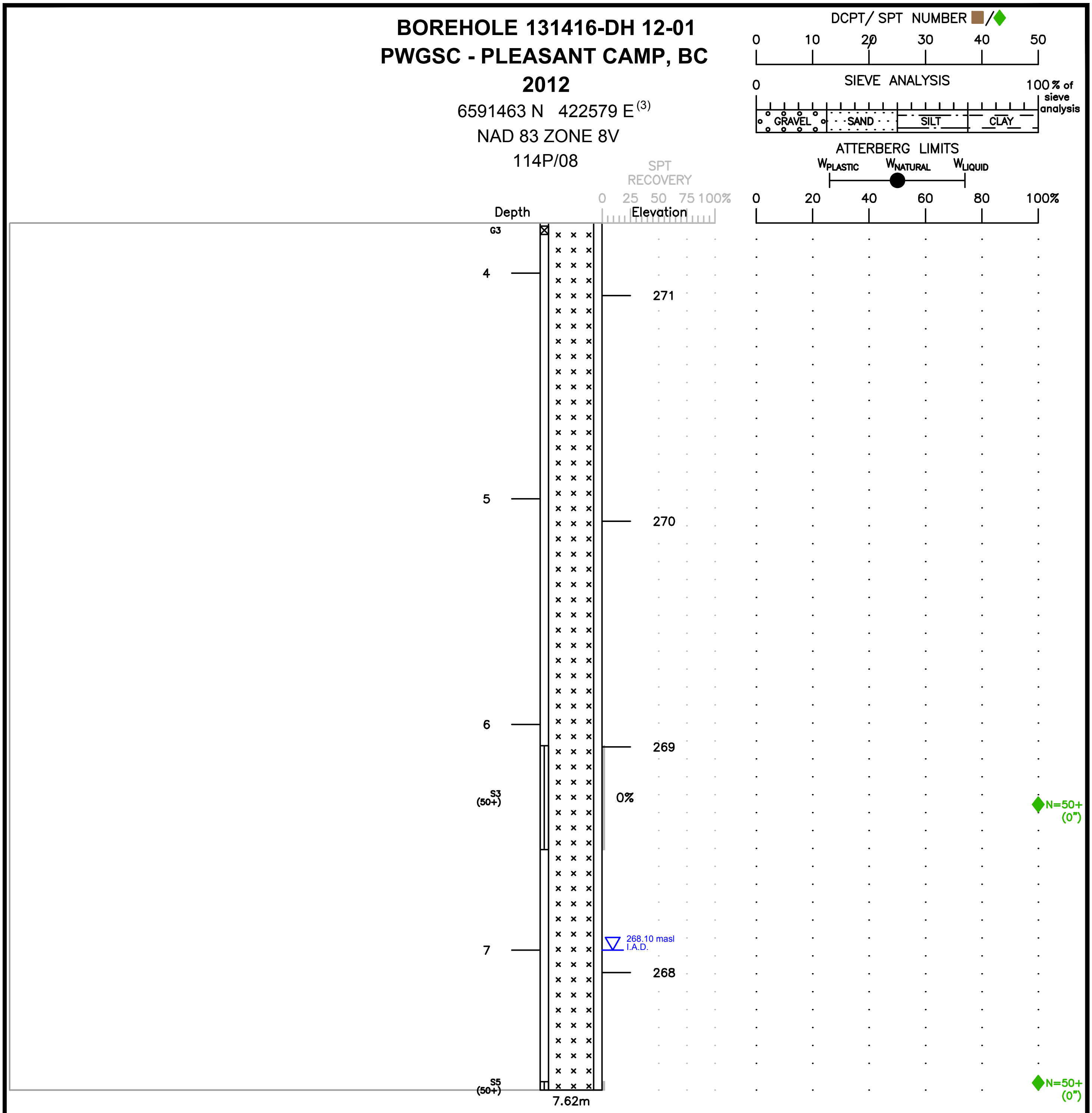
MDH
ENGINEERED SOLUTIONS
Member of the SNC-LAVALIN Group

SUPERVISOR D. GAMAL / N. SAFI	**CONTRACTOR** GEOTECH DRILLING SERVICES LTD.	**APPROVED BY**	
LOGGED BY N. SAFI	**OPERATOR** T. HESSE	**DRAWN BY** C. WU	
GEOLOGY BY N/A	**DRILL RIG TYPE** DR212	**PROJECT No.** 131416	
DATE DRILLED 05-OCT-12	**ABANDONMENT** CUTTINGS AND BENTONITE SEAL	**SCALE** 1:25	**DATE** 06-NOV-12

ACADDWG:\\P:\SLE\01 − British Columbia\JCS#131416−E011 CBSA Pleasant Camp Remedial Excavation\Drafting\Borehole\BH−131416−01.dwg

BOREHOLE 131416-DH 12-01
PWGSC - PLEASANT CAMP, BC
2012

6591463 N 422579 E (3)
NAD 83 ZONE 8V
114P/08



NOTES:
1. Dynamic Cone Penetration / Standard Penetration Tests (SPT) conducted with 63.5 kg (140 lb) automatic trip hammer falling 762 mm (30 inches).
2. (#,#) denotes DCPT / (#,#,#) denotes SPT blows per 152 mm (6.0 inches).
3. Coordinates are handheld GPS. Accuracy for this unit is +/− 15 m.
4. Elevations are in meters above sea level (masl) and interpolated from contours (+/− 0.50 m).
5. Depths are in meters (m).

PAGE 2 OF 2

LIMITATION

This drill log is a summary of the conditions estimated by the field personnel at the specific location at the time of drilling. The conditions and properties described above will vary between locations and may vary with time.

CLIENT

PUBLIC WORKS AND
GOVERNMENT
SERVICES CANADA

PRODUCED BY

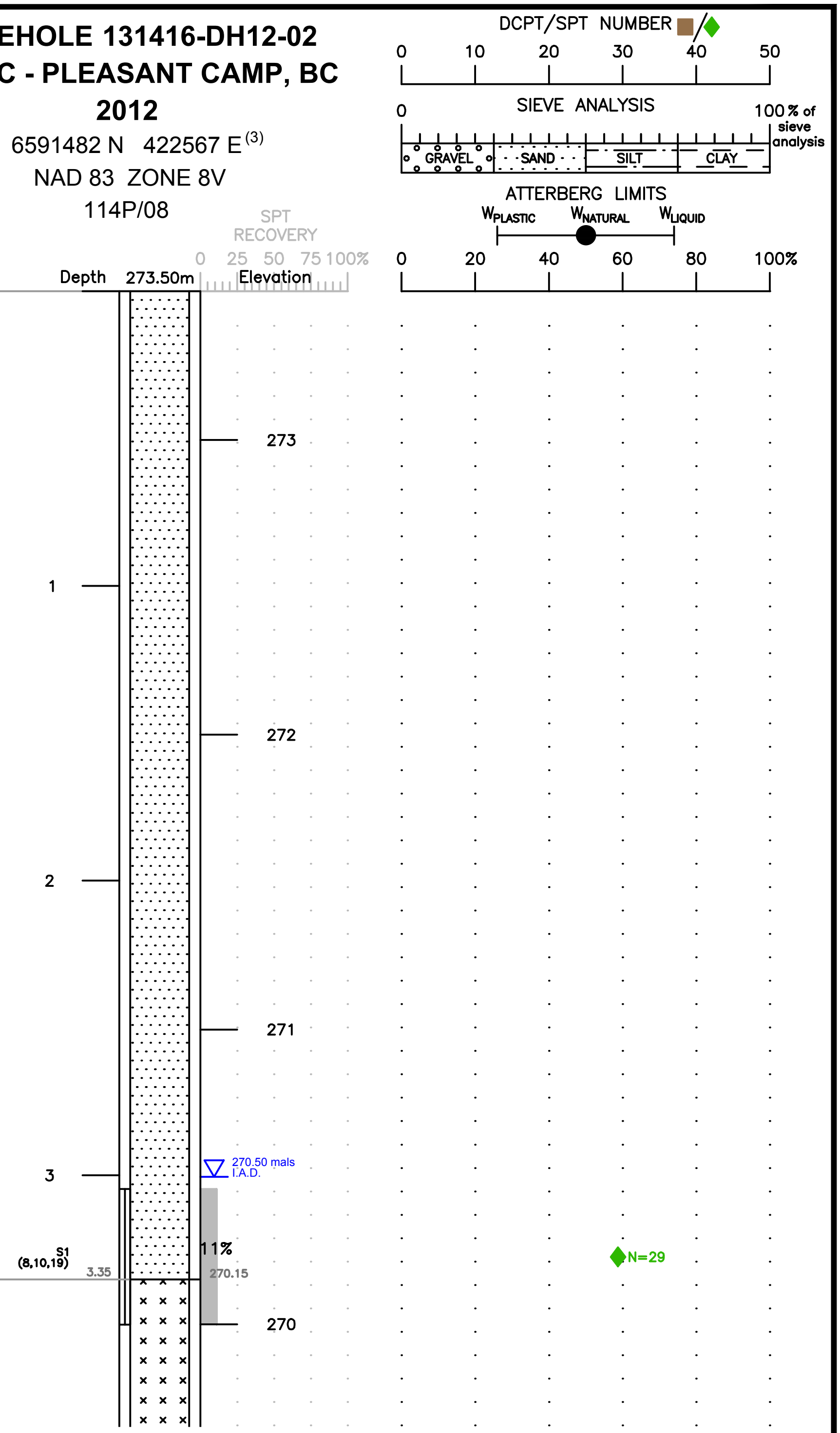
MDH ENGINEERED SOLUTIONS
Member of the SNC-LAVALIN Group

SUPERVISOR	D. GAMAL / N. SAFI	**CONTRACTOR**	GEOTECH DRILLING SERVICES LTD.	**APPROVED BY**	
LOGGED BY	N. SAFI	**OPERATOR**	T. HESSE	**DRAWN BY**	C. WU
GEOLOGY BY	N/A	**DRILL RIG TYPE**	DR212	**PROJECT No.**	131416
DATE DRILLED	07–OCT–12	**ABANDONMENT**	CUTTINGS AND BENTONITE SEAL	**SCALE** 1:25	**DATE** 06–NOV–12

ACADDWG:\\P:\SLE\01 – British Columbia\JCS#131416–E011 CBSA Pleasant Camp Remedial Excavation\Drafting\Borehole\BH–131416–01.dwg

BOREHOLE 131416-DH12-02
PWGSC - PLEASANT CAMP, BC
2012

6591482 N   422567 E (3)
NAD 83 ZONE 8V
114P/08



SAND: silty, fine to medium grained,trace gravels,
non plastic, subrounded gravels, damp, brown

– at 1.5 m: gravel recovered in SPT, compact,
trace rootlets in SPT

BEDROCK: light grey, hard and slow drilling

NOTES:
1. Dynamic Cone Penetration / Standard Penetration Tests (SPT) conducted with 63.5 kg (140 lb) automatic trip hammer falling 762 mm (30 inches).
2. (#,#) denotes DCPT / (#,#,#) denotes SPT blows per 152 mm (6.0 inches).
3. Coordinates are handheld GPS. Accuracy for this unit is +/– 15 m.
4. Elevations are in meters above sea level (masl) and interpolated from contours (+/– 0.50 m).
5. Depths are in meters (m).

LIMITATION

This drill log is a summary of the conditions estimated by the field personnel at the specific location at the time of drilling. The conditions and properties described above will vary between locations and may vary with time.

CLIENT

PUBLIC WORKS AND
GOVERNMENT
SERVICES CANADA

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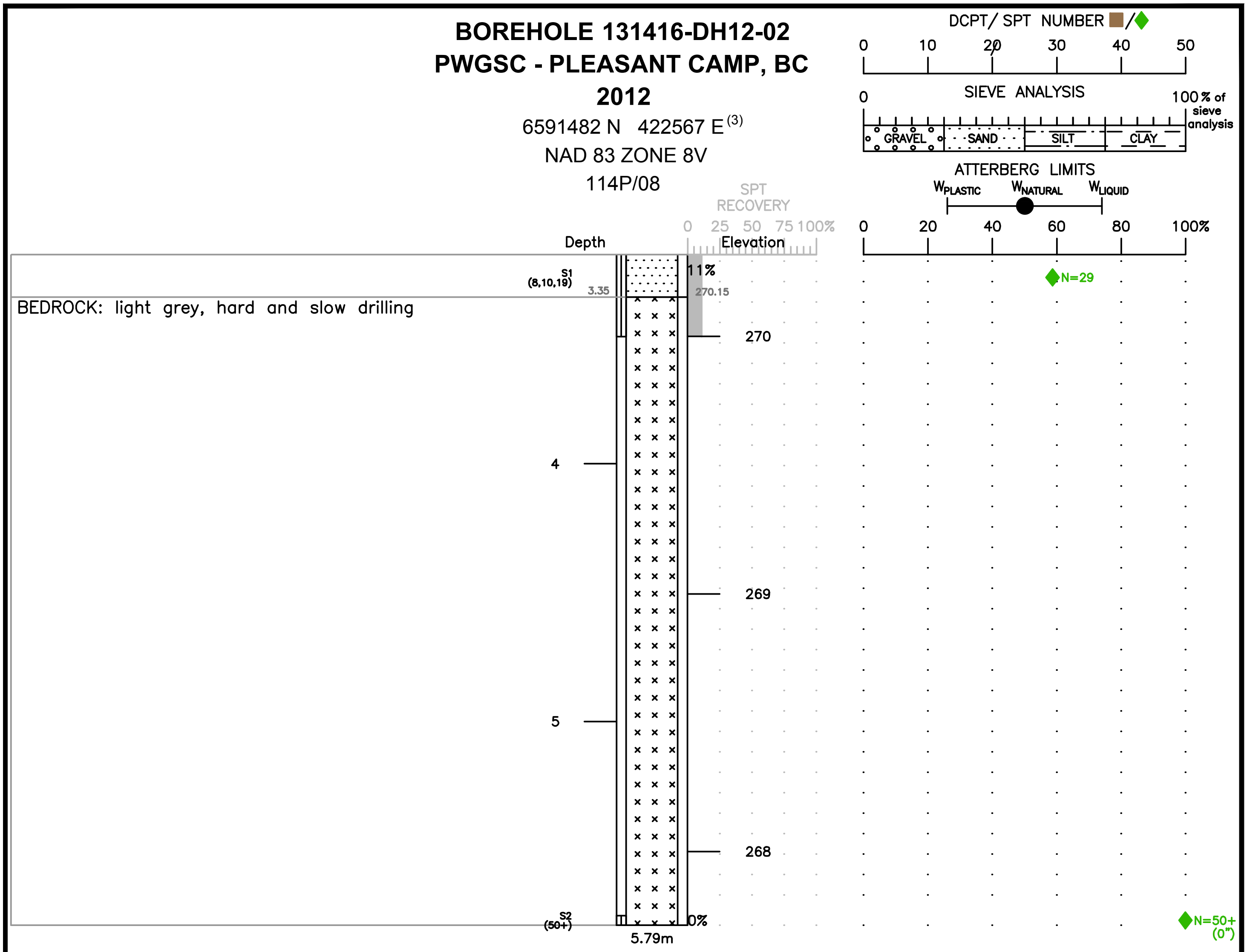
ENGINEERED SOLUTIONS
Member of the SNC-LAVALIN Group

SUPERVISOR	D. GAMAL / N. SAFI	**CONTRACTOR**	GEOTECH DRILLING SERVICES LTD.	**APPROVED BY**			
LOGGED BY	N. SAFI	**OPERATOR**	T. HESSE	**DRAWN BY**	C. WU		
GEOLOGY BY	N/A	**DRILL RIG TYPE**	DR212	**PROJECT No.**	131416		
DATE DRILLED	07–OCT–12	**ABANDONMENT**	CUTTINGS AND BENTONITE SEAL	**SCALE**	1:25	**DATE**	06–NOV–12

ACADDWG:\\P:\SLE\01 – British Columbia\JCS#131416-E011 CBSA Pleasant Camp Remedial Excavation\Drafting\Borehole\BH-131416-02.dwg

BOREHOLE 131416-DH12-02
PWGSC - PLEASANT CAMP, BC
2012

6591482 N 422567 E$^{(3)}$
NAD 83 ZONE 8V
114P/08



NOTES: 1. Dynamic Cone Penetration / Standard Penetration Tests (SPT) conducted with 63.5 kg (140 lb) automatic trip hammer falling 762 mm (30 inches).
2. (#,#) denotes DCPT / (#,#,#) denotes SPT blows per 152 mm (6.0 inches).
3. Coordinates are handheld GPS. Accuracy for this unit is +/− 15 m.
4. Elevations are in meters above sea level (masl) and interpolated from contours (+/− 0.50 m).
5. Depths are in meters (m).

LIMITATION

This drill log is a summary of the conditions estimated by the field personnel at the specific location at the time of drilling. The conditions and properties described above will vary between locations and may vary with time.

CLIENT

PUBLIC WORKS AND
GOVERNMENT
SERVICES CANADA

PRODUCED BY

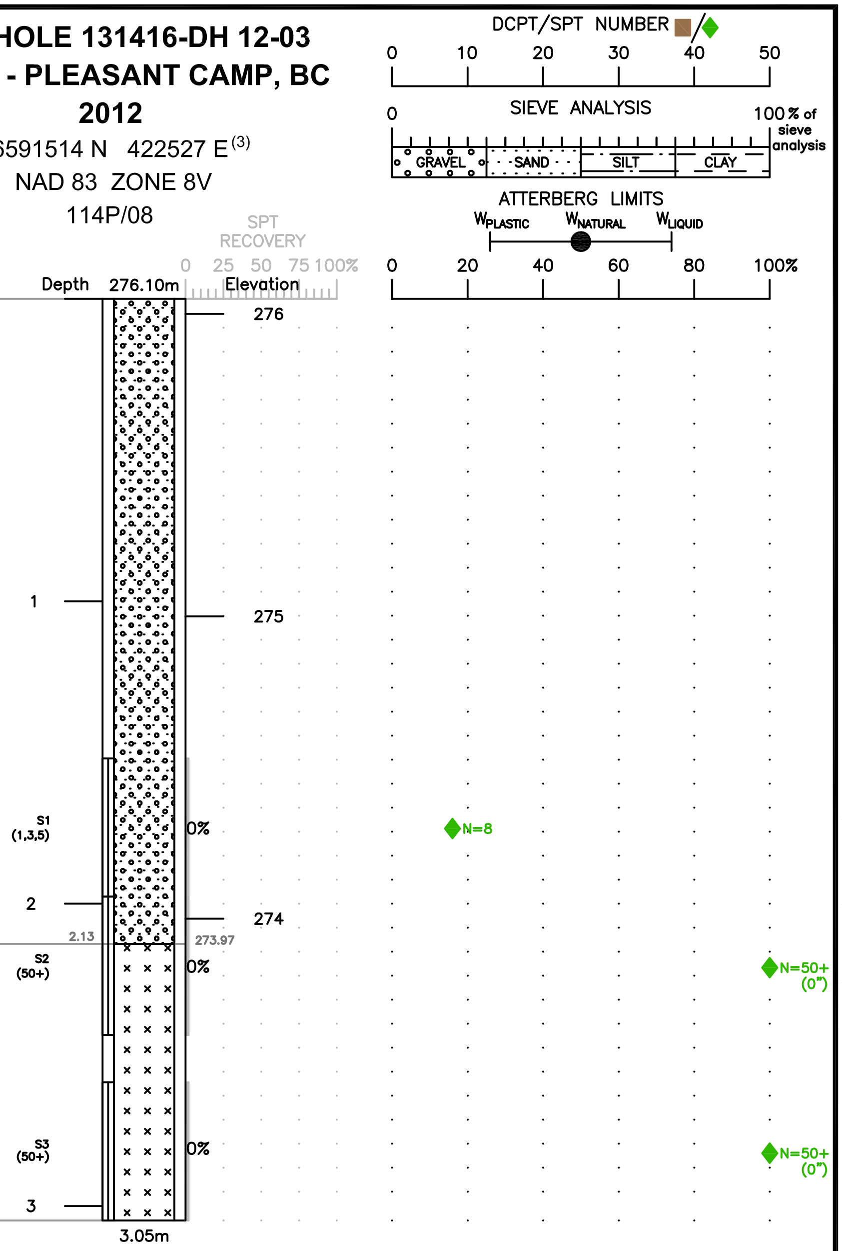
MDH
ENGINEERED SOLUTIONS
Member of the SNC-LAVALIN Group

SUPERVISOR	D. GAMAL / N. SAFI	**CONTRACTOR**	GEOTECH DRILLING SERVICES LTD.	**APPROVED BY**	
LOGGED BY	N. SAFI	**OPERATOR**	T. HESSE	**DRAWN BY**	C. WU
GEOLOGY BY	N/A	**DRILL RIG TYPE**	DR212	**PROJECT No.**	131416
DATE DRILLED	07–OCT–12	**ABANDONMENT**	CUTTINGS AND BENTONITE SEAL	**SCALE** 1:25	**DATE** 06–NOV–12

ACADDWG:\\P:\SLE\01 – British Columbia\JCS#131416–E011 CBSA Pleasant Camp Remedial Excavation\Drafting\Borehole\BH–131416–02.dwg

BOREHOLE 131416-DH 12-03
PWGSC - PLEASANT CAMP, BC
2012

6591514 N 422527 E[3]
NAD 83 ZONE 8V
114P/08



SAND AND GRAVEL: some silt, subrounded to subangular gravels, non–plastic, moist to damp, brown.

– at 1.5 m: loose (SPT), medium to coarse grained

BEDROCK: light grey cuttings, dry, hard and slow drilling, dusty

NOTES:
1. Dynamic Cone Penetration / Standard Penetration Tests (SPT) conducted with 63.5 kg (140 lb) automatic trip hammer falling 762 mm (30 inches).
2. (#,#) denotes DCPT / (#,#,#) denotes SPT blows per 152 mm (6.0 inches).
3. Coordinates are handheld GPS. Accuracy for this unit is +/– 15 m.
4. Elevations are in meters above sea level (masl) and interpolated from contours (+/– 0.50 m).
5. Depths are in meters (m).

LIMITATION

This drill log is a summary of the conditions estimated by the field personnel at the specific location at the time of drilling. The conditions and properties described above will vary between locations and may vary with time.

CLIENT

PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PRODUCED BY

MDH
ENGINEERED SOLUTIONS
Member of the SNC-LAVALIN Group

SUPERVISOR	D. GAMAL / N. SAFI	**CONTRACTOR**	GEOTECH DRILLING SERVICES LTD.	**APPROVED BY**	
LOGGED BY	N. SAFI	**OPERATOR**	T. HESSE	**DRAWN BY**	C. WU
GEOLOGY BY	N/A	**DRILL RIG TYPE**	DR212	**PROJECT No.**	131416
DATE DRILLED	05–OCT–12	**ABANDONMENT**	CUTTINGS AND BENTONITE SEAL	**SCALE** 1:25	**DATE** 06–NOV–12

ACADDWG:\\P:\SLE\01 – British Columbia\JCS#131416–E011 CBSA Pleasant Camp Remedial Excavation\Drafting\Borehole\BH–131416–03.dwg

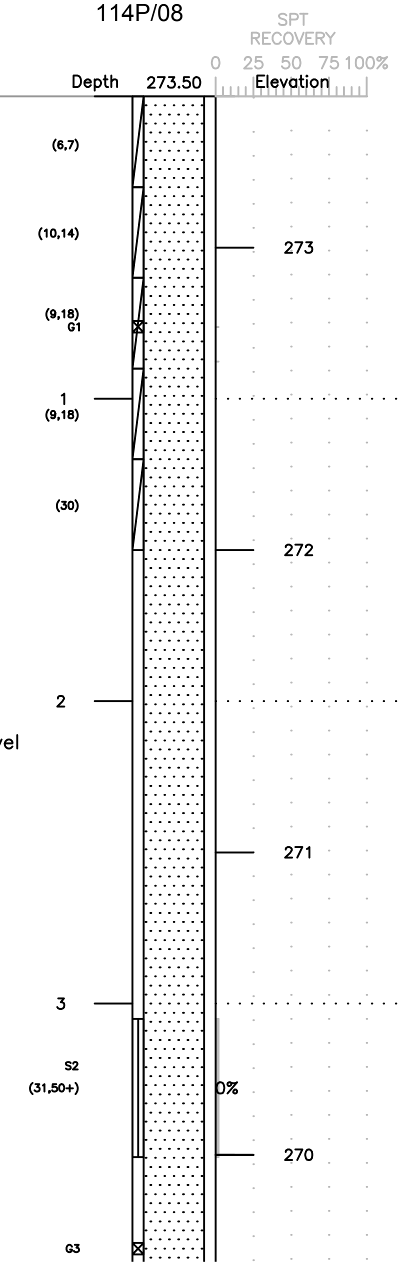
BOREHOLE 131416-DH 12-04
PWGSC - PLEASANT CAMP, BC
2012

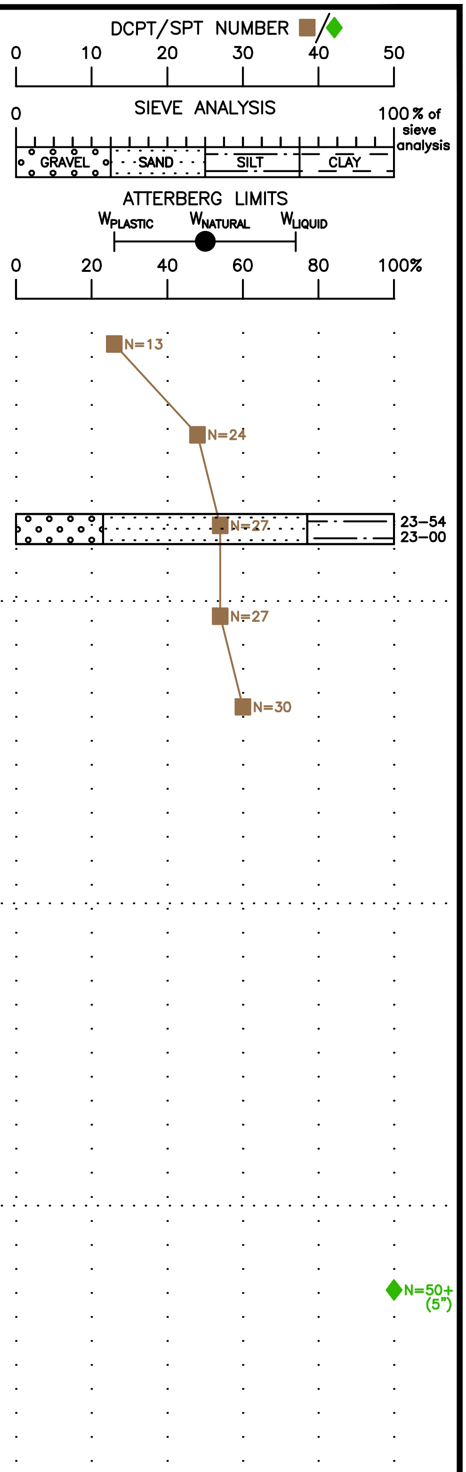
6591463 N 422579 E (3)
NAD 83 ZONE 8V
114P/08

SAND: silty, gravelly, trace rootlets, fine to medium grained, non plastic,damp, brown

- at 2.1 m: light grey gravel cuttings, 1.2 m gravel seam

- at 3.4 m: some to trace silt, some gravel





NOTES:
1. Dynamic Cone Penetration / Standard Penetration Tests (SPT) conducted with 63.5 kg (140 lb) automatic trip hammer falling 762 mm (30 inches).
2. (#,#) denotes DCPT / (#,#,#) denotes SPT blows per 152 mm (6.0 inches).
3. Coordinates are handheld GPS. Accuracy for this unit is +/− 15 m.
4. Elevations are in meters above sea level (masl) and interpolated from contours (+/− 0.50 m).
5. Depths are in meters (m).

LIMITATION

This drill log is a summary of the conditions estimated by the field personnel at the specific location at the time of drilling. The conditions and properties described above will vary between locations and may vary with time.

CLIENT

PUBLIC WORKS AND
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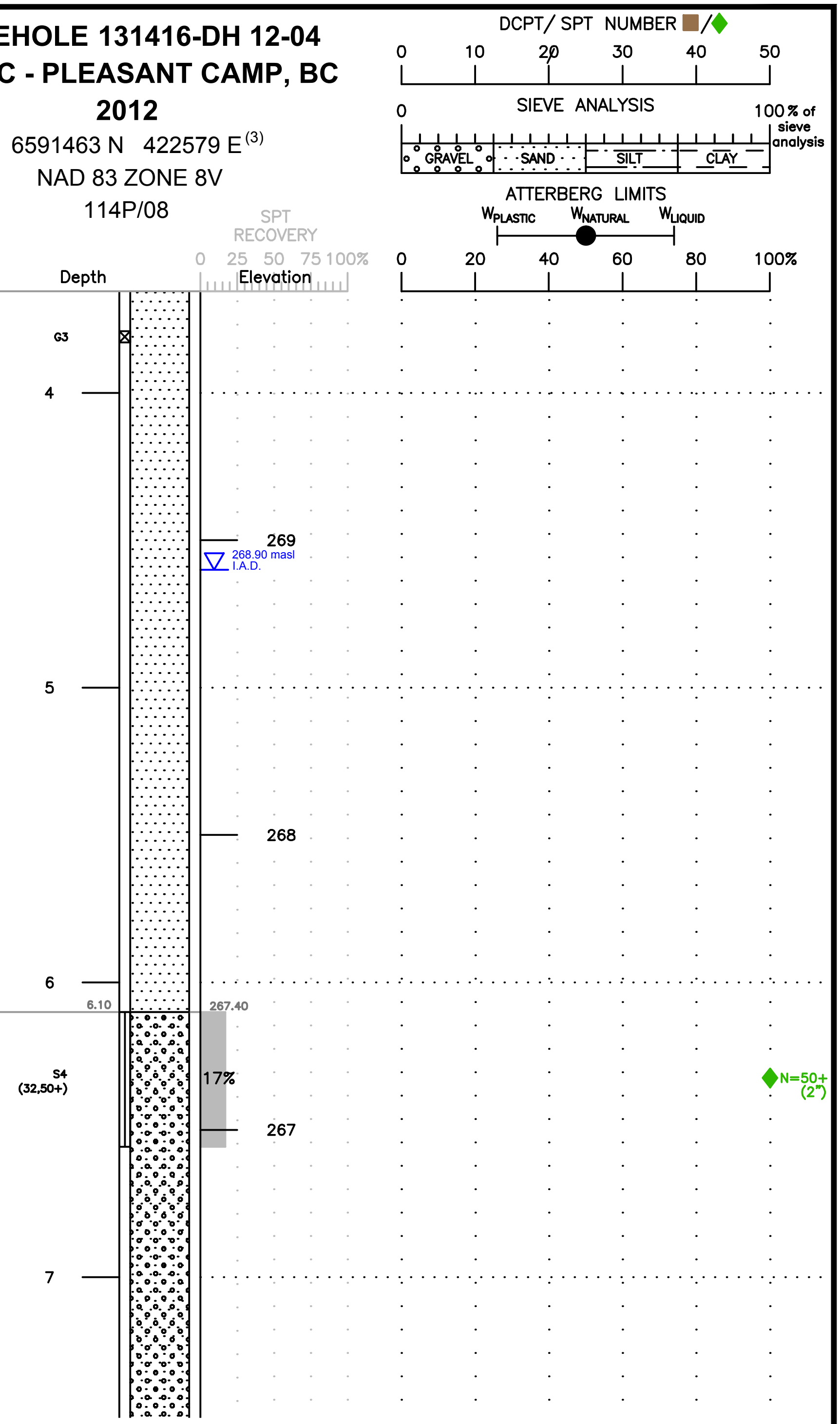
Member of the SNC-LAVALIN Group

SUPERVISOR	D. GAMAL / N. SAFI	**CONTRACTOR**	GEOTECH DRILLING SERVICES LTD.	**APPROVED BY**			
LOGGED BY	N. SAFI	**OPERATOR**	T. HESSE	**DRAWN BY**	C. WU		
GEOLOGY BY	N/A	**DRILL RIG TYPE**	DR212	**PROJECT No.**	131416		
DATE DRILLED	07-OCT-12	**ABANDONMENT**	CUTTINGS AND BENTONITE SEAL	**SCALE**	1:25	**DATE**	14-NOV-12

ACADDWG:\\P:\SLE\01 - British Columbia\JCS#131416-E011 CBSA Pleasant Camp Remedial Excavation\Drafting\Borehole\BH-131416-04.dwg

BOREHOLE 131416-DH 12-04
PWGSC - PLEASANT CAMP, BC
2012

6591463 N   422579 E[3]
NAD 83 ZONE 8V
114P/08



SAND AND GRAVEL: trace silt, coarse grained, subrounded gravel, wet, dark grey/white.

NOTES:
1. Dynamic Cone Penetration / Standard Penetration Tests (SPT) conducted with 63.5 kg (140 lb) automatic trip hammer falling 762 mm (30 inches).
2. (#,#) denotes DCPT / (#,#,#) denotes SPT blows per 152 mm (6.0 inches).
3. Coordinates are handheld GPS. Accuracy for this unit is +/− 15 m.
4. Elevations are in meters above sea level (masl) and interpolated from contours (+/− 0.50 m).
5. Depths are in meters (m).

PAGE 2 OF 4

LIMITATION

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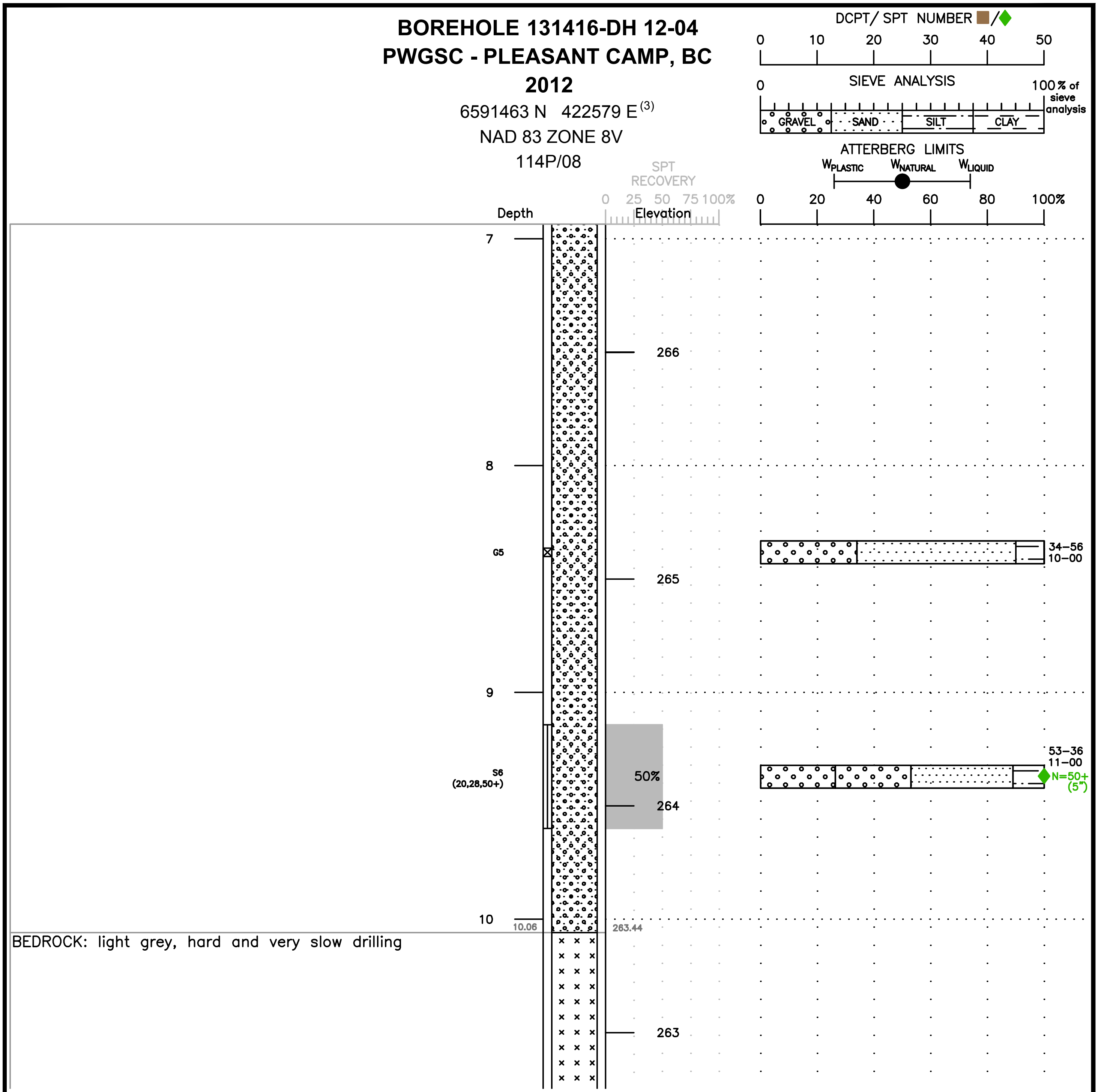
LOGGED BY	N. SAFI	**OPERATOR**	T. HESSE	**DRAWN BY**	C. WU		
GEOLOGY BY	N/A	**DRILL RIG TYPE**	DR212	**PROJECT No.**	131416		
DATE DRILLED	07−OCT−12	**ABANDONMENT**	CUTTINGS AND BENTONITE SEAL	**SCALE**	1:25	**DATE**	14−NOV−12

ACADDWG:\\P:\SLE\01 − British Columbia\JCS#131416−E011 CBSA Pleasant Camp Remedial Excavation\Drafting\Borehole\BH−131416−04.dwg

BOREHOLE 131416-DH 12-04
PWGSC - PLEASANT CAMP, BC
2012

6591463 N 422579 E $^{(3)}$
NAD 83 ZONE 8V
114P/08



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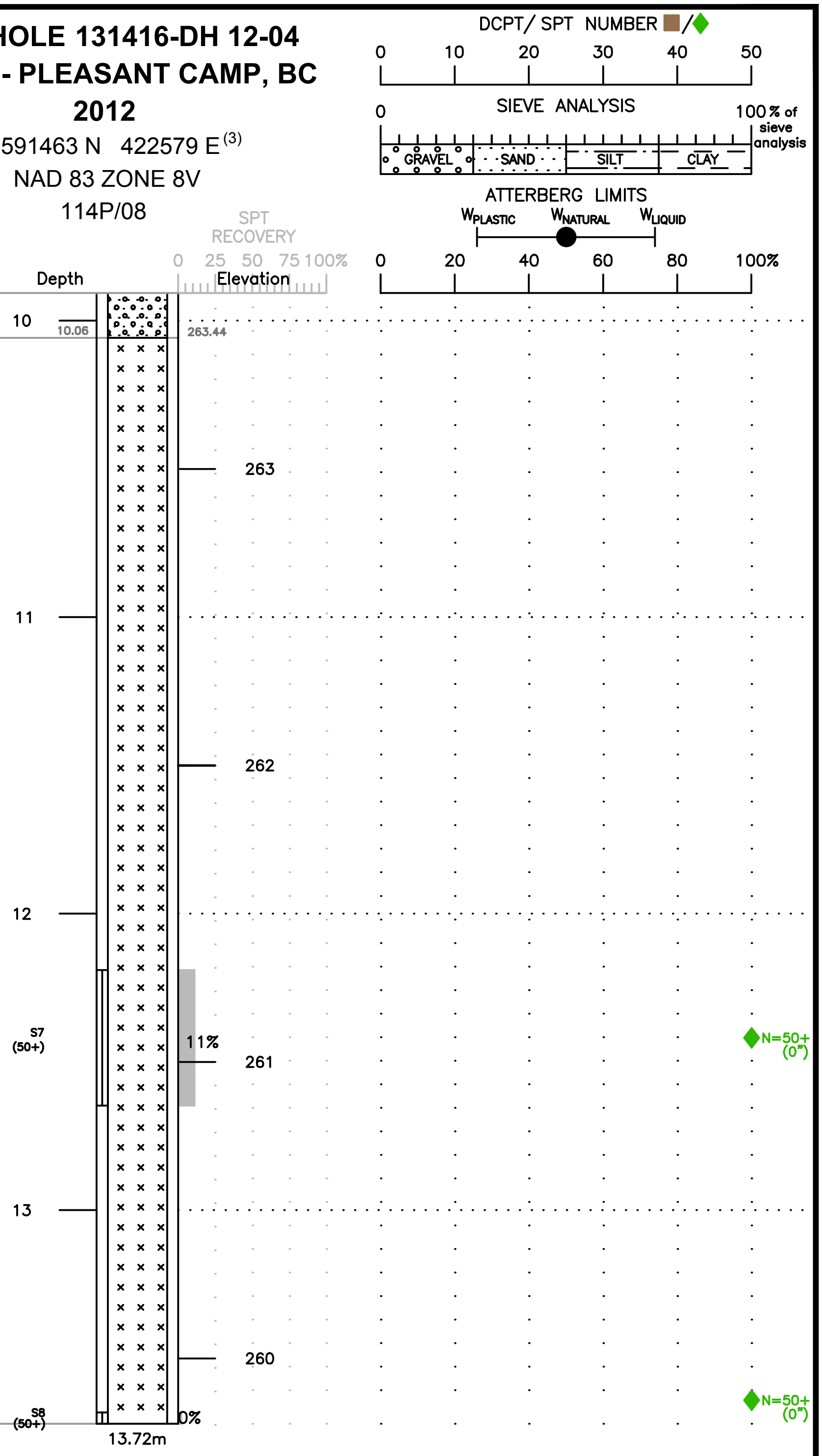
GEOLOGY BY	N/A	**DRILL RIG TYPE**	DR212	**PROJECT No.**	131416
DATE DRILLED	07–OCT–12	**ABANDONMENT**	CUTTINGS AND BENTONITE SEAL	**SCALE** 1:25	**DATE** 14–NOV–12

ACADDWG:\\P:\SLE\01 – British Columbia\JCS#131416–E011 CBSA Pleasant Camp Remedial Excavation\Drafting\Borehole\BH–131416–04.dwg

BOREHOLE 131416-DH 12-04
PWGSC - PLEASANT CAMP, BC
2012

6591463 N 422579 E(3)
NAD 83 ZONE 8V
114P/08



BEDROCK: light grey, hard and very slow drilling

NOTES:
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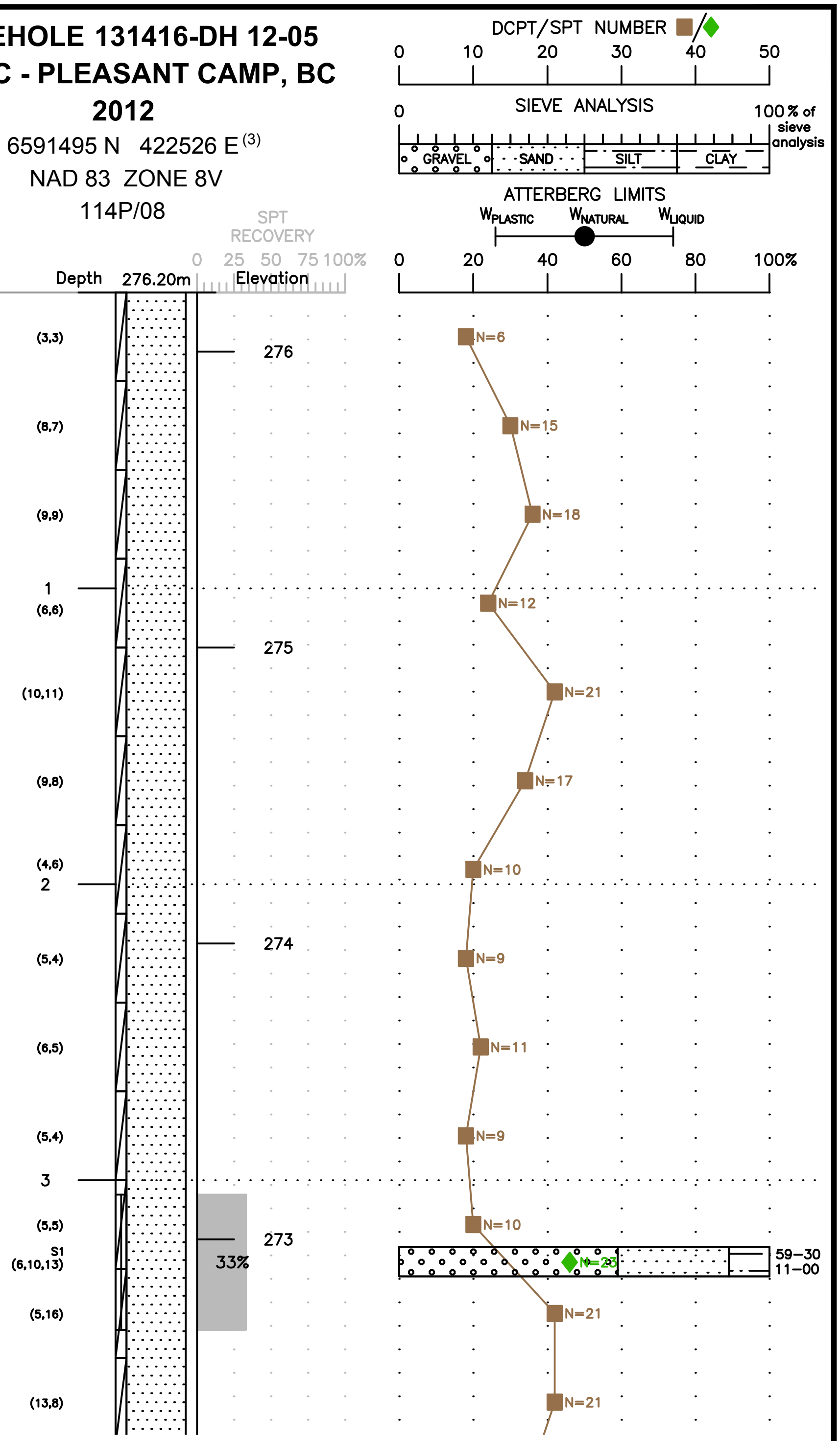
DATE DRILLED	07–OCT–12	**ABANDONMENT**	CUTTINGS AND BENTONITE SEAL	**SCALE**	1:25	**DATE**	14–NOV–12

ACADDWG:\\P:\SLE\01 – British Columbia\JCS#131416–E011 CBSA Pleasant Camp Remedial Excavation\Drafting\Borehole\BH–131416–04.dwg

BOREHOLE 131416-DH 12-05
PWGSC - PLEASANT CAMP, BC
2012

6591495 N 422526 E $^{(3)}$
NAD 83 ZONE 8V
114P/08



SAND: some gravel, some to trace silt, non plastic, medium to coarse grained, subangular gravels, damp, brown.

– at 3.0 m: compact (SPT), gravelly, trace silt, coarse–grained, some oxidations stains, wet at end of SPT

NOTES:
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LIMITATION

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LOGGED BY	N. SAFI	**OPERATOR**	T. HESSE	**DRAWN BY**	C. WU
GEOLOGY BY	N/A	**DRILL RIG TYPE**	DR212	**PROJECT No.**	131416
DATE DRILLED	05–OCT–12	**ABANDONMENT**	CUTTINGS AND BENTONITE SEAL	**SCALE** 1:25	**DATE** 14–NOV–12

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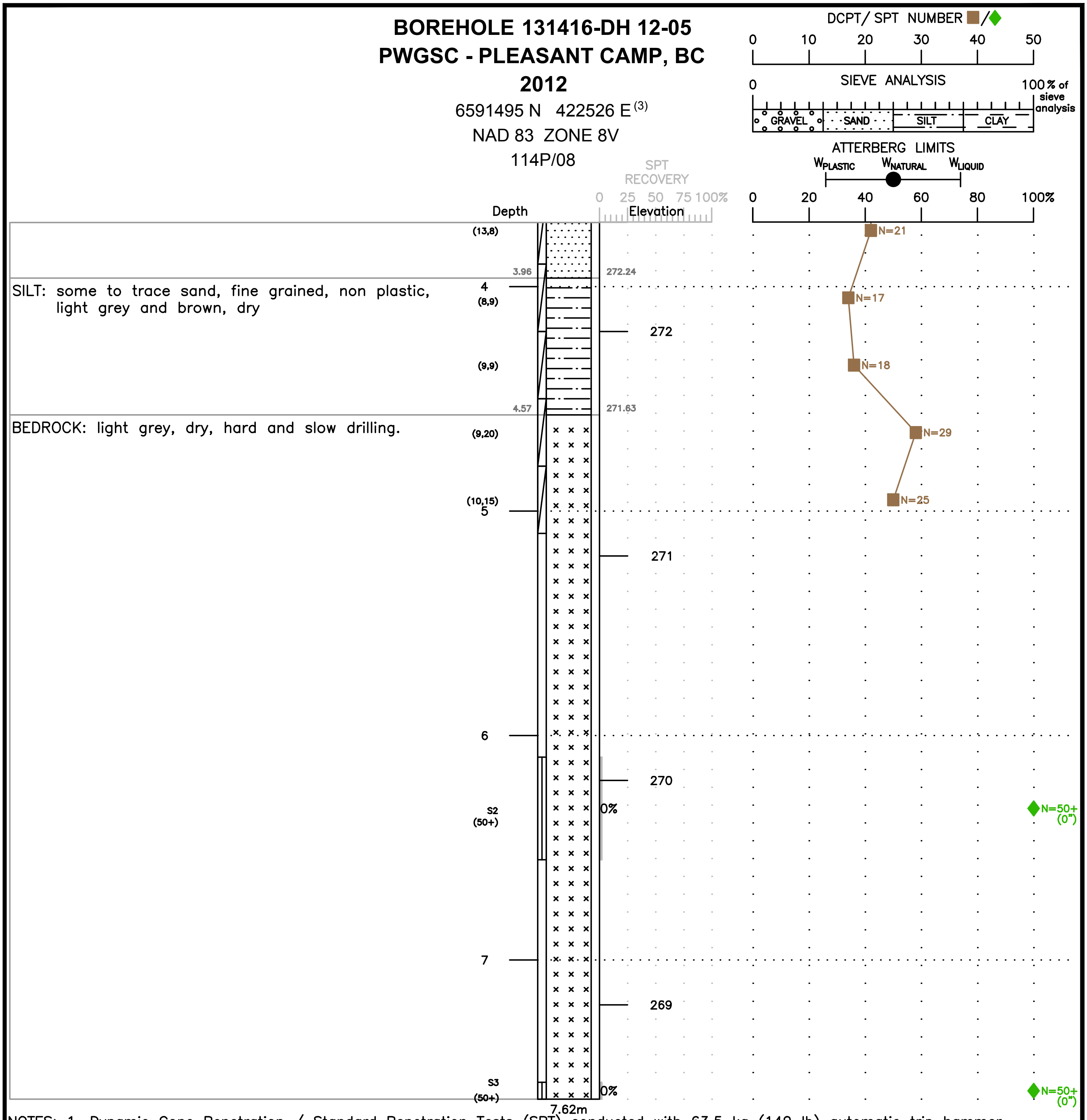
BOREHOLE 131416-DH 12-05
PWGSC - PLEASANT CAMP, BC
2012

6591495 N 422526 E (3)
NAD 83 ZONE 8V
114P/08



SILT: some to trace sand, fine grained, non plastic, light grey and brown, dry

BEDROCK: light grey, dry, hard and slow drilling.

NOTES:
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LIMITATION

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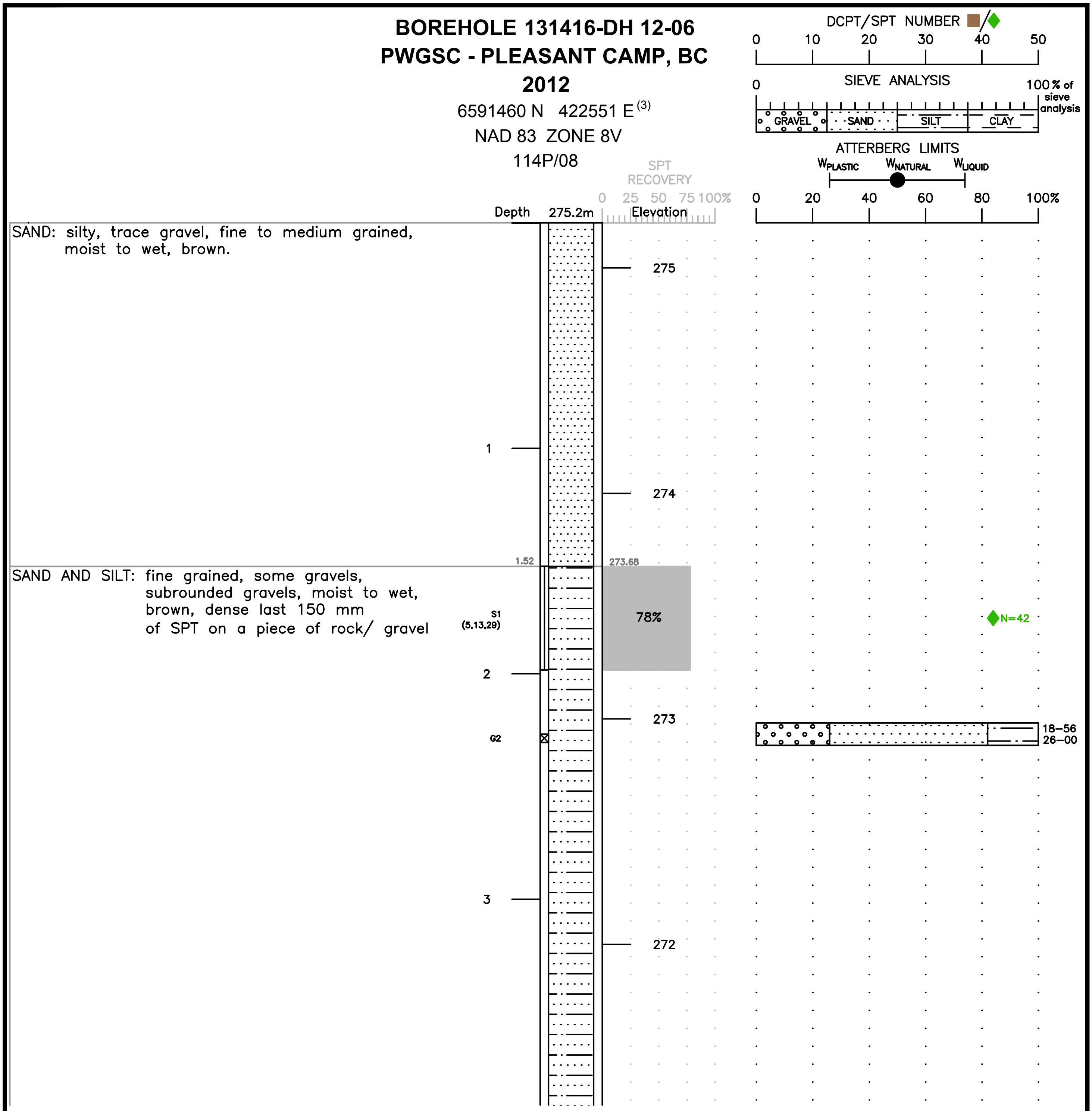
GEOLOGY BY	N/A	**DRILL RIG TYPE**	DR212	**PROJECT No.**	131416
DATE DRILLED	05–OCT–12	**ABANDONMENT**	CUTTINGS AND BENTONITE SEAL	**SCALE** 1:25	**DATE** 14–NOV–12

BOREHOLE 131416-DH 12-06
PWGSC - PLEASANT CAMP, BC
2012

6591460 N 422551 E$^{(3)}$
NAD 83 ZONE 8V
114P/08



SAND: silty, trace gravel, fine to medium grained, moist to wet, brown.

SAND AND SILT: fine grained, some gravels, subrounded gravels, moist to wet, brown, dense last 150 mm of SPT on a piece of rock/ gravel

NOTES:
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LIMITATION

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LOGGED BY	N. SAFI	**OPERATOR**	T. HESSE	**DRAWN BY**	C. WU		
GEOLOGY BY	N/A	**DRILL RIG TYPE**	DR212	**PROJECT No.**	131416		
DATE DRILLED	06–OCT–12	**ABANDONMENT**	CUTTINGS AND BENTONITE SEAL	**SCALE**	1:25	**DATE**	14–NOV–12

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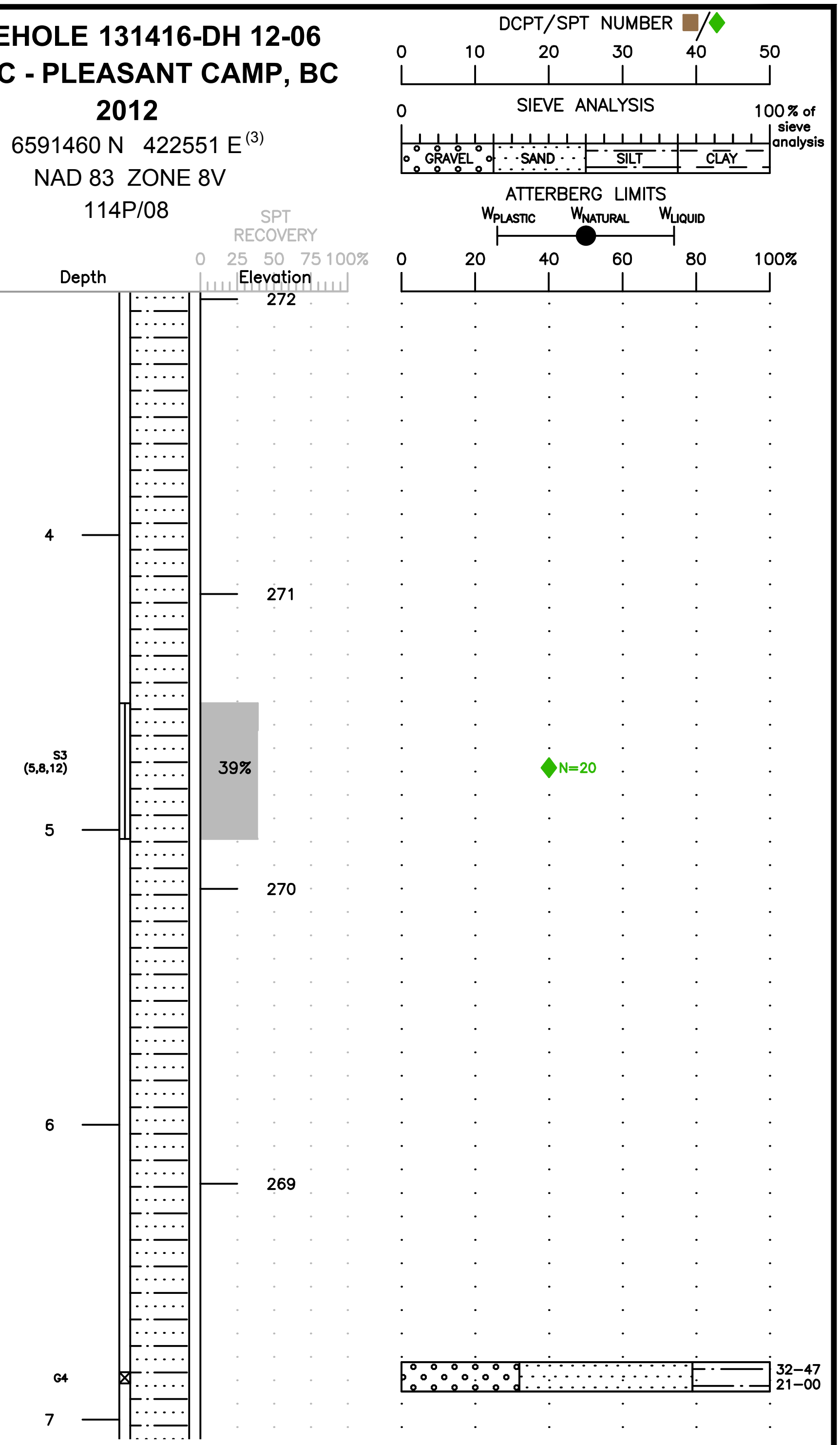
BOREHOLE 131416-DH 12-06
PWGSC - PLEASANT CAMP, BC
2012

6591460 N 422551 E(3)
NAD 83 ZONE 8V
114P/08

– at 4.6 m: compact, SPT end consists of coarse gravels, light grey and white

– at 6.1 m: silt sand, dark grey in color, low plastic silt, wet



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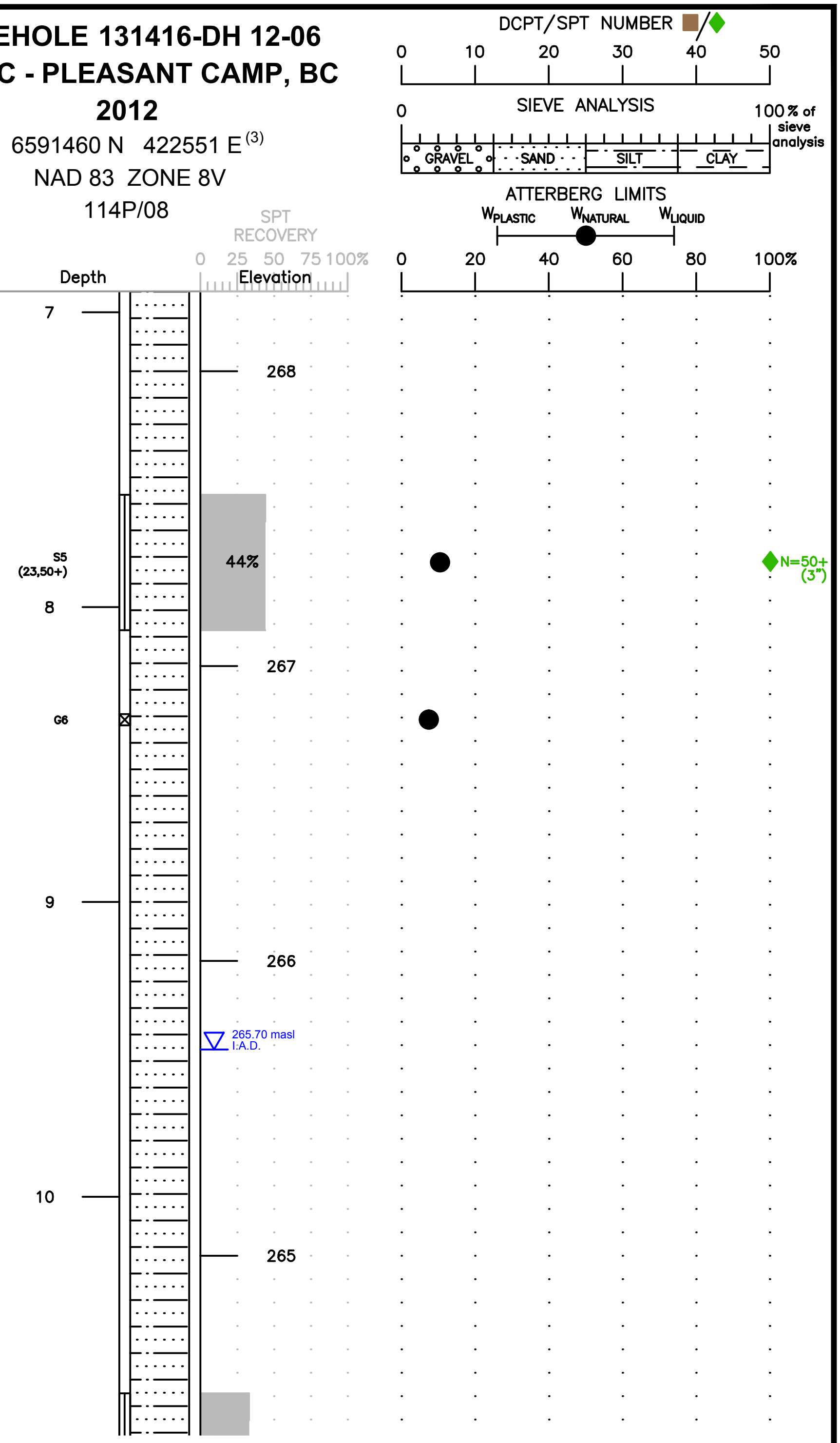
ACADDWG:\\P:\SLE\01 – British Columbia\JCS#131416–E011 CBSA Pleasant Camp Remedial Excavation\Drafting\Borehole\BH–131416–06.dwg

BOREHOLE 131416-DH 12-06
PWGSC - PLEASANT CAMP, BC
2012

6591460 N 422551 E (3)
NAD 83 ZONE 8V
114P/08



– at 7.9 m: damp to dry, fine gravel, silty sand, less gravel, non plastic

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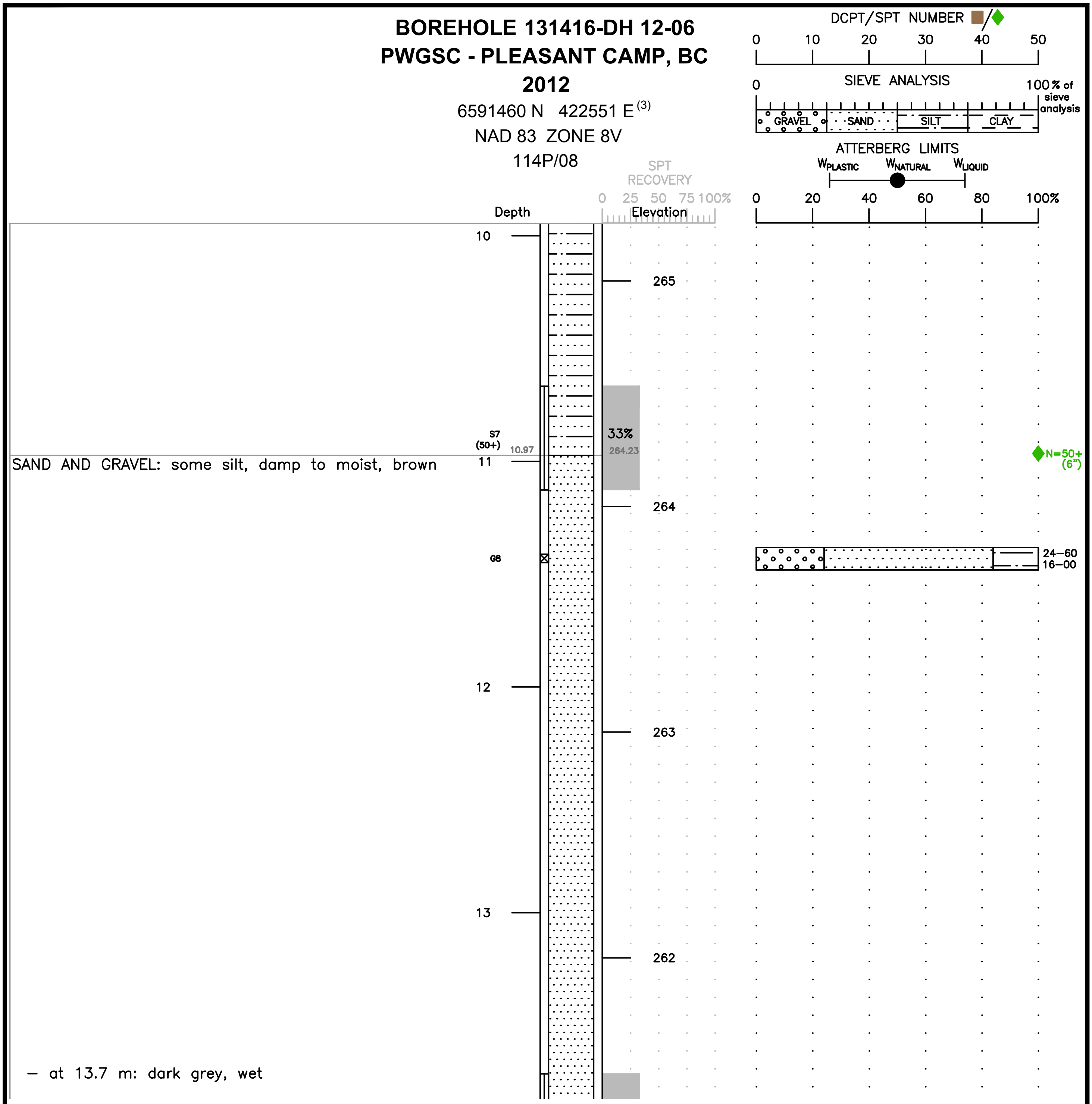
GEOLOGY BY	N/A	**DRILL RIG TYPE**	DR212	**PROJECT No.**	131416
DATE DRILLED	06–OCT–12	**ABANDONMENT**	CUTTINGS AND BENTONITE SEAL	**SCALE** 1:25	**DATE** 14–NOV–12

ACADDWG:\\P:\SLE\01 – British Columbia\JCS#131416–E011 CBSA Pleasant Camp Remedial Excavation\Drafting\Borehole\BH–131416–06.dwg

BOREHOLE 131416-DH 12-06
PWGSC - PLEASANT CAMP, BC
2012

6591460 N 422551 E (3)
NAD 83 ZONE 8V
114P/08



SAND AND GRAVEL: some silt, damp to moist, brown

– at 13.7 m: dark grey, wet

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GEOLOGY BY	N/A	**DRILL RIG TYPE**	DR212	**PROJECT No.**	131416
DATE DRILLED	14–NOV–12	**ABANDONMENT**	CUTTINGS AND BENTONITE SEAL	**SCALE** 1:25	**DATE** 06–NOV–12

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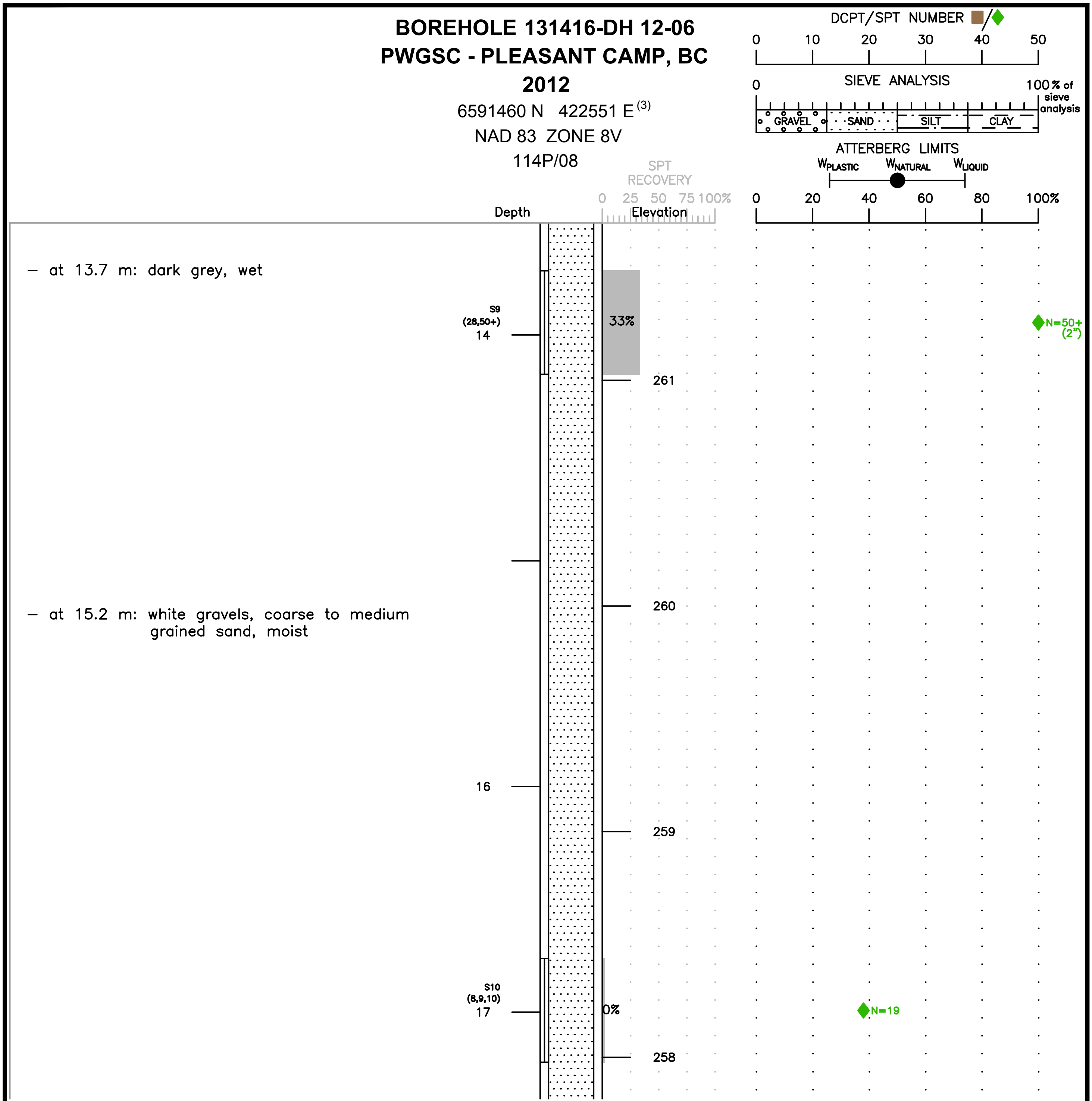
BOREHOLE 131416-DH 12-06
PWGSC - PLEASANT CAMP, BC
2012

6591460 N 422551 E$^{(3)}$
NAD 83 ZONE 8V
114P/08



– at 13.7 m: dark grey, wet

– at 15.2 m: white gravels, coarse to medium grained sand, moist

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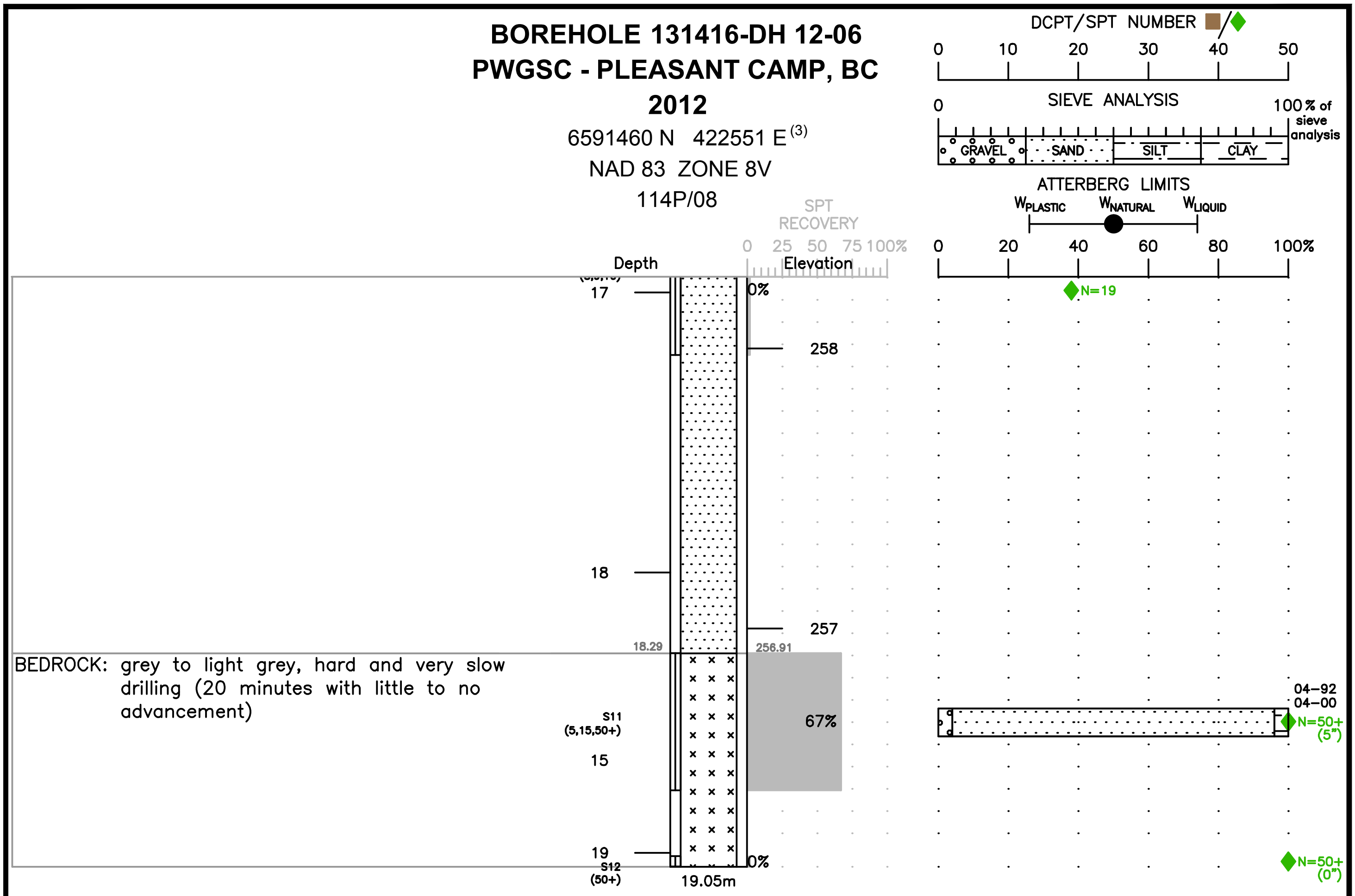
BOREHOLE 131416-DH 12-06
PWGSC - PLEASANT CAMP, BC
2012

6591460 N 422551 E $^{(3)}$
NAD 83 ZONE 8V
114P/08



BEDROCK: grey to light grey, hard and very slow drilling (20 minutes with little to no advancement)

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GEOLOGY BY	N/A	**DRILL RIG TYPE**	DR212	**PROJECT No.**	131416
DATE DRILLED	06–OCT–12	**ABANDONMENT**	CUTTINGS AND BENTONITE SEAL	**SCALE** 1:25	**DATE** 14–NOV–12

ACADDWG:\\P:\SLE\01 – British Columbia\JCS#131416–E011 CBSA Pleasant Camp Remedial Excavation\Drafting\Borehole\BH–131416–06.dwg

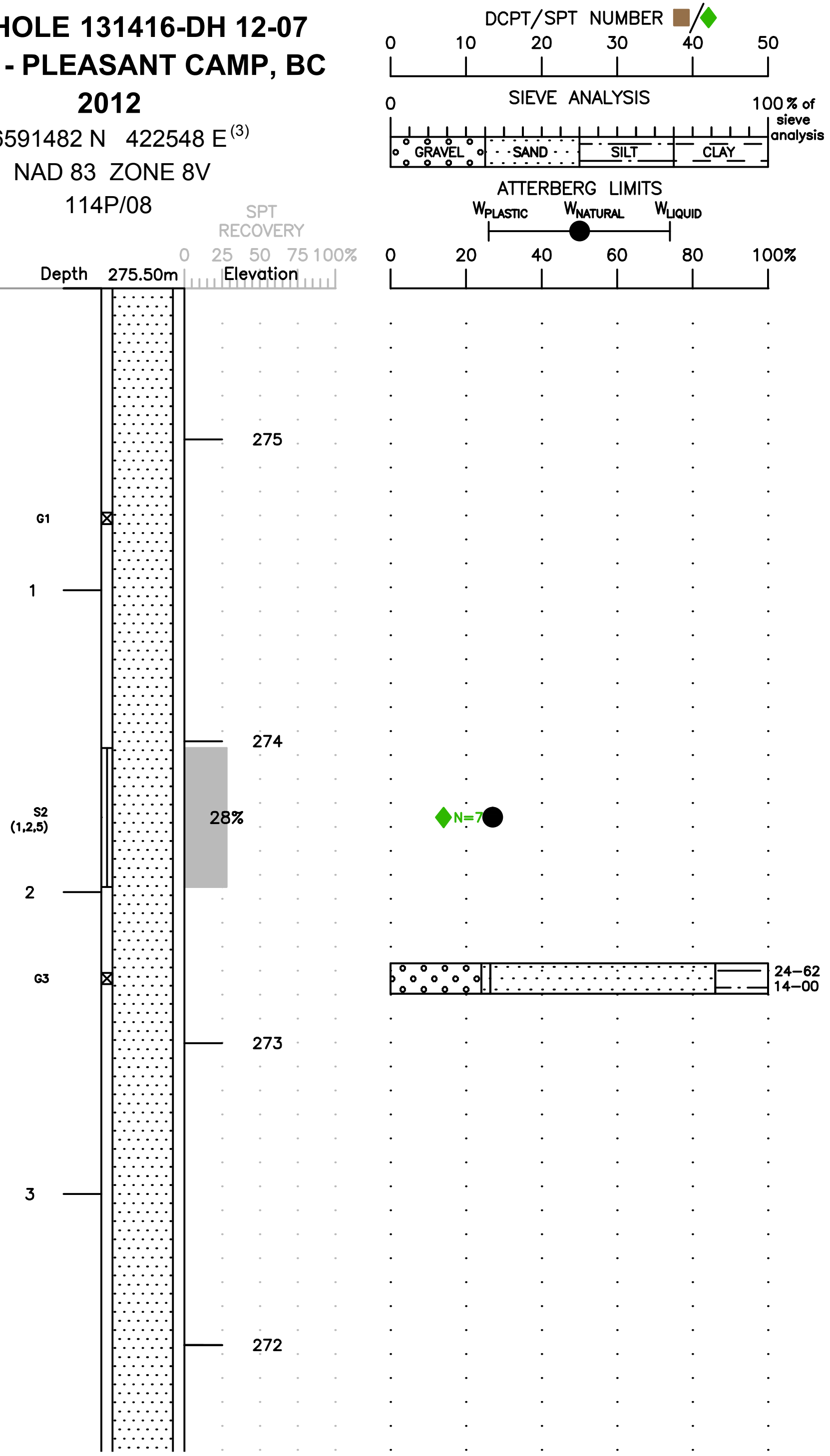
BOREHOLE 131416-DH 12-07
PWGSC - PLEASANT CAMP, BC
2012

6591482 N 422548 E$^{(3)}$
NAD 83 ZONE 8V
114P/08

SAND: gravelly, some silt, medium to coarse grained, wet (drillers used water), brown (imported fill?)

– at 1.5 to 2.0 m: loose (SPT), silty clayey, wet

– at 2.7 m: light grey, some white gravel, no silt to trace silt



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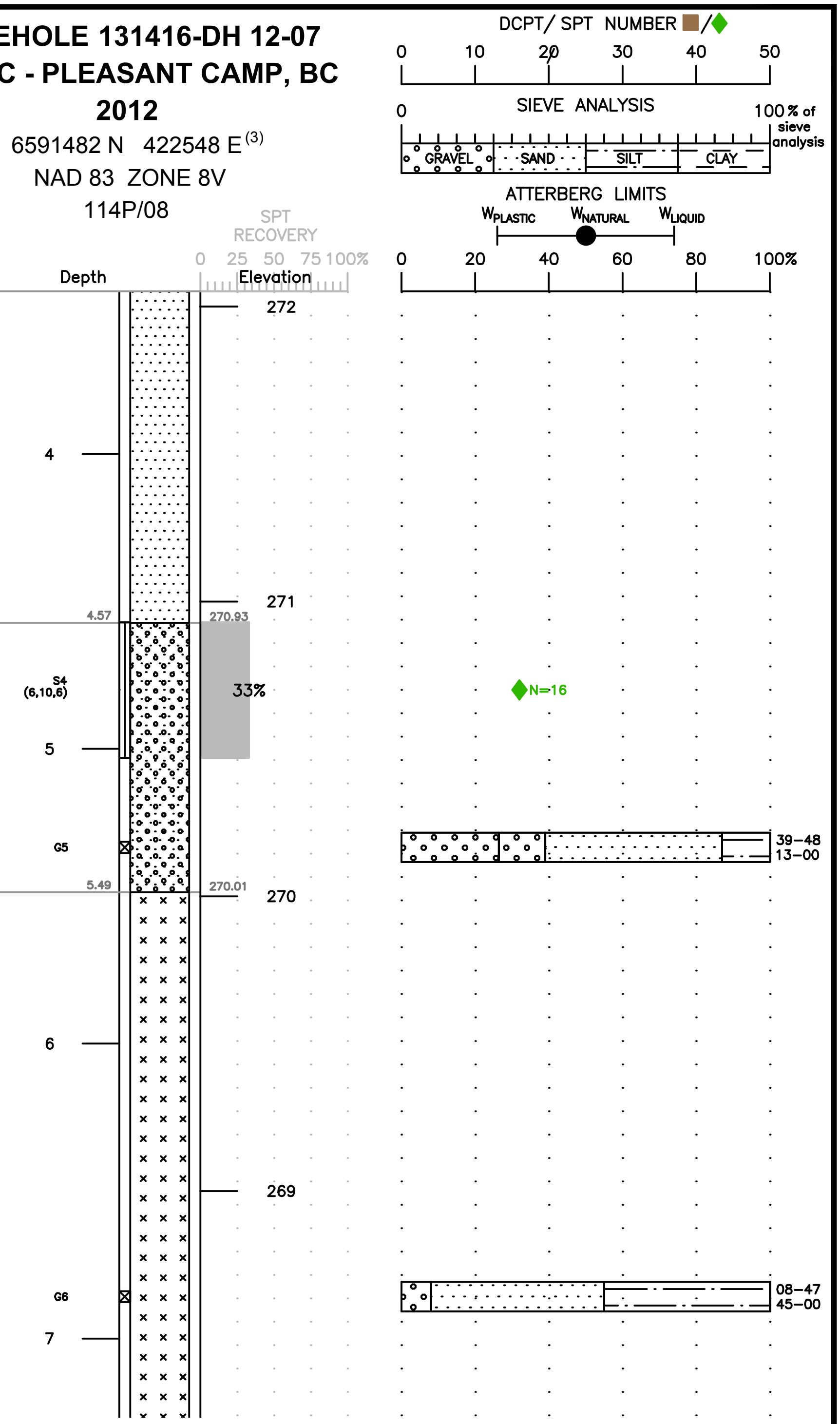
LOGGED BY	N. SAFI	**OPERATOR**	T. HESSE	**DRAWN BY**	C. WU
GEOLOGY BY	N/A	**DRILL RIG TYPE**	DR212	**PROJECT No.**	131416
DATE DRILLED	07–OCT–12	**ABANDONMENT**	CUTTINGS AND BENTONITE SEAL	**SCALE** 1:25	**DATE** 14–NOV–12

BOREHOLE 131416-DH 12-07
PWGSC - PLEASANT CAMP, BC
2012

6591482 N 422548 E(3)
NAD 83 ZONE 8V
114P/08



SAND AND GRAVEL: coarse grained sand, subangular to subrounded gravel, non plastic, compact (SPT), brown to dark grey, wet

BEDROCK: light grey, hard and slow drilling, sandy silt, damp

NOTES:
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2. (#,#) denotes DCPT / (#,#,#) denotes SPT blows per 152 mm (6.0 inches).
3. Coordinates are handheld GPS. Accuracy for this unit is +/− 15 m.
4. Elevations are in meters above sea level (masl) and interpolated from contours (+/− 0.50 m).
5. Depths are in meters (m).

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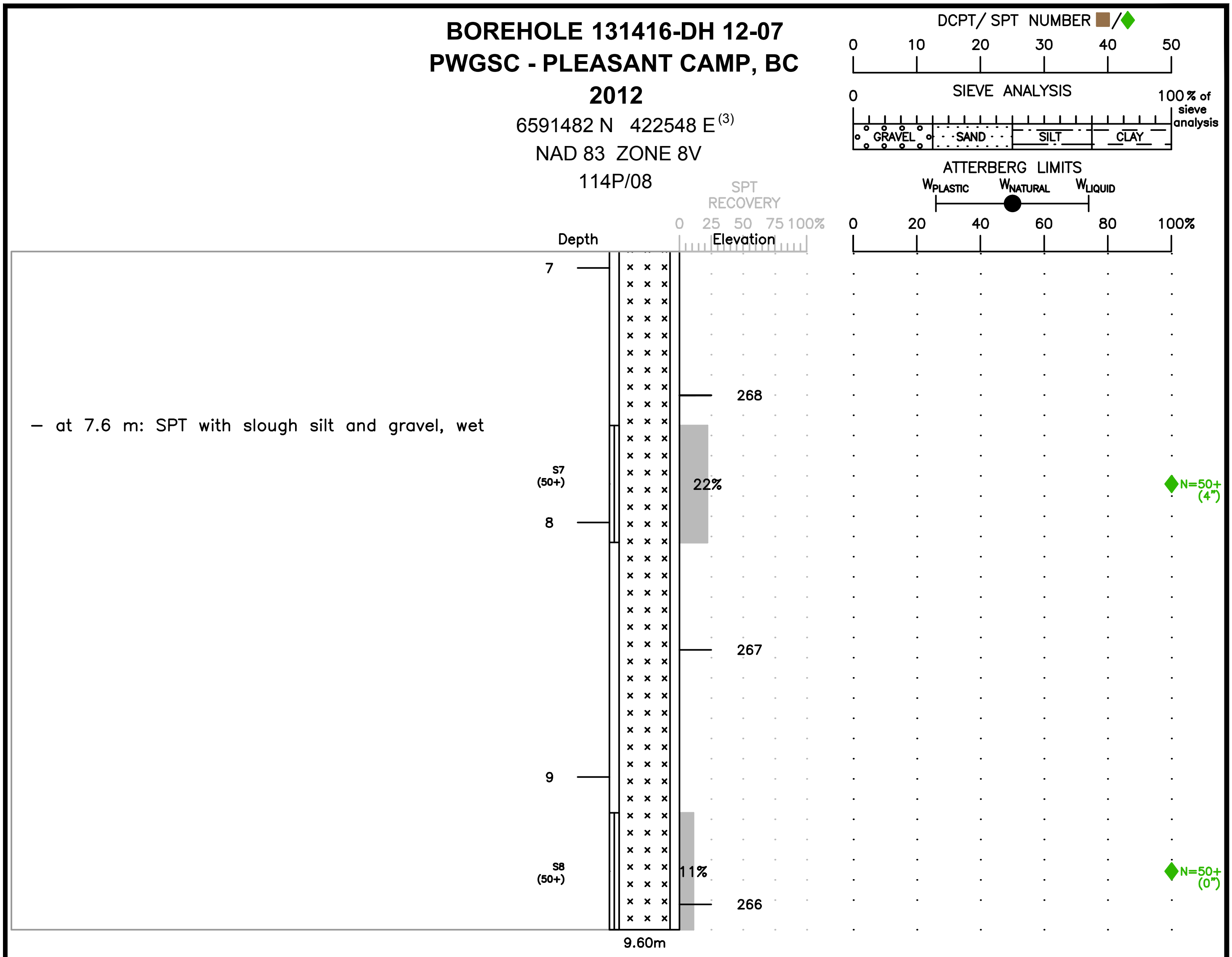
LOGGED BY	N. SAFI	**OPERATOR**	T. HESSE	**DRAWN BY**	C. WU
GEOLOGY BY	N/A	**DRILL RIG TYPE**	DR212	**PROJECT No.**	131416
DATE DRILLED	07–OCT–12	**ABANDONMENT**	CUTTINGS AND BENTONITE SEAL	**SCALE** 1:25	**DATE** 14–NOV–12

ACADDWG:\\P:\SLE\01 – British Columbia\JCS#131416–E011 CBSA Pleasant Camp Remedial Excavation\Drafting\Borehole\BH–131416–07.dwg

BOREHOLE 131416-DH 12-07
PWGSC - PLEASANT CAMP, BC
2012

6591482 N 422548 E (3)
NAD 83 ZONE 8V
114P/08



– at 7.6 m: SPT with slough silt and gravel, wet

NOTES: 1. Dynamic Cone Penetration / Standard Penetration Tests (SPT) conducted with 63.5 kg (140 lb) automatic trip hammer falling 762 mm (30 inches).
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PAGE 3 OF 7

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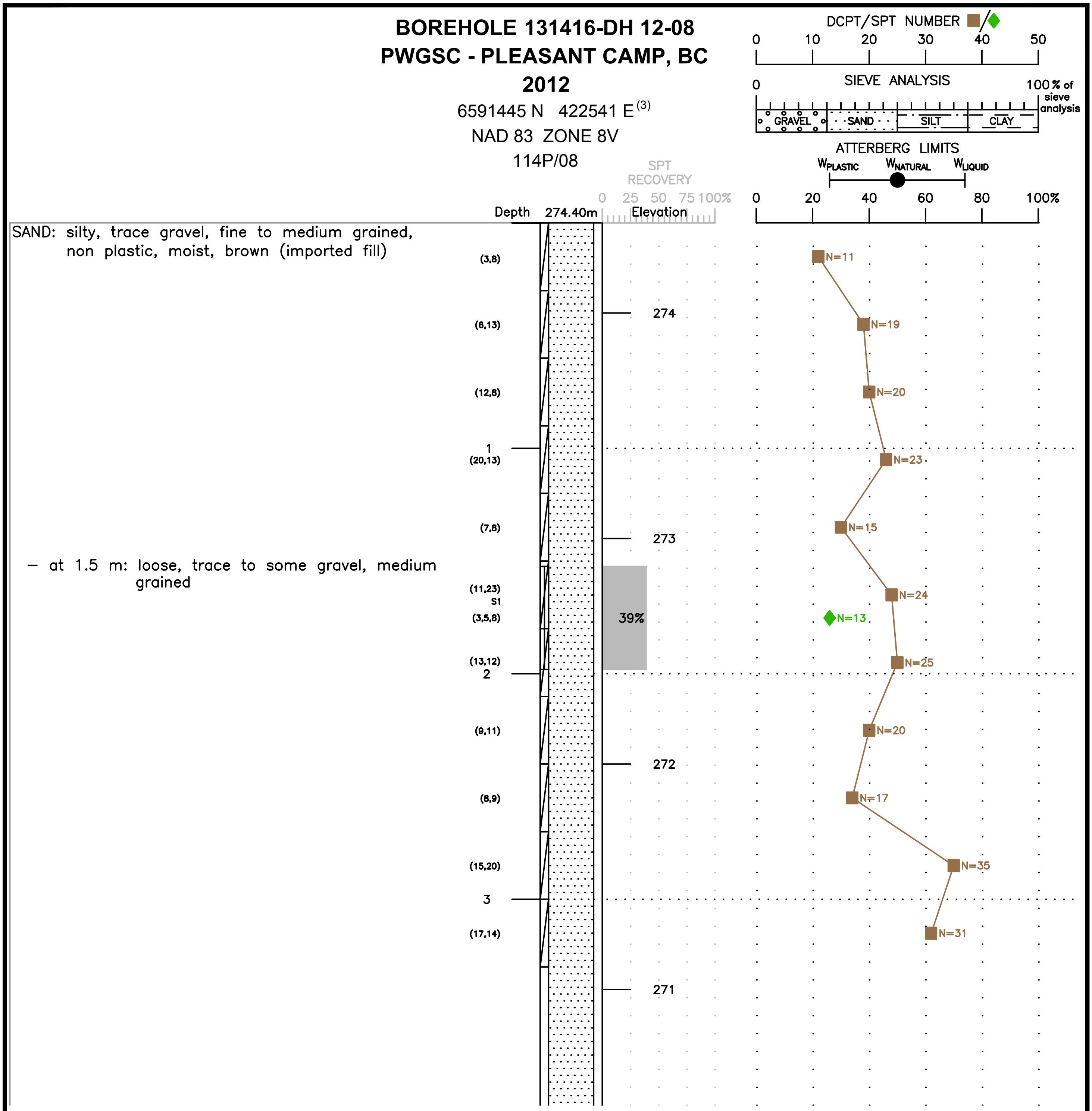
BOREHOLE 131416-DH 12-08
PWGSC - PLEASANT CAMP, BC
2012

6591445 N 422541 E$^{(3)}$
NAD 83 ZONE 8V
114P/08



SAND: silty, trace gravel, fine to medium grained, non plastic, moist, brown (imported fill)

– at 1.5 m: loose, trace to some gravel, medium grained

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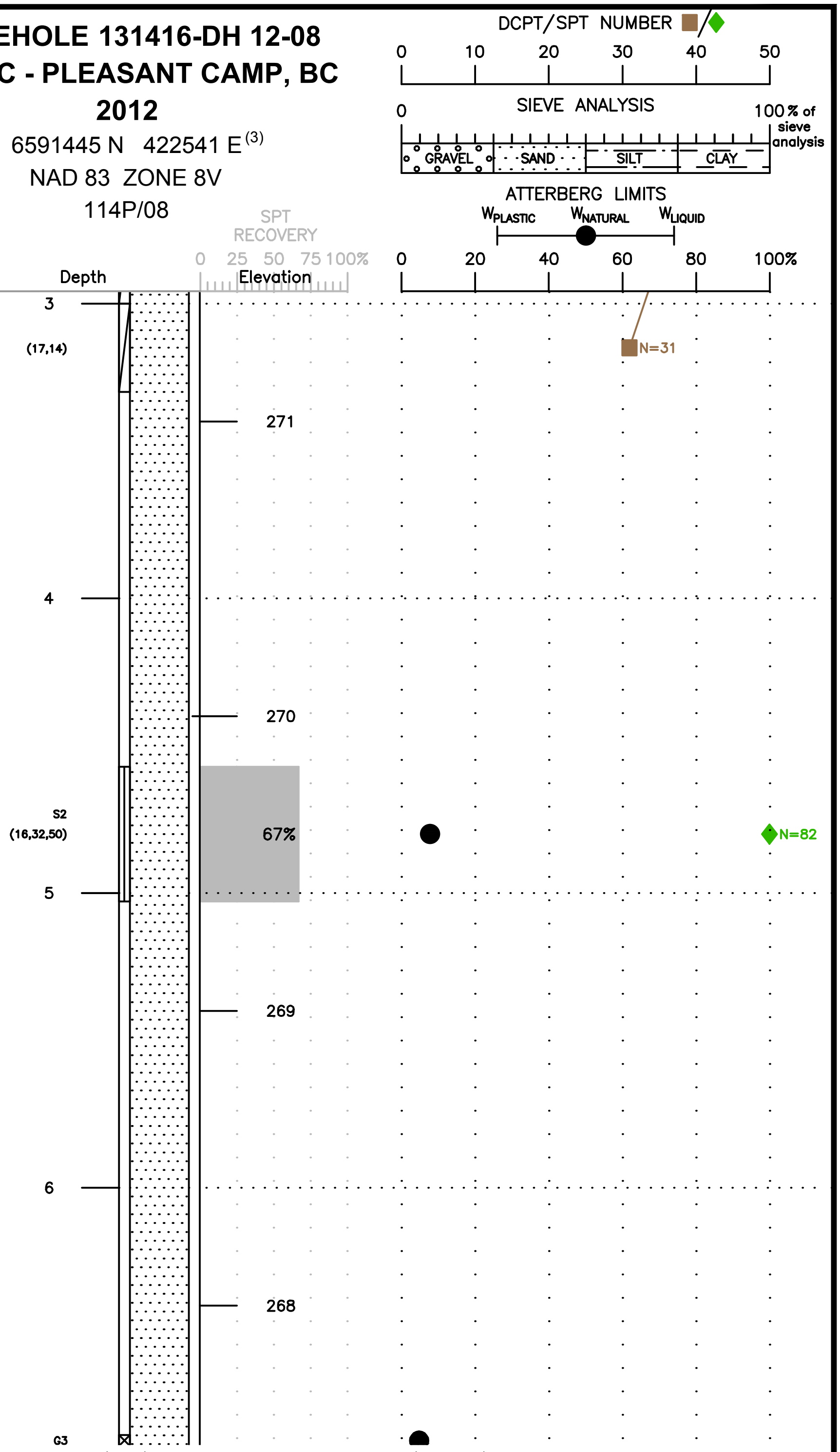
DATE DRILLED	07–OCT–12	**ABANDONMENT**	CUTTINGS AND BENTONITE SEAL	**SCALE** 1:25	**DATE** 14–NOV–12

BOREHOLE 131416-DH 12-08
PWGSC - PLEASANT CAMP, BC
2012

6591445 N 422541 E(3)
NAD 83 ZONE 8V
114P/08



– at 4.6 m: white calcite rock seam, trace clay

– at 6.4 m: fine grained, dry, hard drilling

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ACADDWG:\\P:\SLE\01 – British Columbia\JCS#131416–E011 CBSA Pleasant Camp Remedial Excavation\Drafting\Borehole\BH–131416–08.dwg

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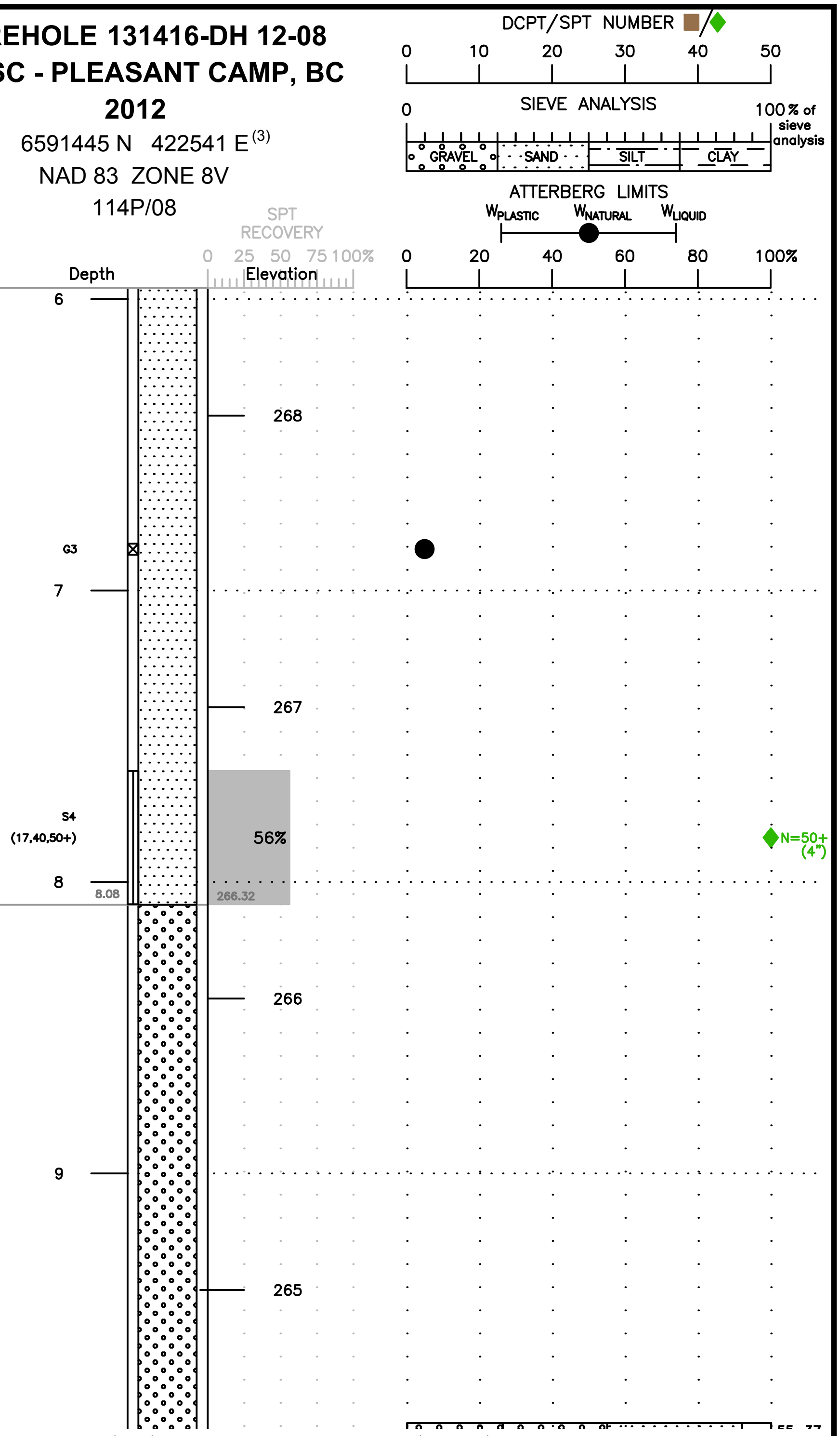
6591445 N 422541 E(3)
NAD 83 ZONE 8V
114P/08

– at 6.4 m: fine grained, dry, hard drilling

– at 7.6 m: some clay, moist to damp, some gravel, trace oxidations

GRAVEL: trace silt, some sand, wet, non plastic, very dense, very slow drilling, light grey.



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BOREHOLE 131416-DH 12-08
PWGSC - PLEASANT CAMP, BC
2012

6591445 N 422541 E(3)
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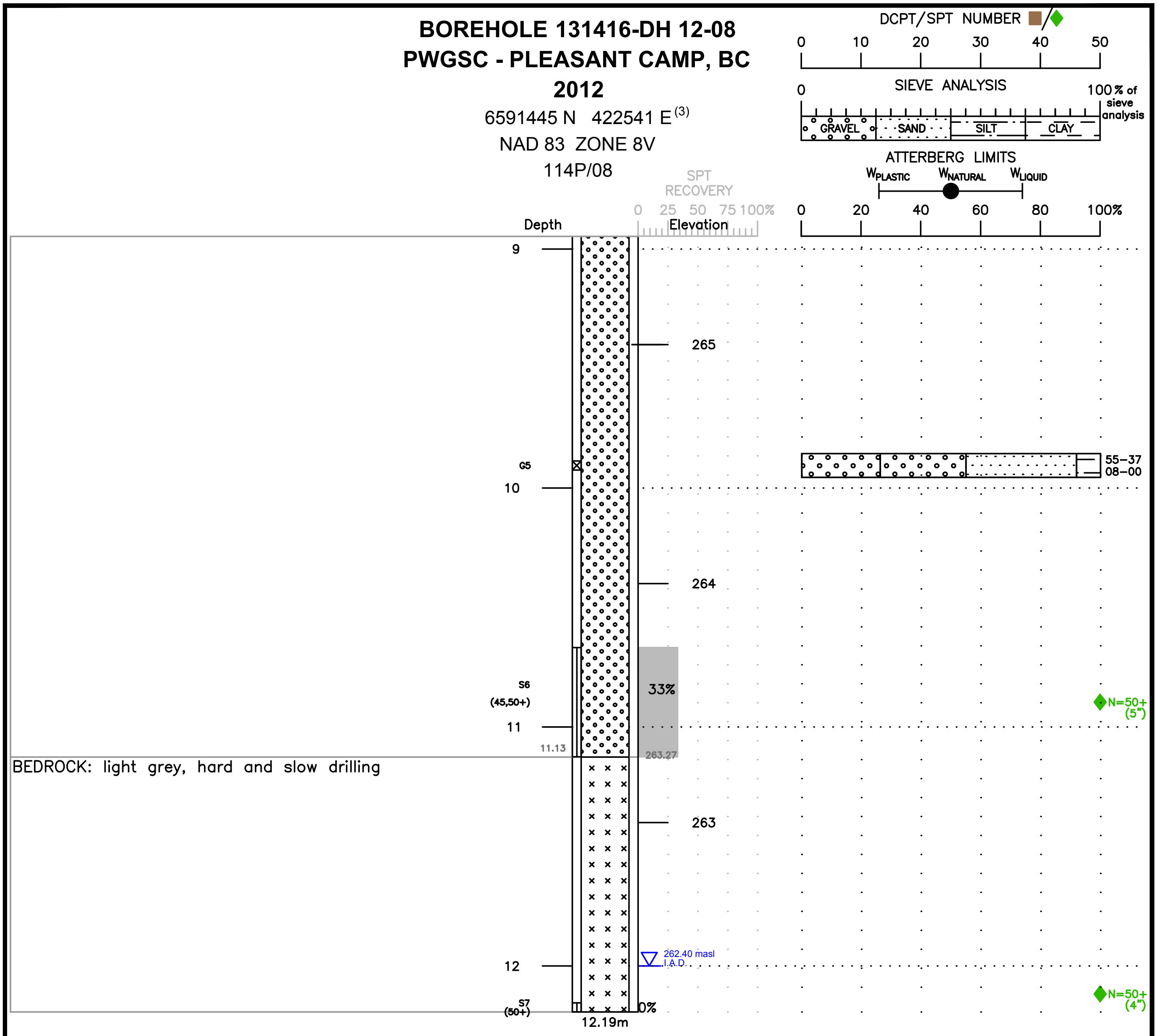
114P/08



BEDROCK: light grey, hard and slow drilling

NOTES:
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APPROVED BY
LOGGED BY N. SAFI
OPERATOR T. HESSE
DRAWN BY C. WU
GEOLOGY BY N/A
DRILL RIG TYPE DR212
PROJECT No. 131416
DATE DRILLED 07–OCT–12
ABANDONMENT CUTTINGS AND BENTONITE SEAL
SCALE 1:25
DATE 14–NOV–12

ACADDWG:\\P:\SLE\01 – British Columbia\JCS#131416–E011 CBSA Pleasant Camp Remedial Excavation\Drafting\Borehole\BH–131416–08.dwg

BOREHOLE 131416-DH 12-09
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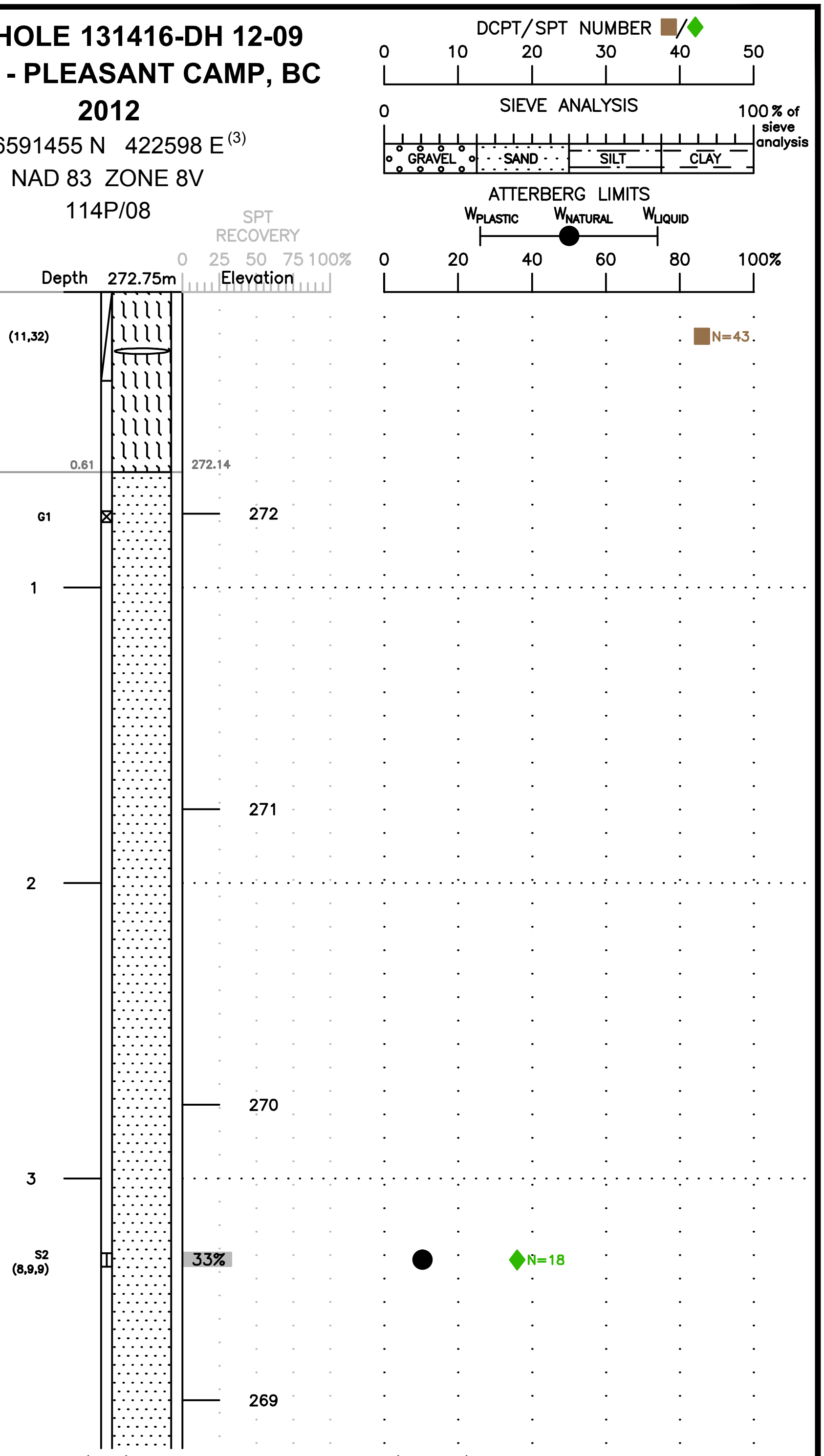
6591455 N 422598 E (3)
NAD 83 ZONE 8V
114P/08



GRAVEL (FILL): sandy, dry, brown.
- at 0.2 m: 450 mm rock (hard drilling) (imported fill)

SAND: some silt, trace gravel, fine to medium grained, non plastic, dry to damp, brown
- at 3.0 m: compact, moist, trace clay, trace oxidation, easy drilling

NOTES:
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DATE DRILLED	08–OCT–12	**ABANDONMENT**	CUTTINGS AND BENTONITE SEAL	**SCALE**	1:25	**DATE**	14–NOV–12

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BOREHOLE 131416-DH 12-09
PWGSC - PLEASANT CAMP, BC
2012

6591455 N 422598 E (3)
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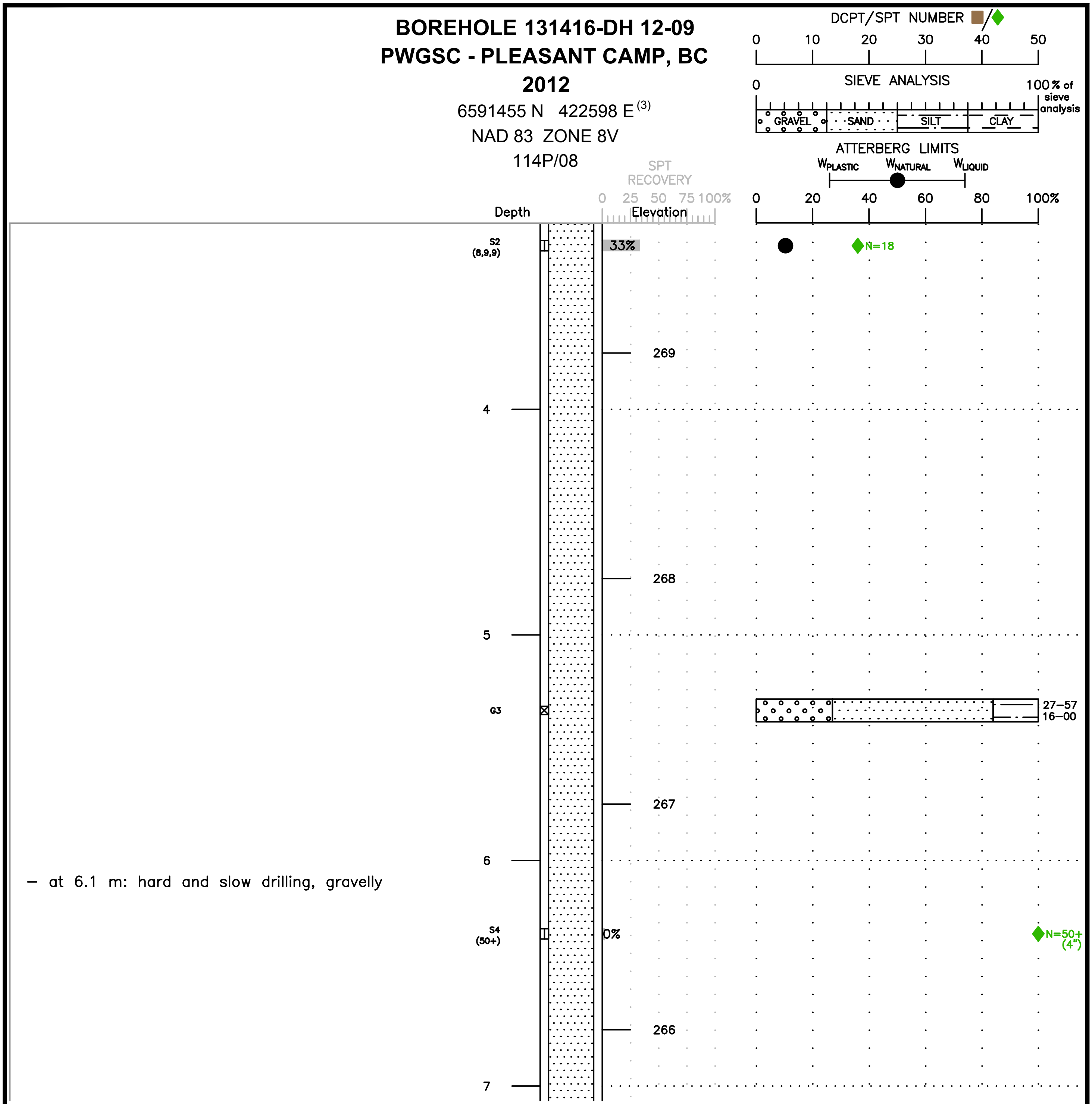
114P/08



– at 6.1 m: hard and slow drilling, gravelly

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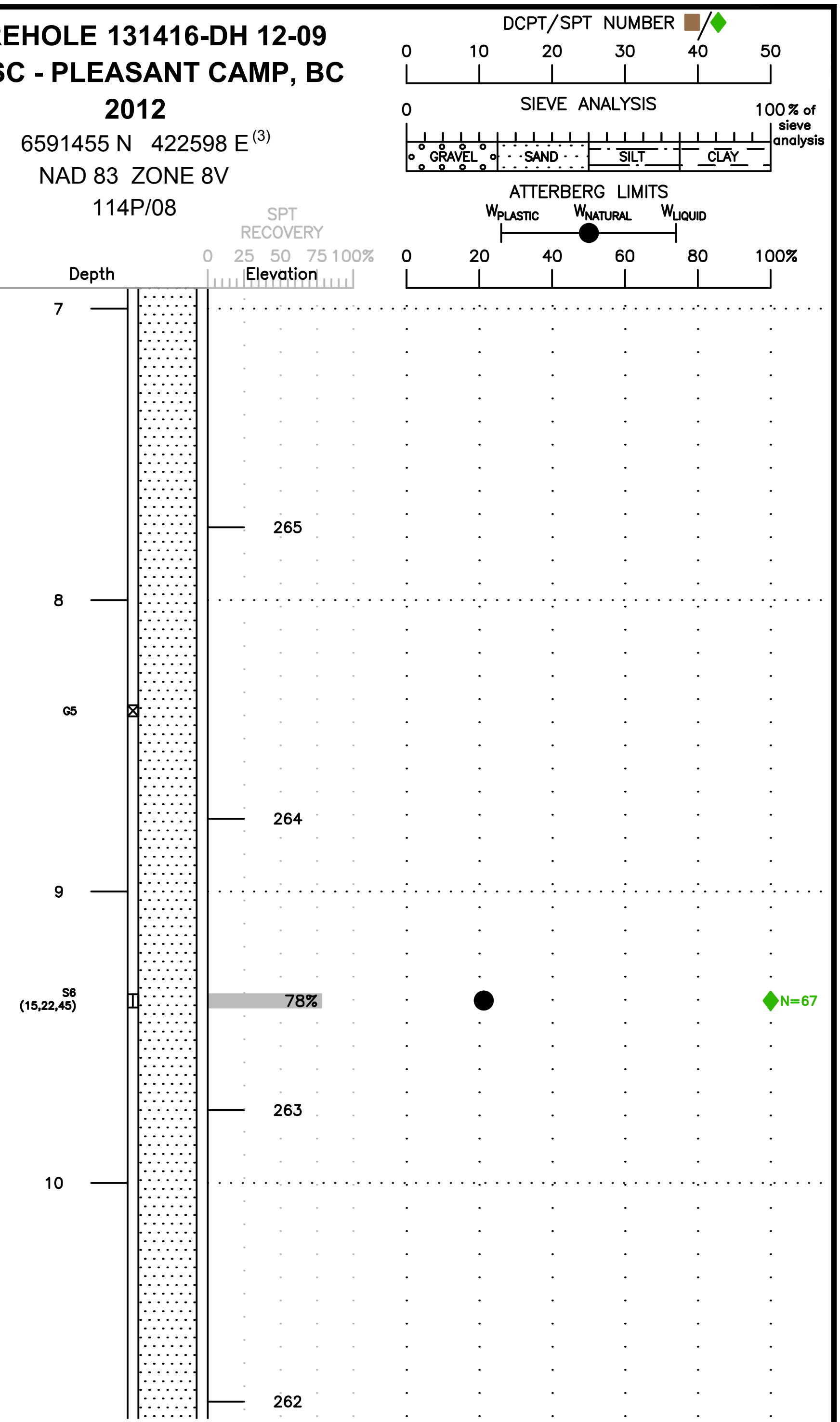
BOREHOLE 131416-DH 12-09
PWGSC - PLEASANT CAMP, BC
2012

6591455 N 422598 E (3)
NAD 83 ZONE 8V
114P/08



- at 7.6 m: dark grey, dry (drillers added water)

- at 9.1 m: sand silt, very dense, moist to wet

- at 9.9 m: light grey

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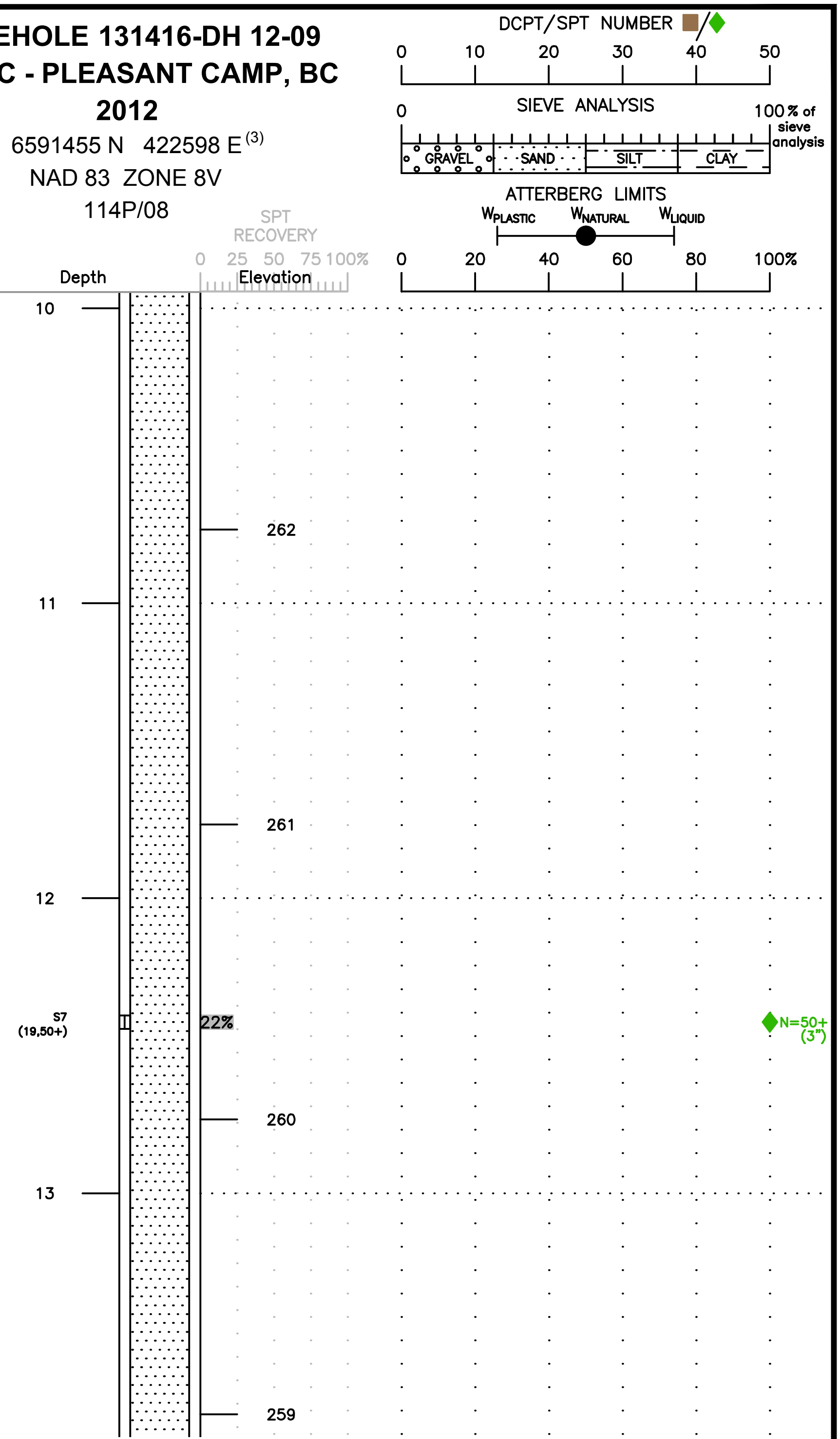

– at 11.3 m: coarse grained, brown

– at 13.7 m: light grey/brown, very dense, wet

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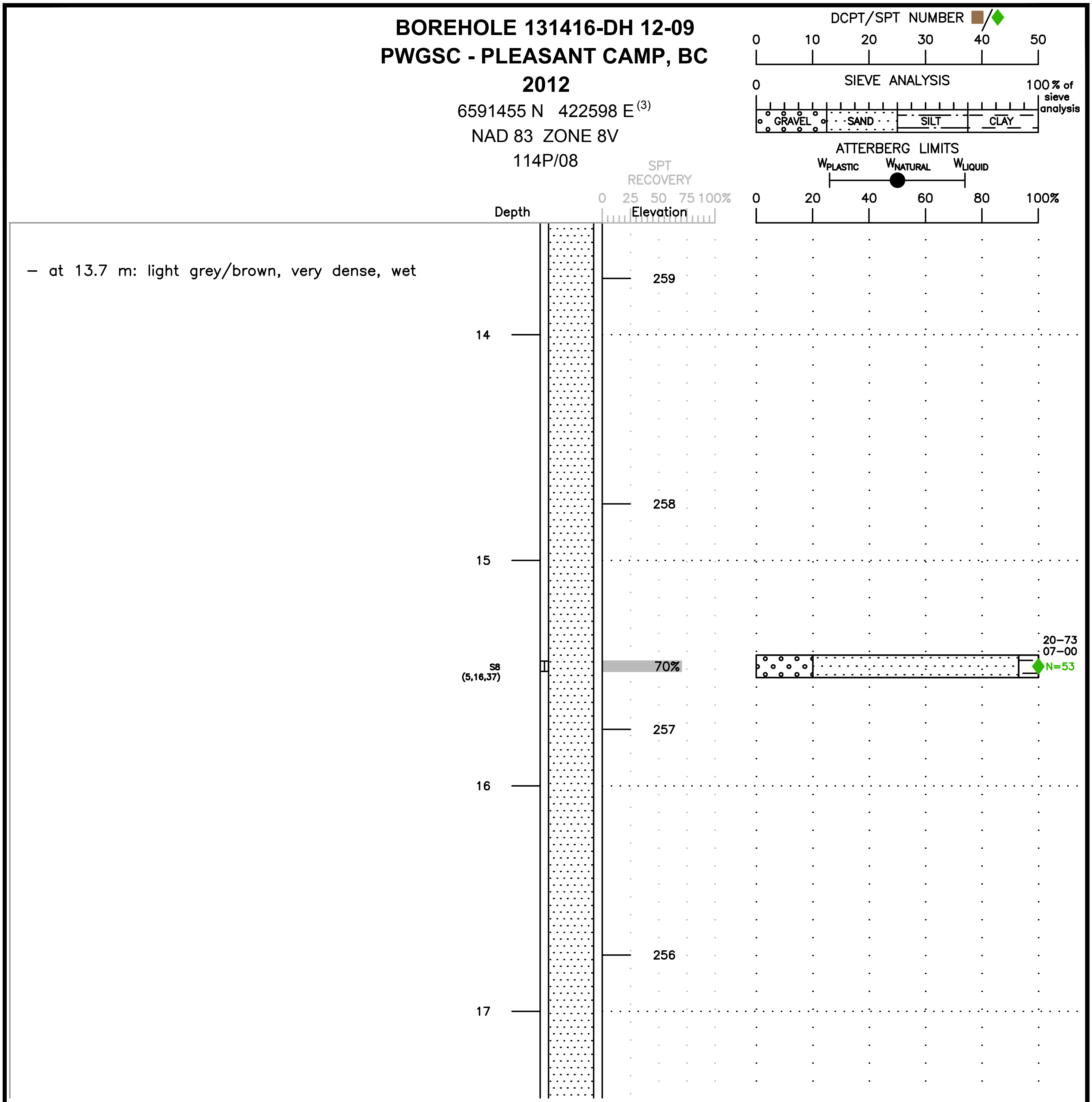

– at 13.7 m: light grey/brown, very dense, wet

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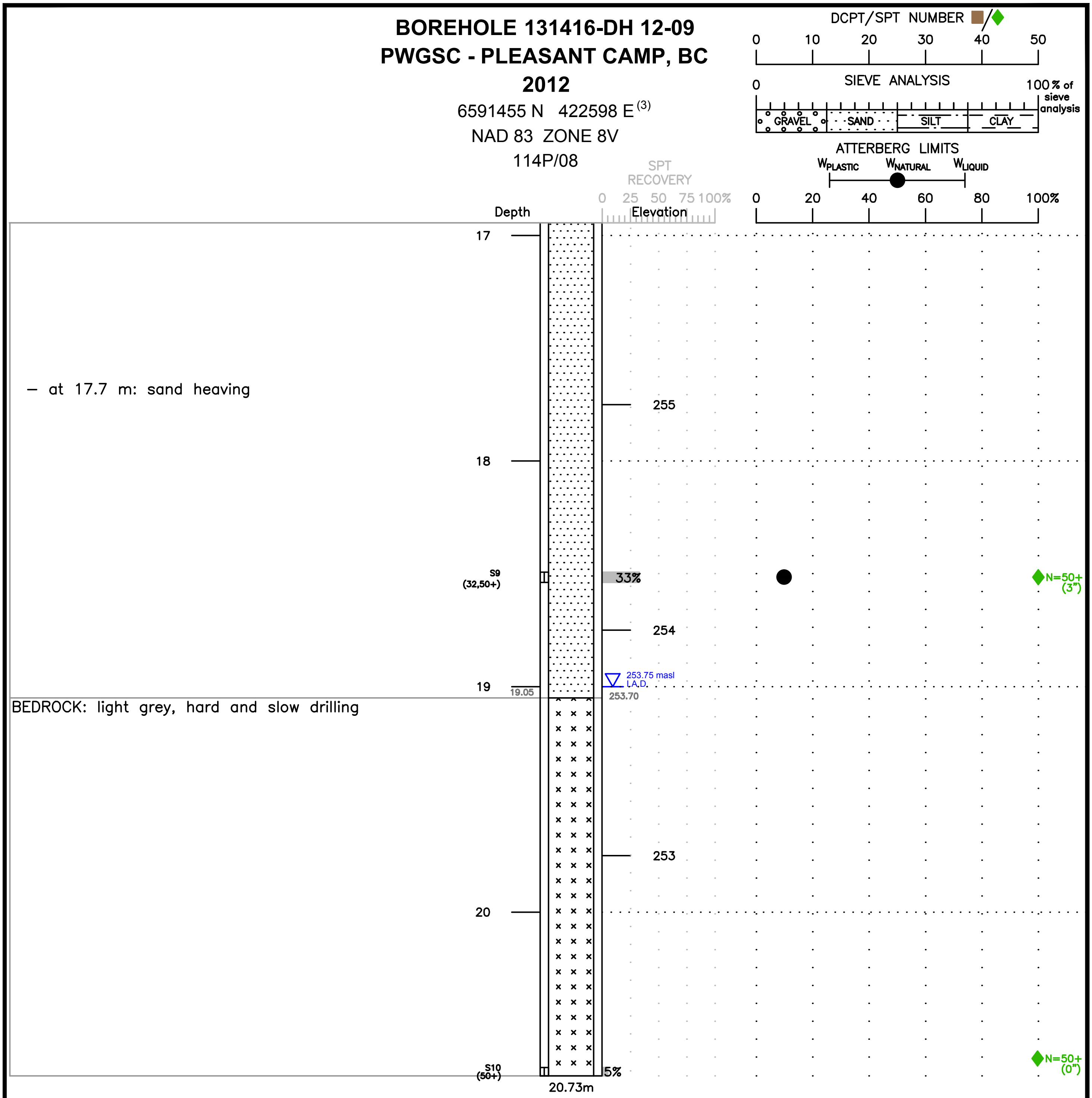

– at 17.7 m: sand heaving

BEDROCK: light grey, hard and slow drilling

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ACADDWG:\\P:\SLE\01 – British Columbia\JCS#131416–E011 CBSA Pleasant Camp Remedial Excavation\Drafting\Borehole\BH–131416–09.dwg

APPENDIX III

Laboratory Test Results

MOISTURE-DENSITY RELATIONSHIP REPORT

MDH Job No: 131416
CLIENT: Public Works and Government Services Canada
PROJECT: Pleasant Camp
DATE: 9-Nov-12 CHECKED BY: DH
TESTED BY: IH
SAMPLE: B1

Test Results:

Water Content:	Dry Density
(%)	(kg/m^3)
2.1	1986
3.8	1969
5.0	2009
5.7	2001
7.1	2046

Maximum dry density: kg/m^3
Optimum water content: %

Results corrected for oversized material?
yes

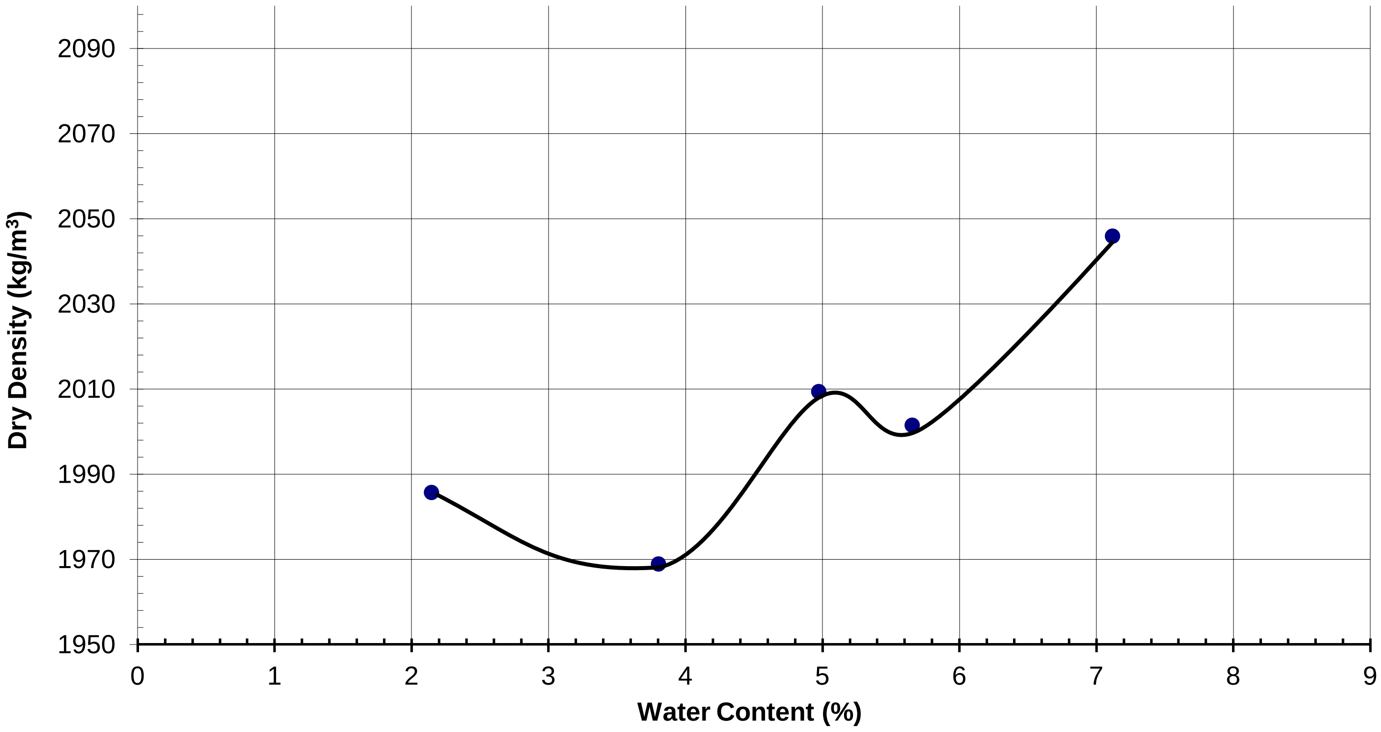
Test Details:	**ASTM D698**	
Effort:	Modified	
Procedure used:	A	
Diameter of mold:	101	mm
Compacted material less than:	9.5	mm in diameter
Method of preparation:	dry	

Oversize Correction Data (if applicable):		
Percentage oversize fraction:	2.5	%
Specific gravity:	2.65	(assumed)

Date sampled:
Sampled by:
Source: Pit 1

Soil description: Sandy granular
As-received moisture: 6.1%

Comments: Typical non-cohesive soil results.



PARTICLE-SIZE ANALYSIS REPORT

(Test Reference: ASTM D 422)

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Sieve Analysis

Sieve	Diameter (mm)	% Finer
3"	76.2	100
2"	50.8	100
1"	25.4	100
3/4"	19.1	100
3/8"	9.5	96
# 4	4.75	77
# 10	2.00	60
# 20	0.850	48
# 40	0.425	40
# 60	0.250	34
# 100	0.150	29
# 200	0.075	23

CLIENT:	Public Works and Government Services Canada
PROJECT:	Pleasant Camp
MDH Job No:	131416
SAMPLE:	DH 12-04 G1
DATE:	9-Nov-12

PARTICLE SIZE DISTRIBUTION SUMMARY

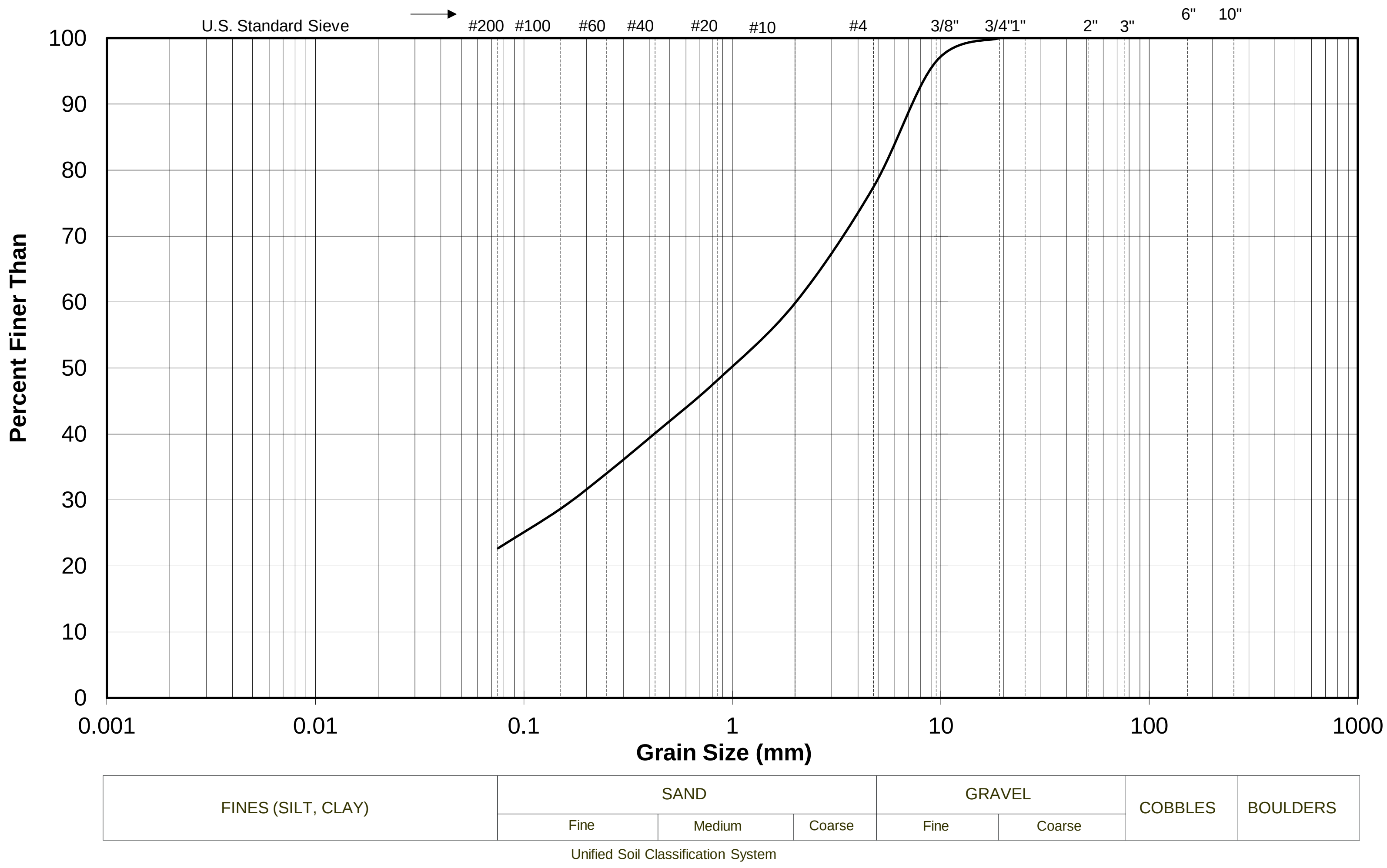
% GRAVEL	23
% SAND	54
% FINES (SILT, CLAY)	23

Hydrometer Analysis

Dispersing agent:
Sodium Hexametaphosphate

Dosage of dispersing agent:
40 g/L

COMMENTS:



PARTICLE-SIZE ANALYSIS REPORT

(Test Reference: ASTM D 422)

Sieve Analysis

Sieve	Diameter (mm)	% Finer
3"	76.2	100
2"	50.8	100
1"	25.4	100
3/4"	19.1	100
3/8"	9.5	93
# 4	4.75	66
# 10	2.00	40
# 20	0.850	26
# 40	0.425	21
# 60	0.250	18
# 100	0.150	14
# 200	0.075	10

Hydrometer Analysis

Dispersing agent:
Sodium Hexametaphosphate

Dosage of dispersing agent:
40 g/L

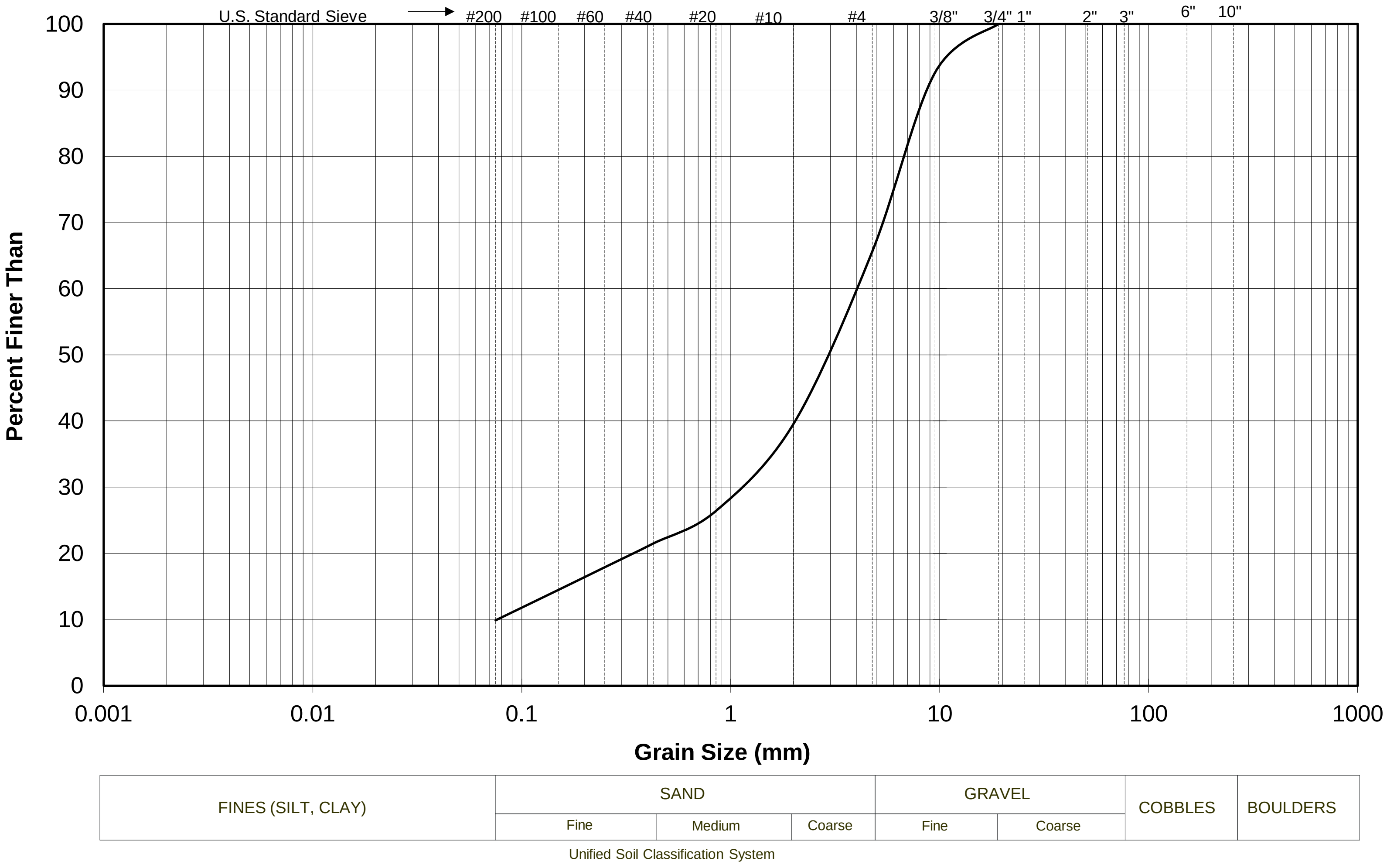
MDH
ENGINEERED SOLUTIONS
Member of the SNC-LAVALIN Group

CLIENT: Public Works and Government Services Canada
PROJECT: Pleasant Camp
MDH Job No: 131416
SAMPLE: DH 12-04 G5
DATE: 8-Nov-12

PARTICLE SIZE DISTRIBUTION SUMMARY

% GRAVEL	34
% SAND	56
% FINES (SILT, CLAY)	10

COMMENTS:



PARTICLE-SIZE ANALYSIS REPORT

(Test Reference: ASTM D 422)

MDH
ENGINEERED SOLUTIONS
Member of the SNC-LAVALIN Group

Sieve Analysis

Sieve	Diameter (mm)	% Finer
3"	76.2	100
2"	50.8	100
1"	25.4	100
3/4"	19.1	100
3/8"	9.5	61
# 4	4.75	47
# 10	2.00	36
# 20	0.850	28
# 40	0.425	23
# 60	0.250	18
# 100	0.150	14
# 200	0.075	11

CLIENT: Public Works and Government Services Canada
PROJECT: Pleasant Camp
MDH Job No: 131416
SAMPLE: DH 12-04 S6
DATE: 9-Nov-12

PARTICLE SIZE DISTRIBUTION SUMMARY

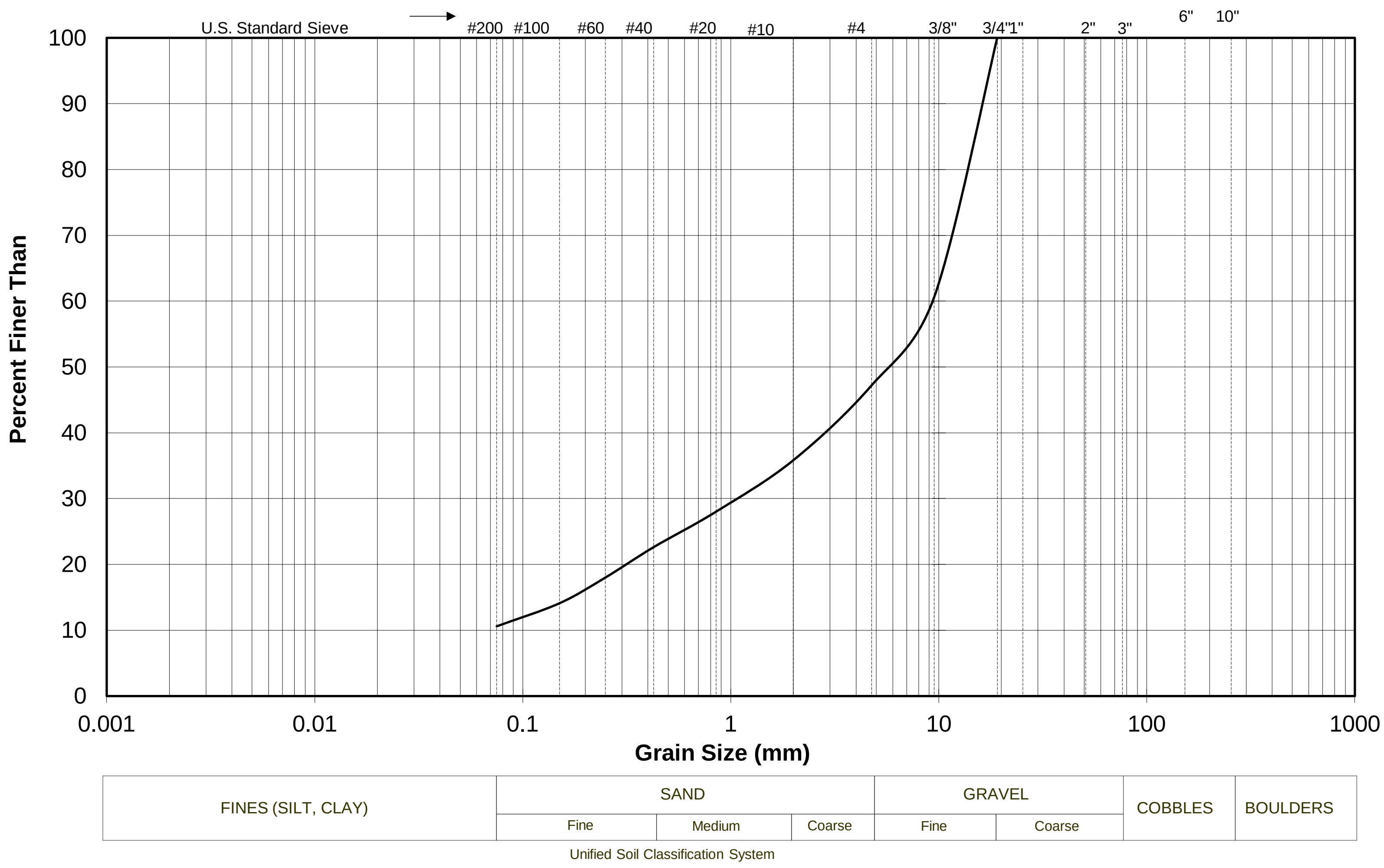
% GRAVEL	53
% SAND	36
% FINES (SILT, CLAY)	11

Hydrometer Analysis

Dispersing agent:
Sodium Hexametaphosphate

Dosage of dispersing agent:
40 g/L

COMMENTS:



PARTICLE-SIZE ANALYSIS REPORT

(Test Reference: ASTM D 422)

MDH ENGINEERED SOLUTIONS
Member of the SNC-LAVALIN Group

Sieve Analysis

Sieve	Diameter (mm)	% Finer
3"	76.2	100
2"	50.8	100
1"	25.4	74
3/4"	19.1	63
3/8"	9.5	53
# 4	4.75	41
# 10	2.00	30
# 20	0.850	23
# 40	0.425	19
# 60	0.250	16
# 100	0.150	14
# 200	0.075	11

CLIENT:	Public Works and Government Services Canada
PROJECT:	Pleasant Camp
MDH Job No:	131416
SAMPLE:	DH 12-05 S1
DATE:	8-Nov-12

PARTICLE SIZE DISTRIBUTION SUMMARY

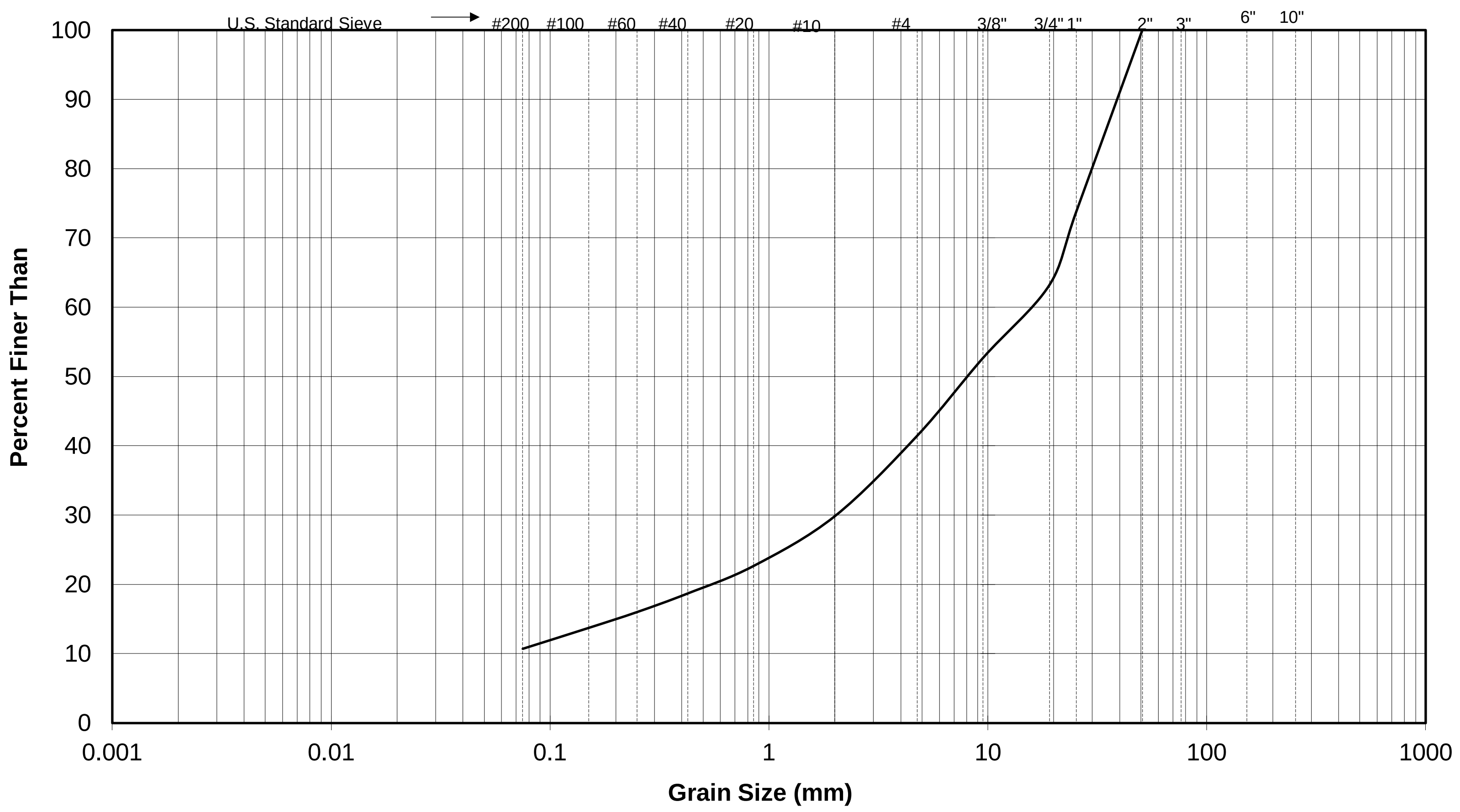
% GRAVEL	59
% SAND	30
% FINES (SILT, CLAY)	11

Hydrometer Analysis

Dispersing agent:
Sodium Hexametaphosphate

Dosage of dispersing agent:
40 g/L

COMMENTS:



FINES (SILT, CLAY)	SAND			GRAVEL		COBBLES	BOULDERS
	Fine	Medium	Coarse	Fine	Coarse		

Unified Soil Classification System

PARTICLE-SIZE ANALYSIS REPORT

(Test Reference: ASTM D 422)

MDH
ENGINEERED SOLUTIONS
Member of the SNC-LAVALIN Group

CLIENT: Public Works and Government Services Canada
PROJECT: Pleasant Camp
MDH Job No: 131416
SAMPLE: DH 12-06 G2
DATE: 9-Nov-12

Sieve Analysis

Sieve	Diameter (mm)	% Finer
3"	76.2	100
2"	50.8	100
1"	25.4	100
3/4"	19.1	100
3/8"	9.5	98
# 4	4.75	82
# 10	2.00	67
# 20	0.850	55
# 40	0.425	47
# 60	0.250	40
# 100	0.150	34
# 200	0.075	26

PARTICLE SIZE DISTRIBUTION SUMMARY

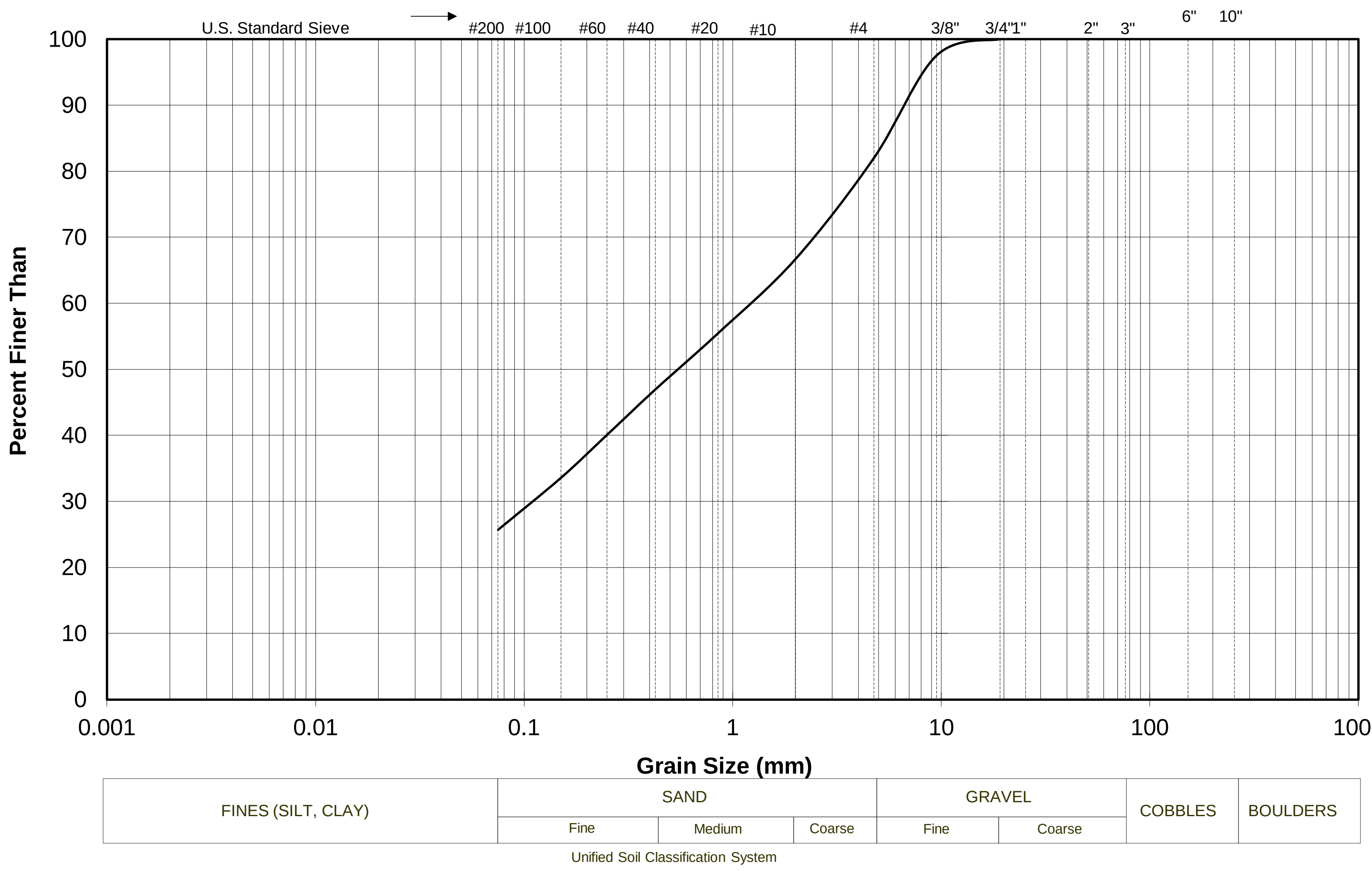
% GRAVEL	18
% SAND	56
% FINES (SILT, CLAY)	26

Hydrometer Analysis

Dispersing agent:
Sodium Hexametaphosphate

Dosage of dispersing agent:
40 g/L

COMMENTS:



PARTICLE-SIZE ANALYSIS REPORT

(Test Reference: ASTM D 422)

MDH ENGINEERED SOLUTIONS
Member of the SNC-LAVALIN Group

Sieve Analysis

Sieve	Diameter (mm)	% Finer
3"	76.2	100
2"	50.8	100
1"	25.4	100
3/4"	19.1	100
3/8"	9.5	98
# 4	4.75	68
# 10	2.00	47
# 20	0.850	36
# 40	0.425	30
# 60	0.250	27
# 100	0.150	25
# 200	0.075	21

CLIENT:	Public Works and Government Services Canada
PROJECT:	Pleasant Camp
MDH Job No:	131416
SAMPLE:	DH 12-06 G4
DATE:	8-Nov-12

PARTICLE SIZE DISTRIBUTION SUMMARY

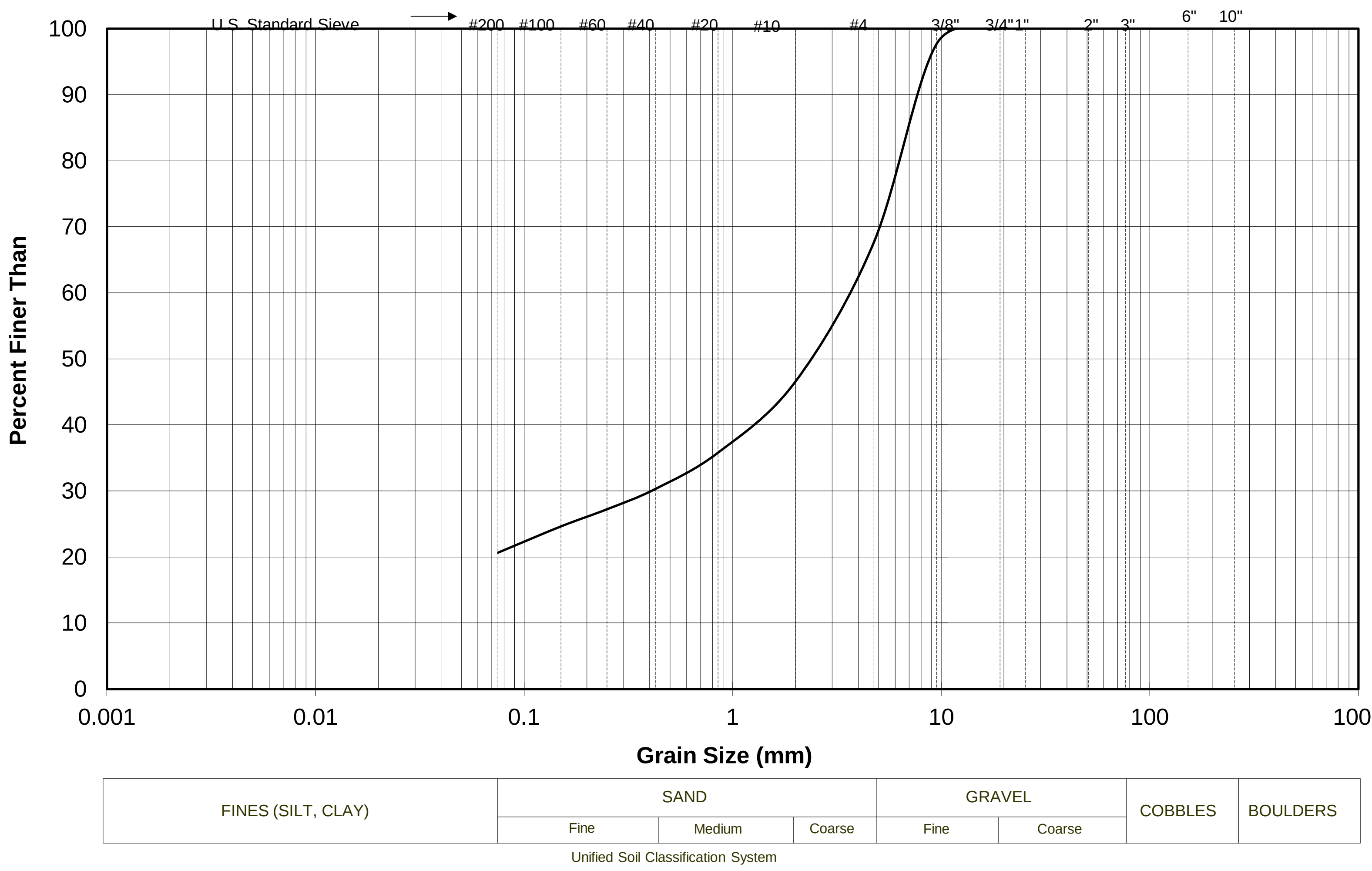
% GRAVEL	32
% SAND	47
% FINES (SILT, CLAY)	21

Hydrometer Analysis

Dispersing agent:
Sodium Hexametaphosphate

Dosage of dispersing agent:
40 g/L

COMMENTS:



The testing services reported here have been performed in accordance with accepted local industry standards.

The results presented are for the sole use of the designated client only.

This report constitutes a testing service only. It does not represent any interpretation or opinion regarding specification compliance or material suitability.

Engineering interpretation will be provided by MDH Engineered Solutions Corp upon request.

PARTICLE-SIZE ANALYSIS REPORT

(Test Reference: ASTM D 422)

Sieve Analysis

Sieve	Diameter (mm)	% Finer
3"	76.2	100
2"	50.8	100
1"	25.4	100
3/4"	19.1	100
3/8"	9.5	97
# 4	4.75	76
# 10	2.00	55
# 20	0.850	40
# 40	0.425	29
# 60	0.250	24
# 100	0.150	20
# 200	0.075	16

ENGINEERED SOLUTIONS

Member of the SNC-LAVALIN Group

CLIENT:	Public Works and Government Services Canada
PROJECT:	Pleasant Camp
MDH Job No:	131416
SAMPLE:	DH 12-06 G8
DATE:	8-Nov-12

PARTICLE SIZE DISTRIBUTION SUMMARY

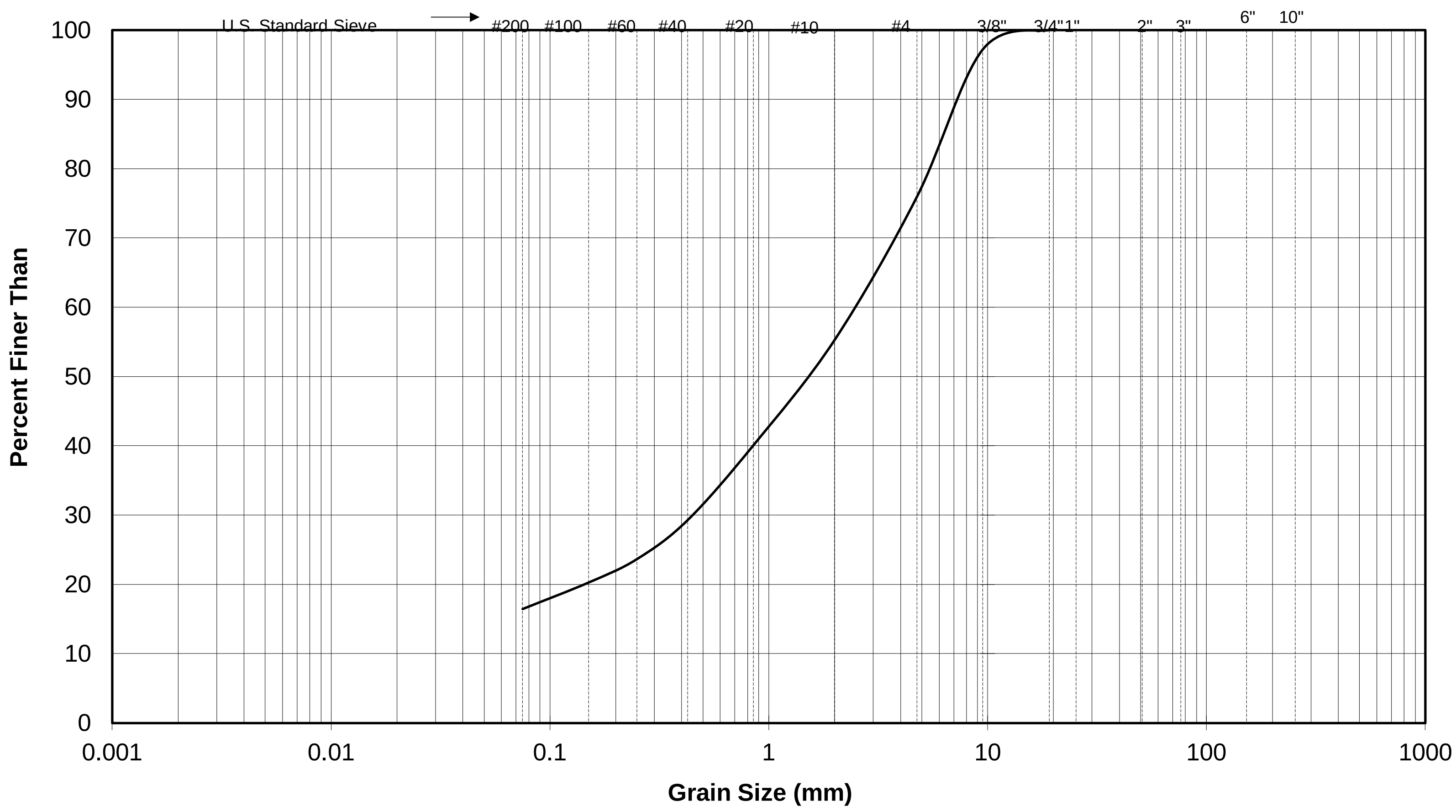
% GRAVEL	24
% SAND	60
% FINES (SILT, CLAY)	16

Hydrometer Analysis

Dispersing agent:
Sodium Hexametaphosphate

Dosage of dispersing agent:
40 g/L

COMMENTS:



FINES (SILT, CLAY)	SAND			GRAVEL		COBBLES	BOULDERS
	Fine	Medium	Coarse	Fine	Coarse		

Unified Soil Classification System

The testing services reported here have been performed in accordance with accepted local industry standards.

The results presented are for the sole use of the designated client only.

This report constitutes a testing service only. It does not represent any interpretation or opinion regarding specification compliance or material suitability.

Engineering interpretation will be provided by MDH Engineered Solutions Corp upon request.

PARTICLE-SIZE ANALYSIS REPORT

(Test Reference: ASTM D 422)

MDH ENGINEERED SOLUTIONS
Member of the SNC-LAVALIN Group

Sieve Analysis	Sieve	Diameter (mm)	% Finer
	3"	76.2	100
	2"	50.8	100
	1"	25.4	100
	3/4"	19.1	100
	3/8"	9.5	97
	# 4	4.75	96
	# 10	2.00	93
	# 20	0.850	88
	# 40	0.425	74
	# 60	0.250	42
	# 100	0.150	15
	# 200	0.075	4

Hydrometer Analysis

Dispersing agent:
Sodium Hexametaphosphate

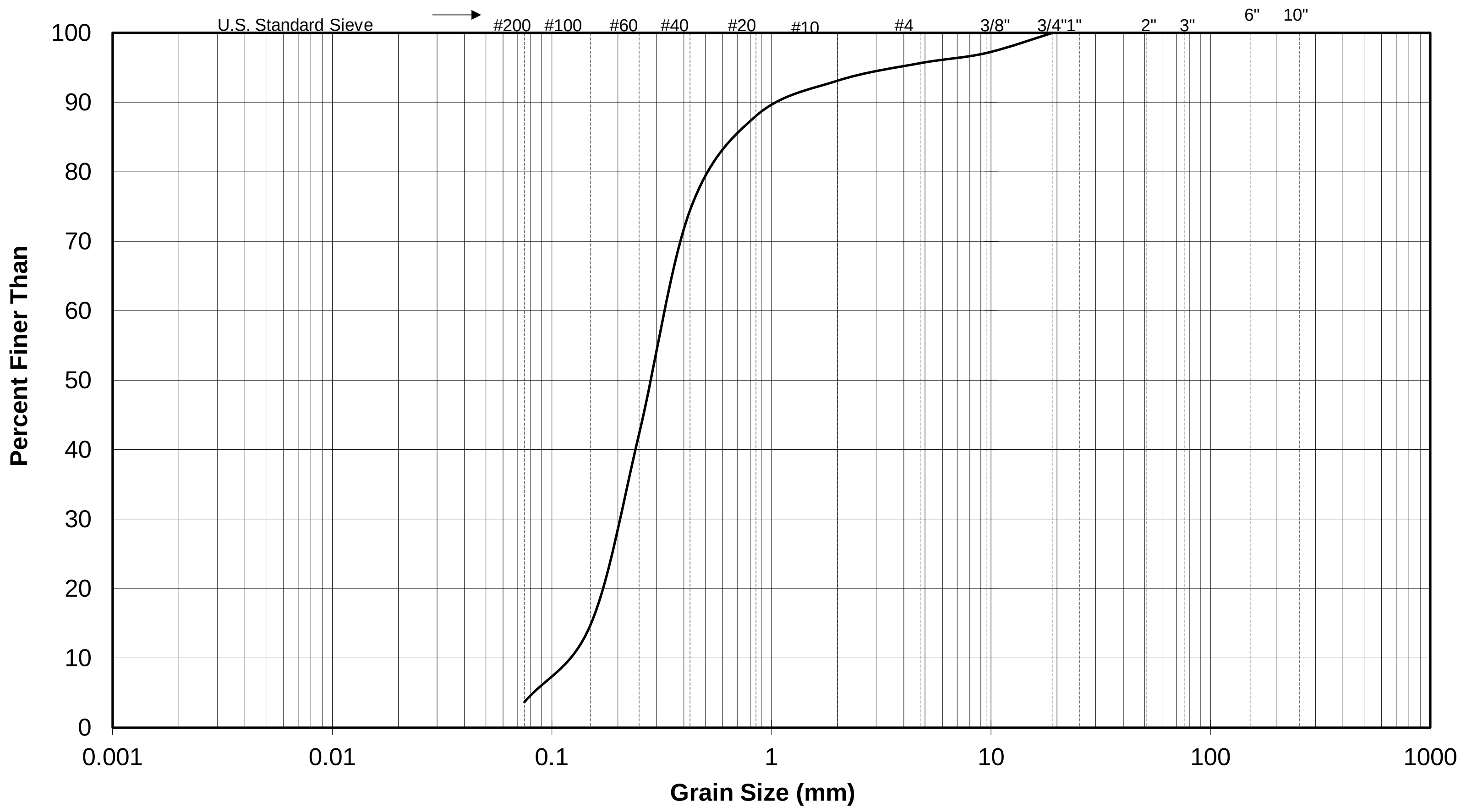
Dosage of dispersing agent:
40 g/L

CLIENT: Public Works and Government Services Canada
PROJECT: Pleasant Camp
MDH Job No: 131416
SAMPLE: DH 12-06 S11
DATE: 8-Nov-12

PARTICLE SIZE DISTRIBUTION SUMMARY

% GRAVEL	4
% SAND	92
% FINES (SILT, CLAY)	4

COMMENTS:



FINES (SILT, CLAY)	SAND			GRAVEL		COBBLES	BOULDERS
	Fine	Medium	Coarse	Fine	Coarse		

Unified Soil Classification System

PARTICLE-SIZE ANALYSIS REPORT

(Test Reference: ASTM D 422)

MDH ENGINEERED SOLUTIONS
Member of the SNC-LAVALIN Group

Sieve Analysis	Sieve	Diameter (mm)	% Finer
	3"	76.2	100
	2"	50.8	100
	1"	25.4	100
	3/4"	19.1	100
	3/8"	9.5	96
	# 4	4.75	76
	# 10	2.00	56
	# 20	0.850	43
	# 40	0.425	34
	# 60	0.250	28
	# 100	0.150	21
	# 200	0.075	14

CLIENT:	Public Works and Government Services Canada
PROJECT:	Pleasant Camp
MDH Job No:	131416
SAMPLE:	DH 12-07 G3
DATE:	9-Nov-12

Hydrometer Analysis

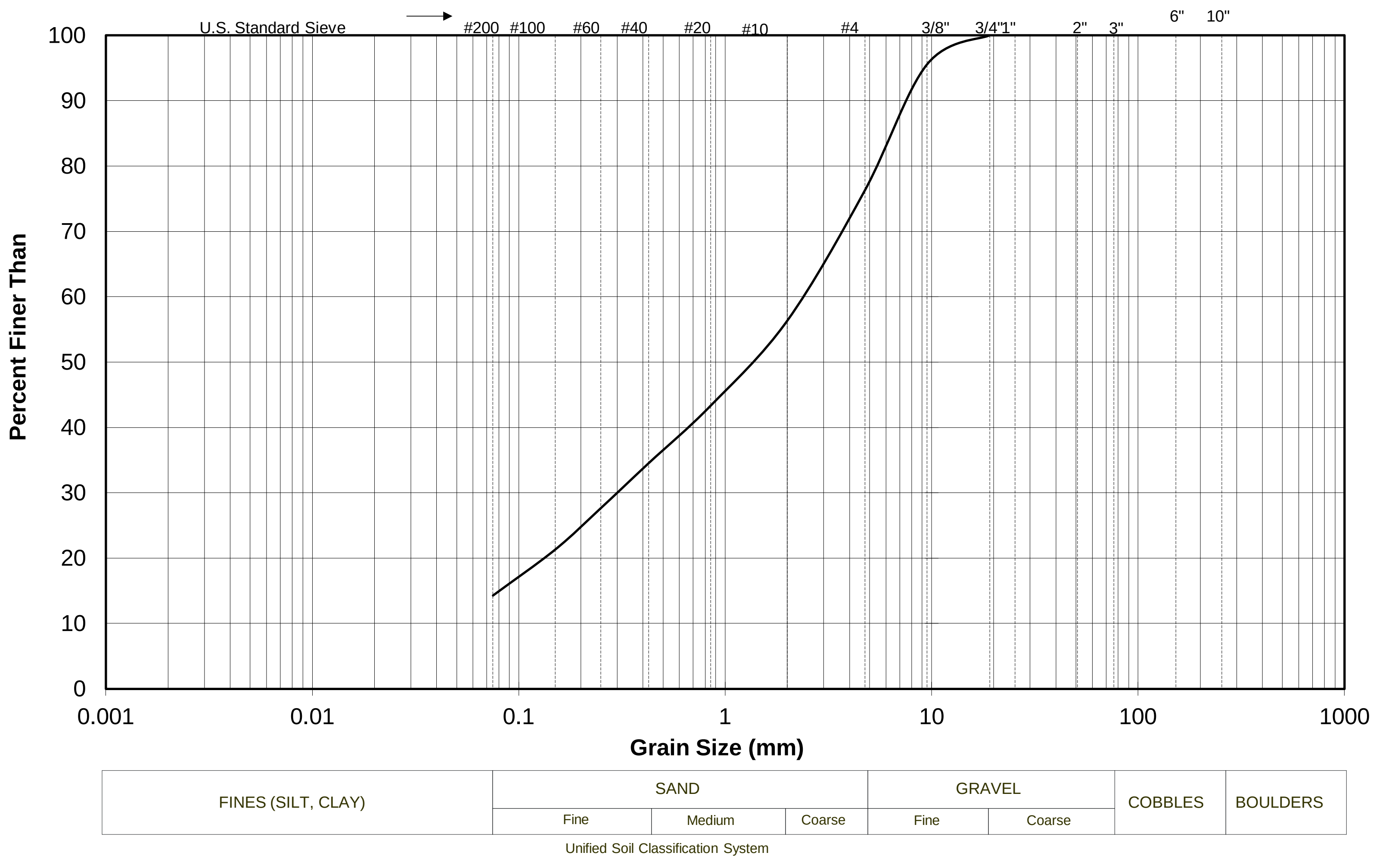
Dispersing agent:
Sodium Hexametaphosphate

Dosage of dispersing agent:
40 g/L

PARTICLE SIZE DISTRIBUTION SUMMARY

% GRAVEL	24
% SAND	62
% FINES (SILT, CLAY)	14

COMMENTS:



PARTICLE-SIZE ANALYSIS REPORT

(Test Reference: ASTM D 422)

MDH ENGINEERED SOLUTIONS
Member of the SNC-LAVALIN Group

Sieve Analysis

Sieve	Diameter (mm)	% Finer
3"	76.2	100
2"	50.8	100
1"	25.4	100
3/4"	19.1	100
3/8"	9.5	92
# 4	4.75	61
# 10	2.00	38
# 20	0.850	27
# 40	0.425	22
# 60	0.250	19
# 100	0.150	16
# 200	0.075	13

CLIENT:	Public Works and Government Services Canada
PROJECT:	Pleasant Camp
MDH Job No:	131416
SAMPLE:	DH 12-07 G5
DATE:	9-Nov-12

PARTICLE SIZE DISTRIBUTION SUMMARY

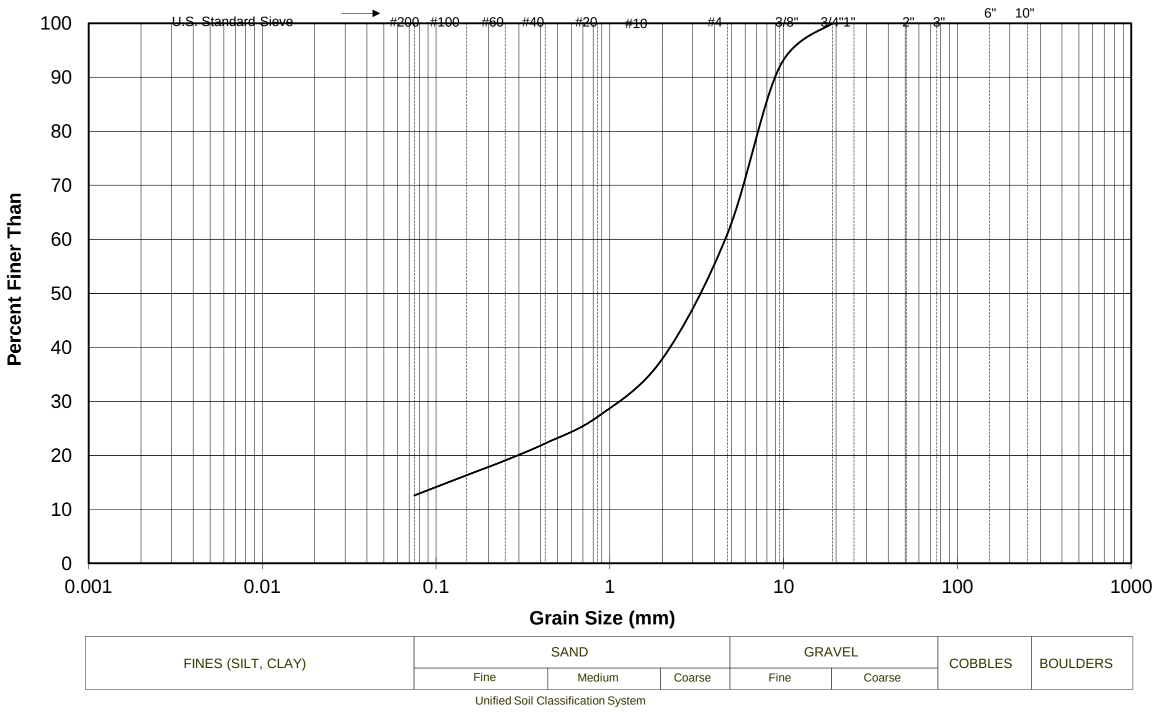
% GRAVEL	39
% SAND	48
% FINES (SILT, CLAY)	13

Hydrometer Analysis

Dispersing agent:
Sodium Hexametaphosphate

Dosage of dispersing agent:
40 g/L

COMMENTS:



PARTICLE-SIZE ANALYSIS REPORT

(Test Reference: ASTM D 422)

MDH
ENGINEERED SOLUTIONS
Member of the SNC-LAVALIN Group

Sieve Analysis

Sieve	Diameter (mm)	% Finer
3"	76.2	100
2"	50.8	100
1"	25.4	100
3/4"	19.1	100
3/8"	9.5	100
# 4	4.75	92
# 10	2.00	75
# 20	0.850	65
# 40	0.425	59
# 60	0.250	55
# 100	0.150	51
# 200	0.075	45

CLIENT:	Public Works and Government Services Canada
PROJECT:	Pleasant Camp
MDH Job No:	131416
SAMPLE:	DH 12-07 G6
DATE:	9-Nov-12

PARTICLE SIZE DISTRIBUTION SUMMARY

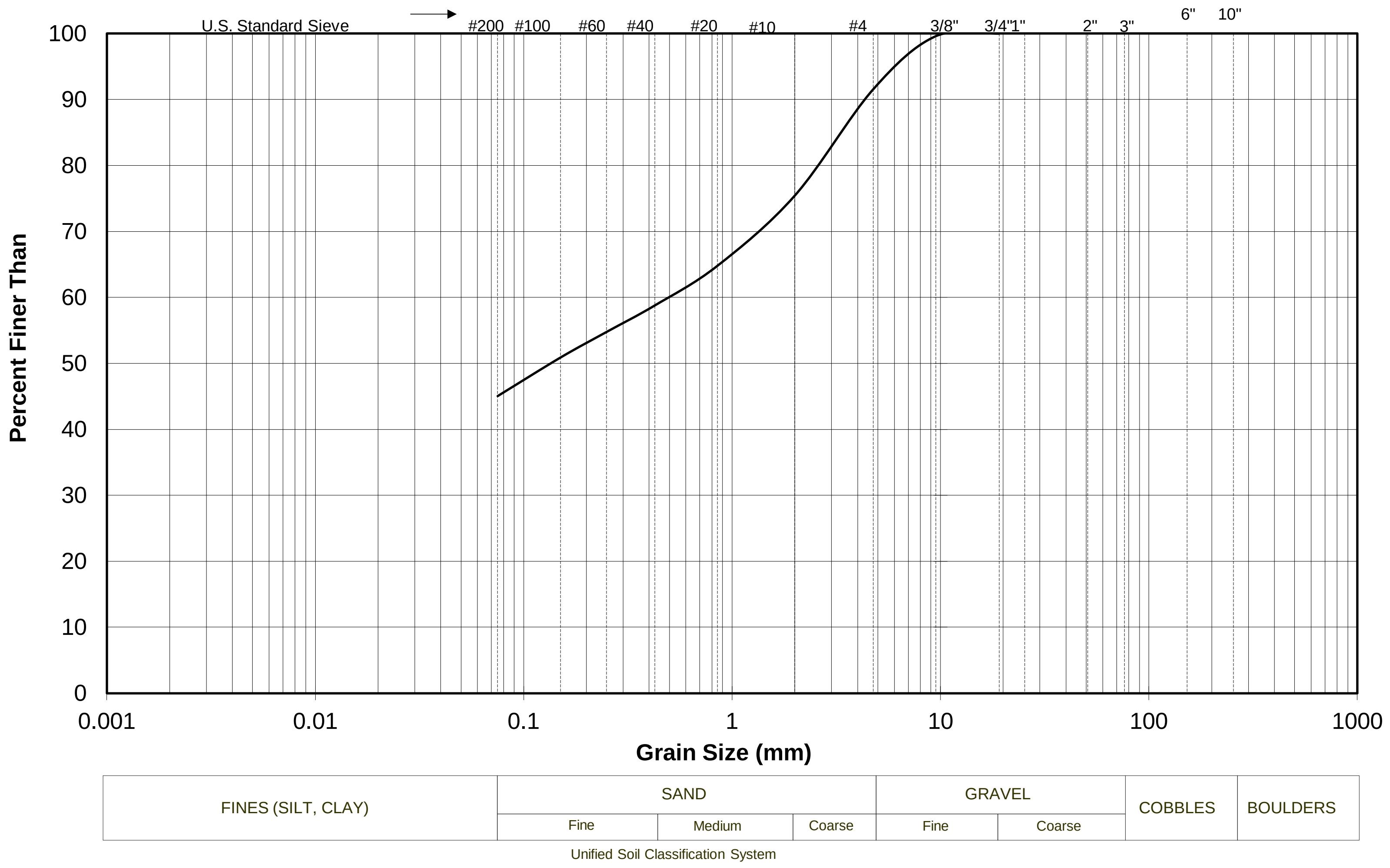
% GRAVEL	8
% SAND	47
% FINES (SILT, CLAY)	45

Hydrometer Analysis

Dispersing agent:
Sodium Hexametaphosphate

Dosage of dispersing agent:
40 g/L

COMMENTS:



PARTICLE-SIZE ANALYSIS REPORT

(Test Reference: ASTM D 422)

MDH
ENGINEERED SOLUTIONS
Member of the SNC-LAVALIN Group

Sieve Analysis	Sieve	Diameter (mm)	% Finer
	3"	76.2	100
	2"	50.8	100
	1"	25.4	100
	3/4"	19.1	100
	3/8"	9.5	91
	# 4	4.75	45
	# 10	2.00	21
	# 20	0.850	14
	# 40	0.425	12
	# 60	0.250	10
	# 100	0.150	9
	# 200	0.075	8

CLIENT:	Public Works and Government Services Canada
PROJECT:	Pleasant Camp
MDH Job No:	131416
SAMPLE:	DH 12-08 G5
DATE:	8-Nov-12

PARTICLE SIZE DISTRIBUTION SUMMARY

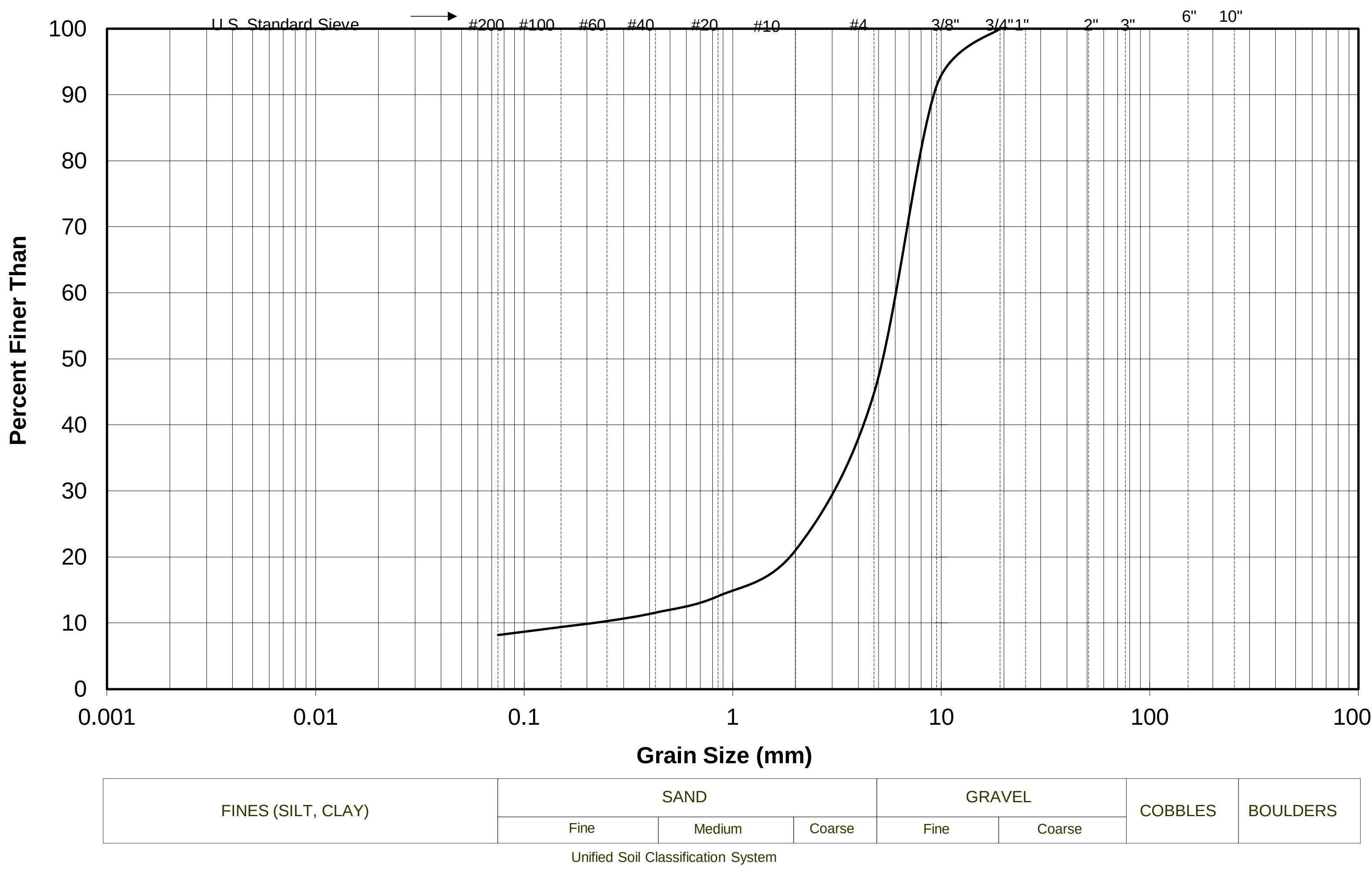
% GRAVEL	55
% SAND	37
% FINES (SILT, CLAY)	8

Hydrometer Analysis

Dispersing agent:
Sodium Hexametaphosphate

Dosage of dispersing agent:
40 g/L

COMMENTS:



PARTICLE-SIZE ANALYSIS REPORT

(Test Reference: ASTM D 422)

MDH ENGINEERED SOLUTIONS
Member of the SNC-LAVALIN Group

Sieve Analysis

Sieve	Diameter (mm)	% Finer
3"	76.2	100
2"	50.8	100
1"	25.4	100
3/4"	19.1	100
3/8"	9.5	96
# 4	4.75	73
# 10	2.00	48
# 20	0.850	33
# 40	0.425	26
# 60	0.250	23
# 100	0.150	20
# 200	0.075	16

CLIENT:	Public Works and Government Services Canada
PROJECT:	Pleasant Camp
MDH Job No:	131416
SAMPLE:	DH 12-09 G3
DATE:	9-Nov-12

Hydrometer Analysis

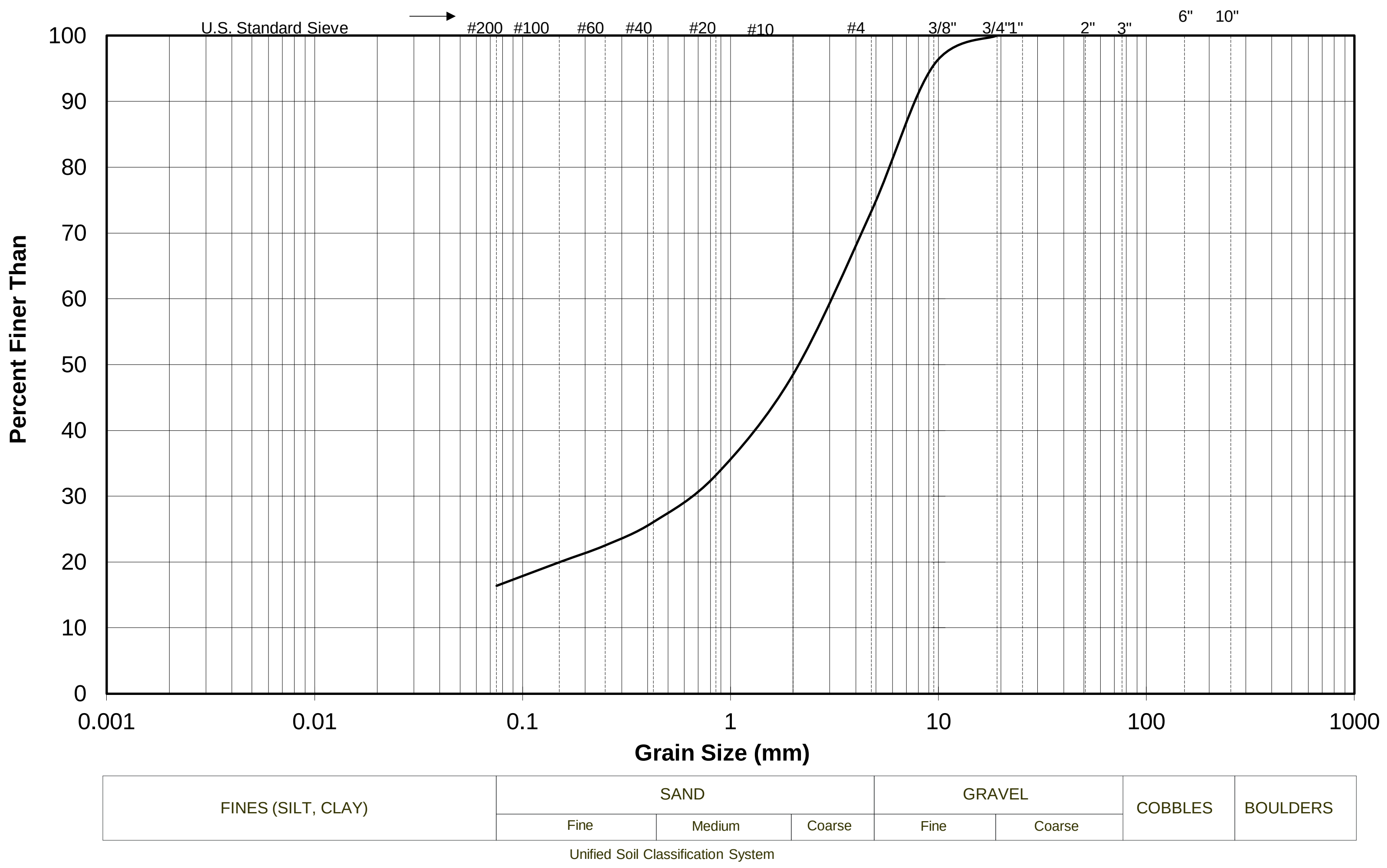
Dispersing agent:
Sodium Hexametaphosphate

Dosage of dispersing agent:
40 g/L

PARTICLE SIZE DISTRIBUTION SUMMARY

% GRAVEL	27
% SAND	57
% FINES (SILT, CLAY)	16

COMMENTS:



PARTICLE-SIZE ANALYSIS REPORT

(Test Reference: ASTM D 422)

Sieve Analysis

Sieve	Diameter (mm)	% Finer
3"	76.2	100
2"	50.8	100
1"	25.4	100
3/4"	19.1	94
3/8"	9.5	86
# 4	4.75	80
# 10	2.00	71
# 20	0.850	57
# 40	0.425	34
# 60	0.250	18
# 100	0.150	11
# 200	0.075	7

Hydrometer Analysis

Dispersing agent:
Sodium Hexametaphosphate

Dosage of dispersing agent:
40 g/L

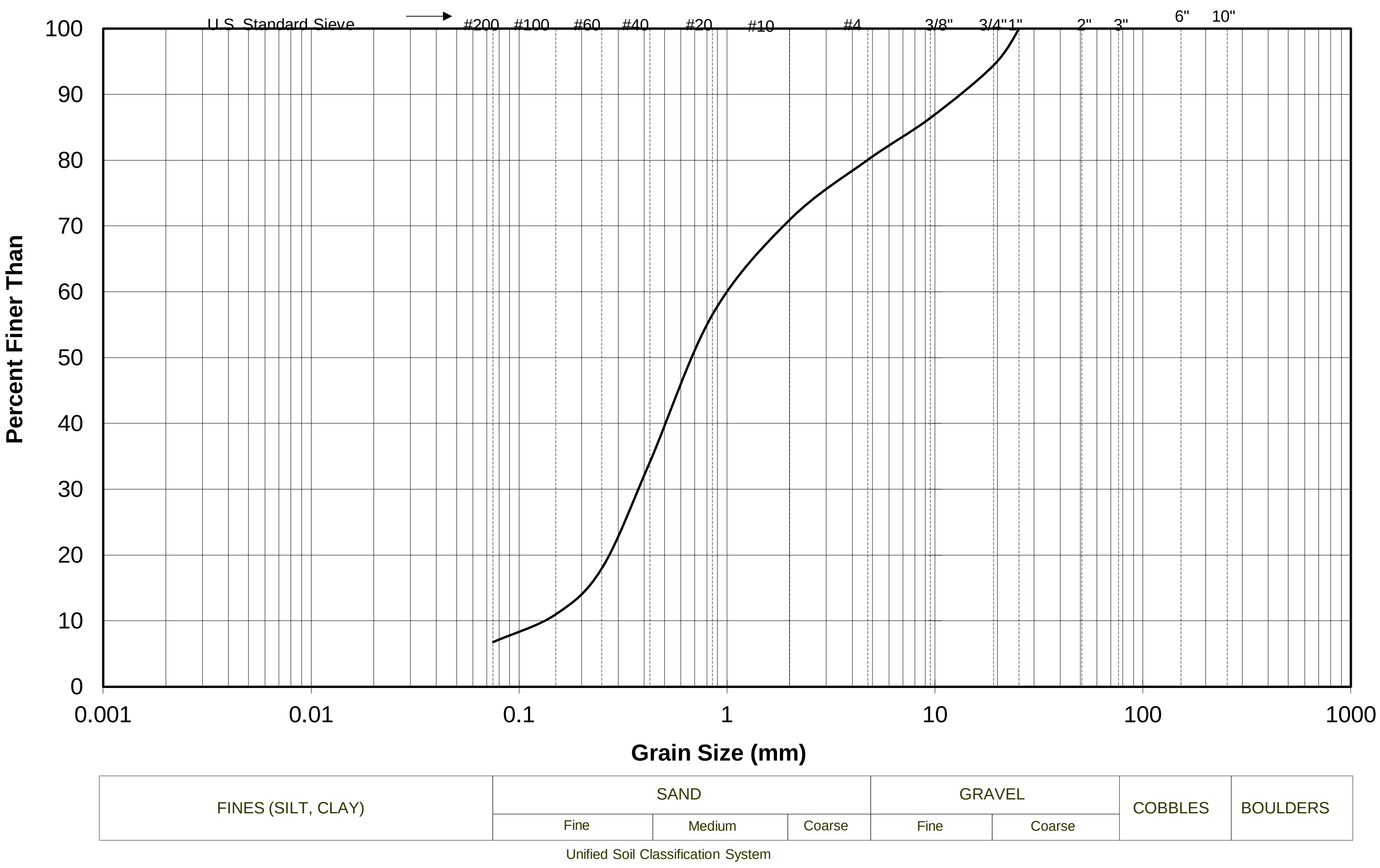
MDH ENGINEERED SOLUTIONS
Member of the SNC-LAVALIN Group

CLIENT:	Public Works and Government Services Canada
PROJECT:	Pleasant Camp
MDH Job No:	131416
SAMPLE:	DH 12-09 S8
DATE:	8-Nov-12

PARTICLE SIZE DISTRIBUTION SUMMARY

% GRAVEL	20
% SAND	73
% FINES (SILT, CLAY)	7

COMMENTS:



MDH
ENGINEERED SOLUTIONS
Member of the SNC-LAVALIN Group

WATER CONTENTS

Client: Public Works and Government Services Canada
Project: Pleasant Camp
MDH # 131416
Tech VK
Date: 14-Nov-12

Sample #	G6	S2	S2	G3	S6	S5
Test Hole #	DH12-06	DH12-07	DH12-08	DH12-08	DH12-09	DH12-06
Depth	27.5	5	15	22.5	30	25
Tare #	S0S	PP1	AA22	PP32	BB03	CC49
Tare Mass (g)	37.69	37.96	37.91	37.57	37.29	37.50
Wet sample + tare (g)	206.00	115.45	181.15	200.28	180.89	185.58
Dry sample + tare (g)	194.47	98.60	170.94	192.89	155.81	171.66
Wt. Dry sample (g)	156.78	60.64	133.03	155.32	118.52	134.16
Water Content (%)	7.35	27.79	7.67	4.76	21.16	10.38
Sample #	S2	S9				
Test Hole #	DH12-09	DH12-09				
Depth	10	60				
Tare #	BB35	BB38				
Tare Mass (g)	38.26	37.25				
Wet sample + tare (g)	181.93	170.99				
Dry sample + tare (g)	168.50	159.00				
Wt. Dry sample (g)	130.24	121.75				
Water Content (%)	10.31	9.85				
Sample #						
Test Hole #						
Depth						
Tare #						
Tare Mass (g)						
Wet sample + tare (g)						
Dry sample + tare (g)						
Wt. Dry sample (g)						
Water Content (%)						

Comments:

APPENDIX IV

Earthquake Hazard Calculation

2010 National Building Code Seismic Hazard Calculation

INFORMATION: Eastern Canada English (613) 995-5548 français (613) 995-0600 Facsimile (613) 992-8836
Western Canada English (250) 363-6500 Facsimile (250) 363-6565

Requested by: Deyab Gamal El-Dean, SNC-Lavalin December 06, 2012

Site Coordinates: 59.5045 North 136.4631 West

User File Reference: Pleasant Camp

National Building Code ground motions:
2% probability of exceedance in 50 years (0.000404 per annum)

Sa(0.2)	**Sa(0.5)**	**Sa(1.0)**	**Sa(2.0)**	**PGA (g)**
0.921	**0.609**	**0.329**	**0.178**	**0.404**

Notes. Spectral and peak hazard values are determined for firm ground (NBCC 2010 soil class C - average shear wave velocity 360-750 m/s). Median (50th percentile) values are given in units of g. 5% damped spectral acceleration (Sa(T), where T is the period in seconds) and peak ground acceleration (PGA) values are tabulated. Only 2 significant figures are to be used. ***These values have been interpolated from a 10 km spaced grid of points. Depending on the gradient of the nearby points, values at this location calculated directly from the hazard program may vary. More than 95 percent of interpolated values are within 2 percent of the calculated values.***

Ground motions for other probabilities:

Probability of exceedance per annum	0.010	0.0021	0.001
Probability of exceedance in 50 years	40%	10%	5%
Sa(0.2)	0.288	0.538	0.697
Sa(0.5)	0.172	0.334	0.443
Sa(1.0)	0.085	0.171	0.235
Sa(2.0)	0.047	0.093	0.126
PGA	0.142	0.249	0.314

References

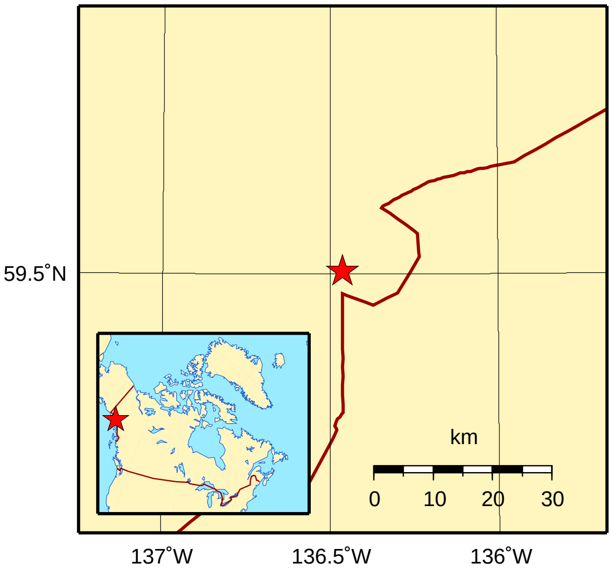
National Building Code of Canada 2010 NRCC no. 53301; sections 4.1.8, 9.20.1.2, 9.23.10.2, 9.31.6.2, and 6.2.1.3
Appendix C: Climatic Information for Building Design in Canada - table in Appendix C starting on page C-11 of Division B, volume 2

User's Guide - NBC 2010, Structural Commentaries NRCC no. 53543 (in preparation)
Commentary J: Design for Seismic Effects

Geological Survey of Canada Open File xxxx
Fourth generation seismic hazard maps of Canada: Maps and grid values to be used with the 2010 National Building Code of Canada (in preparation)

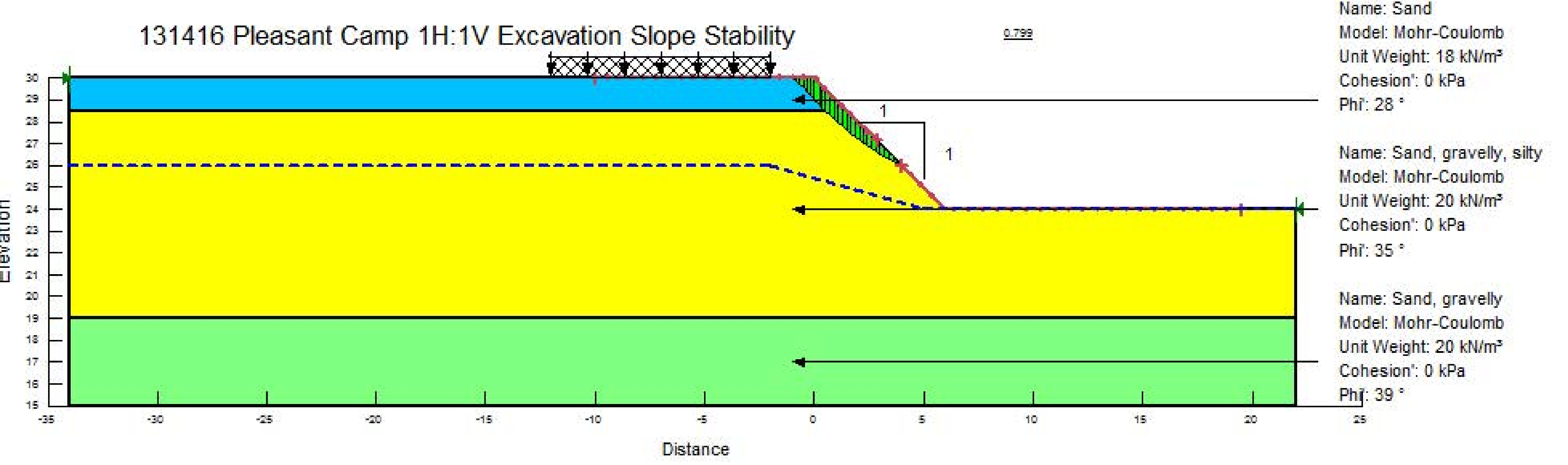
See the websites *www.EarthquakesCanada.ca* and *www.nationalcodes.ca* for more information

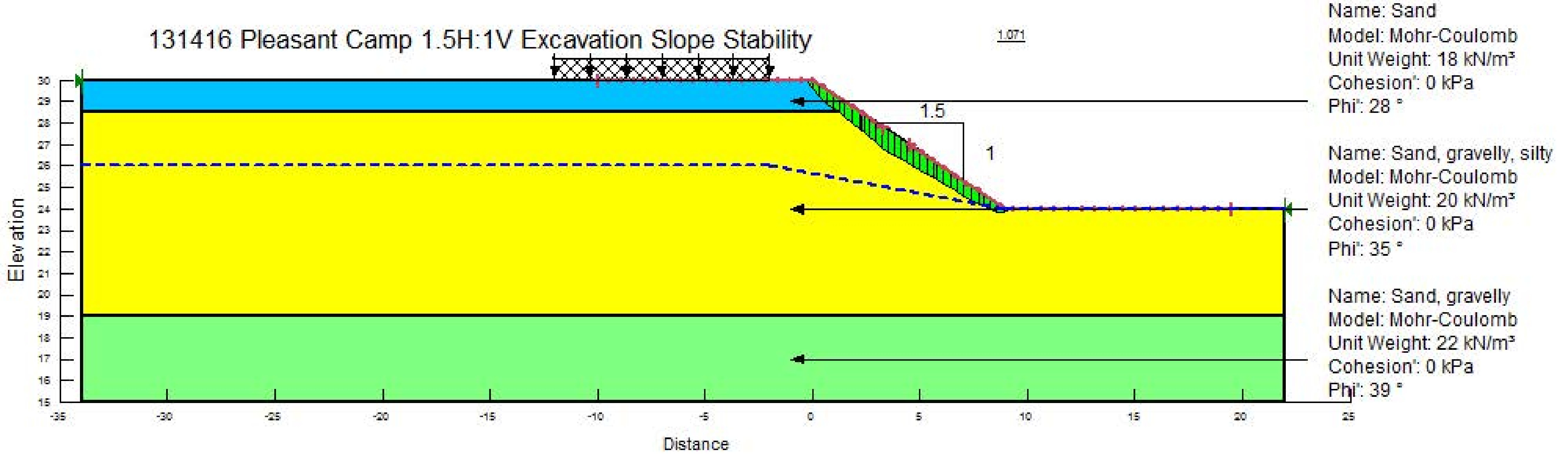
Aussi disponible en français

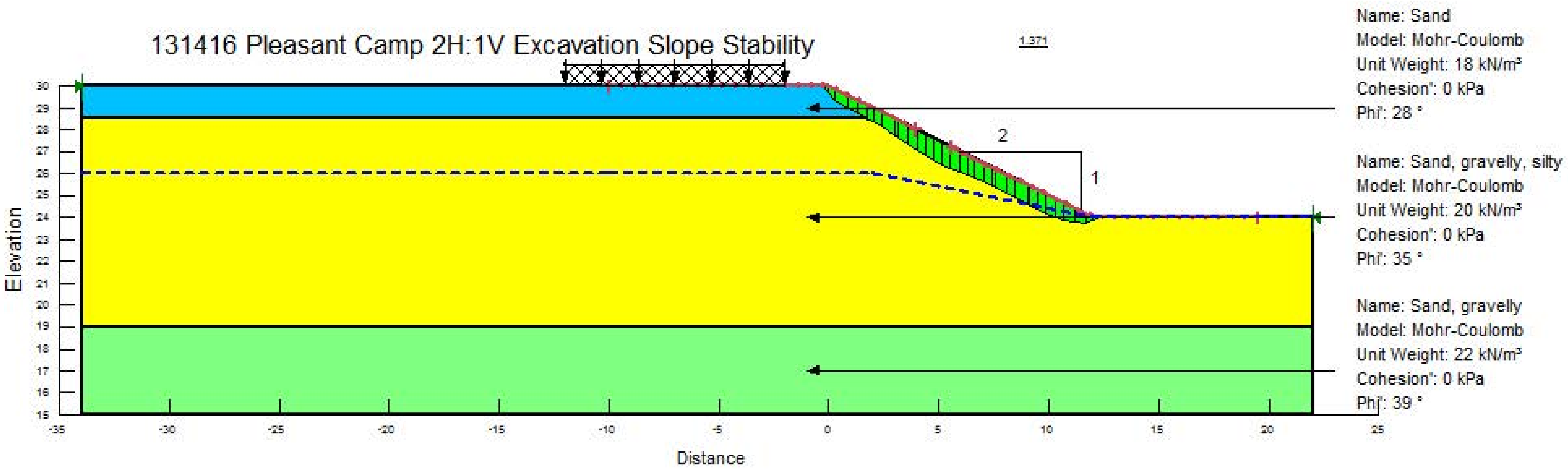


APPENDIX V

Slope Stability Analyses

131416 Pleasant Camp 1H:1V Excavation Slope Stability
0.799
1
1
Name: Sand
Model: Mohr-Coulomb
Unit Weight: 18 kN/m³
Cohesion': 0 kPa
Phi': 28 °
Name: Sand, gravelly, silty
Model: Mohr-Coulomb
Unit Weight: 20 kN/m³
Cohesion': 0 kPa
Phi': 35 °
Name: Sand, gravelly
Model: Mohr-Coulomb
Unit Weight: 20 kN/m³
Cohesion': 0 kPa
Phi': 39 °
Elevation
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
Distance
-35
-30
-25
-20
-15
-10
-5
0
5
10
15
20
25

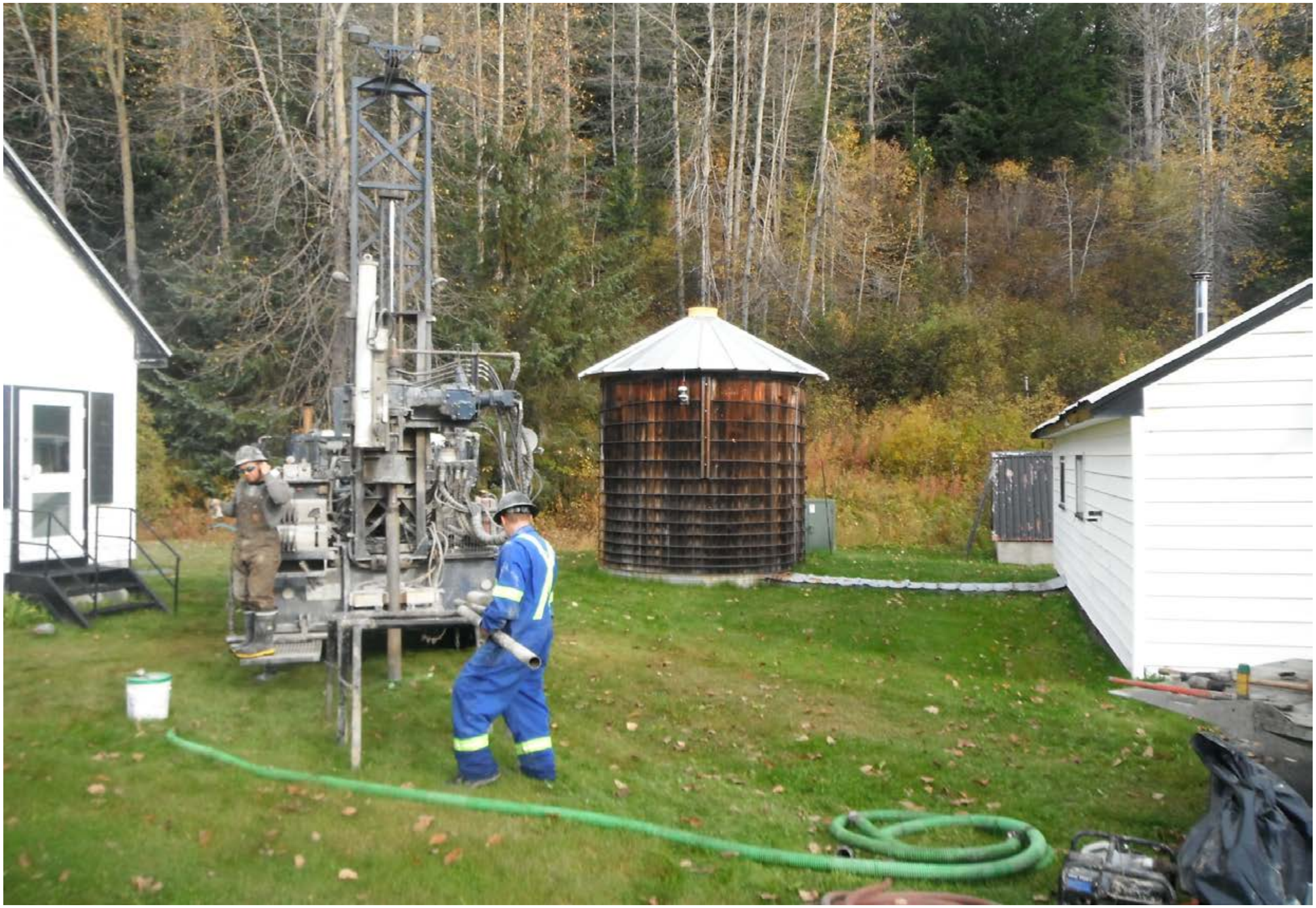

131416 Pleasant Camp 1.5H:1V Excavation Slope Stability
1.071
1.5
1
Name: Sand
Model: Mohr-Coulomb
Unit Weight: 18 kN/m³
Cohesion': 0 kPa
Phi': 28 °
Name: Sand, gravelly, silty
Model: Mohr-Coulomb
Unit Weight: 20 kN/m³
Cohesion': 0 kPa
Phi': 35 °
Name: Sand, gravelly
Model: Mohr-Coulomb
Unit Weight: 22 kN/m³
Cohesion': 0 kPa
Phi': 39 °
Elevation
30
29
28
27
26
25
24
23
22
21
20
19
18
17
16
15
-35
-30
-25
-20
-15
-10
-5
0
5
10
15
20
25
Distance


131416 Pleasant Camp 2H:1V Excavation Slope Stability
1.371
2
1
Name: Sand
Model: Mohr-Coulomb
Unit Weight: 18 kN/m³
Cohesion': 0 kPa
Phi': 28 °
Name: Sand, gravelly, silty
Model: Mohr-Coulomb
Unit Weight: 20 kN/m³
Cohesion': 0 kPa
Phi': 35 °
Name: Sand, gravelly
Model: Mohr-Coulomb
Unit Weight: 22 kN/m³
Cohesion': 0 kPa
Phi': 39 °
Elevation
30
29
28
27
26
25
24
23
22
21
20
19
18
17
16
15
Distance
-35
-30
-25
-20
-15
-10
-5
0
5
10
15
20
25

APPENDIX VI

Site Photographs

SCALE NTS		DATE	PRODUCED BY	CLIENT: PWGSC		TITLE:	Pleasant Camp DH12-03 dusty bedrock cuttings
DESIGN BY	N. SAFI	12-Dec-12	MDH ENGINEERED SOLUTIONS Member of the SNC-LAVALIN Group	PROJECT No.	131416		
DRAWN BY				Photo No.	1		
APPROVED BY	D. GAMAL EL-DEAN						



SCALE NTS		DATE	PRODUCED BY	CLIENT: PWGSC		TITLE:	Pleasant Camp DH12-05
DESIGN BY	N. SAFI	12-Dec-12	ENGINEERED SOLUTIONS Member of the SNC-LAVALIN Group	PROJECT No.	131416		
DRAWN BY				Photo No.	2		
APPROVED BY	D. GAMAL EL-DEAN						

SCALE NTS		DATE	PRODUCED BY MDH ENGINEERED SOLUTIONS Member of the SNC-LAVALIN Group	CLIENT: PWGSC		TITLE:	Pleasant Camp House 5 (9)
DESIGN BY	N. SAFI	12-Dec-12		PROJECT No.	131416		
DRAWN BY				Photo No.	3		
APPROVED BY	D. GAMAL EL-DEAN						

SCALE NTS		DATE	PRODUCED BY	CLIENT: PWGSC		TITLE:	
DESIGN BY	N. SAFI	12-Dec-12	MDH ENGINEERED SOLUTIONS Member of the SNC-LAVALIN Group	PROJECT No.	131416		Pleasant Camp New constructed houses 1 to 8 (4 buildings)
DRAWN BY				Photo No.	4		
APPROVED BY	D. GAMAL EL-DEAN						

SCALE NTS		DATE	PRODUCED BY	CLIENT: PWGSC		TITLE:	Pleasant Camp Looking at cutoms building from House 5
DESIGN BY	N. SAFI	12-Dec-12	MDH ENGINEERED SOLUTIONS Member of the SNC-LAVALIN Group	PROJECT No.	131416		
DRAWN BY				Photo No.	5		
APPROVED BY	D. GAMAL EL-DEAN						

SCALE NTS		DATE	PRODUCED BY	CLIENT: PWGSC		TITLE:	Pleasant Camp DH12-05 S1 10' - 11.5'
DESIGN BY	N. SAFI	12-Dec-12	MDH ENGINEERED SOLUTIONS Member of the SNC-LAVALIN Group	PROJECT No.	131416		
DRAWN BY				Photo No.	6		
APPROVED BY	D. GAMAL EL-DEAN						

SCALE NTS		DATE	PRODUCED BY	CLIENT: PWGSC			TITLE:	
DESIGN BY	N. SAFI	12-Dec-12	MDH ENGINEERED SOLUTIONS Member of the SNC-LAVALIN Group	PROJECT No.	131416			Pleasant Camp DH12-01 S5 25' - 26.5'
DRAWN BY				Photo No.	7			
APPROVED BY	D. GAMAL EL-DEAN							

SCALE NTS		DATE	PRODUCED BY	CLIENT: PWGSC		TITLE:	Pleasant Camp DH12-06 S1 5' - 6.5'
DESIGN BY	N. SAFI	12-Dec-12	MDH ENGINEERED SOLUTIONS Member of the SNC-LAVALIN Group	PROJECT No.	131416		
DRAWN BY				Photo No.	8		
APPROVED BY	D. GAMAL EL-DEAN						

SCALE NTS		DATE	PRODUCED BY	CLIENT: PWGSC		TITLE:
DESIGN BY	N. SAFI	12-Dec-12	MDH ENGINEERED SOLUTIONS Member of the SNC-LAVALIN Group	PROJECT No.	131416	Pleasant Camp DH12-09 S8 50' - 51.5'
DRAWN BY				Photo No.	9	
APPROVED BY	D. GAMAL EL-DEAN					

SCALE NTS		DATE	PRODUCED BY	CLIENT: PWGSC		TITLE:
DESIGN BY	N. SAFI	12-Dec-12	MDH ENGINEERED SOLUTIONS Member of the SNC-LAVALIN Group	PROJECT No.	131416	Pleasant Camp DH12-08 white (calcite) rock
DRAWN BY				Photo No.	10	
APPROVED BY	D. GAMAL EL-DEAN					

SCALE NTS		DATE	PRODUCED BY	CLIENT: PWGSC		TITLE:	
DESIGN BY	N. SAFI	12-Dec-12	MDH ENGINEERED SOLUTIONS Member of the SNC-LAVALIN Group	PROJECT No.	131416		Pleasant Camp DH12-08 slope
DRAWN BY				Photo No.	11		
APPROVED BY	D. GAMAL EL-DEAN						