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**CATCH BASIN WASTE DEWATERING
PILOT STUDY**

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CAPITAL REGIONAL DISTRICT

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A handwritten signature in purple ink, appearing to read "Alana Duncan", written over a horizontal line.

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EXECUTIVE SUMMARY

SNC-Lavalin Morrow Environmental (Morrow) along with Septage Processing Ltd. (SPL) conducted a pilot study of the collection process, and analysis of catch basins wastes on behalf of the Capital Regional District (CRD). The SPL Facility received and processed non-hazardous liquid waste, by removing organic and inorganic debris and solids from the liquid waste prior to discharging the liquid to the sanitary sewer under a waste discharge permit issued by the CRD. For this Pilot study SPL had a “dewatering bin” fabricated and installed at the facility to accept catch basin wastes and allow for the separation of solid catch basin wastes and decant water.

This pilot study has been conducted as follow up to work previously conducted by Morrow documented in Morrow’s report “Catch Basin Waste Review of Assessment Treatment and Disposal Practices” completed for the CRD. It was previously identified that catch basin wastes are quite variable in composition and chemical concentrations therefore making disposal an issue. The purpose of the study was to identify contaminant concentrations for both the solids and decant portions of catch basin contents to assist in the determination of appropriate treatment and disposal of the wastes. A second objective of the pilot and the project study was to determine if it was economically feasible to collect the catch basin wastes decant the water and dispose/recycle the solids.

Prior to disposal, if the wastes are de-watered the reduction in the liquid content results in a reduction in weight of waste thus the solids become less costly to dispose. Disposal options and testing requirements for catch basin solids depend on the needs and requirements of the final receiver of the wastes. Discussions with remediation contractors who operate permitted bioremediation facilities (receiving sites) have indicated if the material is dewatered and less than the HW standards disposal costs (based on approximately 20 tonnes) would be around \$50-\$85/tonne (depending on concentrations of contaminants). Hartland landfill tipping fees for this material is \$150/tonne. A sampling program could be developed for a dewatering facility, where if the analytical data was consistent the frequency of sample collection and analysis could be reduced.

Arguably the most important step to in the whole process is at the very beginning prior to cleaning the catch basin. Catch basin wastes should be evaluated firstly on a visual inspection and site evaluation for obvious contaminants prior to collection and should not be mixed with

suspect non-impacted wastes if the wastes are visually contaminated. Consequently the wastes are not disposed of at the higher HW costs, but can be disposed of at a local permitted facility and a much lower cost. Potentially if the analytical results identifies that the solids are less than the *Contaminated Sites Regulation*¹ (CSR) SRA Schedule 7 standards, the material may even be reused.

Typically the vector trucks dispose of both the solid and liquid portion of the catch basin wastes at Hartland Landfill at a per tonnage cost. Ideally the catch basin liquids (including liquids generated from cleaning of the catch basins) should be disposed of at a liquid decant facility, and treated prior to disposal and the catch basin solids should be dried and disposed of at a permitted facility. This would result in a dramatic decrease in wastes at Hartland and a substantial decrease in costs, as the disposal rate would be applied to “dry” solids and the rate for liquid disposal would be marginal.

¹ *Contaminated Site Regulation (CSR), B.C. Reg. 375/96, including amendments up to B.C. Reg. 239/2007.*

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1. BACKGROUND

This study has been conducted as follow up to work previously conducted by Morrow documented in Morrow's report "Catch Basin Waste Review of Assessment Treatment and Disposal Practices" completed for the CRD

Morrow previously reviewed the current practises for assessment, treatment, and disposal of catch basin wastes in the CRD. The purpose of the review was to provide advice to generators on how to deal with their catch basin wastes, to provide advice to service providers (haulers) on how to approach servicing catch basins and to determine what are acceptable treatment and disposal practices for catch basin wastes. The follow up to this review was to implement a pilot dewatering facility for catch basins wastes operated by Septage Processing Ltd. (SPL). The purpose of the pilot/project study was to identify contaminant concentrations to assist in the determination of appropriate treatment and disposal of the wastes. A second objective of the pilot and the project study was to determine if it was economically feasible to collect the catch basin wastes decant the water and dispose/recycle the solids.

2. SCOPE OF WORK

The scope of work for the study included:

1. Field review, a site evaluation of the catch basin cleaning process, an assessment of procedures, including the use of the catch basin evaluation protocols.
2. Assessment and evaluation of the Dewatering Facility (S.P.L. Wastewater Recovery Centre (SPL) at 995 Henry Eng. Place, Langford).
3. Sampling and analysis of catch basin wastes, both the solids and decant water for hydrocarbon and metal parameters. It was proposed that the catch basin wastes would be segregated based on land use, as it was expected different land uses would have different contaminant concentrations.
 - residential roads (contain minimal traffic and are designed to provide service to private property);
 - industrial roads;
 - arterial roads (designed to maximized transportation between neighbourhoods and the region) and collector roads (collect and disperse traffic within a local road system);
 - commercial complexes (malls, office buildings etc); and
 - downtown roads (posed their own hazards with respects to sharps)

2.1. Field review

2.1.1. Catch Basin Cleaning Field Assessment

A Morrow field representative observed the removal of the catch basin wastes by a vactor truck on three separate cleaning events. The purpose of which was to observe how the vactor truck operated, how the catch basins were cleaned, and what process the operator followed in evaluating the catch basins prior to waste removal.

2.1.2. Collection of Catch Basin Wastes

Field assessments were completed at an industrial property, at a service station property, and at a large institutional parking lot.

2.1.3. Catch Basin Evaluation Protocols

The following outlines the catch basin evaluation protocols presently employed by vector truck Operators. As the Operator arrives at each catch basin he conducts an assessment of the area surrounding the catch basin looking for evidence of oil, grease, staining and any unusual colour or odour. This is followed by an inspection of the catch basin, the cover is removed and the catch basin is visually checked inside for floating materials, oil, grease, staining, discoloured water or any unusual odour. If the operator has a concern in regards to the catch basin contents (i.e. the look or smell) he does not clean the catch basin but records his observations on his Commercial Information Sheet (Appendix I) noting the catch basin location and continues on to the next catch basin.

The Commercial Information Sheet is returned to the office for processing and for copying to a supervisor. Subsequently, the Supervisor inspects the catch basin and after assessing the situation makes a decision on how to deal with the contents of the catch basin:

- the catch basin cleaned as normal,
- have the waste material tested, at the cost of the owner, or
- have it removed and disposed of as potentially hazardous waste.

2.1.4. Site Inspection Checklist

Morrow discussed the Catch Basin Checklist and Area Visual Inspection Checklist documented in Morrow's Catch Basin Review Report, with two drivers and a supervisor from two different hauling companies. All parties commented that there was no need to fill in a Catch Basin Checklist and an Area Visual Inspection Checklist for each and every catch basin. In their opinion this would take too long. Their present procedure is to record any potential contamination on their Commercial Information Sheet (Appendix 1) and bring it to the attention of their supervisor. Since the Commercial Information Sheet has only limited space for

comments and was not designed for recording potential contamination issues, all agreed that an amended Commercial Information Sheet would be beneficial in recording the location and findings of a suspected contaminated catch basin.

3. DEWATERING FACILITY ASSESSMENT

3.1. Visual Inspection of SPL Dewatering Plan: Capacity; Storage; Effectiveness

The SPL Facility receives non-hazardous liquid waste from Vancouver Island. The process removes organic and inorganic debris, solids and suspended solids from the waste stream, discharging effluent in compliance with the criteria established in a waste discharge permit issued under the CRD Bylaw 2922.

A new dewatering bin was installed in May 2007 to accept catch basin wastes and allow for the separation of solid catch basin wastes and decant water.

The dewatering bin is a modified and strengthened roll-on-off bin, (dimensions 20ft x 10ft x 3 ft height) with a sliding metal roof shielding the waste from the wind or rain. The bin is split into two compartments. The rear compartment stores the decant water which is pumped, via a sump pump, into the SPL wastewater treatment facility where it is mixed with septic and 'non-hazardous' liquid wastes for further treatment before being discharged to the CRD/City of Langford sanitary sewer. The rear compartment baffle wall has five screened drainage holes 2 inches above the floor and is spot-welded on the floor to allow drainage of decant water. The first compartment contains the solid waste which when dewatered is loaded into a roll-on-off bin dimensions (18ft x 8ft x 3 ft height) ready for sampling prior to final disposal.

The capacity of the dewatering facility is limited by the size of the bin and the rate of dewatering. Experience to date suggests that this particular dewatering facility could process around 20 tonnes per day. There is also space at the site for two final storage bins that can hold up to 10 tonnes each. Therefore it was identified that there was not enough storage capacity to store catch basins solids from each of the different land uses (residential, industrial, arterial, downtown and commercial complexes), thus mixing of the material would occur. Further the haulers, which utilize this facility, do not have contracts to clean catch basins on municipal roads. They mainly deal with:

- Private housing developments and condos
- Commercial complexes such as shopping malls, office buildings, sports arenas
- Gas stations and car washes
- Institutional properties such as schools, hospitals and provincial parks

At first it was noted that the dewatering of the first load was not efficient. The spot-welded distance on the dewater compartment wall was too close to the bin floor and was easily blocked by particulate material. Modifications were made by cutting out larger slots and this has improved drainage by increasing the flow area for the decant water. A filter cloth was hung over the drainage holes but was found ineffective since it easily clogged with fine suspended solids causing drainage to be severely reduced. The filter cloth was subsequently removed.

Originally there was no roof over the dewatering bin. It was discussed that there was a desire to inhibit additional water so a roof was installed. There are plans to modify this roof since it is restricting the movement of the vehicle when backing in. There is also the risk of damage during a collision.

3.2. Final Waste Segregation and Storage at the SPL Facility

It was noted that the SPL operator had several segregation options when dewatering and storing the waste at the dewatering facility. Prior to placing the load in the dewatering bin, the Vactor truck driver decanted the majority of the wastewater into the SPL waste-receiving tank. The remaining waste was then placed in the dewatering bin. The SPL operator then inspected the load for evidence of:

- Oil sheen on the decant water
- Oil and grease in the solid waste
- Excessive trash
- Unusual colour or odour
- Large pieces such as concrete, stones, metal, wood.

If the operator was unhappy with the look of the waste he informed his supervisor, who also inspected the material and decided whether to have:

- the material tested,
- drummed as potentially hazardous waste, or
- rejected and reloaded by the driver.

Otherwise the load was dewatered and the solid waste transferred by backhoe to the final bin. The final bin is located within the main processing plant and is therefore protected from the

weather. When it is full it is sampled and held while awaiting the analysis results. There is only space for two bins and therefore as previously stated segregation by soil types or collection groups is not be possible.

With respect to the quality of the decant water as it is placed directly into the SPL receiving tank, even if it is highly contaminated risk of potential problems with the treatment plant are considered low, because the high daily volume of the plant, which is ~180,000 L/day. The ability to assess/identify at the source is the main prevention to reduce risk.

4. SAMPLING COLLECTION PROGRAM

4.1. Field Observations - Dewatering

4.1.1. Industrial

Catch basin waste collected from an Industrial Site was the first material to be placed in SPL's dewatering facility. Initially the majority of the wastewater (approximately 1,600 litres) was decanted directly into the SPL waste-receiving tank for treatment. The remaining waste (comprised of about 200 kg of solid waste and 100 liters of decant water) was placed in the dewatering bin. The solid waste was black in colour and had a hydrocarbon odour. It comprised of about 60% decaying vegetation, 30% sand and silt, and 10% trash comprising of fir cones, twigs, branches and plastic. The decant water was black in colour; high in suspended solids and had a hydrocarbon sheen.

4.1.2. Carwash / Service Station

Catch basin waste was collected from the three car wash interceptor sumps and three site catch basins servicing the parking lot. It was estimated that approximately 2,000 kg of solid waste and 450 liters of decant water were placed into the dewatering bin. The solid waste was dark brown in colour comprises of about 85% sand and silt, 10% decaying vegetation, 5% trash. The decant water was dark brown in colour; high in suspended solids and had a hydrocarbon sheen and odour.

4.1.3. Institutional Parking Lot

Waste from approximately 50 catch basins was collected during a day's operation and approximately 7110 liters wastewater was decanted into the SPL waste-receiving tank to be treated that same day. The solid waste was left overnight in the Vactor truck (to allow Morrow and CRD staff to witness the dewatering operation) and dewatered the next day. About 4500 kg of solid waste was collected and 200 liters of decant water removed. The solid waste was brown in colour and comprised of 80% sand, silt, gravel and small stones, 15% decomposing organic material and about 5% trash. The decant water was brown in colour and high in suspended solids.

4.2. Potential Contaminants of Concern

The potential contaminants of concern (PCOC) found in catch basin wastes sourced from vehicles include: hydrocarbons and metals from gasoline, diesel, oil and grease, vehicle exhaust, antifreeze, and residuals washed from vehicles including undercoatings, brake linings, rubber from tires. Other sources include: garbage, atmospheric deposition, pesticides, herbicides, fertilizers, fecal matter, illicit dumping, spills.

4.3. Sample Collection

Following the discharge of the catch basin wastes to the bin at the decant facility representative samples of the solid waste and decant water were collected separately from the three dewatering events and sent to Cantest for analytical testing for: PAH; EPH; BETX; VPH, metals and TSS (water only).

The analytical results for soil and water samples were compared to standards contained in the following regulations:

- *Contaminated Sites Regulation (CSR)*, BC Reg. 375/96, including amendments up to BC Reg 239/2007;
- *Hazardous Waste Regulation (HWR)*, B.C. Reg. 63/88, including amendments up to B.C. Reg. 261/2006.
- *Environmental Management Act*, (EMA), S.B.C 2003, c 53, as am. By S.B.C. 2004, c. 18, and
- CRD Bylaw No. 2922, *Capital Regional District Sewer Use Bylaw No. 5, 2001*, December 10, 2003.

4.4. Analytical Results Sampling Program

The analytical results indicate that the solid waste samples, collected by Morrow, did not exceed the hazardous waste standards as outlined in the EMA. The CSR commercial land use (CL) standards for toluene and EPH were exceeded, however, there were no PAH or any other hydrocarbon parameters exceedances. The metal results were also quite interesting with no

exceedances for the Institutional parking lot (SP07-3), only a chromium concentration exceeded the CL standards for the Carwash / Service Station Facility (SP07-2) site, but seven metals exceeded the CL standards from the sample collected from the Industrial site (SP07-1). Analytical results are presented on Tables 1 through 3, attached.

In regards to the decant water only one parameter, toluene collected from the Carwash / Service Station Facility (SP07-2) site and two TSS samples (SP07-2 and SP07-3) exceed the CRD sewer use bylaw all other parameters were within the limits. Analytical results are presented on Tables 4 through 6, attached.

5. DISCUSSION OF ANALYTICAL RESULTS IN THE CRD

The CRD has commissioned previous investigations in regards to catch basin wastes to identify if they were hazardous. In Morrows report “Catch Basin Waste Review of Assessment Treatment and Disposal Practices” this previous work is discussed, the following is a summary.

5.1. Solids

The analytical results from investigations conducted by Carley Environmental Inc.² indicated that the street waste solids were not hazardous wastes, however, were contaminated above the CSR CL standards for heavy metals and some PAH parameters. Carley concluded, “in general, the quality of catch basin solids does not appear to differ significantly between the residential, commercial, and industrial land uses. The contaminant levels for industrial and commercial areas are slightly higher; however, traffic volume is likely to be the main factor rather than land use.” Carley also concluded that, in general, solid catch basin waste does not appear to be a HW under the BC HWR. However, spills at an individual catch basin could result in waste being classified as HW. Earth Tech³ reviewed analytical results of four samples collected by the CRD from catch basins from a commercial area. The samples were analyzed for metals, PAH, VOCs and leachability. All of the four samples exceeded the CL standards for at least one parameter analyzed, and one sample exceeded the HW standard for oil and grease and xylenes.

5.2. Liquid

The 1998 Carley study concluded that the quality of liquid waste from municipal catch basins does not vary significantly between the residential, commercial, and industrial land uses in the CRD, and that liquid waste from all three types of land uses had concentrations of several metals, COD, TSS, and PAHs in exceedence of the CRD Sewer Use Bylaw. In 2002 Earth Tech reviewed the analytical results of three samples of liquid waste collected by the CRD from catch basins of automotive repair operations. All three samples exceeded at least one of the CRD Sewer Use standards. Analysis of samples of liquid waste collected from municipalities across the CRD indicated that all samples failed to meet the CRD Sewer Use Bylaw standards for discharge to the sanitary sewer.

² Carley Environmental Inc. “*Street Waste Investigation*” January 1998 and “*CRD Street Waste Investigation Additional Sampling – 1998*”, May 1998)

³ Earth Tech Inc. “*Review of Management Practices for Catch Basin and Oil-Water Separator Wastes*” Prepared for Capital Regional District Environmental Services. October 23, 2002.

6. DISPOSAL OPTIONS

Final disposal options for both the solid and liquid portions of the catch basin waste is dependent on not only the level of contamination but also:

- Volume of the soil components (silt , clay, sand and gravel),
- Volume by trash,
- Volume of organic material (leaves),
- The availability of dewatering facilities,
- The availability of permitted disposal sites vs. the landfill, and
- The economics of waste disposal costs vs. further processing costs and potential recycling charges.

Therefore based on the data collected to date three disposal options were identified as being the most practical.

- The traditional approach of catch basin waste (solids and liquids) being disposed of at Hartland Landfill;
- Using the SPL dewatering facility to reduce the liquid component of catch basin waste and then disposing of the solids at Hartland Landfill; and
- Using the SPL dewatering facility to reduce the liquid component of catch basin waste and disposing the solids at private permitted facilities.

7. COST BENEFIT ANALYSIS

A cost benefit analysis was completed for each of the three disposal options to determine the most cost effective option. The analysis was based on the third sample collection program - Institutional Parking Lot (discussed above in Section 4.1) where catch basin waste was collected from 50 catch basins.

1.0 Traditional Approach – 100% of the catch basin wastes are disposed of at Hartland Landfill

- 7.3 t (liquids) @ \$150/t = \$1,095.00
- 4.5 t (solids) @ \$150/t = \$675.00

Total Disposal Cost \$1,770.00

2.0 Dewatering Facility (Liquids) / Hartland Landfill (Solids)

- 7,300L (liquids) @ \$0.063/L = \$460.00
- 4.5 t (solids) @ \$150/t = \$675.00

Total Disposal Cost \$1,135.00

3.0 Dewatering Facility (Liquids) / Private Disposal Site (Solids)

- 7,300L (liquids) @ \$0.063/L = \$460.00
- 4.5 t (solids) @ \$50/t = \$225.00 or @ \$85/t = \$383.00

Total Disposal Cost \$685.00 or \$843.00

- Difference between traditional approach vs. dewatering with the solids going to Hartland is \$635.00;
- Difference between dewatering with solids going to Hartland vs. dewatering with solids going to a private operator is between \$450.00 and \$292.00;

- Difference between traditional approach vs. dewatering with the solids going to a private operator is \$1,085.00 or \$927.00.

Upon review the cost benefit analysis clearly shows that it is much more cost effective to utilize a dewatering facility and a private operator for solids disposal, which would ultimately save the generator money. Also important to note is that using SPL to treat the liquids and a private company to dispose of the solids will ultimately reduce the amount of waste being disposed of at Hartland Landfill.

8. CONCLUSIONS AND RECOMMENDATIONS

The findings of the sampling indicate that street waste solids from road and commercial complexes catch basins are generally not hazardous waste as defined by the EMA.

Based on the data collected by Morrow, Carley and Earth Tech, the solids from the catch basin cleaning of residential, commercial and industrial areas do not differ significantly. The range and values are slightly higher in commercial and industrial areas, but this may be due to higher traffic volume and not related to the land use.

By conducting the field evaluations with the haulers it was identified that they conduct site evaluations and assess each catch basin prior to cleaning to minimize the potential of hazardous waste impacts. This is perhaps the most important step in the whole process, followed by a second assessment of the wastes at the decant facility. Consequently it is important that the operators have annual refresher training which would include a review of collection practices, documentation and disposal practices. The supervisor at the decant facility should not only inspect all loads dumped by the haulers for evidence of contamination, but should also have the authority to reject the wastes, and either have the hauler collect the material, have the wastes disposed of as hazardous waste or have samples collected and analyzed at the haulers expense. It is suggested that the supervisor also review the haulers field inspection forms prior to acceptance for suspect issues and be involved in an annual refresher training program.

Analytical results indicated that the contaminant levels in the solids exceed CSR CL standards for one or more parameter. Generally of the hydrocarbon parameters toluene and EPHs often failed and for the heavy metals, chromium followed by arsenic, zinc, copper, lead, mercury, molybdenum and antimony. Therefore catch basin solids generally need to be disposed of at a permitted facility. The exception to this would be if analytical sampling has been conducted and the results show that the waste is less than the CSR – SRA criteria. Even if the solids did meet the standards it would take a considerable amount of effort and extra cost to process the material to make it acceptable for reuse.

The cost benefit analysis showed that it is less expensive to utilize a dewatering facility and a private operator for solids disposal. This consequently provides the opportunity for other operators (Hazco, Quantum) of permitted disposal sites to dispose of the solids instead of having the wastes needlessly going to Hartland Landfill.

DEFINED TECHNICAL TERMS

Adsorption	The selective collection and concentration of a liquid or gas onto the surface of a solid. Indicates that a chemical adheres to the surface of the solid.
Agricultural Land Use (AL)	The use of land for the primary purpose of producing agricultural products for human or animal consumption including, without limitation, livestock raising operations, croplands, orchards, pastures, greenhouses, plant nurseries, and farms. <i>(Defined by the CSR)</i>
Aquatic Life Water Use (AW)	The use of water as habitat for any component of the freshwater or marine aquatic ecosystem, including phytoplankton, zooplankton, benthos, macrophytes, and fish. <i>(Defined by the CSR)</i>
AWCWQ	<i>Approved and Working Criteria for Water Quality - 1995 (AWCWQ)</i> , BC ELP, April 1995. Replaced by the <i>BC Water Quality Guidelines (1998)</i> and <i>A Compendium of Working Water Quality Guidelines for BC: 1998 Edition</i> .
BMP	<i>Best Management Practices – educational/suggested practices, voluntary</i>
BCWQG	Water Management Branch, MWLAP, <i>British Columbia Approved Water Quality Guidelines (Criteria), 1998 Edition</i> (Bca regulatory document under a bylaw hasWQG), updated August 24, 2001.
BETX	Benzene, ethylbenzene, toluene, and xylenes.
CCME	Canadian Council of Ministers of the Environment.
CRD	Capital Regional District
COC	Contaminant of Concern
COP	<i>A regulatory document containing legal requirements as adopted by a regional district or municipality</i>
CL	Commercial Land Use - The use of land for the primary purpose of buying, selling, or trading of merchandise or services including, without limitation, shopping malls, office complexes, restaurants, hotels, motels, grocery stores, automobile service stations, petroleum distribution operations, dry cleaning operations, municipal yards, warehouses, law courts, museums, churches, golf courses, government offices, air and sea terminals, bus and railway stations, and storage associated with these uses. <i>(Defined by the CSR)</i>
CSR	<i>Contaminated Site Regulation (CSR)</i> , B.C. Reg. 375/96, including amendments up to B.C. Reg. 239/2007.
DW	Drinking Water Use - The use of water for the purpose of consumption by humans. <i>(Defined by the CSR)</i>
EPH	Extractable Petroleum Hydrocarbons - Gross screening test. Includes light (C ₁₀ to C ₁₉) and heavy (C ₁₉ to C ₃₂) fractions. Reported EPH results have not been corrected for PAH concentrations. (see HEPH and LEPH)
HW	Hazardous Waste - Waste containing concentrations of compounds as defined in the HWR. Section 13 of the CSR allows for an exemption from the HWR management responsibilities for specific classes of hazardous waste. If the section 13 exemption applies at a site, details will be provided in the Regulatory Framework section of the report.

HEPHs	Heavy Extractable Petroleum Hydrocarbons - Includes petroleum hydrocarbons in soil with carbon lengths ranging from C ₁₉ to C ₃₂ , with the exception of the following PAHs: benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene and pyrene. <i>(Defined by the CSR)</i>
HWR	<i>Hazardous Waste Regulation (HWR), B.C. Reg. 63/88, including amendments up to B.C. Reg. 261/2006.</i>
IL	Industrial Land Use - The use of land for the primary purpose of conducting industrial manufacturing and assembling processes and their ancillary uses including, without limitation, factories, metal foundries, wood treatment facilities, mines, refineries, hydroelectric dams, metal smelters, automotive assembly plants, rail car or locomotive maintenance facilities, railyards, non-retail breweries and bakeries, roads and highways, wastewater and sewage treatment plants, electrical transformer stations and salvage yards. <i>(Defined by the CSR)</i>
EHw₁₀₋₁₉	Includes light extractable petroleum hydrocarbons in water, carbon ranges C ₁₀ -C ₁₉ . The EHw ₁₀₋₁₉ standard is solubility based and is intended to assess the presence/absence of light non-aqueous phase liquids (NAPL). <i>(Defined by the CSR)</i>
LEPHs	Light extractable petroleum hydrocarbons - Includes petroleum hydrocarbons in soil with carbon lengths ranging from C ₁₀ to C ₁₉ , with the exception of the following PAHs: benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene, naphthalene, phenanthrene and pyrene. <i>(Defined by the CSR)</i>
LEPHw	Includes light petroleum hydrocarbons in water with carbon lengths ranging from C ₁₀ to C ₁₉ with the exception of the following PAHs acenaphthene, acridine, anthracene, fluorene, naphthalene and phenanthrene. Term references a specified analytical methodology which became mandatory on October 15, 1999. LEPHw standards are toxicologically based and are intended to protect aquatic life water uses. <i>(Defined by the CSR)</i>
Model Bylaw or Code of Practice	A document prepared by the CRD for adoption by municipalities
MoE	Ministry of Environment (MoE), formerly known as the Ministry of Water, Land and Air Protection (MWLAP).
MOG	Mineral oil and grease
OWS	Oil-water separator
PAH	Polycyclic Aromatic Hydrocarbons. Compounds with more than one benzene-ring structure. PAHs regulated under the CSR include: Soil - benz(a)anthracene; benzo(b)fluoranthene; benzo(k)fluoranthene; dibenz(a,h)anthracene; indeno(1,2,3-c,d)pyrene; naphthalene; phenanthrene; pyrene. Water - acenaphthene; acridine; anthracene; benz(a)anthracene; benzo(a)pyrene; fluoranthene; fluorene; naphthalene; pyrene.
PCOC	Potential Contaminant of Concern.

RL	Residential Land Use - The use of land for the primary purpose of: <ul style="list-style-type: none"> (a) a residence by persons on a permanent, temporary, or seasonal basis, including single family dwellings, cabins, apartments, condominiums, or townhouses, or (b) institutional facilities, including schools, hospitals, daycare operations, prisons, correctional centres, and community centres. <i>(Defined by the CSR)</i>
SWOG	Special Waste oil and grease. Oil and grease analyzed as per the HWR.
TSS	Total suspended solids.
TCLP	Toxicity Characteristic Leaching Procedure - This procedure is described in Part 2 of Schedule 4 of the Environmental Management Act, <i>Hazardous Waste Regulation</i> (HWR), B.C. Reg. 63/88, including amendments up to B.C. Reg 454/2004. It is intended to simulate the leaching effects of acid rain.
TDG CLR	<i>Transportation of Dangerous Goods Clear Language Regulations</i> (TDG CLR) (Canada), SOR/DORS/2001-286, August 15, 2002.
UL	Urban Park Land Use - The use of urban land for the primary purpose of outdoor recreation including, without limitation, municipal parks, fairgrounds, sports fields, rifle ranges, captive wildlife parks, biking and hiking areas, community beaches and picnic areas, but does not mean wildlands such as ecological reserves, national or provincial parks, protected wetlands or woodlands, native forests, tundra and alpine meadows. <i>(Defined by the CSR)</i>
VHw₆₋₁₀	Includes volatile petroleum hydrocarbons in water, carbon range C ₆ -C ₁₀ . The VHw ₆₋₁₀ standard is solubility based and is intended to assess the presence/absence of light non-aqueous phase liquids (NAPL). <i>(Defined by the CSR)</i>
VOCs	Volatile Organic Compounds. Specific compounds that partition strongly into the air phase rather than water phase based upon vapour pressures.
VPHs	Includes petroleum hydrocarbons in soil with carbon lengths ranging from C ₆ to C ₁₀ , with the exception of benzene, ethylbenzene, toluene, and xylenes. <i>(Defined by the CSR)</i>
VPHw	Includes volatile petroleum hydrocarbons in water with carbon lengths ranging from C ₆ to C ₁₀ , with the exception of benzene, ethylbenzene, toluene, xylenes. Term references a specified analytical methodology which became mandatory on October 15, 1999. VPHw standards are toxicologically based and are intended to protect aquatic life water uses. <i>(Defined by the CSR)</i>

9. REFERENCES

Carley Environmental Inc. "Street Waste Investigation" Prepared for the Capital Regional District.
January 1998.

Carley Environmental Inc. "CRD Street Waste Investigation Additional Sampling – 1998" CRD
May 22, 1998

Earth Tech Inc. Review of Management Practices for Catch Basin and Oil-Water Separator
Wastes. Prepared for Capital Regional District Environmental Services. October 23,
2002.



APPENDIX I

SITE INSPECTION CHECKLISTS

COMMERCIAL INFO SHEETS (CATCH BASIN /AREA VISUAL CHECKLIST)

Commercial Info Sheets

Job Date _____ w/o # _____ Driver _____ Truck # _____

Client Name _____ p/o # _____

Phone (h/o) _____ (cell) _____

Site Address _____ Area _____

Billed to _____ Billed by _____

Manifest # _____ BL # _____

Generator Name _____

Generator Address _____

Ship Name	Class	UN #	Pk Grp	Litres	s/l

Site/Contact Info

Additional Info

Truck Rinsed _____ yes _____ no

Tank Cleanout Time _____ Start _____ Finish

Standby Time _____ Start _____ Finish

Leave Shop	Arrive Site	Leave Site	Time on Site	Arv Dump	Lv Dump	Arv Shop

Drivers Notes _____

Area Visual Inspection Checklist

Group Classification based on Source

- | | | | |
|-------------------------------------|--------------------------|----------------|--------------------------|
| Residential Roads | <input type="checkbox"/> | Downtown Roads | <input type="checkbox"/> |
| Industrial Roads | <input type="checkbox"/> | Arterial Roads | <input type="checkbox"/> |
| Commercial Complexes | <input type="checkbox"/> | Carwash | <input type="checkbox"/> |
| Institutional i.e. School, Hospital | <input type="checkbox"/> | Other | _____ |

Potential Pollutant Sources

Vehicle Accessibility Issues

Major Observations and Causes for Concern

Visual Inspection of Catch Basins

- | | | | |
|--------------------|--------------------------|-------------------------------------|--------------------------|
| Floating Materials | <input type="checkbox"/> | Unusual Odour | <input type="checkbox"/> |
| Suspended Solids | <input type="checkbox"/> | Surface Staining Around Catch Basin | <input type="checkbox"/> |
| Oil and Grease | <input type="checkbox"/> | Discolouration of Water | <input type="checkbox"/> |

Comments:



APPENDIX II

PILOT STUDY PHOTOGRAPHS



Photograph 1: Dewatering facility has been constructed from a modified roll-off bin which has been split into two compartments. The large front compartment is where the catchbasin wastes are dumped and the solids dewatered.



Photograph 2: The rear compartment stores the decant water prior to being pumped via a sump pump into the SPL Facility.



Photograph 3 & 4: The baffle wall which separates the two compartments, has 5 screened drainage holes allowing the water to drain from the solids.





Photograph 5: When the hauler arrives at the dewatering facility he backs into the roll-off bin and drains the majority of the water from the vac truck, then the solids are dumped.



Photograph 6: When the hauler arrives at the dewatering facility he backs into the roll-off bin and drains the majority of the water from the vac truck, then the solids are dumped.



Photograph 7: When the hauler arrives at the dewatering facility he backs into the roll-off bin and drains the majority of the water from the vac truck, then the solids are dumped.



Photograph 8: The decant water is heavily sediment laden when it first drains from the catch basin solids.



Photograph 9: The solids are comprised of various soil components, which include silt, sand and gravel as well as organic matter (leaves, twigs), garbage (cigarette butts, paper, plastic) and sometimes hazardous materials (sharps).



APPENDIX III
ANALYTICAL TABLES



APPENDIX III
ANALYTICAL TABLES

TABLE 1: Summary of Analytical Results for Hydrocarbons in Soil

Sample Location	Sample ID	Sample Date (yyyy mm dd)	Depth Interval (m)	Field Screen ^a (ppm)	Monocyclic Aromatic Hydrocarbons				Gross Parameters			
					Benzene (µg/g)	Ethylbenzene (µg/g)	Toluene (µg/g)	Xylenes (µg/g)	VPHs (C6-C10) (µg/g)	EPH ^d (C10-C19) (µg/g)	EPH ^d (C19-C32) (µg/g)	
Recycling Facility												
SP07-1	SP07-1-070524	2007 05 24	-	-	< 0.04	< 0.5	4.7	0.8	< 100	680	5,100	
Station												
SP07-2	SP07-2-070531	2007 05 31	-	-	< 0.04	< 0.5	6.6	0.9	< 100	1,500	29,000	
Institution												
SP07-3	SP07-3-070628	2007 06 28	-	-	< 0.04	< 0.5	1.5	< 0.1	< 100	280	2,900	
BC Standards												
CSR Residential Land Use (RL) ^b												
					0.04	1	1.5	5	200	1,000	1,000	
CSR Commercial Land Use (CL) ^b												
					0.04	7	2.5	20	200	2,000	5,000	

Associated CanTest files: 80525082, 80601077, 80630012.

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.

BOLD Concentration greater than CSR Residential Land Use (RL) standard.

SHADOW Concentration greater than CSR Commercial Land Use (CL) standard.

^a Field screening results are measured based on a 'dry headspace' method using a combustible gas meter calibrated to a hexane standard.

^b The site-specific factors used for determining the matrix standards for this site include: intake of contaminated soil, groundwater used for drinking water, toxicity to soil invertebrates and plants, and groundwater flow to surface water used by freshwater or marine and/or estuarine aquatic life (whichever is most stringent).

^c EPH concentrations have not been corrected for the presence of PAHs.

^d EPH has no applicable CSR standard, however results have been compared to LEPH and HEPH standards, which are conservative comparisons.

TABLE 2: Summary of Analytical Results for PAHs in Soil

Sample Location		Recycling Facility	Service Station	Institution	BC Standards	
Sample ID	Sample Date (yyyy mm dd)	SP07-1 2007 05 24	SP07-2 2007 05 31	SP07-3 2007 06 28	CSR Residential Land Use ^b (RL)	CSR Commercial Land Use ^a (CL)
Depth Interval (m)	Field Screen ^a (ppm)	-	-	-		
Parameter	Units	Analytical Results				
Polycyclic Aromatic Hydrocarbons						
Naphthalene	µg/g	< 0.5	< 0.5	< 0.5	5	50
Acenaphthylene	µg/g	< 0.5	< 0.5	< 0.5	n/a	n/a
Acenaphthene	µg/g	< 0.5	< 0.5	< 0.5	n/a	n/a
Fluorene	µg/g	< 0.5	< 0.5	< 0.5	n/a	n/a
Phenanthrene	µg/g	0.53	0.5	2.5	5	50
Anthracene	µg/g	< 0.5	< 0.5	< 0.5	n/a	n/a
Fluoranthene	µg/g	0.55	0.7	1.8	n/a	n/a
Pyrene	µg/g	0.56	0.7	1.7	10	100
Benzo(a)anthracene	µg/g	< 0.5	< 0.5	0.7	1	10
Chrysene	µg/g	< 0.5	< 0.5	1	n/a	n/a
Benzo(b)fluoranthene	µg/g	< 0.5	< 0.5	0.8	1	10
Benzo(k)fluoranthene	µg/g	< 0.5	< 0.5	< 0.5	1	10
Benzo(a)pyrene	µg/g	< 0.5	< 0.5	0.6	1	10
Indeno(1,2,3-cd)pyrene	µg/g	< 0.5	< 0.5	< 0.5	1	10
Dibenz(a,h)anthracene	µg/g	< 0.5	< 0.5	< 0.5	1	10
Benzo(g,h,i)perylene	µg/g	< 0.5	< 0.5	0.5	n/a	n/a
2-Methylnaphthalene	µg/g	< 0.5	< 0.5	< 0.5	n/a	n/a

Associated CanTest files: 80525082, 80601077, 80630012.

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.

BOLD Concentration greater than CSR Residential Land Use (RL) standard.
SHADOW Concentration greater than CSR Commercial Land Use (CL) standard.

^a Field screening results are measured based on a 'dry headspace' method using a combustible gas meter calibrated to a hexane standard.
^b The site-specific factors used for determining the matrix standards for this site include: intake of contaminated soil, groundwater used for drinking water, toxicity to soil invertebrates and plants, and groundwater flow to surface water used by freshwater or marine and/or estuarine aquatic life (whichever is most stringent).

TABLE 3: Summary of Analytical Results for Metals in Soil

Sample Location		Recycling	Service Station	Institution	BC Standards	
Sample ID	Sample Date (yyyy mm dd)	SP07-1	SP07-2	SP07-3	CSR Residential Land Use ^b (RL)	CSR Commercial Land Use ^a (CL)
Depth Interval (m)		2007 05 24	2007 05 31	2007 06 28		
Parameter	Units	Analytical Results				
Physical Parameters						
pH	pH	7.4	7.2	7.5	n/a	n/a
Total Metals						
Antimony	µg/g	25	< 10	< 10	20	40
Arsenic	µg/g	53	< 10	< 10	15	15
Barium	µg/g	195	124	59	500	2,000
Beryllium	µg/g	< 1	< 1	< 1	4	8
Cadmium	µg/g	1.6	0.9	0.7	2.5 (pH 7.0-<7.5)	2.5 (pH 7.0-<7.5)
Chromium	µg/g	85	98	57	60 ^b	60 ^b
Cobalt	µg/g	12	9	11	50	300
Copper	µg/g	169	128	86	150	250
Lead	µg/g	134	114	129	500	1,000
Manganese	µg/g	366	288	267	1,800	n/a
Mercury	µg/g	21.5	0.09	0.24	15	40
Molybdenum	µg/g	12	5	< 4	10	40
Nickel	µg/g	45	30	23	100	500
Selenium	µg/g	< 2	< 2	< 2	3	10
Silver	µg/g	15	< 2	< 2	20	40
Strontium	µg/g	85	24	32	47,000	100,000
Tin	µg/g	12	7	< 5	50	300
Vanadium	µg/g	46	49	46	200	n/a
Zinc	µg/g	561	216	284	450	600

Associated CanTest files: 80525082, 80601077, 80630012.

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.

BOLD Concentration greater than CSR Residential Land Use (RL) standard.

SHADOW Concentration greater than CSR Commercial Land Use (CL) standard.

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

^b Individual standards exist for Cr +3 and Cr +6. Reported value represents more stringent standard.

TABLE 4: Summary of Analytical Results for Hydrocarbons in Decanted Water

Sample Location	Sample ID	Sample Date (yyyy mm dd)	Monocyclic Aromatic Hydrocarbons				Gross Parameters			
			Benzene (mg/L)	Ethyl- benzene (mg/L)	Toluene (mg/L)	Xylenes (mg/L)	VHW ₆₋₁₀ (mg/L)	VPHw (C6-C10) (mg/L)	EPHw ₁₀₋₁₉ (mg/L)	LEPHw (C10-C19) (mg/L)
Recycling Facility										
Decant07-1	Decant07-1-070524/25	2007 05 24/25	< 0.0001	0.0007	0.027	0.0025	< 0.1	< 0.1	13	13
Service Station										
Decant07-2	Decant07-2-070531	2007 05 31	< 0.002	< 0.002	0.27	0.0047	0.27	< 0.1	< 0.1	5
Institution										
Decant07-3	Decant07-3-070628	2007 06 28	< 0.0001	< 0.0001	0.037	< 0.0001	< 0.1	< 0.1	2.3	2.3
Standards										
CRD Sewer Use Bylaw			0.1	0.2	0.2	0.2	n/a	n/a	n/a	n/a

Associated CanTest files: 80525082, 80526008, 80601077, 80630012.

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.

BOLD

Concentration greater than Capital Regional District Sewer Use Bylaw 2922.

^a EPH concentrations have not been corrected for the presence of PAHs.

TABLE 5: Summary of Analytical Results for PAHs in Decanted Water

Sample Location		Recycling Facility	Service Station	Institution	CRD Sewer Use Bylaw
Sample ID	Sample Date (yyyy mm dd)	Decant07-1 Decant07-1-070524 2007 05 24	Decant07-2 Decant07-2-070531 2007 05 31	Decant07-3 Decant07-3-070628 2007 06 28	
Parameter	Units	Analytical Results			
Polycyclic Aromatic Hydrocarbons					
Naphthalene	mg/L	0.0062	< 0.003	< 0.003	n/a
Acenaphthylene	mg/L	< 0.001	< 0.001	< 0.001	n/a
Acenaphthene	mg/L	< 0.001	< 0.001	< 0.001	n/a
Fluorene	mg/L	< 0.0005	< 0.0005	0.00072	n/a
Phenanthrene	mg/L	0.0032	0.0011	0.0027	n/a
Anthracene	mg/L	< 0.0001	< 0.0001	0.00037	n/a
Acridine	mg/L	< 0.0005	< 0.0005	< 0.0005	n/a
Fluoranthene	mg/L	0.0015	0.0012	0.0018	n/a
Pyrene	mg/L	0.0017	0.0011	0.002	n/a
Benzo(a)anthracene	mg/L	0.0005	0.0003	0.00065	n/a
Chrysene	mg/L	0.0009	0.0007	0.0011	n/a
Benzo(b)fluoranthene	mg/L	< 0.0001	0.0009	0.002	n/a
Benzo(k)fluoranthene	mg/L	< 0.0001	< 0.0001	0.0005	n/a
Benzo(a)pyrene	mg/L	< 0.0001	< 0.0001	0.00072	n/a
Indeno(1,2,3-cd)pyrene	mg/L	< 0.0001	< 0.0001	0.00066	n/a
Dibenz(a,h)anthracene	mg/L	< 0.0001	< 0.0001	0.00014	n/a
Benzo(g,h,i)perylene	mg/L	< 0.0001	0.0005	0.001	n/a
Total PAH	mg/L	0.014	0.0058	0.0144	0.05
Quinoline	mg/L	< 0.005	< 0.005	< 0.005	n/a

Associated CanTest files: 80525082, 80601077, 80630012.

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.

BOLD Concentration greater than Capital Regional District Sewer Use Bylaw 2922.

TABLE 6: Summary of Analytical Results for Metals in Decanted Water

Sample Location		Recycling Facility	Service Station	Institution	CRD Sewer Use Bylaw ^a
Sample ID	Sample Date (yyyy mm dd)	Decant07-1 Decant07-1-070524 2007 05 24	Decant07-2 Decant07-2-070531 2007 05 31	Decant07-3 Decant07-3-070628 2007 06 28	
Parameter	Units	Analytical Results			
Physical Parameters					
Hardness	mg/L	567	144	69	n/a
Total Suspended Solids	mg/L	-	4,110	2,040	350
Geochemical Indicators					
Dissolved Aluminum	mg/L	0.055	0.015	0.021	n/a
Dissolved Calcium	mg/L	204	48	24.6	n/a
Dissolved Iron	mg/L	0.47	35	0.87	50
Dissolved Magnesium	mg/L	13.7	5.73	1.93	n/a
Dissolved Manganese	mg/L	0.73	1.49	0.19	5
Dissolved Potassium	mg/L	55.1	12.4	48.4	n/a
Dissolved Sodium	mg/L	93.2	47.5	64.1	n/a
Dissolved Metals					
Antimony	mg/L	0.002	0.002	< 0.001	n/a
Arsenic	mg/L	0.008	0.003	0.002	0.4
Barium	mg/L	0.13	0.81	0.046	n/a
Beryllium	mg/L	< 0.001	< 0.001	< 0.001	n/a
Boron	mg/L	0.76	0.12	0.05	n/a
Cadmium	mg/L	< 0.0002	< 0.0002	< 0.0002	0.3
Chromium	mg/L	0.002	0.002	< 0.001	4
Cobalt	mg/L	0.002	0.01	0.001	5
Copper	mg/L	0.003	0.005	0.001	1
Lead	mg/L	< 0.001	0.002	< 0.001	1
Lithium	mg/L	0.009	0.007	< 0.005	n/a
Mercury	mg/L	< 0.00002	< 0.00002	< 0.00002	0.02
Molybdenum	mg/L	0.013	0.03	0.088	5
Nickel	mg/L	0.013	0.086	0.003	3
Selenium	mg/L	< 0.001	< 0.001	< 0.001	0.3
Silver	mg/L	< 0.00025	< 0.00025	< 0.00025	0.5
Thallium	mg/L	< 0.0001	< 0.0001	< 0.0001	n/a
Titanium	mg/L	0.008	< 0.001	0.003	n/a
Uranium	mg/L	0.0024	< 0.0005	< 0.0005	n/a
Vanadium	mg/L	0.003	< 0.001	0.001	n/a
Zinc	mg/L	0.013	0.09	< 0.005	3

Associated Can Test files: 80525082, 80601077, 80630012.

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.

BOLD Concentration greater than Capital Regional District Sewer Use Bylaw 2922.

^a Dissolved metals concentrations have been compared to the CRD Sewer Use Bylaw standard for Total Metals, which is a conservative comparison.



APPENDIX IV
ANALYTICAL REPORTS

Analysis Report

RECEIVED CANTEST
O O O O

REPORT ON: Analysis of Soil, Water Samples
REPORTED TO: Morrow Environmental Consultants Inc.
202-3440 Douglas St
Victoria, BC
V8Z 3L5

JUL 25 2007

Att'n: Alana Duncan

MORROW ENVIRONMENTAL
CONSULTANTS INC.

CHAIN OF CUSTODY: 2047966
PROJECT NAME: CRD Catch Basin
PROJECT NUMBER: 130777

NUMBER OF SAMPLES: 3

REPORT DATE: July 13, 2007

DATE SUBMITTED: June 30, 2007

GROUP NUMBER: 80630012

SAMPLE TYPE: Soil, Water

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

TEST METHODS:

Volatile Organic Compounds in Water and Soil - analysis was performed using 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.

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

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.

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

(Continued)

CANTEST LTD.


Zhenyong Gao, M.Sc.
Coordinator, Trace Organics

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REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 13, 2007

GROUP NUMBER: 80630012



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, published by the Canadian Society of Soil Science, 1993. The test was performed using a deionized water leach with measurement by pH meter.

Total Suspended Solids in Water - was determined based on Method 2540 D in Standard Methods (21st Edition) and Method X332 in the BC Laboratory 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 Soil - analysis was performed using B.C. MOELP CSR-Analytical Method 3 "Extractable Petroleum Hydrocarbons in Solids by GC/FID" and CSR-Analytical Method 6 "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water (LEPH & HEPH)". The method involves acetone/hexane extraction and GC/FID analysis. EPH components ranging from C10 to C19 and C19 to C32 are quantified against eicosane (n-C20). LEPH & HEPH are calculated by subtraction of specified PAH's.

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

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

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 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.

Mercury in Soil - analysis was performed using Cold Vapour Atomic Fluorescence.

(Continued)

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 13, 2007

GROUP NUMBER: 80630012



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)

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 13, 2007

GROUP NUMBER: 80630012



Conventional Parameters in Water

CLIENT SAMPLE IDENTIFICATION:	Decant07-3-070628	
DATE SAMPLED:	Jun 28/07	DETECTION LIMIT
CANTEST ID:	706300045	
Hardness CaCO ₃	69	1
Total Suspended Solids	2040	1

Results expressed as milligrams per liter (mg/L)

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 13, 2007

GROUP NUMBER: 80630012



Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		Decant07-3-070628		
SAMPLE PREPARATION:		DISSOLVED		
DATE SAMPLED:		Jun 28/07		
CANTEST ID:		706300045		
			DETECTION LIMIT	UNITS
Aluminum	Al	0.021	0.005	mg/L
Antimony	Sb	<	0.001	mg/L
Arsenic	As	0.002	0.001	mg/L
Barium	Ba	0.046	0.001	mg/L
Beryllium	Be	<	0.001	mg/L
Bismuth	Bi	<	0.001	mg/L
Boron	B	0.05	0.05	mg/L
Cadmium	Cd	<	0.0002	mg/L
Calcium	Ca	24.6	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	0.87	0.05	mg/L
Lead	Pb	<	0.001	mg/L
Lithium	Li	<	0.005	mg/L
Magnesium	Mg	1.93	0.05	mg/L
Manganese	Mn	0.19	0.001	mg/L
Mercury	Hg	<	0.02	µg/L
Molybdenum	Mo	0.088	0.0005	mg/L
Nickel	Ni	0.003	0.001	mg/L
Phosphorus	P	<	0.15	mg/L
Potassium	K	48.4	0.1	mg/L
Selenium	Se	<	0.001	mg/L
Silicon	Si	4.4	0.25	mg/L
Silver	Ag	<	0.00025	mg/L
Sodium	Na	64.1	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	0.004	0.001	mg/L

(Continued on next page)

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 13, 2007

GROUP NUMBER: 80630012



Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		Decant07-3-070628		
SAMPLE PREPARATION:		DISSOLVED		
DATE SAMPLED:		Jun 28/07		
CANTEST ID:		706300045		
Titanium	Ti	0.003	0.001	mg/L
Uranium	U	<	0.0005	mg/L
Vanadium	V	0.001	0.001	mg/L
Zinc	Zn	<	0.005	mg/L
Zirconium	Zr	<	0.01	mg/L

mg/L = milligrams per liter
< = Less than detection limit

µg/L = micrograms per liter

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 13, 2007

GROUP NUMBER: 80630012



Polycyclic Aromatic Hydrocarbons in Water

CLIENT SAMPLE IDENTIFICATION:	Decant07-3-070628	
DATE SAMPLED:	Jun 28/07	
CANTEST ID:	706300045	
ANALYSIS DATE:	Jul 6/07	DETECTION LIMIT
Naphthalene	<	3
Acenaphthylene	<	1
Quinoline	<	5
Acenaphthene	<	1
Fluorene	0.72	0.5
Phenanthrene	2.7	0.5
Anthracene	0.37	0.1
Acridine	<	0.5
Total LMW-PAH's	3.79	
Fluoranthene	1.8	0.4
Pyrene	2.0	0.2
Benzo(a)anthracene	0.65	0.1
Chrysene	1.1	0.1
Benzo(b)fluoranthene	2.0	0.1
Benzo(k)fluoranthene	0.50	0.1
Benzo(a)pyrene	0.72	0.1
Indeno(1,2,3-cd)pyrene	0.66	0.1
Dibenz(a,h)anthracene	0.14	0.1
Benzo(g,h,i)perylene	1.0	0.1
Total HMW-PAH's	10.6	
Total PAH's	14.4	

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

< = Less than detection limit

Sample# 706300045 - Detection limits adjusted: Dilution required

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 13, 2007

GROUP NUMBER: 80630012



Monocyclic Aromatic Hydrocarbons in Water

CLIENT SAMPLE IDENTIFICATION:	Decant07-3-070628	TB70404A	
DATE SAMPLED:	Jun 28/07	Jun 28/07	
CANTEST ID:	706300045	706300052	
ANALYSIS DATE:	Jul 4/07	Jul 4/07	DETECTION LIMIT
Benzene	<	<	0.1
Ethylbenzene	<	<	0.1
Toluene	37	<	0.1
Xylenes	<	<	0.1
Volatile Hydrocarbons VHW6-10	<	<	100
VPHw	<	<	100
Styrene	<	<	0.1
Surrogate Recovery			
Toluene-d8	100	99	-
Bromofluorobenzene	87	81	-

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

Surrogate recoveries expressed as percent (%)

< = Less than detection limit

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 13, 2007

GROUP NUMBER: 80630012



Extractable Petroleum Hydrocarbons (EPH) in Water

CLIENT SAMPLE IDENTIFICATION:	Decant07-3-070628	
DATE SAMPLED:	Jun 28/07	DETECTION LIMIT
CANTEST ID:	706300045	
EPHw10-19	2300	250
EPHw19-32	20000	250

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

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 13, 2007

GROUP NUMBER: 80630012



Extractable Petroleum Hydrocarbons - PAH Corrected in Water

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	LEPHw (corrected for PAH's)	HEPHw (corrected for PAH's)
Decant07-3-070628	Jun 28/07	706300045	2300	20000
DETECTION LIMIT UNITS			250 $\mu\text{g/L}$	250 $\mu\text{g/L}$

$\mu\text{g/L}$ = micrograms per liter

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 13, 2007

GROUP NUMBER: 80630012



Monocyclic Volatile Hydrocarbons-Direct Injection- in Soil

CLIENT SAMPLE IDENTIFICATION:	SP07-3-070 628	
DATE SAMPLED:	Jun 28/07	DETECTION LIMIT
CANTEST ID:	706300042	
Benzene	<	0.04
Ethylbenzene	<	0.5
Toluene	1.5	0.5
Xylenes	<	0.1
Styrene	<	0.1

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

< = Less than detection limit

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 13, 2007

GROUP NUMBER: 80630012



Conventional Parameters in Soil

CLIENT SAMPLE IDENTIFICATION:	SP07-3-070 628		
DATE SAMPLED:	Jun 28/07		
CANTEST ID:	706300042		
Moisture	36.0	0.1	%
pH	7.5	0.1	pH units

% = percent

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 13, 2007

GROUP NUMBER: 80630012



Polycyclic Aromatic Hydrocarbons in Soil

CLIENT SAMPLE IDENTIFICATION:	SP07-3-070 628	
DATE SAMPLED:	Jun 28/07	
CANTEST ID:	706300042	
ANALYSIS DATE:	Jul 10/07	DETECTION LIMIT
Naphthalene	<	0.5
2-Methylnaphthalene	<	0.5
Acenaphthylene	<	0.5
Acenaphthene	<	0.5
Fluorene	<	0.5
Phenanthrene	2.5	0.5
Anthracene	<	0.5
Total LMW-PAH's	2.50	
Fluoranthene	1.8	0.5
Pyrene	1.7	0.5
Benzo(a)anthracene	0.7	0.5
Chrysene	1.0	0.5
Benzo(b)fluoranthene	0.8	0.5
Benzo(k)fluoranthene	<	0.5
Benzo(a)pyrene	0.6	0.5
Indeno(1,2,3-cd)pyrene	<	0.5
Dibenz(a,h)anthracene	<	0.5
Benzo(g,h,i)perylene	0.5	0.5
Total HMW-PAH's	7.10	
Total PAH's	9.60	

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

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 13, 2007

GROUP NUMBER: 80630012



Extractable Petroleum Hydrocarbons (EPH) in Soil

CLIENT SAMPLE IDENTIFICATION:	SP07-3-070 628	
DATE SAMPLED:	Jun 28/07	DETECTION LIMIT
CANTEST ID:	706300042	
EPHs10-19	280	250
EPHs19-32	2900	250
LEPHs (corrected for PAH's)	280	250
HEPHs (corrected for PAH's)	2900	250

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

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 13, 2007

GROUP NUMBER: 80630012



Monocyclic Aromatic Hydrocarbons-Methanol Extraction- in Soil

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	Volatile Hydrocarbons VHS6-10	VPHs
SP07-3-070628	Jun 28/07	706300042	<	<
DETECTION LIMIT UNITS			100 $\mu\text{g/g}$	100 $\mu\text{g/g}$

$\mu\text{g/g}$ = micrograms per gram, on a dry weight basis.
< = Less than detection limit

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 13, 2007

GROUP NUMBER: 80630012



Strong Acid Soluble Metals in Soil

CLIENT SAMPLE IDENTIFICATION:		SP07-3-070 628	
DATE SAMPLED:		Jun 28/07	
CANTEST ID:		706300042	
		DETECTION LIMIT	
Selenium	Se	<	2
Antimony	Sb	<	10
Arsenic	As	<	10
Barium	Ba	59	1
Beryllium	Be	<	1
Cadmium	Cd	0.7	0.5
Chromium	Cr	57	2
Cobalt	Co	11	1
Copper	Cu	86	1
Lead	Pb	129	5
Mercury	Hg	0.24	0.01
Molybdenum	Mo	<	4
Nickel	Ni	23	2
Silver	Ag	<	2
Tin	Sn	<	5
Vanadium	V	46	1
Zinc	Zn	284	1
Aluminum	Al	10600	10
Boron	B	10	1
Calcium	Ca	8360	1
Iron	Fe	21000	2
Magnesium	Mg	6450	0.1
Manganese	Mn	267	1
Phosphorus	P	550	20
Potassium	K	686	10
Sodium	Na	384	5
Strontium	Sr	32	1
Titanium	Ti	617	1
Zirconium	Zr	5	1

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

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 13, 2007

GROUP NUMBER: 80630012



Batch Quality Control for Monocyclic Aromatic Hydrocarbons-Methanol Extraction- in Soil (QC# 95919)

Parameter	Blank (ug/g)	Blank Limits
Volatile Hydrocarbons VHS6-10	< 100	100

ug/g = micrograms per gram

REPORTED TO: Morrow Environmental Consultants Inc.



REPORT DATE: July 13, 2007

GROUP NUMBER: 80630012

Batch Quality Control for Monocyclic Volatile Hydrocarbons-Direct Injection- in Soil (QC# 95919)

Parameter	Blank (ug/g)	Blank Limits	Method Performance Check Spike (% Recovery)	Method Performance Check Spike Limits
Benzene	< 0.04	0.04	83	58 - 126
Ethylbenzene	< 0.5	0.5	85	66 - 116
Toluene	< 0.5	0.5	88	76 - 124

ug/g = micrograms per gram

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 13, 2007

GROUP NUMBER: 80630012



Batch Quality Control for Extractable Petroleum Hydrocarbons (EPH) in Soil (QC# 95887)

Parameter	Blank (ug/g)	Blank Limits	Duplicate (R.P.D.) 706300021	Duplicate Limits
EPHs10-19	< 250	250	NC	20
EPHs19-32	< 250	250	NC	20

ug/g = micrograms per gram

R.P.D. = Relative Percent Difference

NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 13, 2007

GROUP NUMBER: 80630012



Batch Quality Control for Polycyclic Aromatic Hydrocarbons in Soil (QC# 95936)

Parameter	Blank (ug/g)	Blank Limits	Duplicate (R.P.D.) 707030303	Duplicate Limits	NRC HS-5 Cert. Ref. Material (% Recovery)	NRC HS-5 Cert. Ref. Material Limits
Naphthalene	< 0.05	0.05	NC	40	80	57 - 111
Acenaphthylene	< 0.05	0.05	NC	40	120	45 - 135
Acenaphthene	< 0.05	0.05	NC	40	-	-
Fluorene	< 0.05	0.05	NC	40	-	-
Phenanthrene	< 0.05	0.05	NC	40	58	49 - 97
Anthracene	< 0.05	0.05	NC	40	68	54 - 129
Fluoranthene	< 0.05	0.05	NC	40	62	59 - 124
Pyrene	< 0.05	0.05	NC	40	48	46 - 84
Benzo(a)anthracene	< 0.05	0.05	NC	40	-	-
Chrysene	< 0.05	0.05	NC	40	71	53 - 114
Benzo(b)fluoranthene	< 0.05	0.05	NC	40	-	-
Benzo(a)pyrene	< 0.05	0.05	NC	40	-	-
Indeno(1,2,3-cd)pyrene	< 0.05	0.05	NC	40	52	49 - 102
Dibenz(a,h)anthracene	< 0.05	0.05	NC	40	80	61 - 126
Benzo(g,h,i)perylene	< 0.05	0.05	NC	40	-	-

ug/g = micrograms per gram

R.P.D. = Relative Percent Difference

NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 13, 2007

GROUP NUMBER: 80630012



Batch Quality Control for Strong Acid Soluble Metals in Soil (QC# 95852)

Parameter	Blank (ug/g)	Blank Limits	CAN MET Till-1 (% Recovery)	CAN MET Till-1 Limits	Duplicate (R.P.D.) 706300023	Duplicate Limits
Antimony Sb	-	-	-	-	NC	30
Arsenic As	< 10	10	123	77 - 146	NC	30
Barium Ba	< 1	1	-	-	0	30
Beryllium Be	-	-	-	-	NC	30
Chromium Cr	-	-	-	-	0	30
Cobalt Co	-	-	-	-	0	30
Copper Cu	< 1	1	-	-	4.7	30
Lead Pb	< 5	5	100	65 - 171	0.6	30
Mercury Hg	-	-	96	33 - 174	12.6	30
Molybdenum Mo	-	-	-	-	NC	30
Nickel Ni	< 2	2	83	49 - 149	8.7	30
Tin Sn	-	-	-	-	NC	30
Vanadium V	-	-	-	-	0	30
Zinc Zn	< 1	1	84	79 - 114	0	30
Calcium Ca	-	-	62	51 - 106	-	-
Iron Fe	-	-	90	74 - 139	-	-
Manganese Mn	-	-	103	92 - 138	-	-

ug/g = micrograms per gram

R.P.D. = Relative Percent Difference

NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 13, 2007

GROUP NUMBER: 80630012



Batch Quality Control for Strong Acid Soluble Metals in Soil (QC# 95852)

Parameter		Duplicate (R.P.D.) 706300040	Duplicate Limits	Duplicate (R.P.D.) 706300085	Duplicate Limits
Antimony	Sb	NC	30	NC	30
Arsenic	As	NC	30	NC	30
Barium	Ba	7.6	30	4.9	30
Beryllium	Be	NC	30	NC	30
Chromium	Cr	6.9	30	3.6	30
Cobalt	Co	18.2	30	0	30
Copper	Cu	0	30	5.1	30
Lead	Pb	PASS	30	PASS	30
Mercury	Hg	0	30	0	30
Molybdenum	Mo	NC	30	NC	30
Nickel	Ni	0	30	4.9	30
Tin	Sn	NC	30	NC	30
Vanadium	V	2.5	30	5	30
Zinc	Zn	0	30	5	30

ug/g = micrograms per gram

R.P.D. = Relative Percent Difference

PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.

NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 13, 2007

GROUP NUMBER: 80630012



Batch Quality Control for Monocyclic Aromatic Hydrocarbons in Water (QC# 96094)

Parameter	Blank (ug/L)	Blank Limits	Duplicate (R.P.D.) 706280017	Duplicate Limits	Volatiles Water Spike (% Recovery)	Volatiles Water Spike Limits
Benzene	< 0.1	0.1	NC	20	99	79 - 117
Ethylbenzene	< 0.1	0.1	NC	20	113	76 - 124
Toluene	< 0.1	0.2	NC	20	111	83 - 118
Xylenes	< 0.1	0.1	NC	20	106	75 - 125
Volatile Hydrocarbons VHw6-10	< 100	100	NC	20	-	-

ug/L = micrograms per liter

R.P.D. = Relative Percent Difference

NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 13, 2007

GROUP NUMBER: 80630012



Batch Quality Control for Conventional Parameters in Water

Parameter	QC Type	QC Result	Units	Lower Limit	Upper Limit
Total Suspended Solids	Blank	< 1	mg/L	0	3
	TSS Control Standard (CalVer)	100.4	% Recovery	91	105
	Duplicate	0.8	R.P.D.	0	18
	Duplicate	1.3	R.P.D.	0	18
	Duplicate	1.5	R.P.D.	0	18
	Duplicate	1.7	R.P.D.	0	18
	Duplicate	2.8	R.P.D.	0	18

mg/L = milligrams per liter

< = Less than detection limit

R.P.D. = Relative Percent Difference

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 13, 2007

GROUP NUMBER: 80630012



Batch Quality Control for Extractable Petroleum Hydrocarbons (EPH) in Water (QC# 95921)

Parameter	Blank (ug/L)	Blank Limits
EPHw10-19	< 250	250
EPHw19-32	< 250	250

ug/L = micrograms per liter

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 13, 2007

GROUP NUMBER: 80630012



Batch Quality Control for Dissolved Metals Analysis in Water (QC# 95843)

Parameter		Dissolved Blank (mg/L)	Dissolved Blank Limits	Duplicate (R.P.D.) 706290174	Duplicate Limits	Duplicate (R.P.D.) 706300100	Duplicate Limits
Aluminum	Al	0.001	0.015	PASS	20	-	-
Antimony	Sb	< 0.0002	0.001	NC	20	-	-
Arsenic	As	< 0.0002	0.001	PASS	20	-	-
Barium	Ba	< 0.0002	0.001	-	-	-	-
Beryllium	Be	< 0.0002	0.001	-	-	-	-
Cadmium	Cd	< 0.00004	0.001	NC	20	-	-
Calcium	Ca	-	-	0	20	1.6	20
Chromium	Cr	< 0.0002	0.001	NC	20	-	-
Cobalt	Co	< 0.0002	0.001	NC	20	-	-
Copper	Cu	< 0.0002	0.001	PASS	20	-	-
Lead	Pb	< 0.0002	0.001	NC	20	-	-
Magnesium	Mg	-	-	0.5	20	1.5	20
Manganese	Mn	< 0.0002	0.001	-	-	-	-
Molybdenum	Mo	< 0.0001	0.001	PASS	20	-	-
Nickel	Ni	< 0.0002	0.001	PASS	20	-	-
Potassium	K	< 0.02	0.05	PASS	20	3.3	20
Silver	Ag	< 0.00005	0.001	NC	20	-	-
Sodium	Na	-	-	0	20	4.2	20
Strontium	Sr	< 0.0002	0.001	-	-	-	-
Thallium	Tl	< 0.00002	0.001	NC	20	-	-
Thorium	Th	< 0.0001	0.0005	NC	20	-	-
Tin	Sn	< 0.0002	0.005	NC	20	-	-
Titanium	Ti	< 0.0002	0.001	-	-	-	-
Uranium	U	< 0.0001	0.0005	PASS	20	-	-
Vanadium	V	< 0.0002	0.001	-	-	-	-
Zinc	Zn	< 0.001	0.01	NC	20	-	-
Zirconium	Zr	< 0.002	0.01	-	-	-	-

mg/L = milligrams per liter

R.P.D. = Relative Percent Difference

PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.

NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 13, 2007

GROUP NUMBER: 80630012



Batch Quality Control for Polycyclic Aromatic Hydrocarbons in Water (QC# 95922)

Parameter	Blank (ug/L)	Blank Limits	Spike (% Recovery)	Spike Limits
Naphthalene	< 0.3	0.3	92	43 - 125
Acenaphthylene	< 0.1	0.1	88	64 - 116
Acenaphthene	< 0.1	0.1	92	62 - 116
Fluorene	< 0.05	0.05	92	70 - 108
Phenanthrene	< 0.05	0.05	96	74 - 118
Anthracene	< 0.01	0.05	90	73 - 117
Acridine	< 0.05	0.05	86	63 - 120
Fluoranthene	< 0.04	0.05	92	75 - 121
Pyrene	< 0.02	0.02	94	78 - 120
Benzo(a)anthracene	< 0.01	0.01	90	76 - 118
Chrysene	< 0.01	0.01	96	71 - 127
Benzo(b)fluoranthene	< 0.01	0.01	88	59 - 138
Benzo(k)fluoranthene	< 0.01	0.01	94	72 - 114
Benzo(a)pyrene	< 0.01	0.1	92	80 - 120
Indeno(1,2,3-cd)pyrene	< 0.01	0.01	88	61 - 123
Dibenz(a,h)anthracene	< 0.01	0.01	92	58 - 126
Benzo(g,h,i)perylene	< 0.01	0.01	94	64 - 116

ug/L = micrograms per liter

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 13, 2007

GROUP NUMBER: 80630012



Batch Quality Control Frequency Summary

Dissolved Metals Preparation (Batch# 95843)

QC Type	No. Samples
Dissolved Blank	1
Duplicate	2

SALM in Soil Digestion (Batch# 95852)

QC Type	No. Samples
CAN MET Till-1	1
Blank	3
Duplicate	3

EPH (LEPH/HEPH)- Soil Prep (Batch# 95887)

QC Type	No. Samples
Blank	1
Cert Ref Material RTC CRM355	1
Duplicate	1
Method Performance Check Spike	1

Suspended Solids Analysis (Batch# 95905)

QC Type	No. Samples
Blank	1
TSS Control Standard (CalVer)	1
Duplicate	5

MeOH Extr'n Prep BTEX/VPH Soil (Batch# 95919)

QC Type	No. Samples
Blank	1
Method Performance Check Spike	1

(Continued on next page)

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 13, 2007

GROUP NUMBER: 80630012



Batch Quality Control Frequency Summary

TEH/EPH Water Preparation (Batch# 95921)

QC Type	No. Samples
Blank	1
Method Performance Check Spike	1

PAH's in Water Sample Prep (Batch# 95922)

QC Type	No. Samples
Blank	1
Spike	1

PAH's in Soil Sample Prep (Batch# 95936)

QC Type	No. Samples
Blank	1
Duplicate	1
NRC HS-5 Cert. Ref. Material	1

Volatiles Analysis (Batch# 96094)

QC Type	No. Samples
Blank	1
Volatiles Water Spike	1
Duplicate	2

SALM Metals in Soil Sieve (Batch# 95832)

QC Type	No. Samples
Batch Size	41

(Continued on next page)

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 13, 2007

GROUP NUMBER: 80630012



Batch Quality Control Frequency Summary

Dissolved Metals Preparation (Batch# 95843)

QC Type	No. Samples
Batch Size	21

SALM in Soil Digestion (Batch# 95852)

QC Type	No. Samples
Batch Size	41

EPH (LEPH/HEPH)- Soil Prep (Batch# 95887)

QC Type	No. Samples
Batch Size	18

Suspended Solids Analysis (Batch# 95905)

QC Type	No. Samples
Batch Size	44

MeOH Extr'n Prep BTEX/VPH Soil (Batch# 95919)

QC Type	No. Samples
Batch Size	32

TEH/EPH Water Preparation (Batch# 95921)

QC Type	No. Samples
Batch Size	18

(Continued on next page)

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: July 13, 2007

GROUP NUMBER: 80630012



Batch Quality Control Frequency Summary

PAH's in Water Sample Prep (Batch# 95922)

QC Type	No. Samples
Batch Size	14

PAH's in Soil Sample Prep (Batch# 95936)

QC Type	No. Samples
Batch Size	14

Volatiles Analysis (Batch# 96094)

QC Type	No. Samples
Batch Size	42

CHAIN OF CUSTODY RECORD

CANTEST

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V5G 1K5

Tel: 604.734.7276
Fax: 604.731.2386
Toll Free: 800.665.8566
www.canstest.com

0000
2047966
1x100
1x500
1x1000

Special Instructions: AutoFax AutoEmail

Return Cooler
 Ship Sample Bottles (please specify)
Samples from Catch Basin Waste
Collection and have not been
filtered.
Metals do not have preservative
use glass jar for ISS.
NO air bubbles in BTEX checked

Group Number
80670012

SP07 - 3-070628

LA 45 Decant 07-3-070628

US E ONLY

Client Name: **Morrow Environmental Consultants Inc. (MOR135)**
Street Address (including suite number): **Suite 202, 3440 Douglas Street**
Telephone: **250-385-5028** Fax: **250-385-5038**
Contact Name: **Alana Duncan** Project Number: **130777**
Quotation Number: **CRD catch Basin**

Postal Code: **V8Z 3L5** City: **Victoria**
E-Mail Address (Required for Electronic Reporting): **alana.duncan@smc-arain.com**
Sample's Name: **Douglas Adams** P.O. Number: _____
Project Name: _____

Page 1 of 1
RESULTS REQUESTED BY:
5 day TAT
Day _____ Month _____ Year _____
(Surcharges May Apply)

Date/Time Sampled (DIMY & 24hr clock)	Sample Type	Total Metals*	Dissolved Metals*	Field Filtered Metals*	Soil Metals*	pH	Conductivity	TDS	Alkalinity (total / spec.)	BOD	COD	Coliform, Total & E.coli	Coliform, Fecal	F, Cl, SO ₄ , NO ₃	Nitrite	Oil & Grease (Total / Mineral)	Oil & Grease (Special Waste)	PCP (Tri, Tetra and Penta)	PCP (Mono and Di)	BETX/PH	VOC	EPH (not PAH corrected)	PAH	LEPH/HEPH (PAH corrected)	PCB	Asbestos	EPH _w	Nunt Containers
D: 28/6/17 T: _____	soil				X															X		X						2
D: 28/6/17 T: _____	water		X																	X		X						6

Relinquished by: **Douglas Adams** Time: **16:00** Received by: _____
Relinquished by: _____ Time: _____ Received by: _____
Method of Shipment: **DHL** Waybill No.: **751649729** Received for Lab by: **PT** Date: **JUN 30** Time: **9:00**
Shipped by: _____ Shipment Condition: _____ Cooler opened by: _____ Date: _____ Time: _____

*Please indicate appropriate regulatory guidelines:
WATER CCME BC-CSR Other (please specify) _____
SOIL CCME BC-CSR Other (please specify) _____

Total Number of Containers: **8**

FOR LABORATORY USE ONLY
Sample State at Receipt: Ambient Cold Frozen N/A
Temperature: **7.8**°C
Custody Seal Intact? Yes No n/a
Number of Coolers/Shipping Containers: **1**

CHROMATOGRAM COVER SHEET



CONTACT		COMPANY NAME	
ALANA DUNCAN		MORROW ENVIRONMENTAL CONSULTANTS INC	
FAX NUMBER	DATE	PGS INCL. COVER	
1-250-385-5038	JULY 10, 2007	3	
FROM	RETURN FAX	TELEPHONE	
CANTEST LTD	604 731 2386	604 734 7276	
SUBJECT			
Chromatogram(s).			

Please find the attached chromatograms associated with:

CANTEST Group # 806 30012

Your Project Name CRO CATCH BASIN

Your Project Number 130777

Sample Matrix SOIL

The originals will follow with the report.

www.cantest.com



Head Office:
4606 Canada Way
Burnaby, BC V5G 1K5
Tel: 604 734 7276

Victoria:
1102 - 4464 Markham St.
Victoria, BC V8Z 7X8
Tel: 250 385 6112

Kelowna:
1328 Land Road
Kelowna, BC V1P 1K9
Tel: 250 765 7501

Winnipeg:
Unit D - 675 Berry St.
Winnipeg, MB R3H 1A7
Tel: 204 772 7276

Toronto:
18 Inkpen Lane
Whitby, ON L1R 2HZ
Tel: 905 665 5556

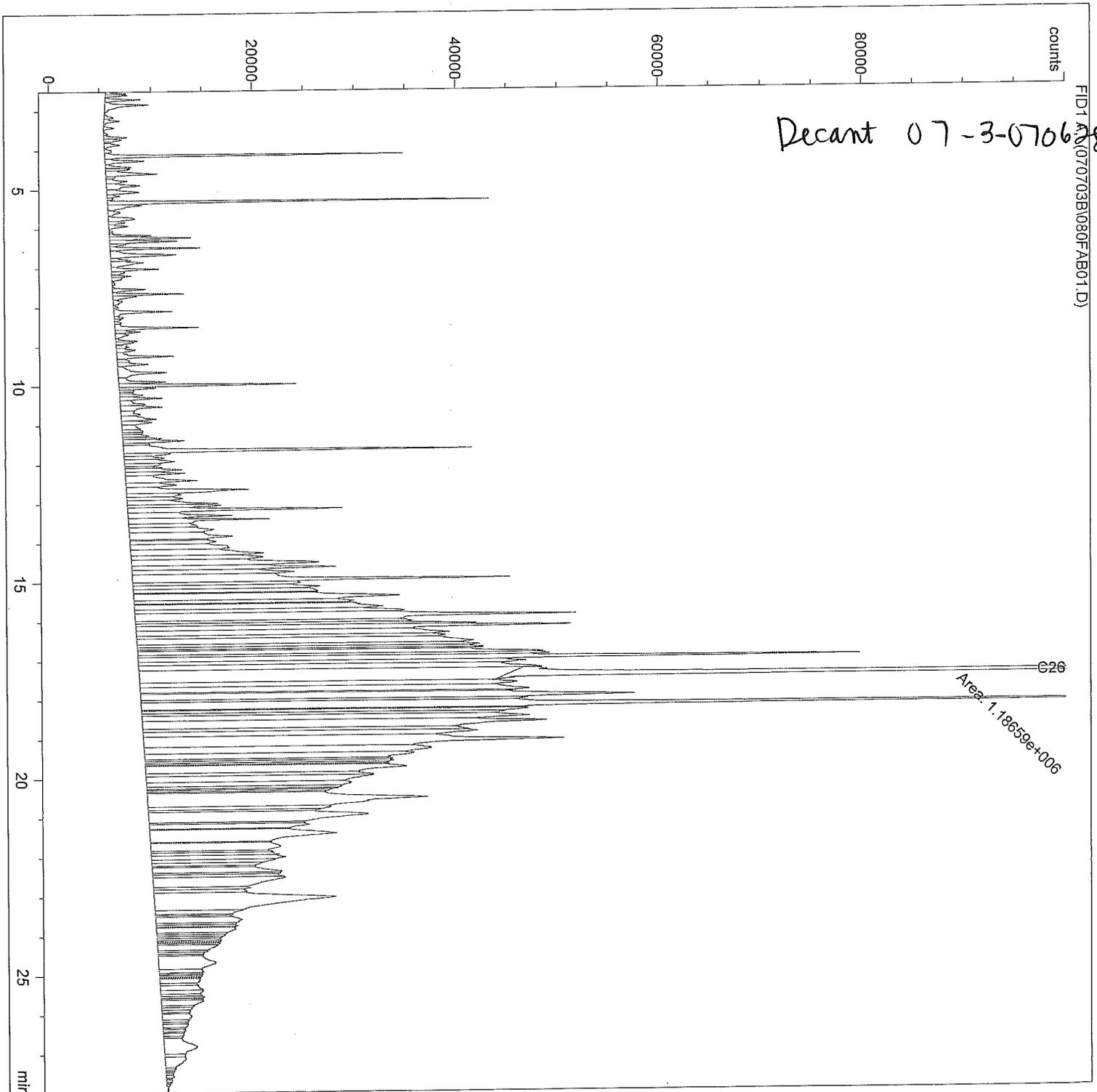
Injection Date : 7/6/07 7:11.49 AM Seq. Line : 1
Sample Name : 706300045 Vial : 80
Acq. Operator : pcn Inj : 1
 Inj Volume : 2 µl

Acq. Method : D:\HPCHEM~1\1\METHODS\!EPH.M
Last changed : 7/6/07 7:50:50 AM by pcn
(modified after loading)
Analysis Method : D:\HPCHEM~1\1\METHODS\!EPH_AP.M
Last changed : 7/5/07 7:58:38 AM by pcn
(modified after loading)

80630012

mor135

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



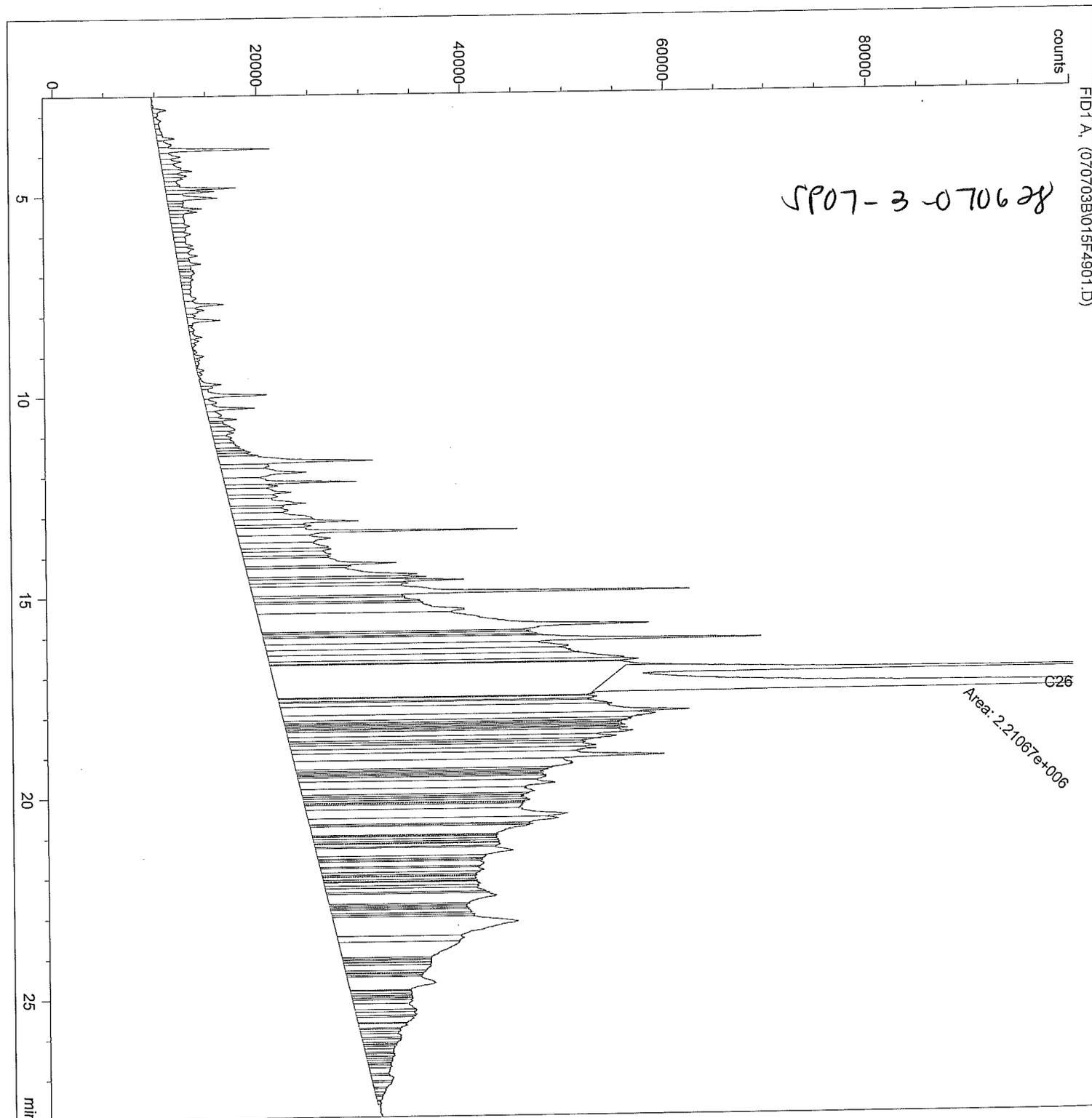
Injection Date : 7/4/07 6:44 PM Seq. Line : 3
Sample Name : 706300042 Vial : 15
Acq. Operator : pcn Inj : 1
 Inj Volume : 2 µl

Acq. Method : D:\HPCHEM~1\1\METHODS\!EPH.M
Last changed : 7/4/07 5:47:55 PM by pcn
Analysis Method : D:\HPCHEM~1\1\METHODS\!EPH_AP.M
Last changed : 7/9/07 7:03:36 AM by pcn
(modified after loading)

806 30012

SMR135

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



Analysis Report

REPORT ON: Analysis of Soil, Water Samples
REPORTED TO: Morrow Environmental Consultants Inc.
202-3440 Douglas St
Victoria, BC
V8Z 3L5

Att'n: Alana Duncan

CHAIN OF CUSTODY: 2063279
PROJECT NAME: CRD Catch Basin
PROJECT NUMBER: 130777

CANTEST
O O O O

RECEIVED

JUN 22 2007

MORROW ENVIRONMENTAL
CONSULTANTS INC.

NUMBER OF SAMPLES: 2

REPORT DATE: June 14, 2007

DATE SUBMITTED: June 1, 2007

GROUP NUMBER: 80601077

SAMPLE TYPE: Water, 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 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.

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

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.

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

(Continued)

CANTEST LTD.


Richard S. Jornitz
Supervisor, Inorganic Testing

Page 1 of 34

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 14, 2007

GROUP NUMBER: 80601077



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, published by the Canadian Society of Soil Science, 1993. The test was performed using a deionized water leach with measurement by pH meter.

Total Suspended Solids in Water - was determined based on Method 2540 D in Standard Methods (21st Edition) and Method X332 in the BC Laboratory 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 Soil - analysis was performed using B.C. MOELP CSR-Analytical Method 3 "Extractable Petroleum Hydrocarbons in Solids by GC/FID" and CSR-Analytical Method 6 "Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Water (LEPH & HEPH)". The method involves acetone/hexane extraction and GC/FID analysis. EPH components ranging from C10 to C19 and C19 to C32 are quantified against eicosane (n-C20). LEPH & HEPH are calculated by subtraction of specified PAH's.

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

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

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 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.

Mercury in Soil - analysis was performed using Cold Vapour Atomic Fluorescence.

(Continued)

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 14, 2007

GROUP NUMBER: 80601077



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.

COMMENTS:

Testing for Volatile Organic Compounds was performed on a sample with headspace.

TEST RESULTS:

(See following pages)

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 14, 2007

GROUP NUMBER: 80601077



Conventional Parameters in Water

CLIENT SAMPLE IDENTIFICATION:	Decant 07-2-07053 1	
DATE SAMPLED:	May 31/07	DETECTION LIMIT
CANTEST ID:	706010245	
Hardness	CaCO ₃ 144	1
Total Suspended Solids	4110	1

Results expressed as milligrams per liter (mg/L)

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 14, 2007

GROUP NUMBER: 80601077



Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		Decant 07-2-07053 1		
SAMPLE PREPARATION:		DISSOLVED		
DATE SAMPLED:		May 31/07		
CANTEST ID:		706010245		
			DETECTION LIMIT	UNITS
Aluminum	Al	0.015	0.005	mg/L
Antimony	Sb	0.002	0.001	mg/L
Arsenic	As	0.003	0.001	mg/L
Barium	Ba	0.81	0.001	mg/L
Beryllium	Be	<	0.001	mg/L
Bismuth	Bi	<	0.001	mg/L
Boron	B	0.12	0.05	mg/L
Cadmium	Cd	<	0.0002	mg/L
Calcium	Ca	48.0	0.05	mg/L
Chromium	Cr	0.002	0.001	mg/L
Cobalt	Co	0.010	0.001	mg/L
Copper	Cu	0.005	0.001	mg/L
Iron	Fe	35.0	0.05	mg/L
Lead	Pb	0.002	0.001	mg/L
Lithium	Li	0.007	0.005	mg/L
Magnesium	Mg	5.73	0.05	mg/L
Manganese	Mn	1.49	0.001	mg/L
Mercury	Hg	<	0.02	µg/L
Molybdenum	Mo	0.030	0.0005	mg/L
Nickel	Ni	0.086	0.001	mg/L
Phosphorus	P	<	0.15	mg/L
Potassium	K	12.4	0.1	mg/L
Selenium	Se	<	0.001	mg/L
Silicon	Si	6.7	0.25	mg/L
Silver	Ag	<	0.00025	mg/L
Sodium	Na	47.5	0.05	mg/L
Strontium	Sr	0.26	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: June 14, 2007

GROUP NUMBER: 80601077



Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		Decant 07-2-07053 1		
SAMPLE PREPARATION:		DISSOLVED		
DATE SAMPLED:		May 31/07		
CANTEST ID:		706010245		
			DETECTION LIMIT	UNITS
Titanium	Ti	<	0.001	mg/L
Uranium	U	<	0.0005	mg/L
Vanadium	V	<	0.001	mg/L
Zinc	Zn	0.090	0.005	mg/L
Zirconium	Zr	<	0.01	mg/L

mg/L = milligrams per liter
< = Less than detection limit

µg/L = micrograms per liter

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 14, 2007

GROUP NUMBER: 80601077



Polycyclic Aromatic Hydrocarbons in Water

CLIENT SAMPLE IDENTIFICATION:	Decant 07-2-07053 1	
DATE SAMPLED:	May 31/07	
CANTEST ID:	706010245	
ANALYSIS DATE:	Jun 7/07	DETECTION LIMIT
Naphthalene	<	3
Acenaphthylene	<	1
Quinoline	<	5
Acenaphthene	<	1
Fluorene	<	0.5
Phenanthrene	1.1	0.5
Anthracene	<	0.1
Acridine	<	0.5
Total LMW-PAH's	1.10	
Fluoranthene	1.2	0.4
Pyrene	1.1	0.2
Benzo(a)anthracene	0.3	0.1
Chrysene	0.7	0.1
Benzo(b)fluoranthene	0.9	0.1
Benzo(k)fluoranthene	<	0.1
Benzo(a)pyrene	<	0.1
Indeno(1,2,3-cd)pyrene	<	0.1
Dibenz(a,h)anthracene	<	0.1
Benzo(g,h,i)perylene	0.5	0.1
Total HMW-PAH's	4.70	
Total PAH's	5.80	

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

< = Less than detection limit

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 14, 2007

GROUP NUMBER: 80601077



Monocyclic Aromatic Hydrocarbons in Water

CLIENT SAMPLE IDENTIFICATION:	Decant 07-2-07053 1	
DATE SAMPLED:	May 31/07	
CANTEST ID:	706010245	
ANALYSIS DATE:	Jun 4/07	DETECTION LIMIT
Benzene	<	2
Ethylbenzene	<	2
Toluene	270	2
Xylenes	4.7	2
Volatile Hydrocarbons VHW6-10	270	100
VPHw	<	100
Styrene	<	2
Surrogate Recovery		
Toluene-d8	97	-
Bromofluorobenzene	93	-

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

Surrogate recoveries expressed as percent (%)

< = Less than detection limit

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 14, 2007

GROUP NUMBER: 80601077



Extractable Petroleum Hydrocarbons (EPH) in Water

CLIENT SAMPLE IDENTIFICATION:	Decant 07-2-07053 1	
DATE SAMPLED:	May 31/07	DETECTION LIMIT
CANTEST ID:	706010245	
EPHw10-19	5000	250
EPHw19-32	14000	250

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

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 14, 2007

GROUP NUMBER: 80601077



Extractable Petroleum Hydrocarbons - PAH Corrected in Water

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	LEPHw (corrected for PAH's)	HEPHw (corrected for PAH's)
Decant 07-2-070531	May 31/07	706010245	5000	14000
DETECTION LIMIT			250	250
UNITS			$\mu\text{g/L}$	$\mu\text{g/L}$

$\mu\text{g/L}$ = micrograms per liter

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 14, 2007

GROUP NUMBER: 80601077



Monocyclic Volatile Hydrocarbons-Direct Injection- in Soil

CLIENT SAMPLE IDENTIFICATION:	SP07-2-070 531	
DATE SAMPLED:	May 31/07	DETECTION LIMIT
CANTEST ID:	706010242	
Benzene	<	0.04
Ethylbenzene	<	0.5
Toluene	6.6	0.5
Xylenes	0.9	0.1
Styrene	<	0.1

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

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 14, 2007

GROUP NUMBER: 80601077



Conventional Parameters in Soil

CLIENT SAMPLE IDENTIFICATION:	SP07-2-070 531		
DATE SAMPLED:	May 31/07		
CANTEST ID:	706010242	DETECTION LIMIT	UNITS
Moisture	29.4	0.1	%
pH	7.2	0.1	pH units

% = percent

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 14, 2007

GROUP NUMBER: 80601077



Polycyclic Aromatic Hydrocarbons in Soil

CLIENT SAMPLE IDENTIFICATION:	SP07-2-070 531	
DATE SAMPLED:	May 31/07	
CANTEST ID:	706010242	
ANALYSIS DATE:	Jun 6/07	DETECTION LIMIT
Naphthalene	<	0.5
2-Methylnaphthalene	<	0.5
Acenaphthylene	<	0.5
Acenaphthene	<	0.5
Fluorene	<	0.5
Phenanthrene	0.5	0.5
Anthracene	<	0.5
Total LMW-PAH's	0.50	
Fluoranthene	0.7	0.5
Pyrene	0.7	0.5
Benzo(a)anthracene	<	0.5
Chrysene	<	0.5
Benzo(b)fluoranthene	<	0.5
Benzo(k)fluoranthene	<	0.5
Benzo(a)pyrene	<	0.5
Indeno(1,2,3-cd)pyrene	<	0.5
Dibenz(a,h)anthracene	<	0.5
Benzo(g,h,i)perylene	<	0.5
Total HMW-PAH's	1.40	
Total PAH's	1.90	

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

< = Less than detection limit

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 14, 2007

GROUP NUMBER: 80601077



Extractable Petroleum Hydrocarbons (EPH) in Soil

CLIENT SAMPLE IDENTIFICATION:	SP07-2-070 531	
DATE SAMPLED:	May 31/07	DETECTION LIMIT
CANTEST ID:	706010242	
EPHs10-19	1500	250
EPHs19-32	29000	250
LEPHs (corrected for PAH's)	1500	250
HEPHs (corrected for PAH's)	29000	250

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

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 14, 2007

GROUP NUMBER: 80601077



Monocyclic Aromatic Hydrocarbons-Methanol Extraction- in Soil

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	Volatile Hydrocarbons VHS6-10	VPHs
SP07-2-070531	May 31/07	706010242	<	<
DETECTION LIMIT			100	100
UNITS			$\mu\text{g/g}$	$\mu\text{g/g}$

$\mu\text{g/g}$ = micrograms per gram, on a dry weight basis.
< = Less than detection limit

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 14, 2007

GROUP NUMBER: 80601077



Strong Acid Soluble Metals in Soil

CLIENT SAMPLE IDENTIFICATION:		SP07-2-070 531	
DATE SAMPLED:		May 31/07	
CANTEST ID:		706010242	
			DETECTION LIMIT
Selenium	Se	<	2
Antimony	Sb	<	10
Arsenic	As	<	10
Barium	Ba	124	1
Beryllium	Be	<	1
Cadmium	Cd	0.9	0.5
Chromium	Cr	98	2
Cobalt	Co	9	1
Copper	Cu	128	1
Lead	Pb	114	5
Mercury	Hg	0.09	0.01
Molybdenum	Mo	5	4
Nickel	Ni	30	2
Silver	Ag	<	2
Tin	Sn	7	5
Vanadium	V	49	1
Zinc	Zn	216	1
Aluminum	Al	10900	10
Boron	B	<	1
Calcium	Ca	6880	1
Iron	Fe	23700	2
Magnesium	Mg	6300	0.1
Manganese	Mn	288	1
Phosphorus	P	486	20
Potassium	K	368	10
Sodium	Na	258	5
Strontium	Sr	24	1
Titanium	Ti	740	1
Zirconium	Zr	6	1

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

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 14, 2007

GROUP NUMBER: 80601077



Batch Quality Control for Monocyclic Aromatic Hydrocarbons-Methanol Extraction- in Soil (QC# 94784)

Parameter	Blank (ug/g)	Blank Limits
Volatile Hydrocarbons VHs6-10	< 100	100

ug/g = micrograms per gram

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 14, 2007

GROUP NUMBER: 80601077



Batch Quality Control for Monocyclic Volatile Hydrocarbons-Direct Injection- in Soil (QC# 94784)

Parameter	Blank (ug/g)	Blank Limits	Method Performance Check Spike (% Recovery)	Method Performance Check Spike Limits
Benzene	< 0.04	0.04	81	58 - 126
Ethylbenzene	< 0.5	0.5	83	66 - 116
Toluene	< 0.5	0.5	87	76 - 124

ug/g = micrograms per gram

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 14, 2007

GROUP NUMBER: 80601077



Batch Quality Control for Extractable Petroleum Hydrocarbons (EPH) in Soil (QC# 94828)

Parameter	Blank (ug/g)	Blank Limits	Duplicate (R.P.D.) 705310299	Duplicate Limits
EPHs10-19	< 250	250	NC	20
EPHs19-32	< 250	250	NC	20

ug/g = micrograms per gram

R.P.D. = Relative Percent Difference

NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 14, 2007

GROUP NUMBER: 80601077



Batch Quality Control for Polycyclic Aromatic Hydrocarbons in Soil (QC# 94738)

Parameter	Blank (ug/g)	Blank Limits	Duplicate (R.P.D.) 706020020	Duplicate Limits	NRC HS-5 Cert. Ref. Material (% Recovery)	NRC HS-5 Cert. Ref. Material Limits
Naphthalene	< 0.05	0.05	NC	40	72	57 - 111
Acenaphthylene	< 0.05	0.05	NC	40	87	45 - 135
Acenaphthene	< 0.05	0.05	NC	40	-	-
Fluorene	< 0.05	0.05	NC	40	-	-
Phenanthrene	< 0.05	0.05	NC	40	59	49 - 97
Anthracene	< 0.05	0.05	NC	40	58	54 - 129
Fluoranthene	< 0.05	0.05	NC	40	65	59 - 124
Pyrene	< 0.05	0.05	NC	40	50	46 - 84
Benzo(a)anthracene	< 0.05	0.05	NC	40	-	-
Chrysene	< 0.05	0.05	NC	40	69	53 - 114
Benzo(b)fluoranthene	< 0.05	0.05	NC	40	-	-
Benzo(a)pyrene	< 0.05	0.05	NC	40	-	-
Indeno(1,2,3-cd)pyrene	< 0.05	0.05	NC	40	54	49 - 102
Dibenz(a,h)anthracene	< 0.05	0.05	NC	40	90	61 - 126
Benzo(g,h,i)perylene	< 0.05	0.05	NC	40	-	-

ug/g = micrograms per gram

R.P.D. = Relative Percent Difference

NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 14, 2007

GROUP NUMBER: 80601077



Batch Quality Control for Strong Acid Soluble Metals in Soil (QC# 94730)

Parameter		Blank (ug/g)	Blank Limits	CAN MET Till-1 (% Recovery)	CAN MET Till-1 Limits	Duplicate (R.P.D.) 706010075	Duplicate Limits
Arsenic	As	< 10	10	131	77 - 146	-	-
Barium	Ba	< 1	1	-	-	-	-
Copper	Cu	< 1	1	-	-	7.4	30
Lead	Pb	< 5	5	125	65 - 171	-	-
Mercury	Hg	-	-	120	33 - 174	-	-
Nickel	Ni	< 2	2	94	49 - 149	-	-
Zinc	Zn	< 1	1	100	79 - 114	1.3	30
Calcium	Ca	-	-	78	51 - 106	-	-
Iron	Fe	-	-	103	74 - 139	-	-
Manganese	Mn	-	-	117	92 - 138	-	-

ug/g = micrograms per gram

R.P.D. = Relative Percent Difference

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 14, 2007

GROUP NUMBER: 80601077



Batch Quality Control for Strong Acid Soluble Metals in Soil (QC# 94730)

Parameter		Duplicate (R.P.D.) 706010263	Duplicate Limits	Duplicate (R.P.D.) 706010277	Duplicate Limits	Duplicate (R.P.D.) 706010291	Duplicate Limits
Antimony	Sb	NC	30	NC	30	NC	30
Arsenic	As	NC	30	NC	30	NC	30
Barium	Ba	4	30	3.3	30	10.7	30
Beryllium	Be	NC	30	NC	30	NC	30
Chromium	Cr	3.5	30	5.4	30	0	30
Cobalt	Co	11.8	30	0	30	13.3	30
Copper	Cu	3.2	30	9.1	30	0	30
Lead	Pb	1.7	30	PASS	30	PASS	30
Mercury	Hg	0	30	0	30	0	30
Molybdenum	Mo	NC	30	NC	30	NC	30
Nickel	Ni	8.2	30	8.7	30	PASS	30
Tin	Sn	PASS	30	NC	30	NC	30
Vanadium	V	8.5	30	4.3	30	0	30
Zinc	Zn	9	30	9.1	30	5.9	30

ug/g = micrograms per gram

R.P.D. = Relative Percent Difference

PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.

NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 14, 2007

GROUP NUMBER: 80601077



Batch Quality Control for Strong Acid Soluble Metals in Soil (QC# 94730)

Parameter		Duplicate (R.P.D.) 706010336	Duplicate Limits	Duplicate (R.P.D.) 706020018	Duplicate Limits	Duplicate (R.P.D.) 706020056	Duplicate Limits
Antimony	Sb	NC	30	6.9	30	NC	30
Arsenic	As	PASS	30	1.9	30	NC	30
Barium	Ba	2.2	30	1.7	30	7.6	30
Beryllium	Be	NC	30	NC	30	NC	30
Chromium	Cr	2.7	30	2.2	30	13.3	30
Cobalt	Co	0	30	2.9	30	PASS	30
Copper	Cu	0	30	3.7	30	21.2	30
Lead	Pb	PASS	30	7.5	30	1	30
Mercury	Hg	18.2	30	14.7	30	3.8	30
Molybdenum	Mo	NC	30	3.1	30	NC	30
Nickel	Ni	0	30	15.4	30	0	30
Tin	Sn	NC	30	3.8	30	PASS	30
Vanadium	V	2.3	30	5.1	30	0	30
Zinc	Zn	1.6	30	2.5	30	9	30

ug/g = micrograms per gram

R.P.D. = Relative Percent Difference

PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.

NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 14, 2007

GROUP NUMBER: 80601077



Batch Quality Control for Strong Acid Soluble Metals in Soil (QC# 94730)

Parameter		Duplicate (R.P.D.) 706020087	Duplicate Limits	Duplicate (R.P.D.) 706020098	Duplicate Limits	Duplicate (R.P.D.) 706020141	Duplicate Limits
Antimony	Sb	NC	30	-	-	NC	30
Arsenic	As	PASS	30	-	-	NC	30
Barium	Ba	5.7	30	-	-	8.2	30
Beryllium	Be	NC	30	-	-	NC	30
Chromium	Cr	27	30	-	-	PASS	30
Cobalt	Co	0	30	-	-	0	30
Copper	Cu	27.2	30	-	-	0	30
Lead	Pb	3.9	30	-	-	PASS	30
Mercury	Hg	0.2	30	-	-	0	30
Molybdenum	Mo	NC	30	-	-	NC	30
Nickel	Ni	0	30	-	-	PASS	30
Tin	Sn	(*)	30	-	-	NC	30
Vanadium	V	5.1	30	-	-	0	30
Zinc	Zn	13	30	3.2	30	1.3	30

ug/g = micrograms per gram

R.P.D. = Relative Percent Difference

PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.

NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

(*) = Quality Control results exceeded internally set limits; after review by Quality Assurance Unit, non-conformance overridden and batch sample analysis results released for reporting

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 14, 2007

GROUP NUMBER: 80601077



Batch Quality Control for Strong Acid Soluble Metals in Soil (QC# 94730)

Parameter	Duplicate (R.P.D.) 706020151	Duplicate Limits	Duplicate (R.P.D.) 706020162	Duplicate Limits	Duplicate (R.P.D.) 706020173	Duplicate Limits	
Arsenic	As	NC	30	NC	30	NC	30
Zinc	Zn	2.3	30	8.3	30	0	30

ug/g = micrograms per gram

R.P.D. = Relative Percent Difference

NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 14, 2007

GROUP NUMBER: 80601077



Batch Quality Control for Strong Acid Soluble Metals in Soil (QC# 94730)

Parameter	Duplicate (R.P.D.) 706020184	Duplicate Limits	Duplicate (R.P.D.) 706020194	Duplicate Limits	Duplicate (R.P.D.) 706020205	Duplicate Limits	
Arsenic	As	NC	30	PASS	30	NC	30
Zinc	Zn	8.1	30	2.2	30	2.6	30

ug/g = micrograms per gram

R.P.D. = Relative Percent Difference

PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.

NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 14, 2007

GROUP NUMBER: 80601077



Batch Quality Control for Conventional Parameters in Water

Parameter	QC Type	QC Result	Units	Lower Limit	Upper Limit
Total Suspended Solids	Blank	< 1	mg/L	0	3
	TSS Control Standard (CalVer)	100.0	% Recovery	91	105
	Duplicate	0.4	R.P.D.	0	18
	Duplicate	0.4	R.P.D.	0	18
	Duplicate	0.8	R.P.D.	0	18
	Duplicate	2.2	R.P.D.	0	18
	Duplicate	2.8	R.P.D.	0	18

mg/L = milligrams per liter

< = Less than detection limit

R.P.D. = Relative Percent Difference

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 14, 2007

GROUP NUMBER: 80601077



Batch Quality Control for Extractable Petroleum Hydrocarbons (EPH) in Water (QC# 94766)

Parameter	Blank (ug/L)	Blank Limits
EPHw10-19	< 250	250
EPHw19-32	< 250	250

ug/L = micrograms per liter

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 14, 2007

GROUP NUMBER: 80601077



Batch Quality Control for Dissolved Metals Analysis in Water (QC# 94732)

Parameter		Dissolved Blank (mg/L)	Dissolved Blank Limits	Duplicate (R.P.D.) 706010256	Duplicate Limits
Aluminum	Al	< 0.001	0.015	-	-
Antimony	Sb	< 0.0002	0.001	-	-
Arsenic	As	< 0.0002	0.001	-	-
Barium	Ba	< 0.0002	0.001	-	-
Beryllium	Be	< 0.0002	0.001	-	-
Cadmium	Cd	< 0.00004	0.001	-	-
Calcium	Ca	-	-	2.4	20
Chromium	Cr	< 0.0002	0.001	-	-
Cobalt	Co	< 0.0002	0.001	-	-
Copper	Cu	< 0.0002	0.001	-	-
Lead	Pb	< 0.0002	0.001	-	-
Magnesium	Mg	-	-	2.9	20
Manganese	Mn	< 0.0002	0.001	-	-
Mercury	Hg	< 0.02	0.05	-	-
Molybdenum	Mo	< 0.0001	0.001	-	-
Nickel	Ni	< 0.0002	0.001	-	-
Potassium	K	< 0.02	0.05	0	20
Silver	Ag	< 0.00005	0.001	-	-
Sodium	Na	-	-	3.2	20
Strontium	Sr	< 0.0002	0.001	-	-
Thallium	Tl	< 0.00002	0.001	-	-
Thorium	Th	< 0.0001	0.0005	-	-
Tin	Sn	< 0.0002	0.005	-	-
Titanium	Ti	< 0.0002	0.001	-	-
Uranium	U	< 0.0001	0.0005	-	-
Vanadium	V	< 0.0002	0.001	-	-
Zinc	Zn	< 0.001	0.01	-	-
Zirconium	Zr	< 0.002	0.01	-	-

mg/L = milligrams per liter

Mercury Hg expressed as: ug/L (micrograms per liter)

R.P.D. = Relative Percent Difference

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 14, 2007

GROUP NUMBER: 80601077



Batch Quality Control for Polycyclic Aromatic Hydrocarbons in Water (QC# 94779)

Parameter	Blank (ug/L)	Blank Limits	Spike (% Recovery)	Spike Limits
Naphthalene	< 0.3	0.3	100	43 - 125
Acenaphthylene	< 0.1	0.1	96	64 - 116
Acenaphthene	< 0.1	0.1	98	62 - 116
Fluorene	< 0.05	0.05	100	70 - 108
Phenanthrene	< 0.05	0.05	110	74 - 118
Anthracene	< 0.01	0.05	98	73 - 117
Acridine	< 0.05	0.05	98	63 - 120
Fluoranthene	< 0.04	0.05	102	75 - 121
Pyrene	< 0.02	0.02	108	78 - 120
Benzo(a)anthracene	< 0.01	0.01	104	76 - 118
Chrysene	< 0.01	0.01	100	71 - 127
Benzo(b)fluoranthene	< 0.01	0.01	96	59 - 138
Benzo(k)fluoranthene	< 0.01	0.01	108	72 - 114
Benzo(a)pyrene	< 0.01	0.1	102	80 - 120
Indeno(1,2,3-cd)pyrene	< 0.01	0.01	96	61 - 123
Dibenz(a,h)anthracene	< 0.01	0.01	100	58 - 126
Benzo(g,h,i)perylene	< 0.01	0.01	100	64 - 116

ug/L = micrograms per liter

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 14, 2007

GROUP NUMBER: 80601077



Batch Quality Control Frequency Summary

SALM in Soil Digestion (Batch# 94730)

QC Type	No. Samples
CAN MET Till-1	1
Blank	3
Duplicate	16

Dissolved Metals Preparation (Batch# 94732)

QC Type	No. Samples
Dissolved Blank	1
Duplicate	1

PAH's in Soil Sample Prep (Batch# 94738)

QC Type	No. Samples
Blank	1
Duplicate	1
NRC HS-5 Cert. Ref. Material	1

TEH/EPH Water Preparation (Batch# 94766)

QC Type	No. Samples
Blank	1
Method Performance Check Spike	1

PAH's in Water Sample Prep (Batch# 94779)

QC Type	No. Samples
Blank	1
Spike	1

(Continued on next page)

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 14, 2007

GROUP NUMBER: 80601077



Batch Quality Control Frequency Summary

MeOH Extr'n Prep BTEX/VPH Soil (Batch# 94784)

QC Type	No. Samples
Blank	1
Method Performance Check Spike	1

Suspended Solids Analysis (Batch# 94789)

QC Type	No. Samples
Blank	1
TSS Control Standard (CalVer)	1
Duplicate	5

EPH (LEPH/HEPH)- Soil Prep (Batch# 94828)

QC Type	No. Samples
Blank	1
Cert Ref Material RTC CRM355	1
Duplicate	1
Method Performance Check Spike	1

Volatiles Analysis (Batch# 94927)

QC Type	No. Samples
Duplicate	1

SALM Metals in Soil Sieve (Batch# 94723)

QC Type	No. Samples
Batch Size	171

(Continued on next page)

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 14, 2007

GROUP NUMBER: 80601077



Batch Quality Control Frequency Summary

SALM in Soil Digestion (Batch# 94730)

QC Type	No. Samples
Batch Size	171

Dissolved Metals Preparation (Batch# 94732)

QC Type	No. Samples
Batch Size	11

PAH's in Soil Sample Prep (Batch# 94738)

QC Type	No. Samples
Batch Size	14

TEH/EPH Water Preparation (Batch# 94766)

QC Type	No. Samples
Batch Size	18

PAH's in Water Sample Prep (Batch# 94779)

QC Type	No. Samples
Batch Size	14

MeOH Extr'n Prep BTEX/VPH Soil (Batch# 94784)

QC Type	No. Samples
Batch Size	42

(Continued on next page)

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 14, 2007

GROUP NUMBER: 80601077



Batch Quality Control Frequency Summary

Suspended Solids Analysis (Batch# 94789)

QC Type	No. Samples
Batch Size	44

EPH (LEPH/HEPH)- Soil Prep (Batch# 94828)

QC Type	No. Samples
Batch Size	13

Volatiles Analysis (Batch# 94927)

QC Type	No. Samples
Batch Size	31

CHROMATOGRAM COVER SHEET

CONTACT		COMPANY NAME	
ALANA DUNCAN		MORROW ENVIRONMENTAL CONSULTANTS Inc.	
FAX NUMBER	DATE	PGS INCL. COVER	
1-250-385-5038	JUNE 8, 2007	2	
FROM	RETURN FAX	TELEPHONE	
CANTEST LTD	604 731 2386	604 734 7276	
SUBJECT			
Chromatogram(s).			

Please find the attached chromatograms associated with:

CANTEST Group # 80601077

Your Project Name CRD CATCH BASIN

Your Project Number 130777

Sample Matrix SOIL

The originals will follow with the report.

www.cantest.com



Head Office:
4606 Canada Way
Burnaby, BC V5G 1K5
Tel: 604 734 7276

Victoria:
1102 - 4464 Markham St.
Victoria, BC V8Z 7X8
Tel: 250 385 6112

Kelowna:
1328 Land Road
Kelowna, BC V1P 1K9
Tel: 250 765 7501

Winnipeg:
Unit D - 675 Berry St.
Winnipeg, MB R3H 1A7
Tel: 204 772 7276

Toronto:
18 Inkpen Lane
Whitby, ON L1R 2HZ
Tel: 905 665 5556

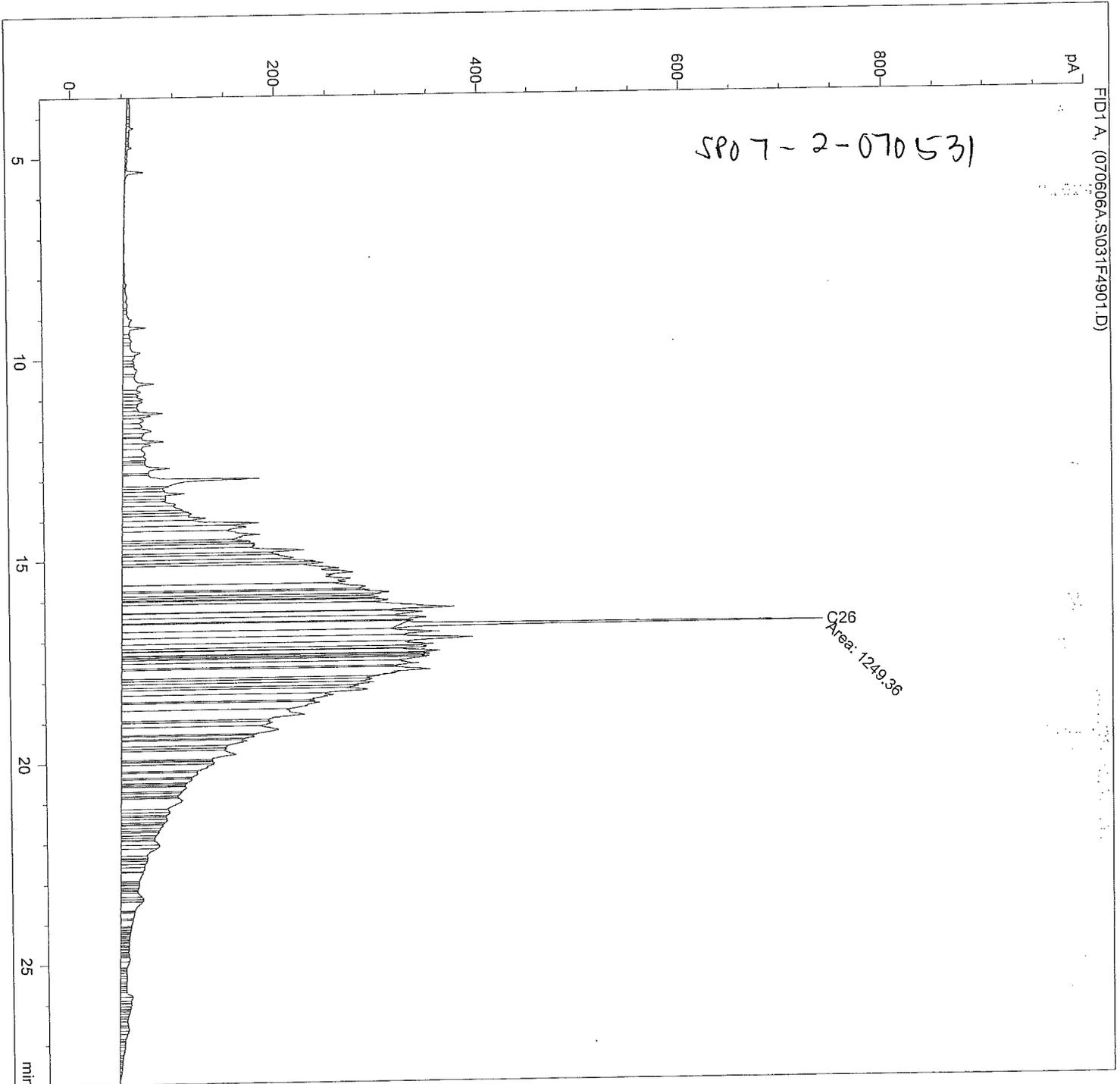
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Sample Name : 706010242 Location : Vial 31
Acq. Operator : pcn Inj : 1
 Inj Volume : 2 µl

Acq. Method : C:\HPCHEM\1\METHODS\EPH.M
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 (modified after loading)
Analysis Method : C:\HPCHEM\1\METHODS\EPHAP.M
Last changed : 6/8/2007 6:31:18 AM by pcn
 (modified after loading)

80601077

MR 135

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



CHROMATOGRAM COVER SHEET

MORROW ENV. CONSULTANTS INC.

CONTACT		COMPANY NAME	
ALANA DUNCAN		MORROW ENV. CONSULTANTS INC.	
FAX NUMBER		DATE	PGS INCL. COVER
1 (250) 385-5038		JUNE 8, 2007	2
FROM	RETURN FAX	TELEPHONE	
CANTEST LTD	604 731 2386	604 734 7276	
SUBJECT			
Chromatogram(s).			

Please find the attached chromatograms associated with:

CANTEST Group # 80601077

Your Project Name CRD CATCH BASIN

Your Project Number 130777

Sample Matrix SOIL

The originals will follow with the report.

www.cantest.com

Head Office:
4606 Canada Way
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Tel: 250 765 7501

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Unit D - 675 Berry St.
Winnipeg, MB R3H 1A7
Tel: 204 772 7276

Toronto:
18 Inkpen Lane
Whitby, ON L1R 2HZ
Tel: 905 665 5556



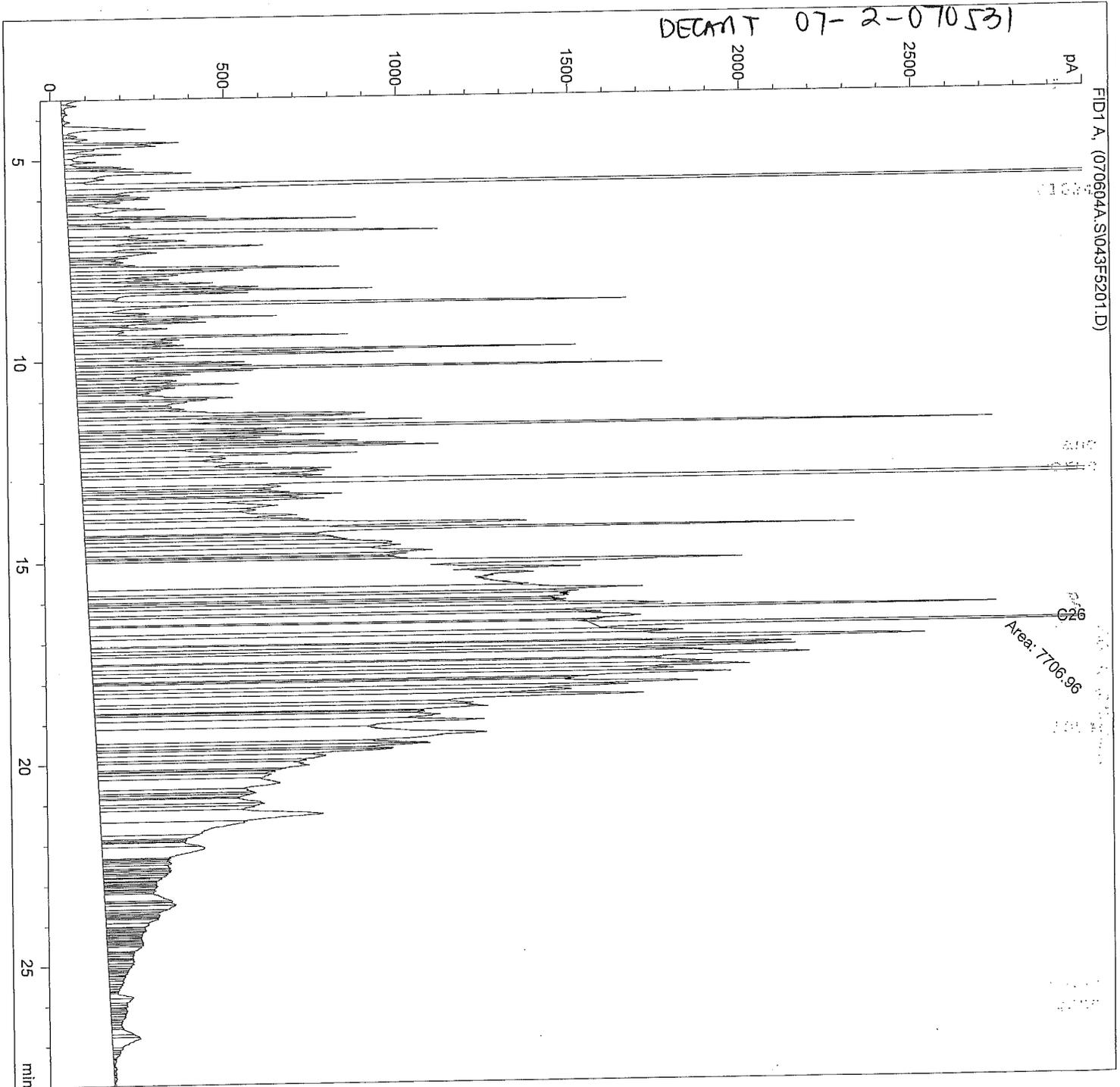
Injection Date : 6/5/2007 2:08:38 PM
Sample Name : 706010245
Acq. Operator : pcn

Seq. Line : 52
Location : Vial 43
Inj : 1
Inj Volume : 2 µl

Acq. Method : C:\HPCHEM\1\METHODS\EPH.M
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(modified after loading)
Analysis Method : C:\HPCHEM\1\METHODS\EPHAP.M
Last changed : 6/6/2007 9:42:12 AM by pcn
(modified after loading)

80601077
MORIS

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



Analysis Report

REPORT ON: Analysis of Water Samples
REPORTED TO: Morrow Environmental Consultants Inc.
202-3440 Douglas St
Victoria, BC
V8Z 3L5

RECEIVED CANTEST
O O O O

JUN 15 2007

Att'n: Alana Duncan

MORROW ENVIRONMENTAL
CONSULTANTS INC.

CHAIN OF CUSTODY: 2047954
PROJECT NAME: CRD Catch Basin
PROJECT NUMBER: 130777

NUMBER OF SAMPLES: 1

REPORT DATE: June 5, 2007

DATE SUBMITTED: May 26, 2007

GROUP NUMBER: 80526008

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.

TEST RESULTS:

(See following pages)

CANTEST LTD.


Zhenyong Gao, M.Sc.
Coordinator, Trace Organics

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 5, 2007

GROUP NUMBER: 80526008



Monocyclic Aromatic Hydrocarbons in Water

CLIENT SAMPLE IDENTIFICATION:	Decant 07-1-07052 5	
DATE SAMPLED:	May 25/07	
CANTEST ID:	705260112	
ANALYSIS DATE:	May 30/07	DETECTION LIMIT
Benzene	<	0.1
Ethylbenzene	0.7	0.1
Toluene	27	0.1
Xylenes	2.5	0.1
Volatile Hydrocarbons Vhw6-10	<	100
VPHw	<	100
Styrene	<	0.1
Surrogate Recovery		
Toluene-d8	100	-
Bromofluorobenzene	114	-

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

Surrogate recoveries expressed as percent (%)

< = Less than detection limit

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 5, 2007

GROUP NUMBER: 80526008



Batch Quality Control for Monocyclic Aromatic Hydrocarbons in Water (QC# 94601)

Parameter	Blank (ug/L)	Blank Limits	Duplicate (R.P.D.) 705280102	Duplicate Limits	Volatiles Water Spike (% Recovery)	Volatiles Water Spike Limits
Benzene	< 0.1	0.1	NC	20	105	79 - 117
Ethylbenzene	< 0.1	0.1	NC	20	106	76 - 124
Toluene	< 0.1	0.2	13.3	20	94	83 - 118
Xylenes	< 0.1	0.1	0	20	104	75 - 125
Volatile Hydrocarbons VHw6-10	< 100	100	NC	20	-	-

ug/L = micrograms per liter

R.P.D. = Relative Percent Difference

NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 5, 2007

GROUP NUMBER: 80526008



Batch Quality Control Frequency Summary

Volatiles Analysis (Batch# 94601)

QC Type	No. Samples
Blank	1
Duplicate	1
Volatiles Water Spike	1
Batch Size	38

CHAIN OF CUSTODY RECORD

CANTEST

4606 Canada Way
Burnaby, B.C.
V5G 1K5

2047954

Tel: 604.734.7276
Fax: 604.731.2386
Toll Free: 800.665.8566
www.cantest.com

Client Name: **Morrow Environmental Consultants Inc. (MOR135)**

Postal Code: **V8Z 3L5**

Street Address (including suite number):
Suite 202, 3440 Douglas Street

City: **Victoria**

Telephone: **250-385-5028**

Fax: **250-385-5038**

E-Mail Address (Required for Electronic Reporting):
Alana.Duncan@SNDCLocalV.IA.COM

Contact Name: **Alana Duncan**

Sampler's Name: **Douglas Adams**

Quotation Number:

Project Number: **CAD catch basin 130717**

P.O. Number

Page 1 of 1
RESULTS REQUESTED BY: 7 days 11/17
Day Month Year
(Surcharges May Apply)

Special Instructions: AutoFax AutoEmail
 Return Cooler Ship Sample Bottles (please specify)
SAMPLES ARE FROM CATCH BASIN WASTE DECONT. THEY HAVE NOT BEEN FILTERED. 2X1000

Sample(s) are from a Drinking Water source servicing multiple households
 Yes

Sample Number	Sample Identification	Date/Time Sampled (D/M/Y & 24hr clock)	Sample Type	Total Metals*	Dissolved Metals*	Field Filtered Metals*	Soil Metals*	pH	Conductivity	TSS	TDS	Alkalinity (total / spec.)	BOD	COD	Coliform, Total & E.coli	Coliform, Fecal	F Cl SO ₄ NO ₃	Nitrite	Oil & Grease (Total / Mineral)	Oil & Grease (Special Waste)	PCP (Tri, Tetra and Penta)	PCP (Mono and Di)	BETX/PH	VOC	EPH (not PAH corrected)	PAH	LEPH/HEPH (PAH corrected)	PCB	Asbestos	HOLD - DO NOT ANALYZE	Number of Containers
80526005																															
705260112	Decant BT-1-070525	D: 25/05/07	Water																												2
A																															
B																															
U																															
S																															
E																															
O																															
N																															
L																															
Y																															

Relinquished by: **Douglas Adams** Date: **25/5/7** Time: **16:00** Received by: _____
 Relinquished by: _____ Date: _____ Time: _____ Received by: _____
 Method of Shipment: **DHL** Waybill No.: **751649830** Received for Lab by: **PA** Date: **25/05/07** Time: **16:00**
 Shipped by: _____ Shipment Condition: _____ Cooler opened by: _____ Date: _____ Time: _____

FOR LABORATORY USE ONLY
 Sample State at Receipt: Ambient Cold Frozen N/A
 Temperature: **6** °C Custody Seal Intact? Yes No n/a
 Comments: _____
 Number of Coolers/Shipping Containers: **1**

*Please indicate appropriate regulatory guidelines:
 WATER CCME BC-CSR Other (please specify) _____
 SOIL CCME BC-CSR Other (please specify) _____
 Total Number of Containers: **2**

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 5, 2007

GROUP NUMBER: 80525082



Conventional Parameters

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

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

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

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 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.

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)

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 5, 2007

GROUP NUMBER: 80525082



Conventional Parameters in Water

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	Hardness CaCO3
Decant07-1-070524	May 24/07	705250126	567
DETECTION LIMIT UNITS			1 mg/L

mg/L = milligrams per liter

REPORTED TO: Morrow Environmental Consultants Inc.

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Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		Decant07-1 -070524		
SAMPLE PREPARATION:		DISSOLVED		
DATE SAMPLED:		May 24/07		
CANTEST ID:		705250126		
			DETECTION LIMIT	UNITS
Aluminum	Al	0.055	0.005	mg/L
Antimony	Sb	0.002	0.001	mg/L
Arsenic	As	0.008	0.001	mg/L
Barium	Ba	0.13	0.001	mg/L
Beryllium	Be	<	0.001	mg/L
Bismuth	Bi	<	0.001	mg/L
Boron	B	0.76	0.05	mg/L
Cadmium	Cd	<	0.0002	mg/L
Calcium	Ca	204	0.05	mg/L
Chromium	Cr	0.002	0.001	mg/L
Cobalt	Co	0.002	0.001	mg/L
Copper	Cu	0.003	0.001	mg/L
Iron	Fe	0.47	0.05	mg/L
Lead	Pb	<	0.001	mg/L
Lithium	Li	0.009	0.005	mg/L
Magnesium	Mg	13.7	0.05	mg/L
Manganese	Mn	0.73	0.001	mg/L
Mercury	Hg	<	0.02	µg/L
Molybdenum	Mo	0.013	0.0005	mg/L
Nickel	Ni	0.013	0.001	mg/L
Phosphorus	P	2.1	0.15	mg/L
Potassium	K	55.1	0.1	mg/L
Selenium	Se	<	0.001	mg/L
Silicon	Si	12.5	0.25	mg/L
Silver	Ag	<	0.00025	mg/L
Sodium	Na	93.2	0.05	mg/L
Strontium	Sr	1.14	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.

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Metals Analysis in Water

CLIENT SAMPLE IDENTIFICATION:		Decant07-1-070524		
SAMPLE PREPARATION:		DISSOLVED		
DATE SAMPLED:		May 24/07		
CANTEST ID:		705250126		
			DETECTION LIMIT	UNITS
Titanium	Ti	0.008	0.001	mg/L
Uranium	U	0.0024	0.0005	mg/L
Vanadium	V	0.003	0.001	mg/L
Zinc	Zn	0.013	0.005	mg/L
Zirconium	Zr	<	0.01	mg/L

mg/L = milligrams per liter
< = Less than detection limit

$\mu\text{g/L}$ = micrograms per liter

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 5, 2007

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Polycyclic Aromatic Hydrocarbons in Water

CLIENT SAMPLE IDENTIFICATION:	Decant07-1-070524	
DATE SAMPLED:	May 24/07	
CANTEST ID:	705250126	
ANALYSIS DATE:	Jun 1/07	DETECTION LIMIT
Naphthalene	6.2	3
Acenaphthylene	<	1
Quinoline	<	5
Acenaphthene	<	1
Fluorene	<	0.5
Phenanthrene	3.2	0.5
Anthracene	<	0.1
Acridine	<	0.5
Total LMW-PAH's	9.40	
Fluoranthene	1.5	0.4
Pyrene	1.7	0.2
Benzo(a)anthracene	0.5	0.1
Chrysene	0.9	0.1
Benzo(b)fluoranthene	<	0.1
Benzo(k)fluoranthene	<	0.1
Benzo(a)pyrene	<	0.1
Indeno(1,2,3-cd)pyrene	<	0.1
Dibenz(a,h)anthracene	<	0.1
Benzo(g,h,i)perylene	<	0.1
Total HMW-PAH's	4.60	
Total PAH's	14.0	

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

< = Less than detection limit

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 5, 2007

GROUP NUMBER: 80525082



Extractable Petroleum Hydrocarbons (EPH) in Water

CLIENT SAMPLE IDENTIFICATION:	Decant07-1-070524	
DATE SAMPLED:	May 24/07	DETECTION LIMIT
CANTEST ID:	705250126	
EPHw10-19	13000	250
EPHw19-32	28000	250

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

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REPORT DATE: June 5, 2007

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Extractable Petroleum Hydrocarbons - PAH Corrected in Water

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	LEPHw (corrected for PAH's)	HEPHw (corrected for PAH's)
Decant07-1-070524	May 24/07	705250126	13000	28000
DETECTION LIMIT UNITS			250 $\mu\text{g/L}$	250 $\mu\text{g/L}$

$\mu\text{g/L}$ = micrograms per liter

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Conventional Parameters in Soil

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	Moisture	pH
SP07-1-070524	May 24/07	705250124	42.6	7.4
DETECTION LIMIT UNITS			0.1 %	0.1 pH units

% = percent

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REPORT DATE: June 5, 2007

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Monocyclic Volatile Hydrocarbons-Direct Injection- in Soil

CLIENT SAMPLE IDENTIFICATION:	SP07-1-070 524	
DATE SAMPLED:	May 24/07	DETECTION LIMIT
CANTEST ID:	705250124	
Benzene	<	0.04
Ethylbenzene	<	0.5
Toluene	4.7	0.5
Xylenes	0.8	0.1
Styrene	<	0.1

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

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 5, 2007

GROUP NUMBER: 80525082



Polycyclic Aromatic Hydrocarbons in Soil

CLIENT SAMPLE IDENTIFICATION:	SP07-1-070 524	
DATE SAMPLED:	May 24/07	
CANTEST ID:	705250124	
ANALYSIS DATE:	May 30/07	DETECTION LIMIT
Naphthalene	<	0.5
2-Methylnaphthalene	<	0.5
Acenaphthylene	<	0.5
Acenaphthene	<	0.5
Fluorene	<	0.5
Phenanthrene	0.53	0.5
Anthracene	<	0.5
Total LMW-PAH's	0.53	
Fluoranthene	0.55	0.5
Pyrene	0.56	0.5
Benzo(a)anthracene	<	0.5
Chrysene	<	0.5
Benzo(b)fluoranthene	<	0.5
Benzo(k)fluoranthene	<	0.5
Benzo(a)pyrene	<	0.5
Indeno(1,2,3-cd)pyrene	<	0.5
Dibenz(a,h)anthracene	<	0.5
Benzo(g,h,i)perylene	<	0.5
Total HMW-PAH's	1.11	
Total PAH's	1.64	

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

< = Less than detection limit

Sample# 705250124 - Detection limits adjusted: Dilution required

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Extractable Petroleum Hydrocarbons (EPH) in Soil

CLIENT SAMPLE IDENTIFICATION:	SP07-1-070 524	
DATE SAMPLED:	May 24/07	DETECTION LIMIT
CANTEST ID:	705250124	
EPHs10-19	680	250
EPHs19-32	5100	250
LEPHs (corrected for PAH's)	680	250
HEPHs (corrected for PAH's)	5100	250

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

REPORTED TO: Morrow Environmental Consultants Inc.

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Monocyclic Aromatic Hydrocarbons-Methanol Extraction- in Soil

CLIENT SAMPLE IDENTIFICATION:	SAMPLE DATE	CANTEST ID	Volatile Hydrocarbons VHS6-10	VPHs
SP07-1-070524	May 24/07	705250124	<	<
DETECTION LIMIT UNITS			100 $\mu\text{g/g}$	100 $\mu\text{g/g}$

$\mu\text{g/g}$ = micrograms per gram, on a dry weight basis.
< = Less than detection limit

REPORTED TO: Morrow Environmental Consultants Inc.

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Strong Acid Soluble Metals in Soil

CLIENT SAMPLE IDENTIFICATION:		SP07-1-070 524	
DATE SAMPLED:		May 24/07	
CANTEST ID:		705250124	
			DETECTION LIMIT
Selenium	Se	<	2
Antimony	Sb	25	10
Arsenic	As	53	10
Barium	Ba	195	1
Beryllium	Be	<	1
Cadmium	Cd	1.6	0.5
Chromium	Cr	85	2
Cobalt	Co	12	1
Copper	Cu	169	1
Lead	Pb	134	5
Mercury	Hg	21.5	0.01
Molybdenum	Mo	12	4
Nickel	Ni	45	2
Silver	Ag	15	2
Tin	Sn	12	5
Vanadium	V	46	1
Zinc	Zn	561	1
Aluminum	Al	12400	10
Boron	B	26	1
Calcium	Ca	25500	1
Iron	Fe	25600	2
Magnesium	Mg	6740	0.1
Manganese	Mn	366	1
Phosphorus	P	995	20
Potassium	K	715	10
Sodium	Na	462	5
Strontium	Sr	85	1
Titanium	Ti	611	1
Zirconium	Zr	6	1

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

REPORTED TO: Morrow Environmental Consultants Inc.

REPORT DATE: June 5, 2007

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Batch Quality Control for Monocyclic Aromatic Hydrocarbons-Methanol Extraction- in Soil (QC# 94484)

Parameter	Blank (ug/g)	Blank Limits
Volatile Hydrocarbons VHS6-10	< 100	100

ug/g = micrograms per gram

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Instrument Quality Control for the HP Dir Inj GC-FID/MS 1119-1118 (QC# 184998)

QC Type: Detection Limit Check Standard

Parameter	% Recovery	Limits
Volatile Hydrocarbons VHS6-10	101	50 - 150

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Batch Quality Control for Monocyclic Volatile Hydrocarbons-Direct Injection- in Soil (QC# 94484)

Parameter	Blank (ug/g)	Blank Limits	Method Performance Check Spike (% Recovery)	Method Performance Check Spike Limits
Benzene	< 0.04	0.04	82	58 - 126
Ethylbenzene	< 0.5	0.5	88	66 - 116
Toluene	< 0.5	0.5	87	76 - 124

ug/g = micrograms per gram

REPORTED TO: Morrow Environmental Consultants Inc.

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GROUP NUMBER: 80525082



Batch Quality Control for Extractable Petroleum Hydrocarbons (EPH) in Soil (QC# 94533)

Parameter	Blank (ug/g)	Blank Limits	Duplicate (R.P.D.) 705250307	Duplicate Limits
EPHs10-19	< 250	250	NC	20
EPHs19-32	< 250	250	NC	20

ug/g = micrograms per gram

R.P.D. = Relative Percent Difference

NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

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Batch Quality Control for Polycyclic Aromatic Hydrocarbons in Soil (QC# 94551)

Parameter	Blank (ug/g)	Blank Limits	Duplicate (R.P.D.) 705280030	Duplicate Limits	NRC HS-5 Cert. Ref. Material (% Recovery)	NRC HS-5 Cert. Ref. Material Limits
Naphthalene	< 0.05	0.05	NC	40	80	57 - 111
Acenaphthylene	< 0.05	0.05	NC	40	93	45 - 135
Acenaphthene	< 0.05	0.05	NC	40	-	-
Fluorene	< 0.05	0.05	NC	40	-	-
Phenanthrene	< 0.05	0.05	NC	40	67	49 - 97
Anthracene	< 0.05	0.05	NC	40	63	54 - 129
Fluoranthene	< 0.05	0.05	NC	40	81	59 - 124
Pyrene	< 0.05	0.05	NC	40	62	46 - 84
Benzo(a)anthracene	< 0.05	0.05	NC	40	-	-
Chrysene	< 0.05	0.05	NC	40	79	53 - 114
Benzo(b)fluoranthene	< 0.05	0.05	NC	40	-	-
Benzo(a)pyrene	< 0.05	0.05	NC	40	-	-
Indeno(1,2,3-cd)pyrene	< 0.05	0.05	NC	40	71	49 - 102
Dibenz(a,h)anthracene	< 0.05	0.05	NC	40	90	61 - 126
Benzo(g,h,i)perylene	< 0.05	0.05	NC	40	-	-

ug/g = micrograms per gram

R.P.D. = Relative Percent Difference

NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

REPORTED TO: Morrow Environmental Consultants Inc.

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Batch Quality Control for Strong Acid Soluble Metals in Soil (QC# 94500)

Parameter	Blank (ug/g)	Blank Limits	CAN MET Till-1 (% Recovery)	CAN MET Till-1 Limits	Duplicate (R.P.D.) 705250133	Duplicate Limits
Antimony Sb	-	-	-	-	NC	30
Arsenic As	< 10	10	123	77 - 146	NC	30
Barium Ba	< 1	1	-	-	4.7	30
Beryllium Be	-	-	-	-	NC	30
Chromium Cr	-	-	-	-	PASS	30
Cobalt Co	-	-	-	-	PASS	30
Copper Cu	< 1	1	-	-	8.7	30
Lead Pb	< 5	5	142	65 - 171	20.4	30
Mercury Hg	-	-	89	33 - 174	0	30
Molybdenum Mo	-	-	-	-	NC	30
Nickel Ni	< 2	2	94	49 - 149	PASS	30
Tin Sn	-	-	-	-	NC	30
Vanadium V	-	-	-	-	6.9	30
Zinc Zn	< 1	1	96	79 - 114	7.5	30
Calcium Ca	-	-	72	51 - 106	-	-
Iron Fe	-	-	101	74 - 139	-	-
Manganese Mn	-	-	114	92 - 138	-	-

ug/g = micrograms per gram

R.P.D. = Relative Percent Difference

PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.

NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

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Batch Quality Control for Strong Acid Soluble Metals in Soil (QC# 94500)

Parameter	Duplicate (R.P.D.) 705250139	Duplicate Limits	Duplicate (R.P.D.) 705250161	Duplicate Limits	Duplicate (R.P.D.) 705250172	Duplicate Limits
Arsenic As	PASS	30	NC	30	NC	30
Zinc Zn	0.4	30	0	30	0	30

ug/g = micrograms per gram

R.P.D. = Relative Percent Difference

PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.

NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

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Batch Quality Control for Strong Acid Soluble Metals in Soil (QC# 94500)

Parameter	Duplicate (R.P.D.) 705250182	Duplicate Limits	Duplicate (R.P.D.) 705250192	Duplicate Limits	Duplicate (R.P.D.) 705250286	Duplicate Limits
Arsenic	As	NC	30	NC	30	-
Zinc	Zn	5.7	30	4.3	30	6.7

ug/g = micrograms per gram

R.P.D. = Relative Percent Difference

NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

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Batch Quality Control for Strong Acid Soluble Metals in Soil (QC# 94500)

Parameter		Duplicate (R.P.D.) 705260087	Duplicate Limits
Antimony	Sb	NC	30
Arsenic	As	NC	30
Barium	Ba	2.2	30
Beryllium	Be	NC	30
Chromium	Cr	17.4	30
Cobalt	Co	11.8	30
Copper	Cu	10.8	30
Lead	Pb	1.3	30
Mercury	Hg	0	30
Molybdenum	Mo	PASS	30
Nickel	Ni	6.5	30
Tin	Sn	NC	30
Vanadium	V	6.7	30
Zinc	Zn	11.7	30

ug/g = micrograms per gram

R.P.D. = Relative Percent Difference

PASS = Duplicate sample results were in the range of one to five times the detection limit. R.P.D. calculation is not applicable in this range. Acceptance criteria is a maximum difference between the duplicates equivalent to the value of the detection limit.

NC = Not Calculated. Duplicate sample results were less than the detection limit. Relative Percent Difference calculation is not defined for analyte levels of less than detection limit.

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Batch Quality Control for Extractable Petroleum Hydrocarbons (EPH) in Water (QC# 94517)

Parameter	Blank (ug/L)	Blank Limits
EPHw10-19	< 250	250
EPHw19-32	< 250	250

ug/L = micrograms per liter

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Batch Quality Control for Dissolved Metals Analysis in Water (QC# 94497)

Parameter		Dissolved Blank (mg/L)	Dissolved Blank Limits
Aluminum	Al	< 0.001	0.015
Antimony	Sb	< 0.0002	0.001
Arsenic	As	< 0.0002	0.001
Barium	Ba	< 0.0002	0.001
Beryllium	Be	< 0.0002	0.001
Cadmium	Cd	< 0.00004	0.001
Chromium	Cr	0.0002	0.001
Cobalt	Co	< 0.0002	0.001
Copper	Cu	< 0.0002	0.001
Lead	Pb	< 0.0002	0.001
Manganese	Mn	< 0.0002	0.001
Molybdenum	Mo	< 0.0001	0.001
Nickel	Ni	< 0.0002	0.001
Potassium	K	< 0.02	0.05
Silver	Ag	< 0.00005	0.001
Strontium	Sr	< 0.0002	0.001
Thallium	Tl	< 0.00002	0.001
Thorium	Th	< 0.0001	0.0005
Tin	Sn	< 0.0002	0.005
Titanium	Ti	< 0.0002	0.001
Uranium	U	< 0.0001	0.0005
Vanadium	V	< 0.0002	0.001
Zinc	Zn	< 0.001	0.01
Zirconium	Zr	< 0.002	0.01

mg/L = milligrams per liter

REPORTED TO: Morrow Environmental Consultants Inc.

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GROUP NUMBER: 80525082



Batch Quality Control for Polycyclic Aromatic Hydrocarbons in Water (QC# 94511)

Parameter	Blank (ug/L)	Blank Limits	Spike (% Recovery)	Spike Limits
Naphthalene	< 0.3	0.3	98	43 - 125
Acenaphthylene	< 0.1	0.1	98	64 - 116
Acenaphthene	< 0.1	0.1	100	62 - 116
Fluorene	< 0.05	0.05	102	70 - 108
Phenanthrene	< 0.05	0.05	106	74 - 118
Anthracene	< 0.01	0.05	100	73 - 117
Acridine	< 0.05	0.05	94	63 - 120
Fluoranthene	< 0.04	0.05	108	75 - 121
Pyrene	< 0.02	0.02	106	78 - 120
Benzo(a)anthracene	< 0.01	0.01	114	76 - 118
Chrysene	< 0.01	0.01	104	71 - 127
Benzo(b)fluoranthene	< 0.01	0.01	108	59 - 138
Benzo(k)fluoranthene	< 0.01	0.01	114	72 - 114
Benzo(a)pyrene	< 0.01	0.1	102	80 - 120
Indeno(1,2,3-cd)pyrene	< 0.01	0.01	100	61 - 123
Dibenz(a,h)anthracene	< 0.01	0.01	106	58 - 126
Benzo(g,h,i)perylene	< 0.01	0.01	104	64 - 116

ug/L = micrograms per liter

REPORTED TO: Morrow Environmental Consultants Inc.

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GROUP NUMBER: 80525082



Batch Quality Control Frequency Summary

MeOH Extr'n Prep BTEX/VPH Soil (Batch# 94484)

QC Type	No. Samples
Blank	1
Method Performance Check Spike	1

Dissolved Metals Preparation (Batch# 94497)

QC Type	No. Samples
Dissolved Blank	1
Duplicate	1

SALM in Soil Digestion (Batch# 94500)

QC Type	No. Samples
CAN MET Till-1	1
Blank	3
Duplicate	8

PAH's in Water Sample Prep (Batch# 94511)

QC Type	No. Samples
Blank	1
Spike	1

TEH/EPH Water Preparation (Batch# 94517)

QC Type	No. Samples
Blank	1
Method Performance Check Spike	1

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Batch Quality Control Frequency Summary

EPH (LEPH/HEPH)- Soil Prep (Batch# 94533)

QC Type	No. Samples
Blank	1
Cert Ref Material RTC CRM355	1
Duplicate	1
Method Performance Check Spike	1

PAH's in Soil Sample Prep (Batch# 94551)

QC Type	No. Samples
Blank	1
Duplicate	1
NRC HS-5 Cert. Ref. Material	1

MeOH Extr'n Prep BTEX/VPH Soil (Batch# 94484)

QC Type	No. Samples
Batch Size	45

SALM Metals in Soil Sieve (Batch# 94485)

QC Type	No. Samples
Batch Size	85

Dissolved Metals Preparation (Batch# 94497)

QC Type	No. Samples
Batch Size	11

(Continued on next page)

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Batch Quality Control Frequency Summary

SALM in Soil Digestion (Batch# 94500)

QC Type	No. Samples
Batch Size	85

PAH's in Water Sample Prep (Batch# 94511)

QC Type	No. Samples
Batch Size	16

TEH/EPH Water Preparation (Batch# 94517)

QC Type	No. Samples
Batch Size	17

EPH (LEPH/HEPH)- Soil Prep (Batch# 94533)

QC Type	No. Samples
Batch Size	17

PAH's in Soil Sample Prep (Batch# 94551)

QC Type	No. Samples
Batch Size	12